

The Wireless World

AND RADIO REVIEW


The Paper for Every Wireless Amateur

4^D

Wednesday, September 3rd, 1930.

BurTON VALVE HOLDER

SELF-LOCATING




1/- each

Pentode-Valve-Holders 1/6 each

Patent No. 316708

MANUFACTURED BY C. F. & H. BurTon

PROGRESS WORKS WALSALL, ENG.



TELSEN
L.F. TRANSFORMERS
Radio's Choice

Have acquired a world-wide reputation for Quality and Value. Built by Specialists in Transformer construction they have set a Quality of Performance above reproach. Your Set will work better with a Telsen Transformer Fit one now!

Radiogram 12/6
Ratios 3-1 & 5-1
Radiogram 7-1
Ratio Price 17/6.

TELSEN ELECTRIC CO. LTD., Miller St., Birmingham.

THE SWITCHBOARD TO EUROPE

3 Valves—Two Screened-Grid

£23 **ULTRA AIR CHROME**

ULTRA ELECTRIC LIMITED, 661/3, Harrow Road, London, N.W.10.

McMICHAEL PORTABLE RECEIVER

Point No. 3. RANGE. 22 GNS

The title "SUPER RANGE PORTABLE FOUR" given to this instrument is well considered. It is indeed a collector of distant stations. Its selectivity was definitely proved in a recent independent test when actually under the twin aerials, and both stations were separated and received entirely clear of each other.

Hear it at any high-class radio store or our London showrooms.

L. McMICHAEL LTD., Wexham Road, Slough, Bucks, 179, Strand, London, W.C.2.

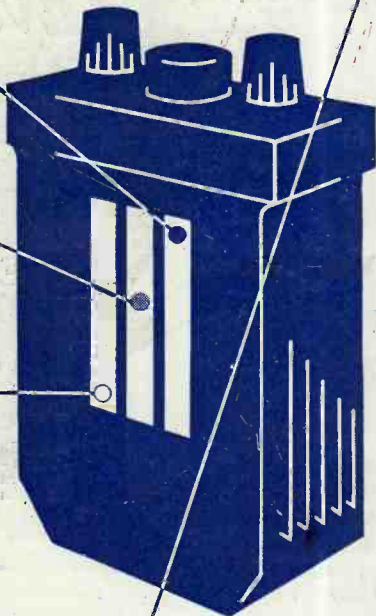


AN ACCUMULATOR THAT THINKS!

RED down
Save sorrow
Recharge
tomorrow

The charge
is lean
When falls the
GREEN

To charge
me right
Bring up the
WHITE



A wonderful new invention is here! National have built an accumulator that will think for you. Three little floats—red, green, white—show you just what is happening inside. Warn you in plenty of time that recharging is due. Cut out all guess-work. Keep every programme smooth and clear. Lengthen the Accumulator's life. Only National 'Dagenite' Wireless Accumulators have this marvellous device. Now—in time for the coming winter—get an all-British 'Dagenite'—made by National.

Send for free catalogue No. R. 151 showing all types, to National Accumulator Co., Ltd., 93 Gl. Portland St., London, W.1

Also branches at: Glasgow, Manchester and Northampton.

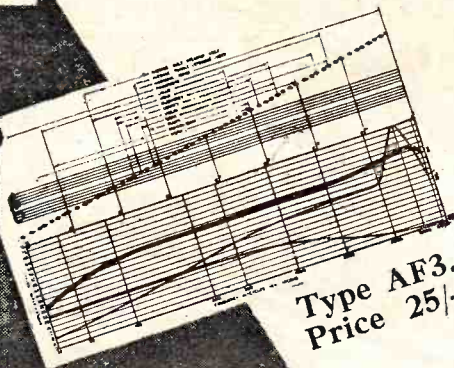
USE **NATIONAL** ACCUMULATORS

THE DAGENITE SERIES FOR CAR AND RADIO

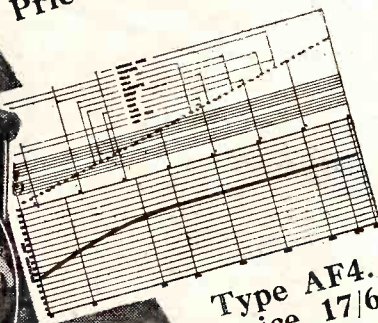
NR38 1/2 x 6 1/2

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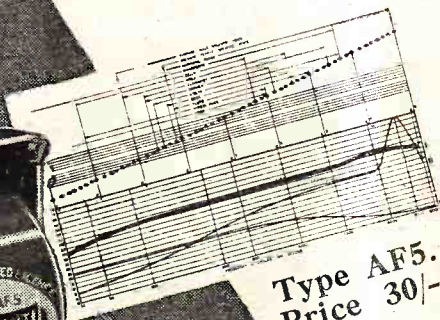
**SUPREME
IN 1925**



Type AF3.
Price 25/-



Type AF4.
Price 17/6



Type AF5.
Price 30/-

The Curve is published to enable you to determine the merits of the article you buy.

Modern conditions in Radio demand a good transformer more than ever before. A Moving Coil Speaker, or improved construction of the receiver, is wasted and will count for nothing if the transformer is inferior.

Ferranti Transformers, supreme in 1925, are still supreme to-day and have no equivalent for performance or reliability. Their performance is guaranteed by the published curves, plotted under normal working conditions.

The curve is the measure of transformer merit: study the curve when buying, and buy

Write for leaflets giving curves and all particulars.

**FERRANTI LTD.
HOLLINWOOD
LANCASHIRE**

**SUPREME
TO-DAY**

**FERRANTI
TRANSFORMERS**

An absolutely new production

EVERYTHING



ELECTRICAL

A sensational advance!

THE NEW

Osram

MUSIC **4** MAGNET

NOW A "4 VALVER"

**MANY MORE STATIONS
MUCH MORE SELECTIVITY
MUCH MORE VOLUME**

This is an event of the greatest interest to the radio world . . . A new "OSRAM MUSIC MAGNET." This year a "Four Valver" . . . An ENTIRELY NEW circuit. It possesses a better appearance than its famous predecessors, fresh ideas in construction which make for utter simplicity in assembly and infinitely better performance, and is sold at the remarkably low price of £11 15 0. It creates an entirely new record in wireless value. The "OSRAM MUSIC MAGNET 4" is the world's best circuit, with the best valves (OSRAM), the best components (GECOPHONE), and gives the best rendering of all that is broadcast. It is manufactured and guaranteed by the G.E.C.



Learn all about this 1931 Radio Sensation by sending for POST FREE Constructor's Instruction Chart.

Fill in coupon on the page opposite. This is a most informative brochure, which you can study before deciding to purchase. Besides full-size mistake-proof assembly charts, it is crammed full of useful hints and tips, and gives results of practical tests conducted in all parts of Great Britain and Ireland. Send for a copy TO-DAY.

THE SET THAT BRINGS THE

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

An amazing 4-valve circuit

— Not a single difficulty in assembling

It has been found necessary to design an ENTIRELY NEW CIRCUIT to enable users to cut through the NATIONAL, REGIONAL and LOCAL stations. In this respect practical tests conducted in all parts of Great Britain and Ireland have proved without question that this assembly kit offers an almost unlimited choice of stations far and near, entirely free from interference. You will find absolutely no difficulty in assembling the "OSRAM MUSIC MAGNET 4," although it is of advanced design, necessitated by the modern broadcasting conditions both in this country and on the Continent. Wherever you reside you can be sure of the utmost of radio enjoyment with this latest radio marvel.

SPECIAL FEATURES

- 1 The two Screen Grid stages give extreme selectivity and sensitivity with an unrivalled range.
- 2 Enormous amplification with perfect stability is given by the complete shielding of H.F. Circuits.
- 3 Equal efficiency guaranteed on both wave length bands.
- 4 Change of wave length is effected by an external switch and the set need not therefore be opened.
- 5 Maximum ease in tuning with a single knob controlling triple gang condenser.
- 6 Assembly is the essence of simplicity.
- 7 Volume control is provided not only to act as such, but to procure extreme selectivity.

You can learn everything that is to be learned about the "OSRAM MUSIC MAGNET 4" from the full-size Instruction Chart that will be sent you POST FREE. Study it carefully. The coupon below is for your convenience.

HIRE PURCHASE TERMS

You can either buy your "OSRAM MUSIC MAGNET 4" for cash or on these attractive HIRE PURCHASE terms:

£1 : 3 : 6 deposit
12 monthly payments of
18/6

Prices apply only in Great Britain and Northern Ireland

MADE IN ENGLAND
Sold by all
Wireless Dealers



CONTINENT TO THE BRITISH ISLES

Please send Instruction Chart to

Name _____ Address _____

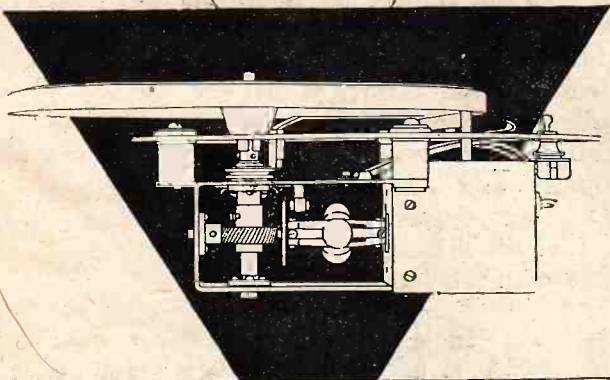
The "Osram Music Magnet 4" Instruction Chart
The General Electric Co. Ltd.
Magnet House, London,
Kingsway, London,
W.C.2
W.W.

Cut out coupon and paste on postcard or enclose in unsealed envelope. Halfpenny postage in either case.

Adv. of The General Electric Co. Ltd., Magnet House, Kingsway, London, W.C.2.

A3 Advertisements for "The Wireless World" are only accepted from firms we believe to be thoroughly reliable.

**no more
tiresome
winding!**



ELECTRIC MOTOR for £3.3.0

The new B.T.H. Electric Gramophone Motor costs only £3.3.0 complete and plays 200 12-inch records for a cost of only one unit of electricity. Why wait? Here is the most moderately priced electric gramophone motor on the market, yet as efficient, as trouble-free as motors costing nearly twice as much.

Price £3.3.0 complete



There is also a B.T.H. Super Motor at £6.6.0 complete

**ELECTRIC
GRAMOPHONE
MOTORS**



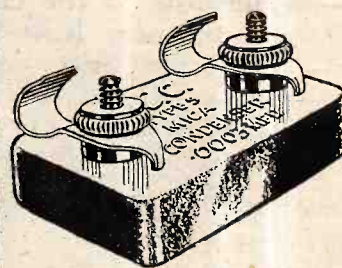
THE EDISON SWAN ELECTRIC CO., LTD.
Radio Division,
1a Newman Street, Oxford Street, W.1
Branches in all the Principal Towns

EDISWAN W.92

TESTS OF TIME

**Standing
for . . .**

. . . over 200 years, this fine old building, on which Sir Christopher Wren worked for thirty-five years, has truly stood the test of time. The Telegraph Condenser Co. have spent 25 years entirely on making "The condenser in the green case"—and this, too, has stood the test of time. The name T.C.C. on a condenser is the undisputed hallmark of accuracy and dependability. For this reason it will pay you to use T.C.C. Condensers in your next Set.



The condenser illustrated is the .0003 mfd. T.C.C. flat mica type 1/3d.

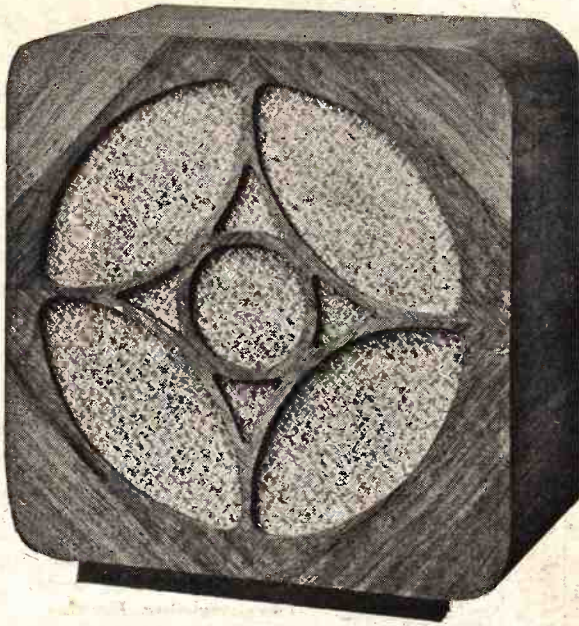
ST. PAUL'S

ADVERT. OF THE TELEGRAPH CONDENSER CO. LTD., N. ACTON, W.3

5750

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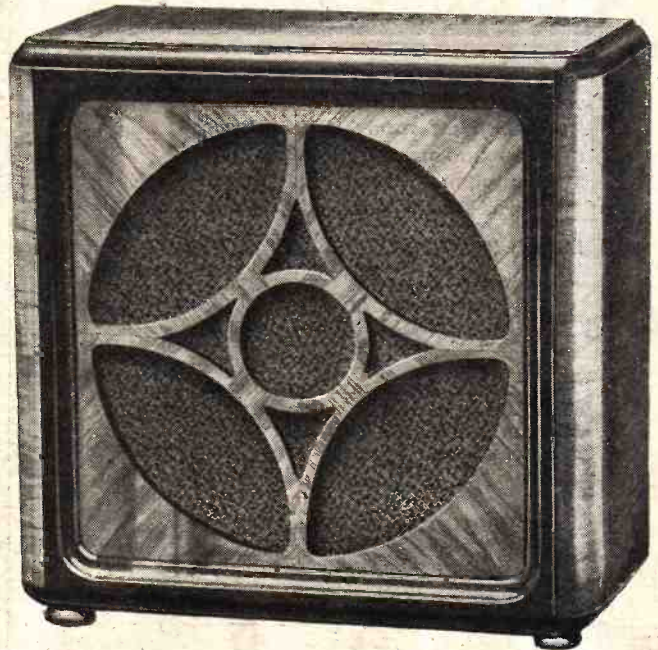
TWO OF THE BLUE SPOT RANGE



41K This speaker's arrival on the market is a great event in wireless history—accurate reproduction at a popular price. Almost every home in England can now have its Blue Spot Speaker. Housed in a beautiful walnut case this fine speaker costs **£2.10.0**

29R This is quite definitely the best Blue Spot Speaker that has yet appeared. There is no higher praise. Whatever type of programme you enjoy, you will enjoy it better with this magnificent speaker. If your taste is for chamber music you can now hear it as hitherto you could only hear it in the concert room; if you prefer jazz you can listen to it with all its pep and snappiness.

And the cabinet is a beautiful piece of furniture in keeping with its wonderful output. Price **£6.6.0**



Meet us at:—

OLYMPIA, SEPT. 19-27, STAND No. 217. MANCHESTER RADIO SHOW, OCT. 8-18, STAND No. 30.

• THE BRITISH BLUE SPOT COMPANY LTD. •

BLUE SPOT HOUSE, 94/96, ROSOMAN STREET, ROSEBERY AVENUE, LONDON, E.C.1

Phone: Clerkenwell 3510. Grams: Bluespot, Smith, London.
Distributors for Northern England, Scotland and North Wales: H. C. RAWSON (Sheffield and London) Ltd.,
100, London Road, Sheffield; 22, St. Mary's Parsonage, Manchester; 183, George Street, Glasgow.

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

You can operate an

A.C.

All Electric Receiver
from a

D.C.

supply main,
by using the



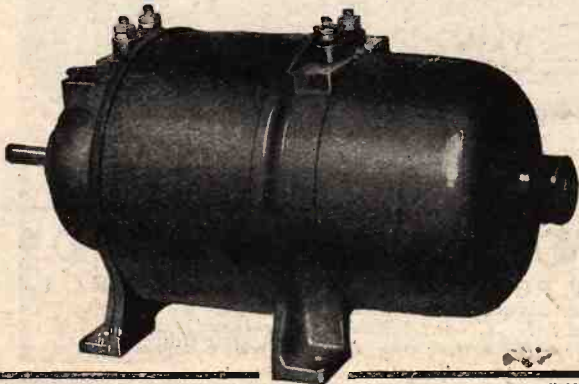
**D. C. to A. C.
ROTARY
TRANSFORMER**

Can be supplied to run from any voltage. 12-250 V.D.C. 40 Watt model £13; 85 Watt model £19, Recommended and used by Philips Radio, Marconiphone, Burndept, Kolster-Brandes, M.P.A., etc., etc.

Write for Pamphlet 596/1 which gives full details.

THE M-L MAGNETO SYND. LTD.,
Radio Dept., COVENTRY.
Telephone: 5001.

Contractors to the Air Ministry,
The British Broadcasting Corporation,
The General Post Office,
Marconiphone, the Gramophone Co.
Ltd., etc., etc.



Godbolds.

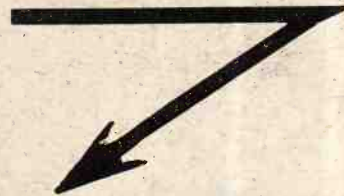
WE ARE EXHIBITING AT



THE NATIONAL RADIO
EXHIBITION
OLYMPIA
SEPT. 19th-27th 1930

STAND
New Empire
Hall **222**

something
entirely new
for



OLYMPIA

**THE NEW R.G.D.
RADIO GRAMPHONE**
has many new features!!

- 2 Screened grid stages!
- Band Pass Filter!
- Super Selective!
- Single knob Tuning!
- Fader from Radio to Record!

All Mains operated with exclusive cabinet design.



Why not book a demonstration now for Stand No. 126 Olympia, or visit our audition room N at the Show? The new R.G.D. Gramophone Pick-Up has a straight line output from 100-2,500 cycles with 95% perfect tracking.

Send for Particulars and Prices.

Also Moving Coil Speakers, Cinema Amplifiers, Gramophone Amplifiers, etc., will be on view on our Stand during the Exhibition.

**The Radiogramophone Development Co.,
72, MOOR STREET, BIRMINGHAM.**

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



The P.240 IS BETTER AND CHEAPER THAN A 2-VOLT PENTODE!

With Mazda valves in all positions your set will give a performance many times better than before.

See the Amazing Mazda Valves on the Edison Brand (No. 67) at Olympia.

The figures shown on this page in conjunction with the curves will prove to the discriminating amateur that the output obtainable from the P240 is approximately equal to that of a 2-volt Pentode, while, by virtue of its extremely low impedance, the overall reproduction is consider-

ably superior. The facts coupled with the low price of 13/6 for the P240 make it extremely popular with those who require a power valve of a relatively large output. It will, for instance, work a moving coil speaker at a volume which is ample for ordinary domestic purposes.

THE AMAZING

MAZDA

RADIO VALVES

The MAZDA P.240 price 13/6

Examine these figures

Amplification Factor	-	7
Anode A.C. Resistance (ohms)	-	1,900
Mutual A.C. Conductance (MA/V)	-	3.7



THE EDISON SWAN ELECTRIC CO., LTD.
 Incorporating the Wiring, Lighting, Refrigeration and Radio Business of The British Thomson-Houston Co., Ltd.
 Radio Division:
 1, Newman Street, Oxford Street, W.1
 Showrooms in all the Principal Towns.

EDISWAN

FERRANTI HIGH VOLTAGE CONDENSERS



EIGHT HUNDRED THOUSAND VOLTS!

AN 800 Kilovolt bank of Condensers built by Ferranti at Hollinwood to the order of a large Electrical Manufacturing Company in the Midlands for testing purposes.

You will appreciate the necessity for safety and reliability in apparatus of this character, and the knowledge, experience and craftsmanship behind it is built in the Ferranti Condensers for your radio set and mains apparatus.

IS IT WORTH YOUR WHILE TO TAKE RISKS WHEN FERRANTI Condensers ensure safety and satisfaction?

British Manufacturers are doing their utmost to resist unemployment. Help them by buying British.

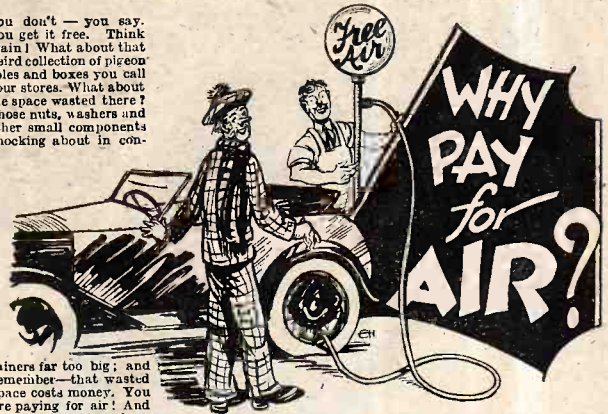
Any mains apparatus you construct will be better and safer with Ferranti components—Transformers, Chokes, Condensers, Resistances—and Safety Boxes into which they may be built for greater security.

Write for list We 411/2.

FERRANTI LTD. HOLLINWOOD LANCASHIRE



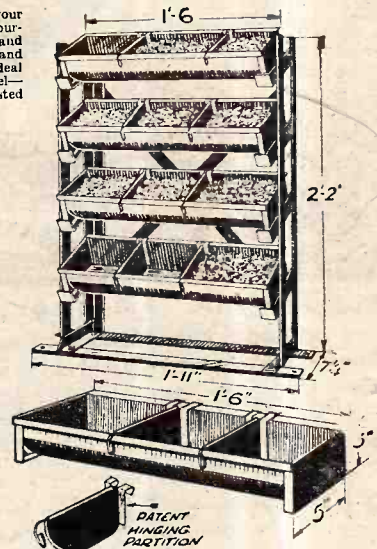
You don't — you say. You get it free. Think again! What about that weird collection of pigeon holes and boxes you call your stores. What about the space wasted there? Those nuts, washers and other small components knocking about in con-



tainers far too big; and remember—that wasted space costs money. You are paying for air! And then again—how long does it take you to find things in your stores? Well, you know the answer yourself! Why not install "Tiltracks" and make your stores a credit account and not a debit? "Tiltracks" fulfil the ideal of "a place for everything." All steel—with compartments that can be adjusted to suit the components to be stored.

THE "BENCHRACK" (Tiltrack Principle).

A real help for storing small parts such as Terminals, Nuts, Washers, Insulators, etc. Made to stand on the work bench, it enables all small parts needed for the job in progress to be stored where they are immediately to hand. All the trays are tilted so that the parts stored can be seen at a glance, and the front faces of the trays are rounded so that the smallest parts can be swept up the slope with the fingers of one hand. Each tray is provided with patent hinging partitions which can be moved quickly to make larger or smaller compartments. Being so accessible these racks greatly facilitate stocktaking. The Experimenter will do his job much quicker and with greater pleasure, and the Factory will save many pounds per year by installing this Benchrack.



30/- F.O.R.



"TILTRACK" WHEELED TRUCK
It wheels to the job. A big time-saver.

Particulars from Manufacturer & Patentes:— **Worsley Street, Hulme, BERTRAM THOMAS, MANCHESTER.**
London Office & Showroom:—28, Victoria Street, S.W.1.



"TILTRACK" (Senior)
For storing all kinds of goods.
Approx. size of Trays, 2' 6" x 12" x 6".

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

EVERYTHING



ELECTRICAL

IMMENSE
POWER
 WITH PERFECT PURITY

Radio Engineers throughout the world are realising that the true worth of a Power Valve lies in its permissible watts dissipation at the anode, this being a reliable guide to the useful power available to the loudspeaker.

The OSRAM P.X.4 is designed with characteristics so that, with an anode voltage of 200, the undistorted power output hitherto only obtainable by valves in the 400-volt class, is possible. You will not necessarily require all this power all the time, but the use of the OSRAM P.X.4 in the last stage of your A.C. set or radio gramophone means that the sudden loud passages can be handled by the loudspeaker with perfect purity—the piano will sound like a piano, and there will be no “cracked notes.”

OSRAM Power Valves have for years been the choice of experts in sound reproduction.

Characteristics:

Filament Volts	...	...	...	4.0
Filament Current	...	...	0.6 amp. approx.	
Anode volts	...	...	200 max.	
Anode dissipation	...	...	10 watts max.	

REDUCED PRICE 22/6

Instructions for use are enclosed in each carton.

OSRAM P.X.4
 (Super Power)
 for A.C. Mains sets & Radio Gramophones



Osram
 A.C. Mains
Valves
 FOR ECONOMICAL WIRELESS

MADE IN ENGLAND

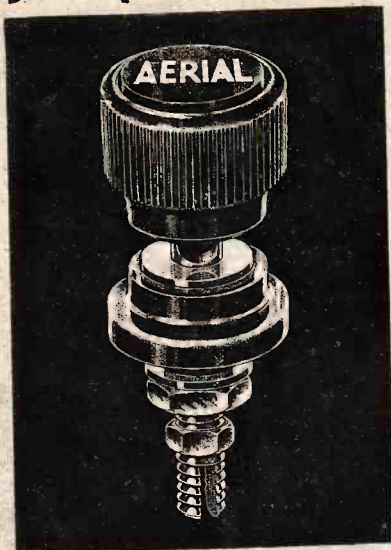
Sold by all Wireless Dealers

Advt. of The General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.

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OLD FRIENDS & NEW

Belling Lee products for 1930-31

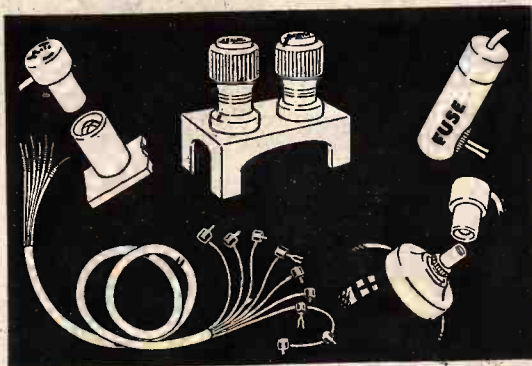


Years ago Belling-Lee were already marketing the famous Terminals which manufacturers are standardising to-day. Belling-Lee products are ahead of their time. Last year's favourites will be this year's favourites too—Terminals, Plugs and Sockets, Wander Plugs, Spades, Anode Connectors and Battery Cords.

TWO NEW COMPONENTS.
The Belling-Lee Bakelite Terminal Mount takes any pair of Belling-Lee Terminals or Plugs and Sockets: can be mounted vertically or horizontally, on your baseboard,

your window ledge—anywhere. Price 8d. The new "Wanderfuse" takes no more headroom than a Wander Plug—though it's a fuse as well. Price 1/6. Spare Fuses (150 m/a) 9d each.

- Belling-Lee Terminals:—
 Type "B" - - - 6d.
 " "M" - - - 4½d.
 " "R" - - - 3d.
 Wander Plug - - - 3d.
 Twin Plug and Socket - 1/6
 (Panel Portion 6d.; Flex Portion 1/-)
 Indicating Spade Terminal 4½d.
 S.G. Anode Connector - 6d.
 Battery Cords, 9 way - 5/9
 Also made in 5, 6, 7, 8 and 10 way.



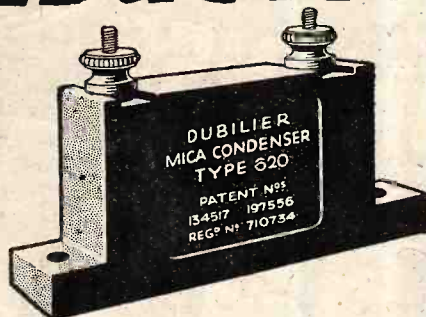
BELLING-LEE
FOR EVERY RADIO CONNECTION

STAND NO. 134, OLYMPIA.

Advertisement of Belling & Lee, Ltd., Queensway Works, Ponders End, Middx.

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

IMPORTANT PRICE REDUCTION



OF CONDENSERS



AND RESISTANCES
from

SEPT 1ST 1930

Product	Old Price	New Price
K.C. ...	12/-	11/-
Midget Condenser ...	5/6	4/-
Dumetohms ...	2/6	1/9

Various reductions

FIXED CONDENSERS		PAPER CONDENSERS		RESISTANCES	
Type	Old Price	Type	Old Price	Type	Old Price
610 and 620		400 v. D.C. Test		10,000—	
.0005 to .0009	2/6 1/8	.01 to .09	2/- 1/9	40,000 ohms	6/6 4/6
.001 and .002	3/- 2/-	.1	2/- 1/10	50,000 "	6/6 5/-
.003, .004, .005	3/- 2/3	.25	2/5 2/3	60,000 "	6/6 6/-
.006	3/- 2/6	.3	2/5 2/3	70,000 "	6/6 6/6
.01	4/- 3/-	1.0, 2.0	no reduction	80,000—	
B775		3.0, 4.0	no reduction	100,000 ohms	6/6 6/6
.01	4/- 3/-	5.0, 6.0	no reduction	150,000 "	9/6 9/6
.02	5/6 3/6	8	12/- 11/9	200,000 "	9/6 9/6
.05	no reduction	10	15/- 14/6	250,000 "	11/3 9/6
.1	8/6 8/-	500 v. D.C. Test	no reduction	300,000 "	13/- 11/-
.2	15/6 14/6	800 v. D.C. Test	no reduction		
.25	19/- 18/-	.1	3/3 2/3		
		.25	3/3 2/9		
		.5	3/3 3/-		

Prices complete with holder.

DUBILIER

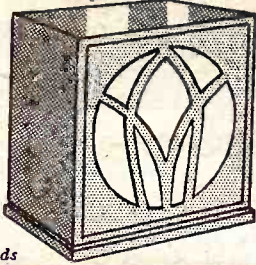
CONDENSER CO. (1925) LTD.

We are exhibiting at Stand 50,
THE NATIONAL RADIO EXHIBITION,
Olympia (New Hall),
September 19—27th, 1930.

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

AMPLION BALANCED ARMATURE SPEAKERS

High notes and low notes crisp and true and evenly balanced, speech so clear that you can hear the slightest inflection of the voice, volume that is full and free from distortion—such superb reproduction is due to the Amplion Unit, made specially for the AB41 and AB45, and a great step forward in the perfection of loudspeakers.



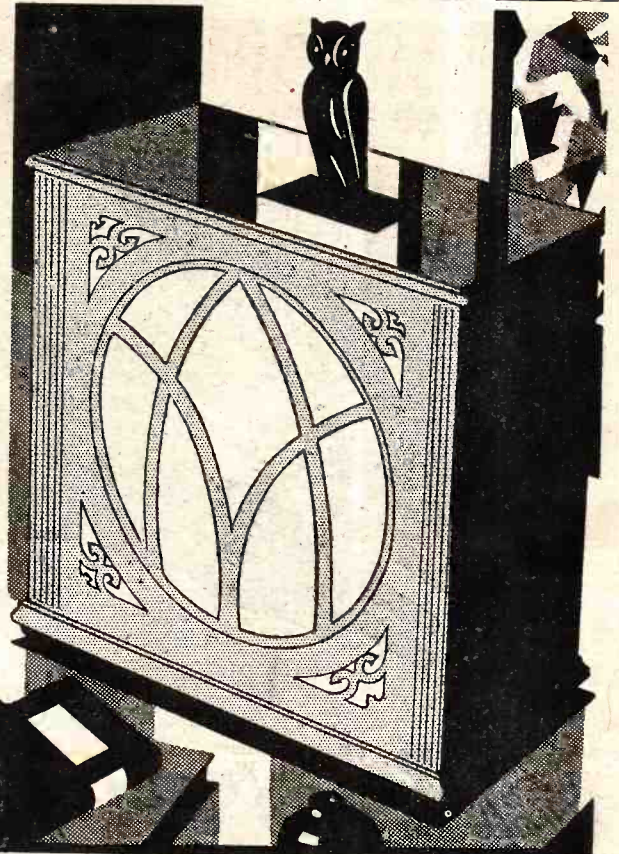
10yds

AB41 (Oak) £5-15 - (Mah.) £6-6
AB45 (Oak) £6-15 - (Mah.) £7-7

The Popular AB6 Model (on left)

The first Amplion Balanced Armature Speaker and one of the most successful speakers that Amplion have produced.

Oak - - - £4-10-0
Mahogany - - - £4-17-6
Walnut - - - £4-17-6



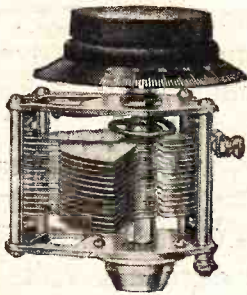
AMPLION

Catalogues from GRAHAM AMPLION LIMITED, 26, SAVILE ROW, LONDON. W.1



NO RESTING ON OUR LAURELS

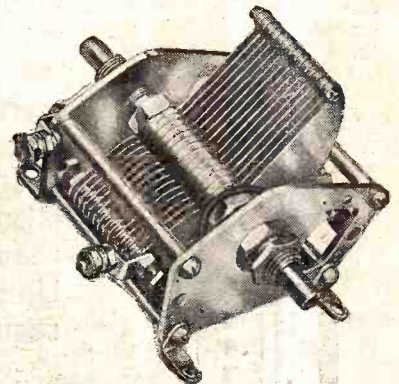
Despite the popularity which Polar condensers always achieve, Polar are not content to 'rest on their laurels,' but are continually introducing improved and new models.



POLAR "IDEAL"

A Fast and Slow Motion tuning condenser. Scientifically designed to give a definitely wider tuning range. Action is very smooth, yet precise, and enables extremely accurate tuning to be obtained. Sturdily built throughout of cleared, hard brass.

·0005 — 12s. 6d.
·00035 — 12s. 3d.
·0003 — 12s. 0d.



POLAR "UNIVERSAL"

With this new condenser, which is specially adapted for ganging, the space between each unit can be varied. Four lugs ensure rigid fixing. Locked rotor vanes. The condenser is unaffected by the withdrawal of the spindle and is specially suitable for right or left hand drum-control or one-hole panel fixing.

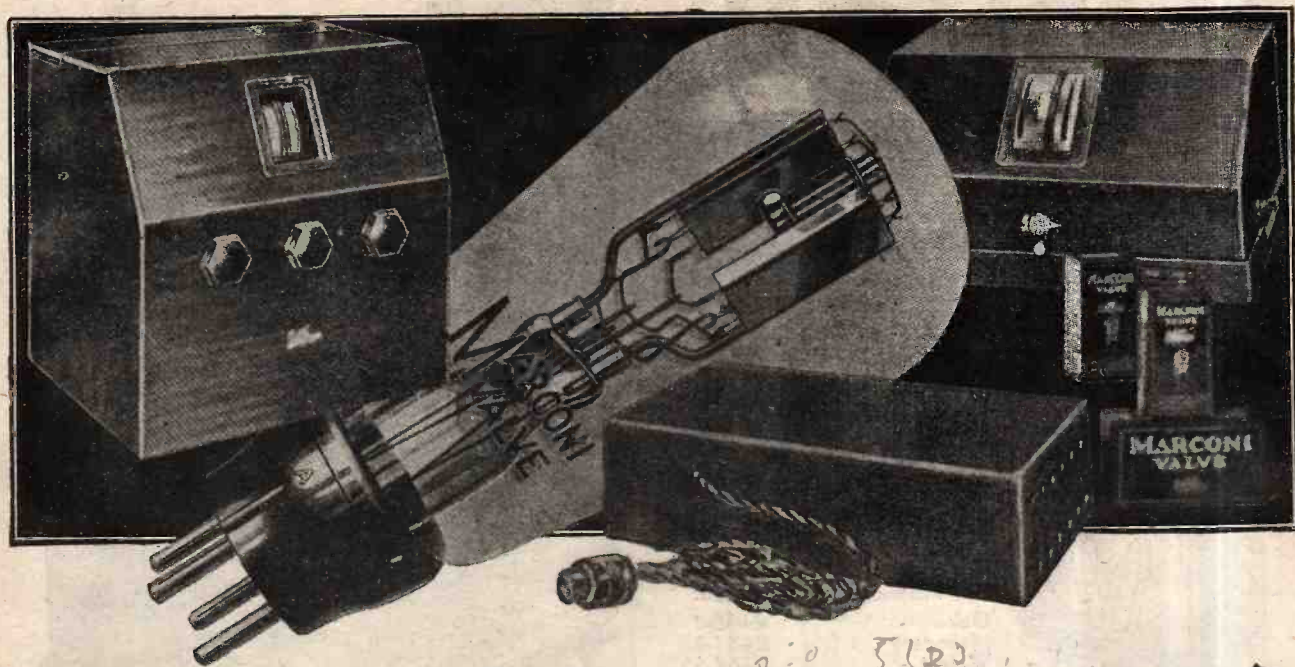
·0005 — 7s. 6d.
·0003 — 7s. 0d.

Write NOW for complete list of
NEW POLAR CONDENSERS

INSPECT POLAR ON
GALLERY STAND 118
OLYMPIA.

WINGROVE & ROGERS Ltd.,
188-9, STRAND, LONDON, W.C.2.

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As many of the circuits and apparatus described in these pages are covered by
patents, readers are advised, before making use of them, to satisfy themselves
that they would not be infringing patents.

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ALTERNATIVE LONG-WAVE PROGRAMMES.

A FEW weeks ago we put forward a proposal that the B.B.C. should consider the possibility of establishing a second long-wave station in order to provide alternative programmes on this wavelength and so complete the regional scheme. We expressed ourselves anxious as to the future of the long-wave Daventry station because it seemed to us that the B.B.C., instead of making sure that this station remained one of first importance, were beginning to look upon it as an almost unnecessary addition to their list of transmitters and to consider that with the full development of shorter wavelength regional stations a long-wave transmitter would tend to be superfluous.

Fortunately, as our readers know, the B.B.C. has since informed us that there is no intention of giving up the long wavelength, and we are grateful for this assurance. This, however, is, in our opinion, not enough. It seems to us to be illogical to continue a long-wave transmission without alternative programmes.

The B.B.C., we believe, would be the first to admit that there are large areas of the country which are only satisfactorily served by the long-wave transmitter, and that, even with the establishment of the full regional scheme, many areas round the coast will still cling to Daventry long wave as the only station receivable at satisfactory strength and without constant interruption from shipping and other coastal interference.

When we remember that the regional scheme has been decided upon because it was considered essential that listeners should have alternative programmes available, and if we concede that many listeners are dependent on the long-wave station, then it appears to us to be entirely illogical on the part of the B.B.C. to be satisfied to continue with the one long-wave transmitter and no alternative programme.

The B.B.C Must Act Quickly.

In our previous comments we urged the B.B.C. to come to a decision on the matter and stake a claim for a second long wavelength immediately, before the growth of Continental stations may make it impossible for a second British station to be accommodated. We also pointed out that a second long-wave station could be erected in a comparatively short time and could be used to give alternative programmes over almost the whole of the country during the rather protracted period necessary for the establishment of the complete regional scheme on the shorter wavelengths.

We do not want to see a repetition of the attitude of procrastination which the B.B.C. exhibited over Empire broadcasting. Readers will well remember that for a year at least after the proposal for an Empire broadcasting station had been put forward, the B.B.C. systematically belittled the idea, implying that it was not a feasible proposition, and then all at once, when they realised that the sentiments in favour of such a station were too strong to be withstood, they came forward with proposals for the establishment of a station as if the idea was a new one of their own imagining.

If the B.B.C. is of the opinion that there are insurmountable obstacles in the way of an alternative long-wave programme, or if they think that the objections outweigh the advantages to be derived, then let them state their views without delay and not remain silent on a matter of the utmost public interest, nor delay action until the most complete answer to the proposal will be available in the knowledge that all remaining long-wave channels have, in the meantime, been occupied by Continental transmitters.

TUNING COILS and

Winding Data

By A.L.M. Sowerby M.Sc.

Full Design Details for the Medium Waves.

ALTHOUGH tuning coils of one kind or another have been used ever since the first wireless signals were heard, it is a sad fact that unanimity in coil design has not yet been reached. Every receiver has its own coils, different in some way or another from those of any other set. Nor is this to be wondered at, for the details that can be varied are so numerous that an almost infinite number of different coils can be wound, according to the tastes and prejudices of the designer.

Unanimity has not even been reached on the simple question of the most suitable value of inductance for the medium waveband, the inductances used varying from a minimum of about 160 microhenrys up to a maximum of some 375 microhenrys. It is proposed, in the present note, to put the case for an intermediate value, namely, 230 microhenrys, and to offer curves from which the best possible coil of this inductance, of any diameter desired, can be wound without any calculation.

At first sight, 230 microhenrys seems a very odd inductance to choose. This figure was, however, arrived at after a good deal of consideration, and is believed to be the best all-round compromise for all ordinary receivers.

The choice of inductance is of very small importance at the lower end of the tuning range, for at wavelengths below about 300 metres the dynamic resistance of the tuned circuit, and hence the amplification obtained, is settled almost entirely by the dielectric losses. At the upper limit of the range, on the other hand, dielectric losses do not contribute so overwhelming a share of the total losses, with the result that for wavelengths over about 400 metres the dynamic resistance of the tuned circuit is very largely dependent on the inductance of the coil, becoming greater as this is increased. It therefore follows that it is best, for the sake of the longer wavelengths, to choose a coil having as high an inductance as is practicable. Since the dielectric losses take charge at the lower wavelengths, the choice of a coil of high inductance will only increase the amplification at the upper end of the scale, resulting in a reasonable approximation to constant dynamic resistance, and hence constant sensitivity in the set as a whole.

Theoretically, the inductance of the coil may be made as large as we please by reducing sufficiently the capacity in parallel with it. In a set, with valves in position, there is still a very appreciable capacity in circuit, even when the tuning dial is set to "0," below which point we naturally cannot go. There are various factors contributing to this stray capacity; taking them all together, it is safe to assume that even in a carefully laid-out set there will be considerable difficulty in reducing the total very far below $40\mu\text{F}$. It will, however, be a very clumsily-built set in which the minimum capacity is greater than $50\mu\text{F}$, so that it will be safe to take this as the figure which limits the inductance value of the tuning coil. If we wish to tune down to about 200 metres, with a minimum capacity of $50\mu\text{F}$, we cannot permit the inductance to exceed about 230 microhenrys, and as we wish to use the highest permissible value, we can fix definitely on 230 microhenrys as the best inductance to choose for the medium waves.

With a coil of this size, a 0.00035 mfd. condenser will tune up to 565 metres, and a 0.0005 mfd. up to 665 metres. As the extra range given by the larger condenser covers a band so full of spark Morse as to be useless to the average listener, the smaller condenser will usually be chosen, with the advantage that the stations in the useful part of the range will be spaced out more comfortably on the dial.

When one comes to work out the best coil of 230 microhenrys inductance one is confronted with so many variable factors that it is quite impossible to design any one coil with the certainty that it will be suitable in all cases. For a compact set, or one employing band-pass filters, a coil of small diameter would probably be chosen, while if the set is to have adequate selectivity while employing only one or two tuned circuits, a larger and more efficient coil would be much more suitable. Then there are other points that come into the question: for a set in which ganged circuits are to be employed, a long coil of many turns of wire has the advantage that when matching the coils a fine adjustment of inductance can be made by removing turns one at a time. On the other hand, a long coil has a higher resistance than a short one of the same surface area.

THE multiplicity of shapes and sizes of tuning coils to be found in broadcast receivers to-day, suggests that no unanimity in design whatsoever has been reached. There appears to be also a great deal of confusion in the mind of the amateur regarding the correct interpretation of the historic research of S. Butterworth. Here the principles of H.F. resistance and the effect of coil shape are carefully examined, and by means of the simple graphs it is possible to calculate the correct gauge of wire, covering and number of turns to give the "best" coil of 1 in. to 4 in. diameter, whether a plain or ribbed former be used.

Tuning Coils and Winding Data.—

The choice of wire-gauge is, in a way, less of a problem than choice of shape and size, for this matter has been effectually settled by the well-known work of Butterworth,¹ by which we are enabled to calculate the diameter of wire that will be correct for any given coil at some one selected frequency. If, however, we settle on a coil of certain length and diameter and work out the wire diameter needed, it is quite usual to find that the calculations tell us that it is desirable to use a gauge of wire that does not exist.

Suppose, for example, we decide to wind a coil of length 2in. on a former of diameter 3in. Consulting *The Wireless World* "Radio Data Charts," we find from Abac No. 17 that 59 turns will be needed to provide the required inductance in the space allotted. Properly speaking, a different gauge of wire will be required for every wavelength within the tuning range; we will choose the wire that gives the best result at 550 metres, since it is at this wavelength, as we have already seen, that the dynamic resistance of the tuned circuit will be at its lowest. For this wavelength Abac No. 19 tells us that in a coil of this size the wire must have a diameter of 0.025in. Since No. 22 s.w.g. has a diameter of 0.028in., and the next gauge, No. 24, has a diameter of 0.022in., the use of either of these will lead to a coil with a resistance a little higher than it need be. We have to work back through the Abacs from the available wire diameters, finding the shape of coil required for the best possible compromise between efficiency and compactness with each wire gauge and each possible diameter. On so doing we find that for a coil of 3in. diameter the correct length of winding for 24-gauge wire is 1.45in. and for 22-gauge wire 2.45in., the turns required being 54 and 63 respectively.

The curves that accompany this article sum up the results of a long series of such calculations, and give the best attainable coils, all of 230 microhenry inductance, that can be wound with wire of even-number gauge. (Odd-number gauges, such as 21, 23, 25, etc., are not readily available.)

In Fig. 1 there are a series of curves, one for each gauge of wire, in which the number of turns required to reach the specified inductance is plotted against diameter of former. These curves are to be used in conjunction with those of Fig. 2,

¹ Butterworth: "The Effective Resistance of Inductance Coils at Radio Frequency." *Experimental Wireless*, April, May, July, and August, 1926.

in which the length of the coil is plotted against the diameter. In addition, there is marked against each curve the thickest insulation that can be permitted on the wire without so increasing its overall diameter that it will no longer go into the space allotted.

Explaining the Curves.

Fig. 3 gives the probable dynamic resistance, at a wavelength of 550 metres, of an average tuned circuit

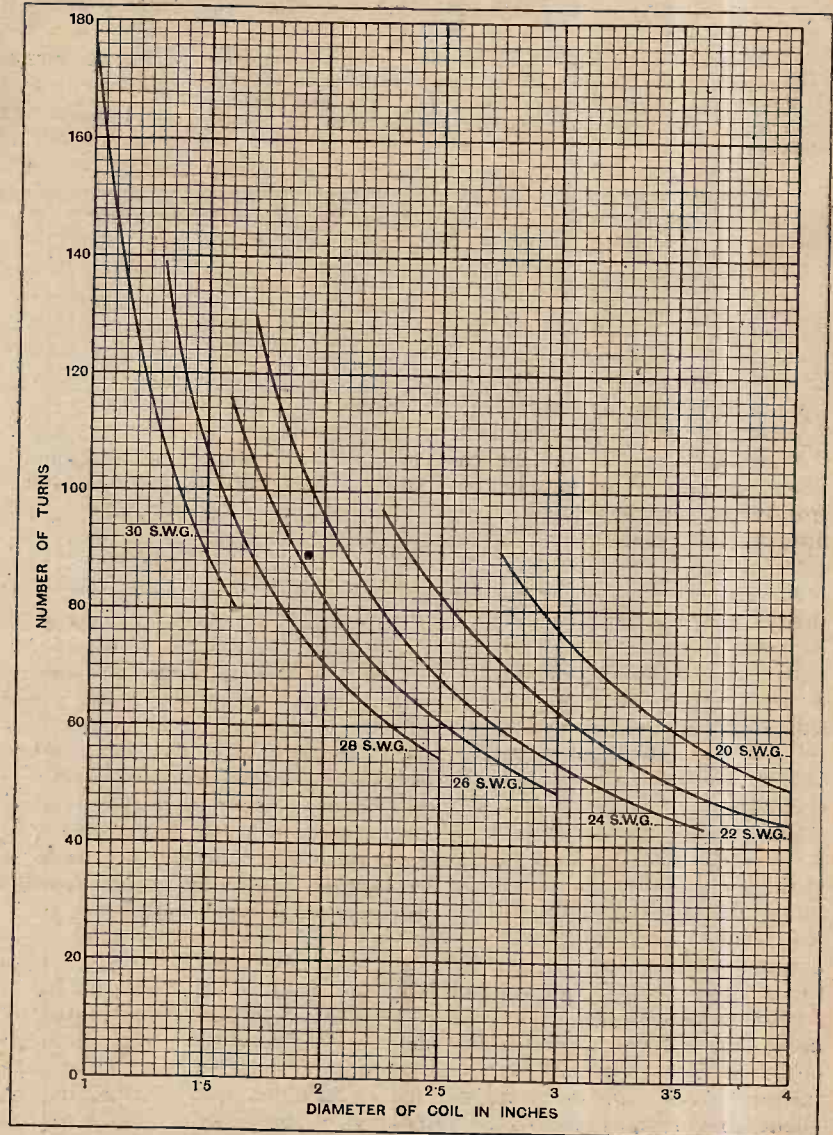


Fig. 1.—Number of turns. The turns required to reach 230 microhenrys with any suitable gauge of wire on a former of any diameter can be read off from these curves. Provided that the turns fill the space given by Fig. 2 the coil is in every case as good as can be made without increasing either its length or its diameter.

incorporating any one of the various coils for which design data are given in Figs. 1 and 2. The dynamic resistances shown are based on measurements made on a tuned circuit which included a coil wound on a former of first-grade paxolin, a tuning condenser of good make, and had a valve, carried in a Burton valve-holder, in

Tuning Coils and Winding Data.—

parallel with it.² Although the actual figures will depend to some extent on the magnitude of the dielectric losses in the circuit, they will at least be approximately correct for any case in which care is taken to keep the dielectric losses down to the minimum that can conveniently be attained.

A very great deal of information is packed into these three diagrams, and in order that it may readily be extracted when required an example of the use of the curves will be given. Suppose we have a former of 2in.

² The losses in this circuit at 550 metres, in addition to the copper loss in the coil, were equivalent to placing a non-inductive resistance of about 400,000 ohms in parallel with the tuning condenser.

diameter, and wish to wind it to 230 microhenrys. Fig. 1 shows that 28, 26 and 24-gauge wire will all make coils of reasonable dimensions, for the curves for each of these gauges extend over the vertical line representing a coil diameter of 2in. The points where these curves cut this line give the number of turns required in each case. In the same way Fig. 2 gives the winding length necessary in each case, and specifies the covering to choose. Finally, Fig. 3 gives the dynamic resistance to be expected at 550 metres from each of the three possible coils. All this information is had by noting the points at which the various curves intersect the vertical line representing a former of diameter 2in., and is read off the curves directly, without any calculation. Putting it in tabular form we have the following:—

Two-inch Coil; 230 microhenrys.

Wire.	Covering.	Turns.	Winding length.	Dynamic Resistance.
28	Enamel	71	1.3in.	101,000
26	Dbl. silk	82	2.05in.	108,000
24	Dbl. cotton	93	3.15in.	114,000

We can now choose from among these three coils according to the space available and the dynamic resistance desired. No matter which of the three is selected, we have the best possible coil (highest dynamic resistance) that can be built into the space allotted on a former of the diameter chosen, for this condition is the fundamental one upon which the whole set of curves has been based. If we consider that none of the coils has a high enough dynamic resistance for our needs, we must of necessity try a former of larger diameter, and read off all the data exactly as before for the new size chosen.

Dynamic Resistance.

But before we grumble at the low values of dynamic resistance shown in Fig. 3 we must recall that at any wavelength shorter than 550 metres the dynamic resistance will be higher than that shown. Figures are given for 550 metres because at this end of the tuning range the dielectric losses are at their lowest, and so could be allowed for with a little more certainty than at shorter wavelengths. Furthermore, the wire diameter, as already mentioned, is chosen throughout to give the highest attainable efficiency at 550 metres in order to minimise as far as possible the variations of dynamic resistance.

The question of wire covering needs a word of explanation. On Fig. 2 both single silk and single cotton-covered

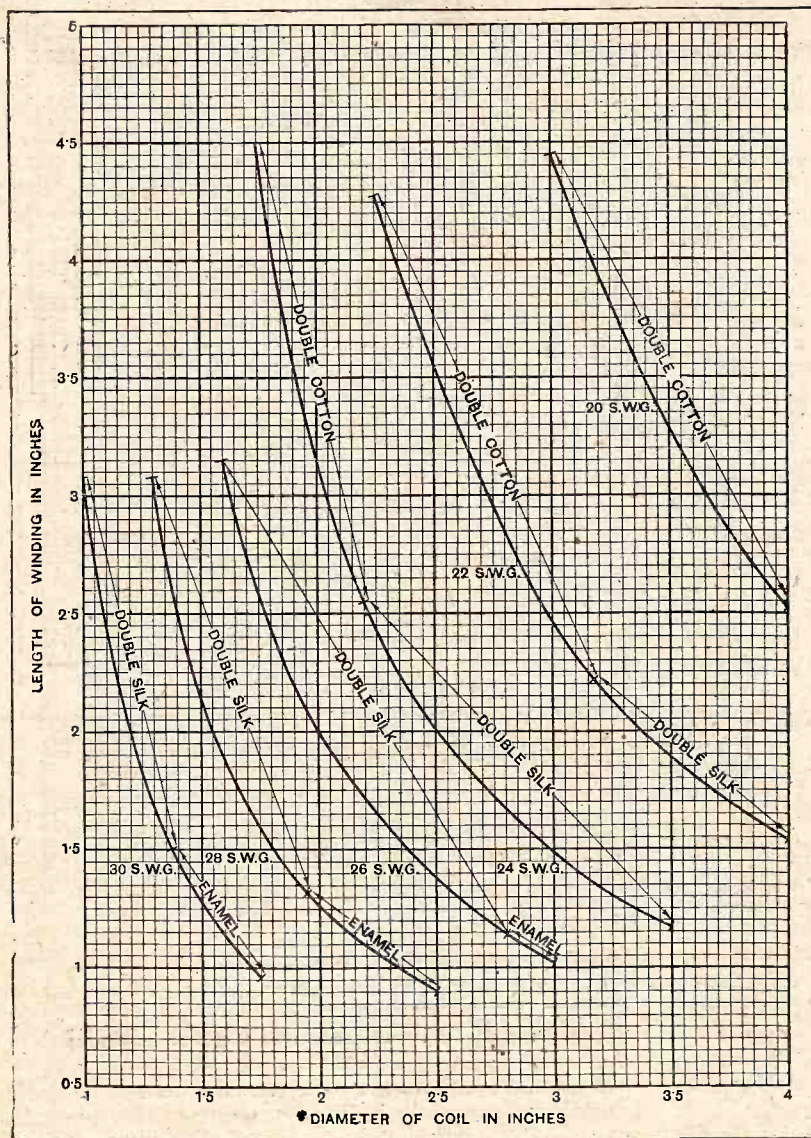


Fig. 2.—Length of winding and wire covering. The winding length which must be occupied by the number of turns specified by Fig. 1 is given by these curves. Note that successive turns do not necessarily touch. Against each curve is shown the thickest wire covering that permits the turns to go into the available space.

Tuning Coils and Winding Data.—

wire have been left out of consideration, as the mechanical strength of the insulation is considered inadequate for single-layer coils wound without proper machines. Where "enamel" is specified, neither double silk nor double cotton-covered wire will go into the allotted space. Where "double silk" is specified, double cotton-covered wire will not fit in, but enamelled wire may perfectly well be used if desired. Where "double cotton" is specified, any covering may be used. Whatever covering be chosen, it is intended that the prescribed number of turns should occupy the prescribed length of winding; in certain cases there will be quite appreciable spacing between successive turns.

Summary.

For those who have sufficient faith in the writer to use his curves without reading through the above justification of them, there follow brief instructions.

1. For a coil-former of known diameter. Above the diameter in each figure read off the following data: From Fig. 1, number of turns for any selected wire gauge; from Fig. 2, winding length and wire covering for the same gauge; from Fig. 3, minimum value of dynamic resistance for the finished tuned circuit.

2. For a minimum dynamic resistance. Choose from Fig. 3 a coil diameter and wire gauge that provide the desired dynamic resistance; then find details of winding as under 1.

3. Ribbed formers. These are sold on a basis of *overall* diameter; the diameter of the equivalent plain tube must be substituted before the curves can be used. Equivalent diameters are given below for all the Becol and Redfern formers listed.

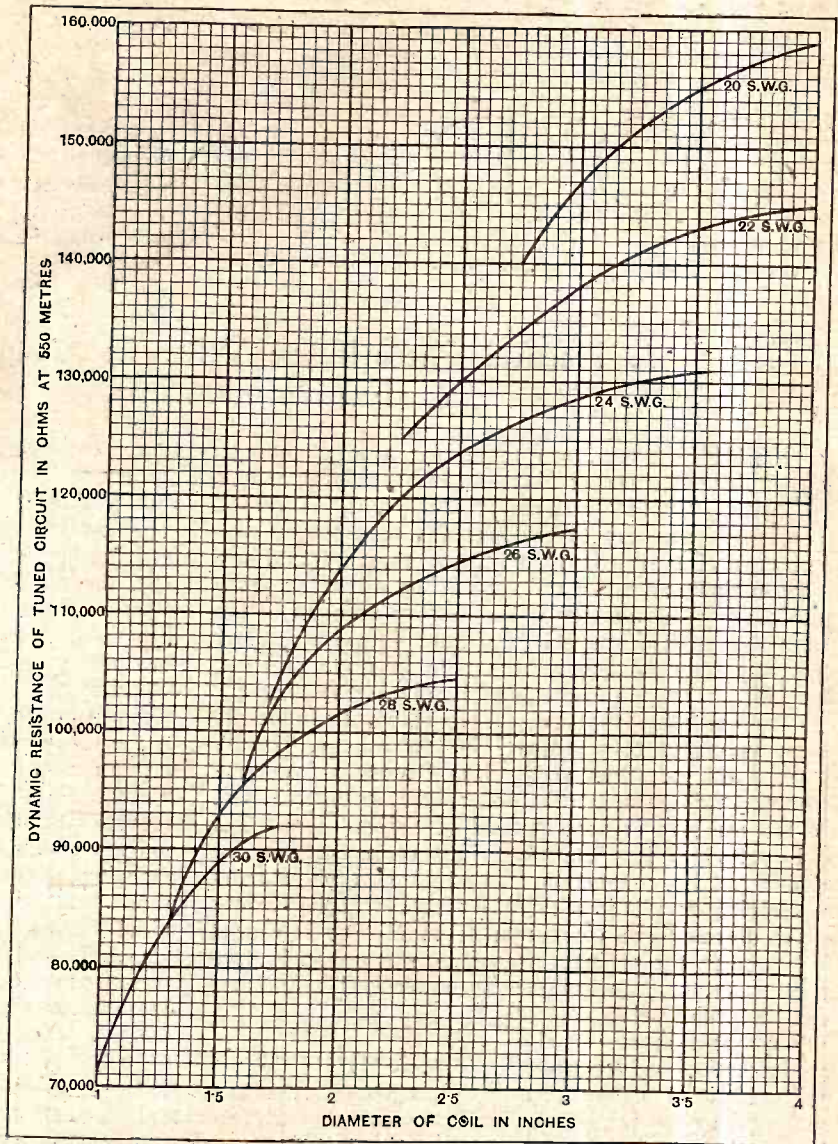


Fig. 3.—Minimum dynamic resistance at 550 metres. This is approximate only, but nevertheless a useful guide. Note that at any other wavelength within the tuning range the dynamic resistance will be higher than at 550 metres.

For formers of diameter or number of ribs not shown in the table, multiply the overall diameter by one of the following factors to find diameter of equivalent plain tube.

No. of Ribs	4	5	6	7	8	9	10
Multiply by	0.806	0.867	0.910	0.936	0.95	0.962	0.970

Make.	Overall Diameter.	No. of Ribs.	Equivalent Diameter
Becol	1 7/16 in.	6	1.31 in.
Redfern	2 in.	6	1.82 in.
Becol	2 1/4 in.	6	2.05 in.
Becol	2 1/2 in.	6	2.28 in.
Redfern	2 3/4 in.	8	2.50 in.
Becol	2 3/8 in.	6	2.62 in.
Becol ; Redfern	3 in.	6	2.73 in.
Redfern	3 in.	8	2.85 in.
Becol	3 in.	9	2.88 in.
Redfern	3 1/4 in.	8	3.32 in.
Becol	3 1/2 in.	6	3.41 in.
Becol	4 in.	6	3.64 in.
Redfern	4 in.	8	3.80 in.

The SEPTEMBER issue of
"EXPERIMENTAL WIRELESS AND THE WIRELESS ENGINEER"

contains, amongst other features, the following articles:—
Moving Coil Loud Speakers. By H. M. Clarke, B.Sc.
An Alternative Equivalent Circuit for the Thermionic Valve.
 By N. R. Bligh, B.Sc.
Frequency Modulation and Distortion. By T. L. Eckersley.
Capacitive and Inductive Coupling. By Raymond M. Wil-
 motte, B.A., A.M.I.E.E.
Some Measurements on Optimum Heterodyne. By J. F.
 Herd, A.M.I.E.E.

COLD VALVES



A Practical Photoelectric Valve Containing No Filament.

By MANFRED VON ARDENNE. (Berlin.)

ATTEMPTS have been made for a long time to replace the heated filaments of amplifying valves with a "cold" cathode of some kind. Although the original incentive to this was the economy in filament current that would result, the more general use of the mains has made the cold valve attractive from quite other points of view. To heat the filament of the first valve of an amplifier, without introducing any trace of hum or noise, is known to be quite difficult, especially when the mains supply alternating current. The various noises that can arise, either with indirectly heated valves or with those of the low-voltage, directly heated type, or when rectified and smoothed current at normal voltage is supplied to ordinary battery valves, are too familiar to need special discussion here. The cold cathode offers the possibility of a considerable advance in this connection. In addition, a whole series of receiving circuits in which the cathodes of the various valves do not have a common potential, and so cannot be heated in the ordinary way from a common battery or other source, can quite easily be realised in practice with the cold valve.

Researches aiming at the production of valves needing no filament current have been going on in various directions since as long ago as 1920, or even earlier. The investigations, in which photoelectric means were almost universally chosen for producing the necessary electrons, were not very fruitful, for the electron current obtained was enormously smaller than the anode currents flowing in normal amplifying stages. It was only when the combination of valves using photoelectric cathodes with coupling resistances of several megohms, as suggested by the author in 1925, was adopted that it became possible to make practical use of the weak photoelectric current for the voltage-amplifying stages of a low-frequency amplifier. Research has been carried on since that time, and the results now reached are described in the present article.

The electrodes of the valve must necessarily be so disposed that a useful measure of illumination is pos-

sible. One method of attaining this would be to make the anode of the valve, as well as the grid, of wire gauze, placing a light source behind the anode. For good mutual conductance, the grid must be brought fairly close to the surface of the cathode.

In these valves, as might be expected, the photoelectric efficiency of the cathode is of great importance. The method of preparing the cathode is that used in making an ordinary photoelectric cell. The valves for experimental work employed a potassium cathode of several square centimetres area, which was sensitised in the usual way with hydrogen. By filling the valve with an inert gas, this sensitising could be rendered permanent. The presence of the gas will permit an ionic current to flow, and at high anode voltages glow discharges could take place between the electrodes. By choosing a suitable gas-pressure and using the correct anode voltages, it was found that this glow-discharge, which causes noises in the amplifier and shortens the life of the valve, could readily be avoided. The ionic current due to the gas does not appreciably affect the operation of the valve as an amplifier, though it necessitates the use of different grid-bias voltages.

CAN light falling on the cathode of a photoelectric cell form a substitute for a current-heated filament? Filamentless valves in which light is used as a means of creating emission are here described for the first time.

While considerable illumination is at present necessary to create a workable value of anode current, the practical results obtainable are interesting and undoubtedly indicate a trend in valve development.

The Amplification Attainable.

It has already been said that on account of their minute emission the valves only give satisfactory results when used in conjunction with anode resistances of very high values. The upper limit of resistance, as determined by commercial experience in making apparatus using valves of the ordinary kind, must be taken as about 10 megohms. If a mode of construction involving the absolute minimum of stray capacity is adopted, the resulting frequency-amplification curve is then just good enough, and at the same time the necessary standard of insulation can be attained with safety. Two working characteristics, taken with an anode resistance of 10 megohms, are given in Fig. 1.

The shape of the curves naturally depends to a very great extent upon the emission from the cathode—that

Cold Valves.—

is to say, upon its illumination. Curve 1 was taken with the cathode illuminated by sunlight. It will be observed that the curve does not drop right down to zero current. This can be accounted for by the assumption that grid and anode are also slightly contaminated during construction by the photoelectric material applied to the cathode. In spite of this fault, which could easily be avoided in factory production, the voltage amplification is about 30 times. The amplification factor of the valve itself is about 40, and its A.C. resistance of the order of two megohms.

In any practical case one would hardly be content with a receiver that would only work when the sun happened to be shining. It is therefore necessary to be assured that satisfactory operation can be secured in ordinary daylight indoors, or by illuminating the valves with electric lamps of reasonable candle-power. Curve 2 in Fig. 1 gives a characteristic taken with the valve illuminated by a 50-candlepower lamp. Even in spite of the uncontrollable fraction of the total current (due to emitting material on grid and anode), an amplification of ten times per stage is attained. With other valves constructed by a different process, stage-gains of 16 and 17 times have been measured under identical conditions of operation.

The curves reproduced in Fig. 1 were obtained by using the circuit of Fig. 2. The grid-current curves, measured at the same time and shown also in Fig. 1, have a shape which indicates that grid current will have no appreciable influence on amplification. The results obtained make it quite clear that the use of these cold valves in a low-frequency amplifier is already a very practical proposition.

Illumination by A.C. Lamps.

As has already been shown, results depend entirely upon the possibility of obtaining a sufficiently intense

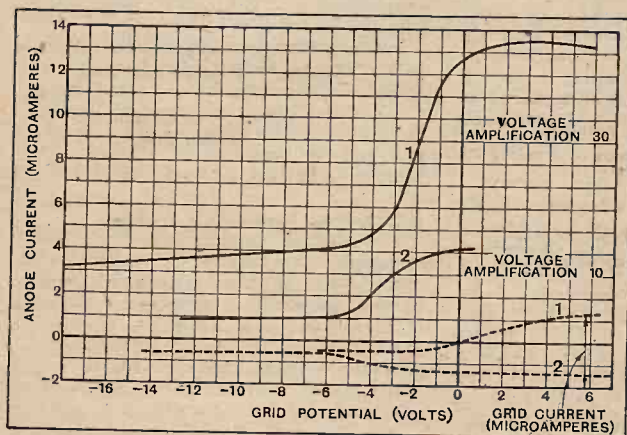
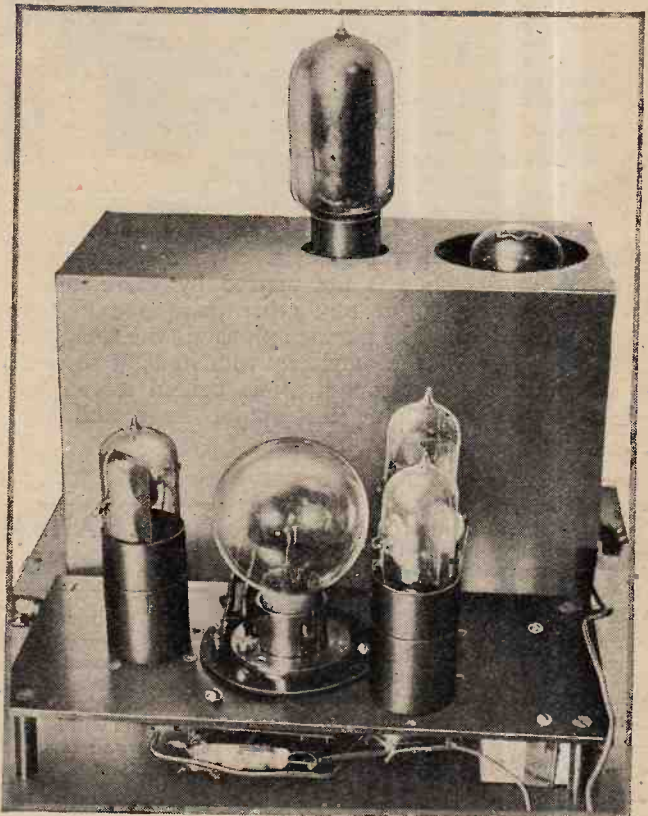


Fig. 1.—Characteristic curves taken under working conditions. 1, illuminated by daylight; 2, illuminated by 50 c.p. lamp. Curves showing grid current are included.

illumination for the cathodes. It is obviously impossible for a receiver designed for everyday use to depend entirely for its sensitivity on the general standard of illumination that happens to prevail in the room where it is to be worked. For this reason an investigation

was made to see how far it was possible to obtain suitable illumination from light-sources supplied from the electric mains. The lower limit of power for a lamp that radiated equally in all directions is about 30 to 50 candle-power. With a lamp of this size the photoelectric cathode must be brought as near to the lamp as possible. So long as the lamp is heated from direct-current mains, its temperature inertia is more than enough to smooth out all voltage variations superimposed on the nominal voltage of the supply. Complications begin to appear when alternating current mains are used. With the aid of a photoelectric cell,



An amplifier constructed to make use of cold valves. Illumination for a pair of valves is provided by a lamp of the half-watt type.

a calibrated amplifier, and a Braund tube, investigations were made of the varying components of the illumination given by different lamps. It was found that the brightness of a 50-c.p. half-watt lamp fluctuates when lighted from 220-volt alternating mains by an amount of about 5 per cent. The effect of such fluctuations upon the slope of the dynamic curve, especially in the first stage of an amplifier, is still dangerously large. It is therefore necessary to change over to a lamp with a greater temperature inertia. Perfectly satisfactory steadiness was obtained with a motor car head lamp bulb, with which the fluctuations amounted to no more than five parts per thousand. A lamp of this type can be seen in the illustration above showing the complete amplifier.

Some interesting investigations have also been made in the direction of using a glow-discharge as light-

Cold Valves.—

source. This discharge was produced in close proximity to the cathode, either in the same bulb or in a separate one, and was energised directly from the well-smoothed output of a battery eliminator. Owing to the closeness of the light to the cathode of the valve, a glow-discharge of this kind provides as great a surface illumination as an ordinary electric lamp.

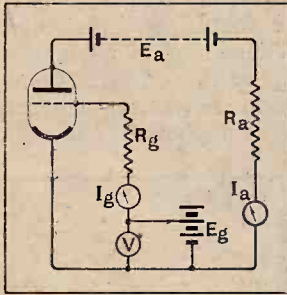


Fig. 2.—Circuit used in determining the working characteristic.

With the cold valves described a series of investigations with amplifiers was undertaken. Fig. 3 shows the circuit of a two-stage voltage amplifier using the cold valves. With a magnification of ten per stage, three of these photo-valves can be used in cascade in a voltage amplifier without taking any special precautions. When adequately screened, reproduction is not marred by valve noise, microphonic ringing, or any other noise due to the valves themselves. The photograph shows the complete amplifier. The voltage amplifier, with its light source, is shown in the foreground, while behind it can be seen the box containing the output stage and the eliminator.

Although it is not at present intended to produce these valves commercially, it is very possible that, by introducing a more efficient photoelectric cathode (for example, one using caesium), and by developing suitable methods of production, they may become of importance in the future.

G. Seibt has succeeded in quite a different way in producing valves that do not require to be heated. In his valves electrons are liberated in a glow-discharge taking place between suitably constructed auxiliary electrodes. The energy for this discharge is drawn from the same source that supplies the anode current, the voltage being increased to compensate for the drop in the glow-discharge.

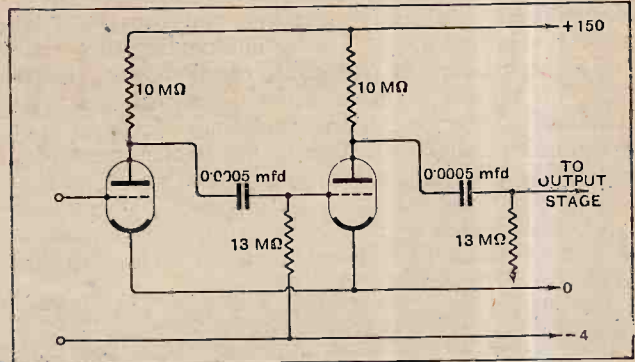


Fig. 3.—Resistance-coupled amplifier circuit using cold valves.

Expeditions from U.S.A.

Capt. Robert Bartlett has sailed for North-Eastern Greenland on s.s. *Morrissey*, taking with him Mr. E. Manley as wireless operator. The call-sign is VOQH, and signals are transmitted on 9,100 and 7,500 kC. (33 and 40 metres).

Capt. MacMillan's Arctic Expedition with the schooner *Bowdoin* is covering Labrador, Greenland, and Iceland. His call-sign is WDDE, and the operator, Mr. Paul Davis, of W9ADU, Culver, Ind., transmits on 5,555, 8,330, and 11,110 kC. (54, 36, and 27 metres).

Ultra-short Waves.

The Radio Experimental Society of Manchester has been licensed for the 5-metre waveband, and expects to carry out some experimental work later in the season. We hope, through the courtesy of Mr. R. M. Kay, the Joint Hon. Sec., to be able to give details of the short-wave transmitter used.

French Short-wave Tests.

The French Meteorological Office will be conducting its seventy-ninth series of short-wave tests on September 6th, 13th, 20th, and 27th. The first three dates are for preliminary tests, when various stations will transmit in the following order, each one starting five minutes after its predecessor:—

Lyons FYR (38 metres), Lyons FYS (26.15 m.), Lyons FYQ (16.35 m.), Trappes FOW (26.15 m.), Lyons FYS (60 m.), Paris FLE (26.70 m.), Lyons FYR (25.75 m.), Trappes FOW (60 m.).

TRANSMITTERS' NOTES.

The preliminary tests start at 13.30 G.M.T., and are repeated at 20.00, but in this second series Paris FLJ (32.50 metres) takes the place of FLE.

On Saturday, September 27th, the principal tests will be conducted from the same stations and in the same order beginning at 9.30 G.M.T. They will be repeated at 11.30, 13.30, 15.30, 18.00, 20.00, and 22.30 G.M.T., but the last three will include Paris FLJ as well as FLE.

Each transmission will last ten minutes and consist of a series of . . . interspersed with test groups of five figures. It will be seen, therefore, that the second half of each will overlap the first half of the succeeding transmission. The powers of the respective stations will be: Lyons FYR and FYQ, 6 kW.; Lyons FYS, 600 watts; Paris FLE, 1 kW.; Paris FLJ, 3 kW.; and Trappes FOW, 400 watts.

A Correction and a "Pirate" Station.

The call-sign of Mr. J. Jones's station at 42, Fford Estyn, Garden Village, Wrexham, is G6SJ, and not G2SJ, as inadvertently printed in our issue of August 20th. We understand that Mr. Jones has been somewhat inconvenienced of late by the misuse of his correct call-sign by an unauthorised station, and that he will not himself be operating for a month or more.

The 28-Megacycle Waveband.

Interest in 28 mC. (10-metre) working seems to be on the increase in the United States, if we may judge by the reports of the International Amateur Radio Union. It is proposed to issue a special W.A.C. (Worked All Continents) certificate confined to this waveband, and our contemporary "Q. S. T." asks who is going to be the first to win it.

Perhaps European transmitters stand a better chance than their American colleagues in obtaining this coveted distinction, as the 10-metre waveband is admittedly more in use in those countries where the general handling of traffic is prohibited or limited.

Forwarding Agents Still Wanted.

The various amateurs who so nobly undertake the task of forwarding communications to transmitters in remote parts of the world in co-operation with the R.S.G.B. and the I.A.R.U., perform a great service to amateur working in general. There are still some distant lands where amateurs are found in comparatively large number but are difficult to reach on account of their call-signs and addresses being unknown. The I.A.R.U., therefore, appeals for further volunteers.

New Call-signs.

D6CZ L. C. Cooke, Ashdown, Harrodene Road, Wembley, Middlesex. (Change of address.)
G6FX J. Abraham, St. Adrien, Van Diemen's Road, Chelmsford.
2BGM J. H. Cant, 89, Royal Parade, Eastbourne. (Change of address.)
2BPM H. H. Johns, School House, Painscastle, Erwood, Brec.



TELEVISION TRANSMITTER

Details of the Studio, Scanning Equipment and Amplifiers.

By T. H. BRIDGEWATER.

DAILY broadcasts of combined vision and sound through the B.B.C. Brookmans Park transmitters take place at the Baird Company's headquarters in Long Acre, the programmes being conveyed by land-line to Savoy Hill, and thence distributed to Brookmans Park. Differing from the B.B.C. the studio has, of necessity, to be in the closest proximity to the control room for several obvious reasons—among which are the facts that the scanning disc with its driving motor and the scanning light are in the control room while the artist being influenced by these performs in the studio; again, the photo-electric cells must be situated in the studio, although their appropriate amplifier is in the control room.

The scanning light falls on a white screen placed some 3 or 4 feet distant, immediately in front of which sits the person whose image is to be transmitted. A bank of photo-electric cells is situated against the dividing wall on a level with the top of the head, and are operated by dispersed light.

In the control room the lamp scanning disc and lens are mounted on a steel frame table, underneath which are housed the controlling resistances for the lamp. On benches round the partition and an adjacent wall are the cell and microphone amplifiers, distribution boards, check receivers, pilot television receiver, line equalisers, and numerous other controls and instruments which contribute to the constitution of the control room.

The lay-out (Fig. 1) is such that two engineers can, if necessary, operate and adjust the whole equipment without having to move more than a yard or so. During

a broadcast, the operating includes the focusing of the scanning spot, checking the disc motor speed, controlling the output amplitude of both vision and speech amplifiers, as indicated by valve voltmeters, watching the image in the pilot receiver, adjusting the line equaliser if necessary, switching the microphone on and off at the proper moments, and maintaining telephonic communication with the B.B.C. It is possible to stand in such a position that one can watch the artist in the studio by looking through the aperture, and then by an inclination of the head to the right, observe the reproduced image in the pilot receiver, after the former has travelled out to Brookmans Park by wire and returned to the same room via the ether. In this way the nature of the transmission can be instantly detected. It may not, perhaps, be generally realised how very much more critical is the human eye as compared with the ear. While a small degree of distortion in the case of television is readily discernible by its effect on the image, in music the ear will pass it by unnoticed. Thus, even quite small changes in the constants of the landlines conveying the signals to the broadcasting station, or of the broadcasting apparatus itself, due to atmospheric or other conditions, may quite appreciably impair the quality of the transmission; consequently, a very close watch has to be kept, and a flexible line equaliser inserted which can be easily adjusted to compensate for these effects.

Reviewing the television equipment in more detail, an important component is the lamp source of light for scanning. This is a 900-watt incandescent half-watt

IN addition to covering the general layout and equipment used in the television studio and control room details are given of synchronising and picture size which will prove helpful to those interested in reception. But few are acquainted with the working of the television studio, and this description shows how the picture-carrying signals are produced.

Television Transmitter.—

lamp having specially bunched filaments so that the emission may approach as nearly as practicable to a point source. This bunching may be very close indeed, and necessitates the composing of the total 900 watts by a current of 30 amperes at 30 volts, so that there shall be no dangerous differences of potential between the several closely situated sections of the filaments. Current supply for the lamp is provided by large-capacity accumulators. The light is focused by a reflecting mirror close behind, so as to illuminate uniformly, some 10 inches distant, that section of the disc occupied by the spiral of holes. The separation of the inner and outer holes is approximately 1.3 cms., giving an arc to pitch ratio of 3/7. There is, therefore, an area requiring illumination of $7/3 \times 1.3 \times 1.3$, or 3.94 square cms. The holes which traverse one at a time, admitting each only 1/2,100 of the total light available, are

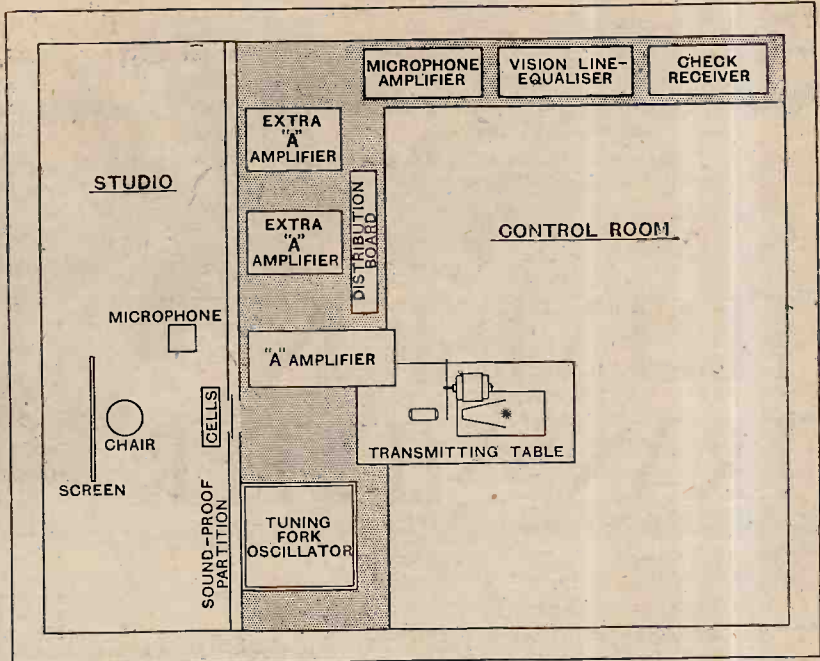


Fig. 1.—Plan view of studio and control room showing the distribution of the equipment.

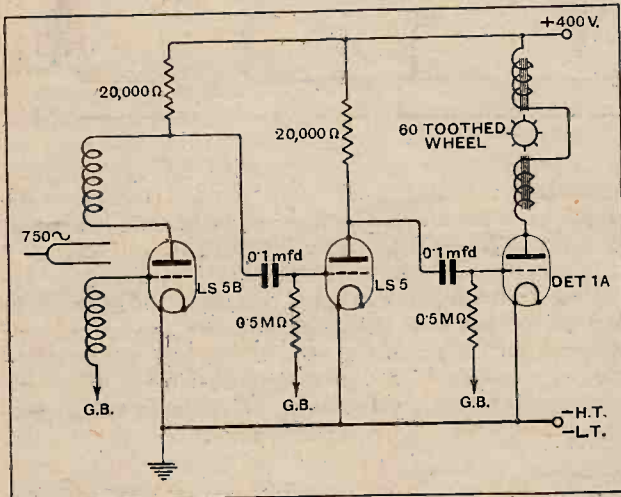


Fig. 2.—Tuning-fork-controlled oscillator followed by an amplifier and toothed wheel speed regulator.

focused by means of a Meyer "Plasmatt" lens (f.i.g: focus 3.5in.) through a glass-panelled aperture on to the screen in the studio.

Between the lens and the disc, where there exists a space of some two inches, is placed what is known as the "synchronising gate," which consists of an aperture vertically adjustable, to ensure a small interval between the passages of light due to successive holes. This produces the "strip frequency," equal to the number of holes multiplied by the revolutions per second of the disc, on which, of course, the principle of synchronisation is dependent. The disc, which is of aluminium 0.005in. thick, and of mean spiral radius 14.65 cms., revolves at a speed of 12.5 revolutions a second, being provisionally standardised as that which produces a minimum of undesirable flicker, as well as

avoiding the production of excessively high frequency.

Little needs to be said about the disc-driving motor itself, except to mention that it is one operating from 12 volts at 1.5 amperes, and specially selected for its smooth running. On the free spindle there is a 60-toothed mild steel wheel rotating between two electromagnets, the general arrangement being almost identical with the synchronising gear in the commercial type "Televisors." The coils of the electromagnets are connected in series in the anode circuit of the output of a tuning-fork-controlled valve oscillator and amplifier, which generates a frequency of exactly 750 cycles per second (Fig. 2). The motor is adjusted to the correct speed where it is maintained owing to the action of the 60 teeth passing the facets of the electromagnets in 1/12.5 second, or 750 a second. Constant speed is in this way assured.

Area of View.

Moving into the studio, we find the scanning light illuminating the white screen. Since the rays from the

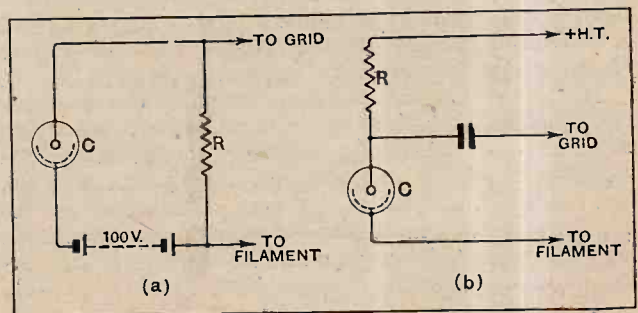


Fig. 3.—(a) Input connections between photo-electric cells and the "A" amplifier. (b) Alternative method of arranging input circuit.

Television Transmitter.—

lens are diverging at a distance of 6 feet, the normal "close-up" position, an area of approximately 11in. by 24in. is explored, representing a spot magnitude of $\frac{11}{24}$ in. square. At 8ft. 6in. from the lens this will become 15in. by 33in., sufficient to accommodate a waist length view of two artists side by side.

We now come to a very vital part in the whole system, namely, the photo-electric cells. These are four of the G.E.C. caesium type (extremely red and infra-red sensitive), placed in a position and angle designed to give the best perspective of the subject, and yet accommodate as much reflected light as possible. These four cells, which roughly form the corners of a rectangle 12in. by 6in., are paralleled and connected to the "A" amplifier. It is of great importance to maintain the connections between the cells and the amplifier as short as possible, owing to the H.F. losses which would otherwise be introduced by the self-capacity of the wire. The input connections are shown in the schematic diagram of Fig. 3 (a). This method is favoured in preference to that shown in Fig. 3 (b), which is popular in talking-picture work, owing to the avoidance of a coupling condenser resulting in slight but nevertheless undesirable cutting-off of low frequencies. The resistance R is 50,000 ohms. A higher value would yield a greater input voltage but also increase the effects of capacity in the cell, a condition which is to be avoided.

The amplifier itself (Fig. 4) is a five-valve R.C.-coupled type of careful design, the output from which is fed through a step-down transformer to two single-stage amplifiers—one having a special output transformer connected through an equaliser to the line to Savoy Hill. It is of supreme importance that a uniform response to frequencies as high as 10 kc. and lower than 50 cycles should be preserved as nearly as possible, as otherwise serious detriment to the quality of the reproduced images will be incurred.

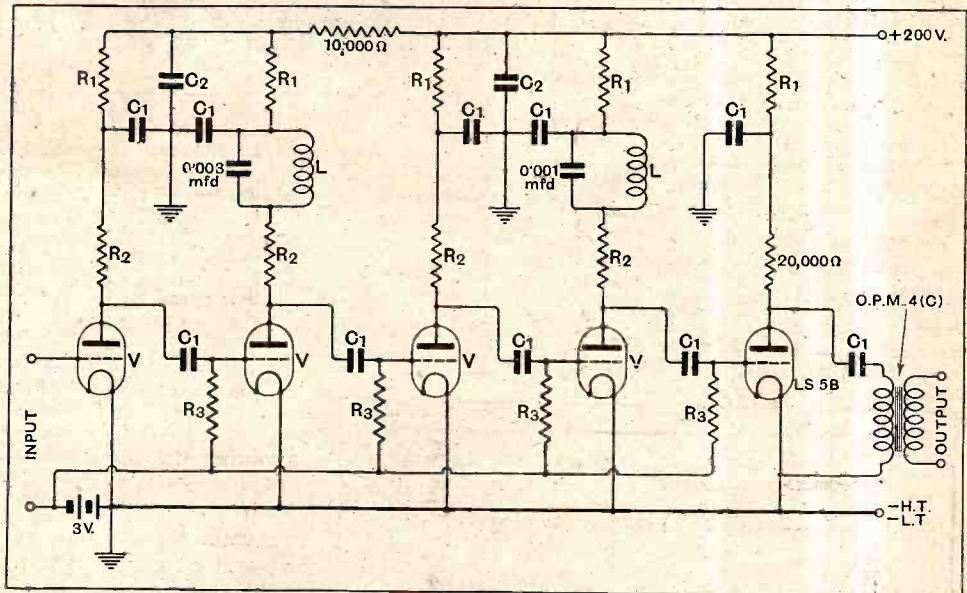


Fig. 4.—Five-stage "A" amplifier interposed between photo-cell circuit and the outgoing line to the B.B.C. R₁, 600 ohms; R₂, 5,000 ohms; R₃, 0.5 megohms; C₁, 1 mfd.; C₂, 2 mfd.; L, 0.075 henry.

Space does not permit of a discussion of some of the smaller details in connection with the television transmitter: e.g., an entirely new vision and sound broadcasting technique has been evolved, which calls for a somewhat complicated system of co-operation between the studio and control room staffs.

ESTIMATING THE COST OF ALL-MAINS OPERATION.

The Difference Between D.C. and A.C. Mains.

WHEN calculating the cost of operating a receiver entirely from the mains, confusion often arises owing to the fact that it is not fully realised that the ordinary consumer is called upon to pay for the power he consumes and not for the current. Owing to the large current consumption of the cathode heaters in an "all A.C." set many people are needlessly scared off, but, on the other hand, there are many who are unduly sanguine of the cost of running a receiver completely from D.C. mains because they have not fully realised that filament current is cheap on A.C. mains and expensive on D.C.

When estimating the cost of operating a set from D.C. mains one must add together the total plate and

filament current taken by the set, and then multiply this sum by the total voltage of the mains. This gives the total wattage taken from the mains. In the case of A.C. mains, however, one must consider each secondary winding on the power transformer separately. The total current drawn from each winding must be multiplied by the voltage existing across its ends. In this way the power supplied by each winding is calculated. All these individual wattage figures must then be added together, and the sum multiplied by a figure which depends on the efficiency of the power transformer; this figure varies in practice between 1.25 and 1.75. In most cases 1.5, representing an efficiency of, roughly, 70 per cent., is correct.



Events of the Week

in Brief Review.

A RADIO CURFEW.

In the Swiss Canton of Vaud the Moudon municipal authorities have forbidden the use of loud speakers and gramophones after 10 p.m., not only in public establishments but in private houses.

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FROM 0.4 TO 10 KILOWATTS.

Tonic treatment is to be applied to the 0.4 kilowatt broadcasting station at Viipuri, Finland, which will soon be transmitting with a power of 10 kilowatts. The original wavelength will be retained, viz., 291 metres.

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HAPPY DAYS FOR PEDESTRIANS.

Novelists in search of thrilling material should focus their imaginations on the day when all car owners copy Mr. Percy Hill, a Wednesbury motorist, who has fitted a public address system on his car to replace the horn. In tests conducted last week the driver was able to "direct" pedestrians to safety at a distance of 300 yards.

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RADIO MECCA AT LYONS.

The Lyons International Fair, which opens on Saturday next, September 6th, will contain a radio section which in itself promises to be one of the most important French wireless shows of the season. No fewer than 200 radio firms will exhibit, and this figure is well up to the average of the Radio Manufacturers' Autumn Show in Paris.

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RADIO AND RUSSIAN MORALS.

To go to gaol in absolute ignorance of the wireless art and to emerge a fully fledged "amateur" is now a happy possibility in Russia. According to a correspondent, the Soviet Government has come to the conclusion that the study of radio is one of the best means of improving a prisoner's morals. It has been found that courses in electricity and wireless develop a new mentality among prison students, many of whom, it is declared, have turned over a new leaf on returning to civil life by taking up radio as a profession.

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MORE POWER FROM KOENIGSWUSTERHAUSEN.

The German broadcasting authorities officially contradict the rumour that a station of extra high power is to be installed at Frankfurt. It has, however, been decided to increase the power of Koenigswusterhausen (Zeesen) from 35 to 50 kilowatts.

THE LATEST IN STUDIOS.

The new Chicago studios of the American National Broadcasting Company, said to be the most elaborate of their kind in the world, will be opened on September 15th.

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OXFORD'S PROBLEM.

The Oxford City Council is considering the advisability of permitting a radio relay service in the city. A sub-committee has been appointed to inspect the system in operation at Swindon.



A PROFESSIONAL "FIELD DAY." A wireless van in use by the 4th Divisional Signals Wireless Section during the army manoeuvres in East Anglia.

MAORIS AT A RADIO SHOW.

A party of Maoris from the Wanganui River provided nightly concerts at the New Zealand Annual Wireless Exhibition held at Wellington in July. The items, writes a correspondent, were broadcast by the local station 2YA, and on most evenings enthusiastic telegrams were received from all parts of the Dominion requesting special numbers. The New Zealand Association of Radio Transmitters handled public radiograms from a special stand in the Exhibition.

SHORT WAVES FROM PARIS.

Paris Experimental Radio, which suspended transmissions on August 1st, will resume on September 15th with simultaneous transmissions on 40 and 299.5 metres.

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NEW POLISH BROADCASTER.

Poland's latest broadcasting station is at Raszyn, about 20 miles from Warsaw. A regular service will begin this month. No particulars are yet available regarding wavelength and power.

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WIRELESS v. FISH.

Two Fleetwood steam trawlers have been fitted with wireless telephone equipment by the International Radio Interrupted Phone Wave Company. The trawlers will patrol the fishing grounds and give wireless notification of the movement of shoals.

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A REAL RADIO CAR.

"Step in, Sir, and choose your station," is the slogan of an enterprising French radio dealer who is touring Brittany with a radio reception car. According to our Paris correspondent, the car is equipped with the latest apparatus fully capable of picking up the majority of European stations. Technical advice is given to every enquirer.

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PRIZES FOR SET BUILDERS.

A section for amateur radio societies is included in the competition staged in connection with the Manchester Wireless Exhibition in October. One of the principal sections is for the construction of a three- or four-stage receiver, mains or battery operated, in which employees of radio firms may take part.

Entry forms, which contain full details, can be obtained from the Radio Editor, *Evening Chronicle*, Withy Grove, Manchester, and are returnable not later than September 15th. Sets are required for judging by September 22nd. Cash prizes are offered amounting to £175.

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WIRELESS AS A CAREER.

Commending wireless as offering promising careers for young men, a writer in the *Handbook of the Hull Municipal Technical College* says:—

"It is only 35 years since Senatore Marconi filed his application for the first British wireless patent. On the screen, in the 'talkies,' in the work of shipping, in world communication through the great 'beam' stations, as well as in factories and workshops which produce and sell the

manifold broadcasting and receiving sets, careers have been opened up for thousands of able young men whose talents might otherwise have run to waste but for this invention."

Special courses in wireless communication have been arranged for the coming season, which opens on September 8th.

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AUTUMN SHOW IN BRUSSELS.

Belgium's annual radio show is to be held at the Parc du Cinquantenaire, Brussels, from October 18th to 27th.

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STILL THEY COME.

Newfoundland and Southern Rhodesia are the latest countries to deposit with the American State Department their ratifications of the International Radiotelegraph Convention, drawn up in Washington in 1927 to regulate the international uses of radio.

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EINSTEIN AND THE EXPERIMENTER.

In his opening speech at the Berlin Radio Exhibition, Professor Einstein made some pungent remarks concerning public indifference to the advance of science.

"There are millions," he said, "who thoughtlessly use the wonders of science and technology, without having grasped them intellectually, any more than a cow understands the botany of plants it chews."

"When you listen to wireless broadcasting, do you wonder how mankind came into possession of this marvel of communication? The source of all technical achievements is sublime curiosity, and the playfulness of experimenting in both the amateurish searcher and the constructive, imaginative inventor."

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ADVANCING TIDE IN CANADA.

Ontario leads the other Provinces of Canada in the matter of wireless receiving licences with a total on July 1st of 211,775. Quebec is second with 71,757, British Columbia third with 35,995, and Saskatchewan fourth with 32,906. There are 9,528 sets licensed in Ottawa, 61,683 in Toronto, 43,054 in Montreal and 15,084 in Winnipeg. The total for the whole Dominion shows an increase during the past twelve months of 107,589.

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400 KILOWATTS FROM KDKA.

Two giant valves, each standing six feet high and requiring the passage of five tons of cool water through their water-jackets every hour, are the "nerve centres" of the new KDKA which has practically been completed by the Westinghouse Company at Saxonburg, near Pittsburgh, writes our Washington correspondent. The valves are rated at 200 kilowatts each.

Instead of stepping up immediately to the power of 400 kilowatts, the operators of KDKA propose to go gradually to 50 kilowatts, the maximum power now allowed by the Federal Radio Commission. And instead of making a sudden transition to the new transmitter, they have asked the Commission to authorise the use of the old KDKA at East Pittsburgh simultaneously with the new for a period of three weeks during which the

old transmitter's output will be decreased gradually and the new one's increased.

The old and new stations will operate in synchronisation with one another during the transition period. Thus the station's listeners will not suffer the inconvenience of adjusting their receiving sets to the new volume expected from the new station. The Westinghouse Company has asked the Commission for authority to operate experimentally after midnight during the autumn and winter with its maximum power of 400 kilowatts, the highest power any station in the world has ever undertaken to use.

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UNCERTAINTY IN SPAIN.

Spanish broadcasting plans are "in the air" once more. The late dictator, Primo de Rivera, decreed that broadcasting

distress call, but proved to be 70 miles from the actual position of the ship.

The position given was regarded as doubtful by the "Vandyck," and full reliance was placed on the ability of the direction finder to determine accurately the bearing of the "Kronprins Gustaf Adolf" from the "Vandyck."

After steaming more than half an hour from the time of receiving the distress call, a further message was received from the Swedish ship that assistance was no longer required, but this in turn was cancelled by a further urgent request for help. Once again the "Vandyck" turned to the rescue, and the direction finder was constantly used to verify the bearing of the Swedish ship. When eventually the direction finder bearings brought her into sight dead ahead the inaccuracy of the position originally given was proved.



GERMANY'S RADIO FESTIVAL. An air view of the Berlin Exhibition grounds taken when the show was in full swing. Note the famous radio tower with its restaurant floor and lift shaft.

should be entrusted to a single enterprise for a period of twenty years, the selection being made after a competition in which all broadcasting concerns would be invited to take part.

With the disappearance of the dictator's régime, however, other counsellors have stepped in, with the result that the idea of a competition has been abandoned. According to a Madrid message, Spanish listeners now have no notion whether they are to be blessed with a system of State radio or private control.

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FIRE AT SEA.

The Marconi Direction Finder played a valuable part in accurately indicating a distressed ship's position and rescuing the crew when the Swedish motor vessel, "Kronprins Gustaf Adolf," caught fire on July 28th fifteen miles north-east of Barra Do Rio Doce Lighthouse, on the Brazilian coast. Her wireless distress calls brought immediate reply from the Lamport and Holt liner "Vandyck," which was 45 miles south of the position given in the

RADIO FOR THAMES POLICE.

The provision of wireless on the Thames police motor launches is an interesting project now being considered at Scotland Yard. The boats so fitted would carry out patrol work in the same manner as the wireless-equipped vans of the Flying Squad on land.

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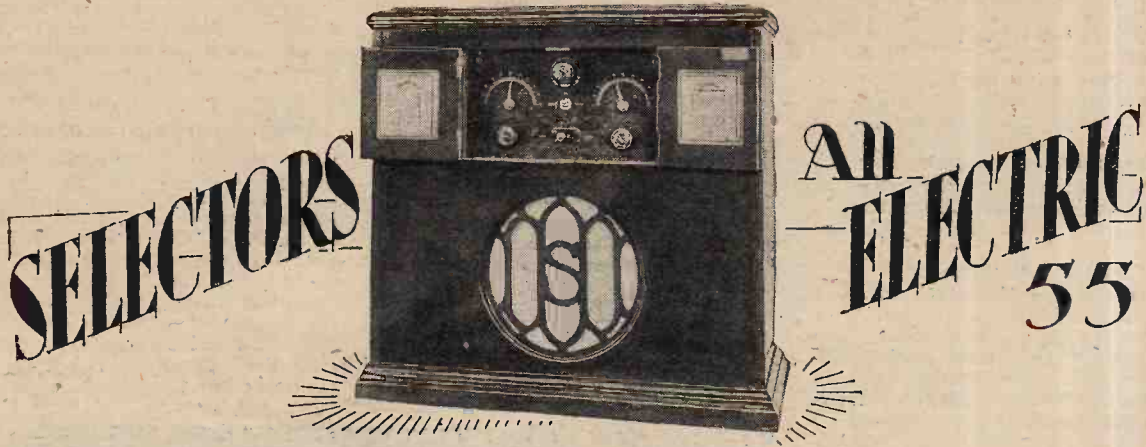
TRANSMITTER POWER RATING.

As we go to press we learn from the B.B.C. that at the request of the International Broadcasting Union, the Corporation is adopting, in common with other broadcasting organisations, a new power rating as from September 1.

The actual power of all B.B.C. stations remains the same as before, though the method of computing the power rating is changed to comply with the new international definition.

In the past different broadcasting organisations have used different methods.

The new system of computing the power of a broadcasting station takes account of modulation, which the method formerly used in this country did not.



A Self-contained Transportable with Moving-coil Loud Speaker.

DESIGNED for operation from A.C. mains this receiver incorporates a self-contained frame aerial and is housed in a hand-polished mahogany cabinet standing on a ball-bearing turntable. It may therefore be classed as a "Table Model Transportable," and should recommend itself to those who may wish to enjoy the broadcast programme in different rooms from time to time. An usually interesting feature of the specification is the provision of a moving-coil loud speaker, an item which at once invests the receiver with an air of distinction.

The name "Selector" has been for some time associated with portable receivers, and the experience gained in this field is reflected in the circuit design and layout of the model under review. For instance, the coupling employed in the single screen-grid H.F. stage is in principle the same as in Selector portables. It is in essence tuned anode coupling, but includes several refinements worthy of favourable comment. The tuning condenser, instead of being connected directly across the anode coils, is joined between anode and earth, a fixed series condenser of comparatively large capacity being inserted as a safety measure in the event of the vanes of the variable condenser short-circuiting. With this arrangement not only is the condenser spindle at a fixed H.F. potential, but is also at earth potential in relation to the H.T. supply and can be bolted direct to the screening box.

The anode coils for medium and long waves and also a coil for reaction are connected in series, the long-wave coil being shorted out by the wave-range switch. The medium-wave coil is in two single-layer sections connected astatically, and the reaction coil which serves for both long and short waves is capacity fed from the anode of the leaky-grid detector. The

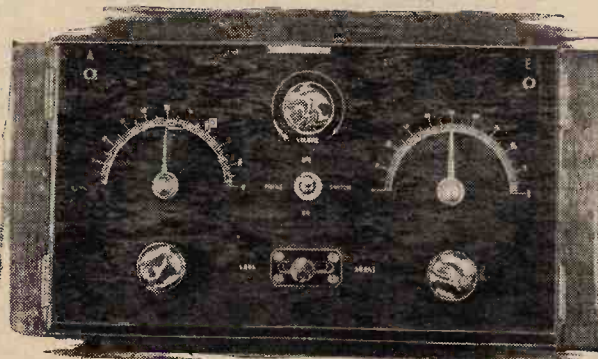
reaction condenser is of the three-element differential type, and maintains a constant by-pass capacity in the detector anode circuit.

The aerial circuit is straightforward, the frame being wound in two sections, one of which is short-circuited for reception on medium waves. Terminal sockets are provided for an external aerial and earth, the aerial being connected to a tapping point on the medium-wave section of the frame.

The Mains Equipment.

Indirectly heated valves are used in the H.F. stage (S.4.V), detector and first L.F. stages (164.V); but the power valve, a P. 625, is directly heated with raw A.C. Transformer coupling is employed for both L.F. stages, the two transformers being assembled in a separate screening box. The rectifier for H.T. supply is a Philips Type 1560 full-wave valve, and for convenience in servicing is mounted together with the components of the receiving circuit in the top half of the cabinet. The general layout of the receiver compartment is shown in one of the photographs, and it will be seen that the components include a mains fuse-holder and a "hum adjuster." The latter takes the form of a filament potentiometer by means of which the negative H.T. lead is returned to the electrical mid-point of the filament circuit. The setting of this potentiometer may vary on different supply mains, and adjustment is carried out with a small screwdriver.

The bottom half of the cabinet contains the moving-coil loud speaker, mains transformer, grid bias, and decoupling resistances and smoothing equipment. The loud speaker is a Magnavox unit complete with metal-oxide rectifier for supplying D.C. to the field winding and output transformer



The control panel showing frame aerial and anode tuning dials.

Selectors All-Electric 55.—

for coupling to the P.625 output valve. A.T.C.C. electrolytic condenser is an additional component which ensures a smooth supply to the field winding. Removal of the output valve served to show that no trace of hum could be attributed to inadequate smoothing of the magnetising current.

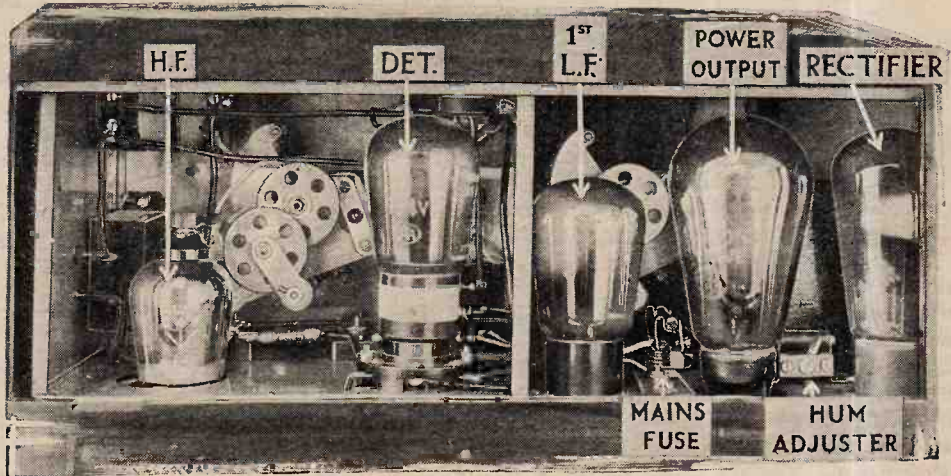
In the bottom right-hand corner at the back of the cabinet is a panel which carries pins for the socket on the mains leads and jacks for a gramophone pick-up and an external loud speaker. The pick-up leads are screened by a braided covering, and the pick-up is connected across the primary of the first L.F. transformer, and an external volume control is required. A choke filter circuit is provided for the external loud speaker in addition to the transformer incorporated in the moving-coil unit. The two loud speakers operate simultaneously.

In testing the receiver in the London district no need was felt for the addition of an external aerial, as entirely satisfactory results were obtained with the self-contained frame aerial. The weight distribution of components has been carefully thought out, and the set revolves freely on the ball-bearing turntable, so that full use can be made of the directional properties of the frame aerial.

The long-wave performance is excellent, and eight stations, in addition to 5XX, were received at full loud speaker strength. With the frame set at maximum, Königswusterhausen is almost equal in strength to 5XX, but it is necessary to sacrifice some volume by rotating the frame to minimum on 5XX if the German station is to be received clear of background. The same applies to Moscow on 1,481 metres.

The selectivity on medium waves is quite adequate for present-day conditions in the ether. In West Central London the Regional Station spreads only 4 degrees with the frame at minimum, and 11 degrees at maximum, on a 100-degree dial, the bands occu-

ried by the National transmitter under similar conditions being 7 and 10 degrees respectively. In this locality fourteen foreign stations were received after dark at good loud speaker strength without interference from the local stations or 5GB. A further test at 5 miles from Brookmans Park showed that eleven foreign stations were still available without interference, the three stations lost being located in wavelength either between the two London transmitters or below 261 metres. Nevertheless, even at this close range, the twin Regional transmitters could be received without mutual interference without calling upon the directional properties of the frame.



The general layout of the receiver compartment. The hum adjuster takes the form of a filament potentiometer.

The quality of reproduction from the Magnavox unit is above criticism and gives an impression of unforced naturalness without any bass resonance. A 50-cycle hum, which is not entirely eliminated by manipulation of the hum adjuster, is noticeable in intervals in the transmission, but is not sufficiently serious to make its presence felt during periods of modulation. The controls are easy to use, and critical adjustment of reaction is unnecessary even when receiving distant stations.

The makers are Messrs. Selectors, Ltd., 1, Dover Street, London, W.1, and the price in the standard mahogany finish is 55 guineas. The set is also available to special order in oak, walnut, and other finishes.

SAFEGUARDING VALVE FILAMENTS.

WHEN using a filament transformer designed to give an output of several amperes in conjunction with a small two-valve receiver which will, of course, only impose a light load upon it, there will be a slight voltage rise even in the case of a good transformer. This may not be sufficient to burn out valves, but it will in most cases greatly curtail their useful life. It is desirable, therefore, in such cases to use a resistance in series with one of the output terminals. Ohm's

Law must be pressed into service in order to enable us to calculate the correct value, but a very convenient instrument to use is a small two-ohm baseboard resistance of the semi-variable type. A maximum value of two ohms is sufficient for all ordinary cases. These devices, which can be obtained from several manufacturers, will usually carry between 2 and 3 amperes without overheating. It is assumed that a variable potentiometer is used across the transformer winding.

WIRELESS THEORY

SIMPLIFIED

By
S. O. PEARSON
B.Sc., A.M.I.E.E.

(Continued from
page 206
of previous issue.)

The Principles of Grid Rectification.

WHEN the grid of a three-electrode valve is made electrically positive with respect to the cathode (or filament) it naturally attracts to itself some of the electrons leaving the cathode. The emitted electrons are drawn away from the cathode by the positively charged anode or plate, but a certain proportion of them will be intercepted by the grid if the latter is made positive, this proportion depending not only on the potential of the grid, but also on the positive anode voltage. Increasing the anode voltage causes the emitted electrons to travel with greater velocity, with the result that a greater proportion of them will be shot through the meshes of the grid and reach the anode in spite of the positive potential of the grid, so that a smaller number of electrons will be trapped.

Those electrons which are intercepted by the grid pass round the external circuit back to the cathode, and this "stream" of moving electrons constitutes a grid current which can be measured by means of a microammeter connected in the grid circuit. It can be taken as a general rule that for most filament valves no grid current will flow when the potential of the grid is negative with respect to the negative end of the filament, however small this negative potential might be. On the other hand, with most valves of the indirectly heated cathode or A.C. type, grid current commences to flow when the grid is still one volt or so negative with respect to the cathode, and increases as the voltage is changed in the positive direction.

Grid-current Curves.

The grid-voltage/grid-current curves are given in Fig. 1 for two general purpose valves of the HL class, one having an indirectly heated cathode, and the other an ordinary filament. Although the constants of the two valves are not quite the same, the grid-current curves show clearly the main difference between the two

types as regards the critical voltage at which grid current commences. In each case the anode potential was maintained constant at about 100 volts.

As the grid voltage is changed from a high negative value towards a more positive value, grid current commences at -1 volt for the A.C. valve, and at zero voltage for the filament valve. It should also be noted that the grid-current curve for the A.C. valve has a much sharper bend, and that the current increases much more rapidly than for the filament valve. This means that the valve with the indirectly heated cathode has a much lower differential resistance from grid to cathode than the other. The efficiency of a valve as a rectifier depends on both the sharpness of the bend and the steepness of the grid-current curve.

As the effect of rectification has to be transferred to the anode circuit of the valve in order that the low-frequency component variations of a modulated wave shall be either passed on to a succeeding amplifying valve or delivered to some other piece of apparatus such as a pair of telephones, special arrangements have to be made in the grid circuit for effecting this transference from grid circuit to anode circuit. If a modulated alternating voltage were to be applied in the ordinary way between the grid and cathode, no rectification

would occur, even though grid current passes during the positive half waves and not during the negative halves. The grid current is made to charge a condenser of low capacity, connected in the grid circuit, to an extent depending on the amplitude of the high-frequency voltage set up across the preceding tuned circuit.

The usual arrangement for grid detection is shown in Fig. 2, where there is a tuned grid circuit, and C_1 is a condenser whose capacity depends on the type of valve in use and, to some extent, on the wavelength. The voltage variations are thus applied to the grid "through" the grid condenser C_1 . The anode circuit

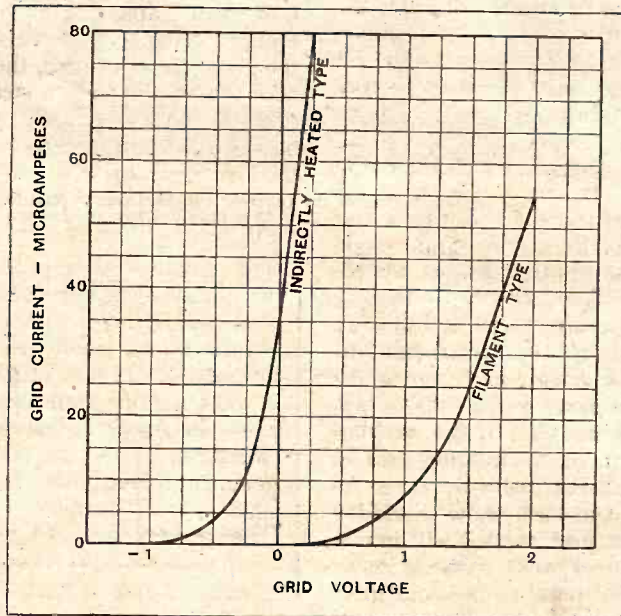


Fig. 1.—Grid-current curves for two representative general-purpose valves of the filament and A.C. type respectively.

Wireless Theory Simplified.—

is shown without any connected external impedance for explanatory reasons.

The mechanism of grid rectification is not so straightforward as that of anode bend detection, but the principle can be fairly simply explained in terms of one or two elementary experiments which can be carried out quite easily in practice. Suppose that a valve is connected up in the manner shown by Fig. 3, where the grid con-

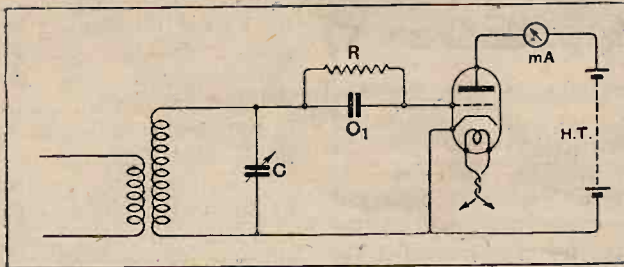


Fig. 2.—Normal grid circuit arrangements for grid rectification.

denser C_1 has a large capacity of 1 microfarad or more. By means of a two-way switch S_1 the potential of the left-hand plate of C_1 can be made either negative or positive with respect to the cathode according to whether contact is made at X or Y respectively, through the medium of the batteries E_1 and E_2 shown. For convenience let E_1 be -1 volt, and let E_2 be $+1$ volt. A second switch S_2 enables a high-resistance R to be connected directly across the grid condenser.

Suppose in the first place the switch S_2 is open, and that S_1 is over on contact X; and suppose further that the condenser is uncharged, so that its plates are at the same potential. Then the grid of the valve will be 1 volt negative with respect to the cathode, and a definite anode current will be indicated by the milliammeter mA. No grid current will flow.

Now imagine that the contact arm of S_1 is suddenly changed over from X to Y, with the result that the left-hand plate of C_1 becomes 1 volt positive. Since the condenser is as yet uncharged both sets of plates will still be at equal potential, and therefore it follows that the right-hand plate of the condenser and the grid of the valve will also become 1 volt positive with respect to the cathode, and the milliammeter will show a sudden increase of anode current. But grid current will immediately begin to flow from the grid to the cathode inside the valve, and so the right-hand plate of the condenser will rapidly lose its positive potential, the anode current falling back towards its original value. The fact that one plate of the condenser is falling in potential whilst the other remains at constant potential means that the condenser is acquiring a charge, the grid current being the charging current.

After an interval depending on the capacity of the condenser the voltage on the grid side will have fallen to the voltage at which grid current just ceases, and no further change will take place. Suppose that it falls back to -1 volt, as would be the case with the valve to which the left-hand curve of Fig. 1 corresponds; then the potential difference between the plates of the condenser will have become 2 volts, and the plate current will have its original value.

If now the switch S_1 is suddenly changed back from Y to X, so that the left-hand side of the condenser has its voltage brought back from $+1$ to -1 volt, a change of 2 volts, then simultaneously the grid side of the condenser will also have its potential dropped by 2 volts, that is, from -1 to -3 volts with respect to the cathode. But with this negative grid voltage no grid current will flow, and therefore the condenser will retain its charge, and theoretically the grid potential will remain at -3 volts indefinitely, the charge being permanently trapped in the condenser.

The Function of the Grid Leak.

By closing the switch S_2 a high resistance of R is connected across the grid condenser, and this provides a path along which the charge in the condenser can leak away. The resistance R is for this reason called a *grid leak* resistance. With S_2 closed, the grid will take up a steady potential at which the current through the grid leak is just balanced by the current from grid to cathode inside the valve for either position of the switch S_1 . If the grid-leak resistance is very large the steady grid voltage will be slightly to the positive side of the value at which grid current commences. The time constant of a condenser shunted by a resistance is proportional to both the capacity and the resistance, and therefore the higher the capacity of the grid condenser and the greater the grid-leak resistance, the longer will the grid potential take to settle down to a steady value after a disturbance.

If the switch arm S_1 were to be oscillated rapidly backwards and forwards between the contacts X and Y, the left-hand plate of the grid condenser would have applied to it an alternating voltage of square-topped wave shape, the maximum value in each direction being

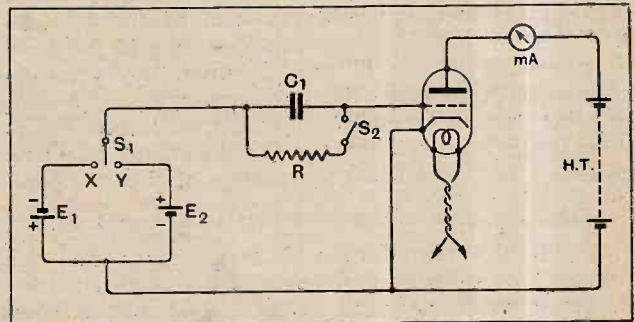


Fig. 3.—Special circuit for illustrating experimentally the principle of grid rectification.

one volt. As regards the left-hand side, the cycle of changes detailed above is now being repeated in rapid succession; but on the grid side the conditions are not quite the same because sufficient time does not elapse between each change to allow the grid to reach a steady potential. During each positive impulse of voltage the condenser is charged to the full extent, but during each negative impulse only a very small fraction of the charge has time to leak away through the grid leak resistance. The result is that the condenser remains charged so long as the impulses persist and the grid itself acquires a mean potential very nearly proportional to the amplitude of the

Wireless Theory Simplified.—

pulsations applied to the left-hand side of the grid condenser; and therefore the anode current will also take up a mean value depending on the amplitude of the pulsations.

Reverting now to the more practical circuit of Fig. 2, in which a high-frequency voltage is developed across the tuning condenser C, it will be realised that the same principles illustrated by Fig. 3 are involved; the fact that under actual conditions we are dealing with sine-shaped waves does not upset the argument. The main idea in grid rectification is that as soon as the grid voltage tends to rise above a certain critical value grid current at once flows and prevents to any appreciable extent further rise, the grid condenser being charged instead. The grid leak is then provided to allow the grid potential to return to its normal value when the oscillation ceases or to take up a mean value depending on the amplitude of the oscillation if it continues.

When the applied oscillation has a varying amplitude, as in Fig. 4 (a), the grid current has the effect of bringing all the positive peak values of the oscillation to practically the same level without reducing to any appreciable extent the actual "voltage swing" or double amplitude of the voltage oscillation. The actual voltage of the grid, therefore, varies somewhat, as shown by (b) in Fig. 4, so that the mean value of the grid potential taken cycle by cycle of the high-frequency variation follows the contour of the low-frequency modulation, and this effect is transferred by the usual action of the valve to the anode circuit, because the change of anode current is proportional to the change of grid potential.

Time Constant of the Grid Condenser and Leak.

For faithful reproduction it is necessary that the "mean" value of the grid voltage shall follow the low-frequency variations exactly. This ideal condition, however, cannot be fully attained in practice because the combination of grid condenser and grid leak possess a

time lag. This time lag has been shown to be essential to obtain rectification, and, therefore, for efficient rectification the *time constant* must be long compared with the time of one cycle of the high-frequency wave. But, on the other hand, a long time constant tends to smooth out or attenuate the highest note frequencies of the modulation, and so a compromise must be struck which gives moderately efficient rectification, and yet does not cause undue high-note loss.

If a charged condenser is shunted by a resistance, the former immediately begins to discharge through the resistance, and the voltage between the plates of the condenser begins to fall. The discharge current is, therefore, greatest at the start, and gradually tails off to zero after, theoretically, an infinitely long time. Now, the time constant of the combination is defined as the time in seconds in which the condenser would be completely discharged if the initial maximum rate of discharge were maintained.

The time constant in seconds is equal to the product of capacity in farads, and the resistance in ohms. Thus, in the grid circuit in Fig. 2, the product C_1R must be long compared with the time of one high-frequency period and yet short compared with one period of the highest note frequency. The grid leak resistance must be large compared with the differential resistance between the grid and cathode of the valve when the grid is positive, and is therefore determined chiefly by the type of the valve.

For a general-purpose valve of the A.C. type (power grid detection) a grid leak of about 0.15 megohm and a grid condenser of 0.0001 mfd. capacity have been found suitable for medium wavelengths. The time constant of this combination is 15×10^{-6} second, whilst the period of a 300-metre wave is 10^{-6} second, and that of a 5,000-cycle note is 200×10^{-6} second. In this instance the time constant is fifteen times as long as the high-frequency period and 0.075 of the 5,000-cycle period.

(To be concluded.)

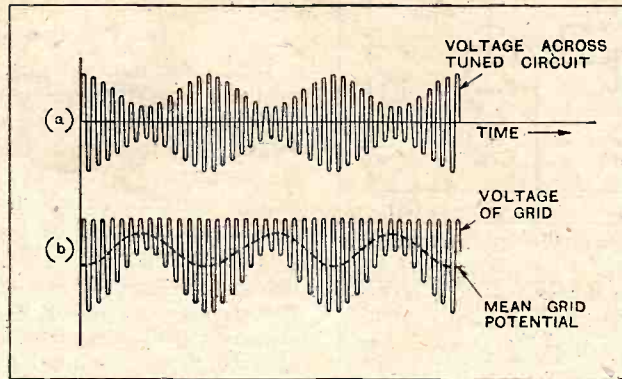


Fig. 4.—Diagram showing the principle of grid rectification under theoretically perfect conditions. In practice the positive peaks of the grid-voltage curve do not fall on a perfectly straight line as shown.

Kempes Engineer's Year Book for 1930. 37th annual issue, revised under the direction of the Editor of *The Engineer*. This standard source of reference for Civil, Mechanical, Electrical, Marine, Mining, and other Engineers, which was first compiled in 1894 by H. R. Kempe and W. Hanneford Smith, has been thoroughly revised and brought up to date in its present issue. A new section is devoted to wireless matters, including a short glossary of Technical Terms, Use-

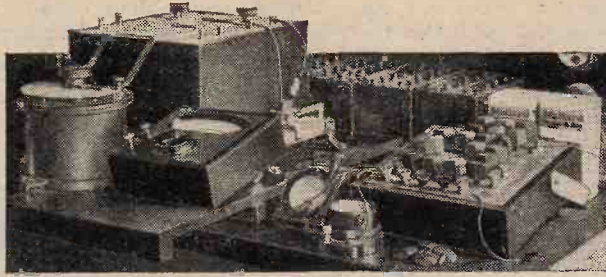
BOOKS RECEIVED.

ful Formulæ, Copper Wire Tables, Wavelength-Frequency and L.C. Tables, Charts of Resistance and Capacity, and of Reactance of Condensers at Radio and Audio-Frequencies.

Pp. 3040+xii+xliv. Published by Morgan Bros., Ltd., London, and Crosby, Lockwood and Son, London, price 31s. 6d.

The Selenium Cell, its Properties and Applications, by G. P. Barnard, with a foreword by J. W. T. Walsh, comprising Part I, The History and Chemical Properties of Selenium and the Construction of Selenium Cells; Part II, The Practical Application in Photometric Measurement, Photophony, Telephotography, Television, and numerous other purposes. Pp. 331, with frontispiece and 258 diagrams and illustrations. Published by Constable and Co., Ltd., London, price 35s. net.

INSULATORS TESTED



[5] VITREOSIL AND PYREX

Two Mechanically Sound Insulators with Good Dielectric Properties.

By W. H. F. GRIFFITHS, F.Inst.P., A.M.I.E.E.

BEFORE the introduction of Mycalex one had to use either Vitreosil or Pyrex for insulation if great geometrical permanence of structure was essential in a piece of low-loss wireless apparatus, notably in low-loss air dielectric condensers. Both of these insulators are hard and are, of course, unaffected by heat, since one is a fused silica and the other a glass. Vitreosil has a much lower dielectric loss than Pyrex, but where any degree of strength is required the latter material has to be employed despite its higher power loss, this being yet another case of the stronger material being the more imperfect electrically.

Vitreosil is pure fused quartz or silica and, as its name suggests, is non-crystalline or vitreous. It is prepared in various grades, transparent, translucent, and opaque, the differences being due to the shape and dimensions of bubbles in the material. The transparent quality contains practically no impurity, or bubbles, and is therefore the most suitable material electrically.

Its chief use as an insulator in radio work is for the insulation of air condensers, both variable and fixed, of the highest quality for precision measurements. When used for this purpose it ensures the relative geometrical permanence of the two plate systems, and it contributes scarcely anything to the losses of the condenser, but, being very easily fractured, extreme care has to be exercised, both in the construction of such condensers and in their transportation.

When viewing Vitreosil as an insulator one is rather apt to forget that one of its chief uses in radio work is

in the manufacture of envelopes for high-power transmitting valves, a use for which it is pre-eminently suited as it is not only capable of withstanding the high temperatures attained, but it can be raised to a much higher temperature than glass during the evacuation of the valve, thus facilitating the removal of residual gas.

It was stated above that Vitreosil, when used as the electrical and mechanical separator of the two plate systems of an air condenser, contributes scarcely anything to its losses. This is due to the fact that it is more free from dielectric loss than any other known material, as is indicated on the chart of Fig. 1. It is so much better, in fact, that it is often used for standards of capacity of negligible power loss against which less perfect materials (and condensers in which they are employed) may be compared. The value of power-loss factor given in the chart must be regarded as approximate only, in order to fix the position of the material relative to the other insulators.

At a wavelength of 300 metres the equivalent series resistance of the 250 $\mu\mu\text{F}$. air condenser of Fig. 2 would be decreased from 0.2 ohm¹ to 0.004 ohm if the ebonite insulators AA were replaced by similar pieces of carefully treated Vitreosil. This resistance is such a low

value that other hitherto negligible sources of loss, such as, for example, the conductor resistance of the plates themselves, can no longer be neglected, and so the resist-

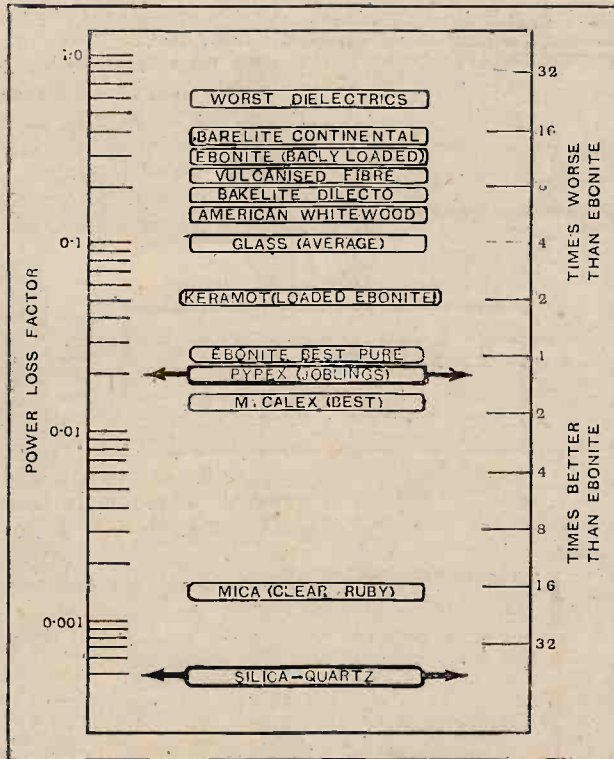


Fig. 1.—Chart of insulating materials showing relative power-loss factors.

¹ Assuming that 10 $\mu\mu\text{F}$ of the capacity is due to the field actually passing through the ebonite insulators.

Insulators Tested—Vitreosil and Pyrex.—

ance of the fused silica insulated condenser may not be quite reduced to this value. Such air condensers, however, have actually been constructed with an effective resistance of the order 0.01 ohm at this wavelength.

Vitreosil, then, is the nearly perfect insulator, but, unfortunately, as is usually the case with good insulators, it has great disadvantages. It fractures easily if pressure is applied unevenly to its surfaces when being clamped between metal parts, thus making it essential to have parallel and plane clamping surfaces which can be ensured only by the expensive operation of grinding and polishing.

Pyrex is much stronger and much less likely to fracture than Vitreosil. It is described by the manufacturers as a low-expansion borosilicate glass, and is, of course, unaffected by heat, has low thermal expansion, and is hard. From a mechanical point of view, therefore, it is

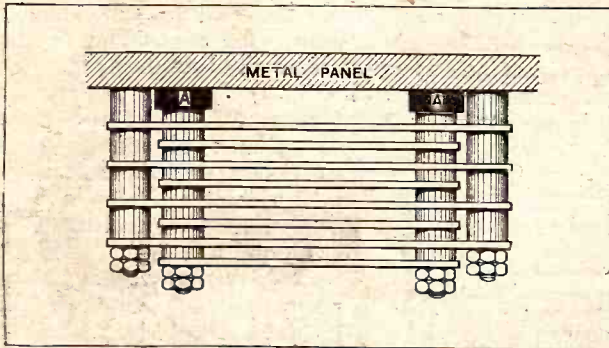


Fig. 2.—Standard air-dielectric condenser used throughout the series of tests.

EKCO L.T. ELIMINATOR FOR A.C. MAINS.

This unit has been designed to replace the L.T. battery, and will supply 2-, 4-, or 6-volt valves with rectified and smoothed current when connected to an alternating supply. The maximum current that may be taken from the unit is 1 amp., and the minimum is given as 0.2 amp. with 6-volt valves, or 0.3 amp. when the 2-volt type are used. From measurements made with the model submitted for test we found that the minimum currents, under the conditions given above, were 0.14 amp. and 0.24 amp. respectively.

The factor of safety allowed is of a high order, provided the instructions contained in the handbook, accompanying each unit, are followed carefully. A test was made on a 250-volt 50-cycle A.C. supply with a resistance connected across the output terminals on the unit to reproduce the "load" that would be imposed by a three-valve set incorporating a S.G. H.F. valve, a detector and an output valve, in the 2-volt class. The total current was computed to be 0.66 amp. From the instructional handbook it was found that the wander lead should be plugged into the fourth socket down on the left-hand side of the control panel. This provided a current

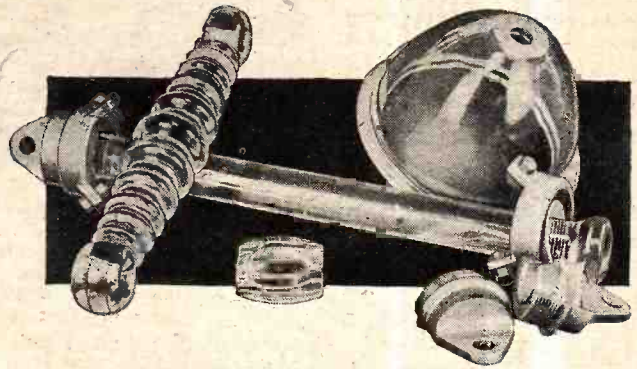
LABORATORY TESTS.**New Apparatus Reviewed.**

range of from 0.55 to 0.8 amp. at 2 volts nominal. From measurements we found that, with the L.T. vernier in the minimum position, the current flowing was 0.47 amp. and the volts across the "load" 1.4, while at the maximum setting the current was 0.7 amp. and the voltage 2.1.



Ekco L.T.1. low-tension eliminator for A.C. mains incorporating Westinghouse rectifier.

better suited than Vitreosil for the separation of the two plate systems of an air condenser. Moreover, although its dielectric loss is much greater than that of Vitreosil,



Specimens of Pyrex insulators used for supporting conductors carrying H.F. currents.

it is a sufficiently low-loss material for use in all but special cases, its power-loss factor being much the same order as that of good ebonite, as will be seen upon reference to the chart of Fig. 1.

Pyrex is homogeneous and of a continuous uniform structure, and so does not depend for its insulating properties upon surface glaze, as is the case with some materials such as, for example, porcelain. Like Vitreosil, Pyrex has to be ground if used in the construction of scientific instruments, but it is admirably suited for moulded aerial insulators, for it does not absorb water and is sufficiently strong and light for use even on high-power transmitting aerials.

A voltmeter is fitted as a means of checking the adjustment, but we found that on the model examined this read slightly low. Where a high-grade instrument is available it would be worth while to use this as a final check.

A further test on a 1-V-1 set, with pentode output, showed that the smoothing of the L.T. is adequate for all practical needs. A Westinghouse metal rectifier is employed, and the smoothing equipment consists of chokes and large-capacity electrolytic condensers. A lamp holder is fitted on one side of the case, and the current to this point controlled by the "on" and "off" switch. If the H.T. eliminator is plugged into this point it obviates the need for two separate mains connections and also simplifies the control, as both units can be operated by the switch on the L.T. unit.

The makers are Messrs. E. K. Cole, Ltd., Ekco Works, Leigh-on-Sea, Essex, and the price of the L.T.1 unit is £8 15s.

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VARLEY 300-HENRY CHOKE.

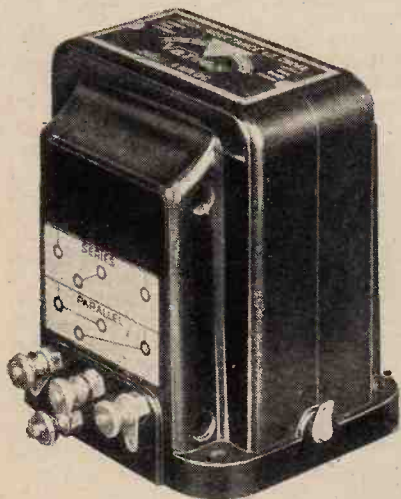
The practice of feeding an L.F. transformer *via* a condenser and deflecting the steady anode current through a resistance will become increasingly popular as the power grid detector circuits are developed. This method is essential with certain

types of L.F. transformers, especially those incorporating a nickel-iron alloy core. The comparatively high value of anode resistance often required demands a higher battery voltage than is always convenient, and to provide an adequate impedance to replace the resistance "Varley," Kingsway House, 103, Kingsway, London, W.C.2, has developed a low-frequency choke with a nominal inductance of 300 henrys. This value is attained, however, with no direct current flowing through the winding. It is stated that an inductance of 200 henrys is available with 8 mA. of D.C. passing—the normal anode current of a power detector. The ohmic resistance is given as 3,000 ohms.

INDUCTANCE OF VARLEY 300 HENRY CHOKE WITH WINDINGS IN SERIES.

D.C. in mA.	Superimposed A.C. in mA.	Inductance, in Henrys.
0	0.56	308
2	0.625	270
4	0.71	241
6	0.77	225
8	0.81	214
10	0.84	205

A sample choke was tested, and the inductance measured at a frequency of 50 cycles, the above interesting values being obtained.



Varley high-inductance L.F. choke giving 308 henrys with no D.C. flowing and 214 henrys with 8 mA. of D.C.

The winding is split into two halves, and by suitably connecting the four terminals provided the sections can be arranged in series or in parallel. The above measurements were made with the series connection.

Some further measurements were made with the two sections in parallel, and the following inductance values reached. The A.C. voltage across the choke was reduced so that the A.C. current attained approximately the same level as in the first test.

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INDUCTANCE OF 300 HENRY CHOKE WITH WINDINGS IN PARALLEL.

D.C. in mA.	Superimposed A.C. in mA.	Inductance in Henrys.
0	0.56	69.6
4	0.595	64.0
8	0.665	58.0
12	0.725	54.0
16	0.77	51.0
20	0.8	48.5
24	0.83	46.2

The policy of sectionalising the winding also provides a centre tap, should the occasion arise to utilise it. It is stated that the impedance of the choke remains inductive up to 800 cycles per second, from which it would appear that the distributed capacity is of the order of 0.000145 mfd.

The price of the choke is 25s.

o o o o

FERRANTI MAINS TRANSFORMERS.

Messrs. Ferranti, Ltd., Hollinwood, Lancs, have recently placed on the market a mains transformer designed especially for use with the Marconi and Osram U9 rectifying valve. With this valve and Ferranti transformer a smoothed D.C. output of 250 volts up to 50 mA. of current is available, and it is, therefore, eminently suited for supplying H.T. to the average type of receiver.

The price of the Model E.V.4, as it is called, is 32s. It is finished in the usual Ferranti style, being totally enclosed, and the insulation is tested to withstand 2,000 volts.

o o o o

HEGRA "DYNAMIK" LOUD SPEAKER.

Produced in the form of a complete chassis this new product of Geo. Becker, Ltd., 39, Grafton Street, London, W.1, has a redesigned balanced armature movement, with twin permanent magnets. The new movement is non-adjustable, and will handle considerably more power, yet its sensitivity is no less than the earlier adjustable unit, the performance of which was above the average in this respect.

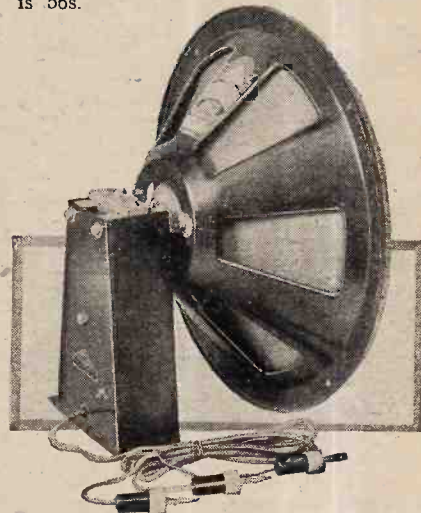
The reproduction of both speech and music is excellent, and the general effect was indistinguishable from the moving-coil loud speaker with which it was compared. A closer examination of the frequency response revealed a practically uniform output from 500 to 6,000 cycles with minor resonances at 1,500 and 2,500 cycles and a slight depression at 4,000 cycles. From 400 down to 150 cycles the output is at a higher level, but the increase is not sufficient to warrant comparison with the resonance which occurs in many loud speakers in this band. The response from 100 down to 50 cycles is less than that of the average moving coil, and there is some evidence of frequency doubling at 50 cycles, but the reduction of output is not sufficient to mar the general effect.

There are three alternative methods of connecting the multiple leads from the

unit windings giving a range of impedances suited to most output valves in current use:—

Frequency.	Impedance (ohms).		
	Low.	Medium.	High.
50	750	1,270	2,070
100	782	1,350	2,610
200	1,010	1,630	3,690
400	1,260	2,160	5,020
800	1,970	3,340	8,600
1,600	3,190	4,780	13,150
3,200	4,800	7,820	22,300
6,400	5,530	8,740	—

Taking all things into account we have no hesitation in placing this instrument in the highest class of balanced armature cone loud speakers. The price is 56s.



Hegra "Dynamik" cone loud speaker chassis.

TRADE NOTES.

J. H. B., Ltd., 29, Farringdon Street, London, E.C.4, who are the sole concessionaires in this country for the "Tekade" wireless products, announce that the name of the company has been changed to Tekade Radio and Electrical, Ltd. No change is made in the company's address, and the telephone number is the same, viz., Central 2482.

o o o o

Catalogues Received.

Messrs. Wright and Weaire, Ltd., 740, High Road, Tottenham, London, N.17.—Illustrated broadsheet dealing with "Wearite" components for the coming season, 1937-1938. o o o o

Messrs. Ferranti, Ltd., Hollinwood, Lancs.—Illustrated list No. Wd. 412, dealing with push-pull output transformers. Heavy duty types O.P.C.X and O.P.C.XX, capable of handling primary currents of 200 and 400 milliamps. respectively, and designed for public address type of equipment, are now listed.

BROADCAST



BREVITIES

By Our Special Correspondent.

A Site for Scottish Regional.—News from Moorside Edge.—That Referendum.—Copyright News.—“Proms” Time-table.—More about “Broadcasting House.”

Western Glen.

Yet another locality nestling in the obscurity which once characterised Daventry, Brookmans Park and Slaithwaite, will soon receive the B.B.C.'s passport to international fame. Unless the present trend of events is entirely deceptive, Wester Glen, on the Slamannan Road near Falkirk, will shortly be proclaimed as the chosen site for the Scottish Regional Station.

Tenders Invited.

I understand that tenders have already been invited for the construction of a station at this spot. Further examination of the subsoil appears to have convinced the engineers that it is suited to the burden.

The B.B.C. is anxious to waste no time after negotiations have been completed. Once in possession of estimates, the Corporation will be able to give the order to “go ahead” immediately the land is acquired.

A Neglected Country.

This desire to give Scotland a regional station at the earliest possible moment is highly commendable, but is no more than Scotland deserves. So far as broadcasting is concerned, Caledonia can be forgiven for being “stern and wild” at the way in which she has been neglected. It would surprise me to receive a single letter of satisfaction from any listener living north of the Grampians, except in the immediate neighbourhood of Aberdeen.

Inverness, the capital of the Highlands, struggles with the erratic signals of 5XX.

Northern Regional Tests.

Meanwhile, no time is being lost at Moorside Edge to ensure that the first test signals from Northern Regional shall go out in October. The probability is that a regular service with a single wavelength may be inaugurated before the end of November. A dual transmission service should follow towards the end of January.

Attacking the Soloist.

The world's trade depression seems to have infected the Savoy Hill letter-bag. The latest grumble concerns the appearance of soloists in orchestral and mili-

tary band performances. Recent letters disclose the existence of a school of thought which considers that an hour's band concert should contain nothing but band items. “We don't want soloists butting in,” is a typical comment.

Two Considerations.

In dealing with this problem the B.B.C. is guided by two considerations. First, there is the well-tryed theory that the ordinary listener welcomes variety; secondly, there is the ordinary bandman's need of a “breather.” Listeners may sometimes forget that a broadcast band or orchestra labours under conditions very different from those in an open-air bandstand or concert hall.

FUTURE FEATURES.

- National (261 and 1,554 metres)**
 SEPTEMBER 7TH.—Brass band concert from Manchester.
 SEPTEMBER 8TH.—Promenade concert.
 SEPTEMBER 9TH.—“Ingredient X,” a play by L. du Garde Peach.
 SEPTEMBER 10TH.—Running commentary on the St. Leger.
 SEPTEMBER 11TH.—Promenade concert.
 SEPTEMBER 13TH.—“Gala,” on open-air diversion, created by Tyrone Power.
- London Regional.**
 SEPTEMBER 7TH.—Military Band concert.
 SEPTEMBER 8TH.—Vaudeville programme.
 SEPTEMBER 9TH.—Promenade concert.
 SEPTEMBER 11TH.—“Under the Spanish Moon,” a programme of Spanish songs and serenades.
 SEPTEMBER 12TH.—Gala.
 SEPTEMBER 13TH.—“The Ridgeway Parade” (1), by Philip Ridgeway.
- Midland Regional.**
 SEPTEMBER 8TH.—Musical Comedy programme.
 SEPTEMBER 10TH.—Three Choirs Festival, relayed from Hereford.
- North Regional (Manchester).**
 SEPTEMBER 10TH.—“Songs that made History,” feature programme.
 SEPTEMBER 13TH.—Liverpool and Manchester Railway Centenary Celebrations relayed from St. George's Hall, Liverpool.
- Belfast.**
 SEPTEMBER 9TH.—“The Constant Lover,” a comedy by St. John Hankin.
 SEPTEMBER 10TH.—The Music of Handel.
- Glasgow.**
 SEPTEMBER 10TH.—“His Own Country,” a play by C. Stewart Black.
 SEPTEMBER 12TH.—“The Rising of the Moon,” a play by Lady Gregory.
 SEPTEMBER 13TH.—Excerpt from concert arranged by Greenock and District Burns Club in connection with Burns Federation Conference.
- Cardiff.**
 SEPTEMBER 7TH.—British Association Service relayed from Bristol Cathedral.
 SEPTEMBER 10TH.—A Sibelius programme.

The Ventilation Question.

Even in a big studio the air quickly becomes vitiated when occupied by a large body of performers. When, as in the case of a military band, the performers are gulping air like suction fans, the best ventilation system in the world is severely taxed.

It is now the usual rule to introduce one soloist when the band performance lasts one hour. For longer periods a second soloist is engaged.

That Referendum.

Savoy Hill is still flirting with the notion of a national referendum to discover whether or not the present programme scheme is a vast mistake.

The idea roused enthusiasm a few weeks ago at the London School of Economics apropos a question as to the demand for adult educational broadcasts. Since then the opinion has gained ground that a referendum might just as well be applied to the programmes as a whole, and there seems little doubt that eventually some effective scheme must be arranged.

No Canvassers?

A house-to-house canvass has been suggested, but it is doubtful whether the British public would welcome this plan. Too many canvassers already darken our doors, and the insinuation of another official foot on the doormat might upset the critical pronouncements of many a householder who would afterwards regret that his hastily expressed opinion of the broadcasting service had been accepted too literally.

Making Use of the Licence.

Putting on one side the ineffectual method of judging listeners' requirements by the few letters received at Savoy Hill, we are left with the system which has met with success in Denmark, i.e., the printing of a questionnaire on the licence forms.

Even a Britisher will express himself in writing when given a dotted line.

Britain Talks to America.

Another milestone on the road to international broadcasting is reached by the completion of arrangements for a number of Sunday afternoon broadcasts by prominent people in this country to

listeners on the Columbia Chain in America.

The series will open on Sunday, September 14th, with a talk at Savoy Hill by Mr. John Masefield, the Poet Laureate. Among other speakers will be Sir Oliver Lodge, Lord Beaverbrook, Sir Herbert Samuel, the Marquis of Zetland, Mrs. Mary Agnes Hamilton, Viscount Astor, and Mr. H. G. Wells.

The talks will be transmitted at 5.30 p.m. (B.S.T. and G.M.T.) via the Transatlantic Telephone Service, and will therefore be inaudible to British listeners. The B.B.C. lends a studio.

Copyright News.

Misunderstanding still exists, apparently, regarding the copyright of the B.B.C. news bulletins. It has come to the notice of the Corporation that on many occasions during the summer, Test Match scores and other news items broadcast have been displayed at country fêtes and similar gatherings. Besides reacting harmfully on the sales of local newspapers, this practice is definitely forbidden in the terms of the wireless receiving licence.

No More Studio Opera?

Opera lovers will be glad to learn that the B.B.C. has concluded arrangements for relaying at least four performances by the Covent Garden Opera Company during its autumn tour in the provinces. No dates are yet fixed.

Less welcome, perhaps, will be the news that the B.B.C. has as yet made no plans for a series of operatic performances from the studio, which have been a prominent feature of other winter seasons.

The "Proms" Time-table.

Promenade concerts during September will be broadcast as follows: National: September 4, 6, 8, 11, 12, 16, 17, 19, 24, 25, 27 and 29. Regional: September 3, 5, 10, 13, 15, 18, 20, 22, 23, 26 and 30.

In October National listeners will hear "Proms" on the 1st and 3rd, and the final concert on October 4th; and Regional on October 2nd.

No Malice Aforethought.

My apologies to the B.B.C. for last week's misprint: "Brookmans Bark."

Dance Orchestration for Broadcasting.

Ambrose and his orchestra have been holiday-making since their last broadcast from the May Fair Hotel at the end of July. In the meantime the "arrangers," as they were described to me, have been busy making a number of special orchestration for broadcasting, some of which

we may expect to hear on Saturday next, September 6th, when Ambrose and his players resume regular weekly broadcasts from 10.30 to midnight.

The Silly Season.

From a London evening paper:—
"I thought how much the listener's enjoyment of the Proms could be enhanced by a running commentary. I felt I would have enjoyed doing it myself, explaining to listeners just those sudden

an advanced skeleton stage, the engineers and programme compilers are beginning to collaborate on the details of interior design.

One innovation already decided upon is the provision of better facilities for dealing with news.

The Harassed Announcer.

No one who listens regularly to the reading of news bulletins at Savoy Hill can fail to notice that there are times when the announcer is not entirely at his ease. Occasionally there are subdued whispers, proclaiming that a second person has crept into the studio with a "stop press" item or an S.O.S.

Duplicate Studios.

Two studios will be used by the news organisation at Broadcasting House, and these will be linked together by an editorial room with communicating windows opening and shutting like the service hatches in the best suburban villas. The news editor will receive the bulletins while sitting in his room, and will stealthily pass them through to the announcer. It is hoped that this plan will save much running about.

The Nerve Centre of Broadcasting.

The seventh and eighth floors of Broadcasting House will contain the nerve centre of British broadcasting, for here the control panels will be installed. Many changes are to be made in the handling of "control" with the object of simplifying the interchange of programmes and landlines. Those who have spent an hour in the Savoy Hill control room and watched the engineers juggling with the "Nat," "Reg," "Leeds," "Gloucester" and other lines, will sympathise.

A Talk from Geneva.

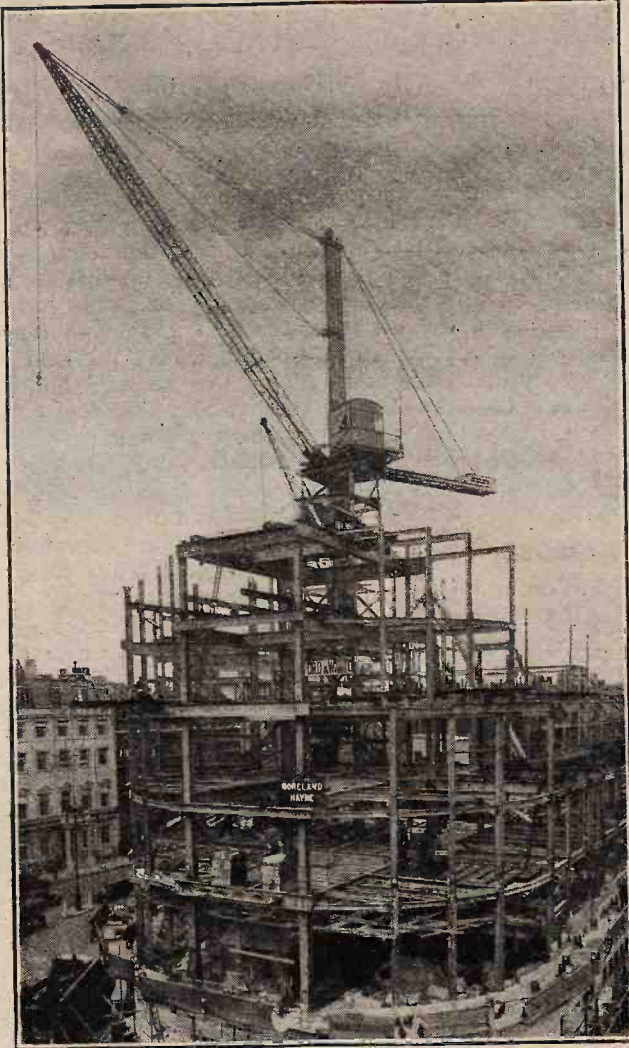
A talk on the League of Nations Assembly will be relayed from Geneva on September 18th.

More "Diversions."

Manchester is responsible for a "Diversions" programme to be broadcast Nationally on September 9th, in which the Mersey by night will be a feature. Listeners will also be taken to a cotton mill, a fun fair and a circus.

London will provide a "Diversions" programme in October, and thereafter listeners may expect to hear one of these entertainments every month throughout the winter.

The monthly interval should allow time for the development of original stunts.



"BROADCASTING HOUSE." The scene in Portland Place as it appeared to the camera last week. The large studio in the sub-basement already exists in skeleton form. It will be almost a replica of the gallery studio at Manchester.

silences, the little bursts of noise, the occasional inaudibility of the music, at any rate on my set, which set the listener in wondering.

"To the highbrow objection that nobody should talk while music is being heard I would retort that occasional explanations would assist hearing, and that some voices go very well with music."

Improving the News Service.

With "Broadcasting House" reaching



Effective Screening





Part II.—How Alternating Currents Penetrate a Conductor.

By R. L. SMITH-ROSE, D.Sc.

(Concluded from page 192 of previous issue.)

IN Part I of this article the valuable screening property of a well-bonded cube of netting was explained. Here we have a type of screen which is in a very practicable form for the purpose of screening whole sets of receiving apparatus, for it is a comparatively simple matter to cover the interior of a receiving-room with wire netting. For example, a wooden hut containing sets of receiving or measuring apparatus can be screened in this manner by simply lining the inside of the hut with wire netting. For most purposes the ordinary one-inch mesh size will be suitable, but if greater efficiency of screening is required the additional cost of the half-inch or even smaller size may be justifiable.

How to Screen a Room.

The netting is simply attached as a lining to the interior (walls, floor, and ceiling) of the hut or room, no insulation being required. The netting on the floor can be conveniently covered with linoleum to save wear on the wire, and also to facilitate sweeping the floor. Care must be taken to bond over the slits which will occur where adjacent strips of the netting meet, so as not to leave gaps in the conducting loops in any place. Windows can usually be covered over directly without any special modification.

In the case of doors, the whole wall containing the closed door can first be covered and then the netting can be slit round the door to permit of its opening. Since these slits will form only part of the wall, they will cause practically no loss of screening efficiency, but as an additional precaution a simple kind of spring contact can be arranged to short circuit the gap at frequent points around the door when it is closed.

The photograph reproduced in Fig. 8 shows a view of a room which has been completely screened with galvanised iron wire netting of half-inch mesh. Special spring clips are arranged around the door opening as shown, to ensure efficient contact, and care has been taken to keep all electric light wires, gas pipes, etc., outside the screen; for, as explained in the first instalment of this article, the screening properties of the cage will be spoiled if any metallic conductor is brought inside without being connected to the screen at its point of entry.

The room shown in Fig. 8 is used to contain a wireless receiver upon which overall performance measurements

are being made, and it is necessary to shield the receiver from any outside interference. Tests carried out on a wavelength of 360 metres have shown that the field inside this room is only 5 per cent. of that prevailing outside, so that the screen may be said to have an efficiency of 95 per cent. If it is required to reduce the field throughout the enclosed space to less than 3 per cent. or 4 per cent. of its initial value, it is necessary to take some additional precautions.

As mentioned above, the screening efficiency depends upon the obtaining of a high ratio of reactance to resistance, and this can be obtained by using solid metallic sheet in place of the wire netting or gauze considered above.

Since we are considering the screening of a comparatively large space from the effects of electromagnetic waves radiated from a distant source, the incoming unshielded field is sensibly uniform over the whole space, and only a small portion of the path of the magnetic field will be contained within the metal of the screen. The permeability of this metal will thus be of small importance in determining the reactance of the current loops, and the magnitude of the current will depend chiefly on the conductivity. Hence in the case where it is desired to screen a large space very completely from incoming electromagnetic waves, a complete enclosure of solid sheet copper would appear to be the best arrangement to employ. While the writer can recall one instance of a commercial receiving station where such an enclosure was employed, it is not usual to require such drastic screening from incoming waves. For most practical purposes, such as the avoidance of direct pick-up on the receiving amplifier of a direction-finder, it is sufficient to employ a containing box of tinned iron sheet, which has the advantage of being cheap and easily obtainable as a covering to ordinary plywood. As an alternative, such a box may be constructed of solid aluminium sheet of sufficient thickness to be self-supporting. As will be seen below, other considerations, such as the avoidance of gaps at joints in the screen, enter into the design of screening boxes and may seriously affect the choice of materials.

Screening a Source of Oscillations.

We have so far confined our attention to the screening of an enclosed space from an electromagnetic wave arriving from a distant source. In a wireless receiver,

Effective Screening.—

however, we generally desire in addition to avoid effect from one stage to another, and possibly also to ensure that a local oscillator does not induce an electromotive force into parts of the receiving circuit where it is not desired. In these cases the electromagnetic field we are endeavouring to screen arises from a comparatively near source, such as the inductance in the anode circuit of one stage, and the direction and intensity of the field will vary greatly over the surface which is to be occupied by the screen; in fact, it is quite possible to have the total primary field through the whole surface of the box equal to zero while its magnitude at many points may be sufficiently great to cause very undesirable effects in a neighbouring box or compartment. In this case what is really required is something in the form of local screening, which can be obtained by the eddy currents set up in the sheets of the metal. These eddy currents actually flow within the thickness of the metal, so that the path of the secondary magnetic field is largely an all-metal path, and the permeability of this metal will now affect the result obtained. The problem has, in fact, now become

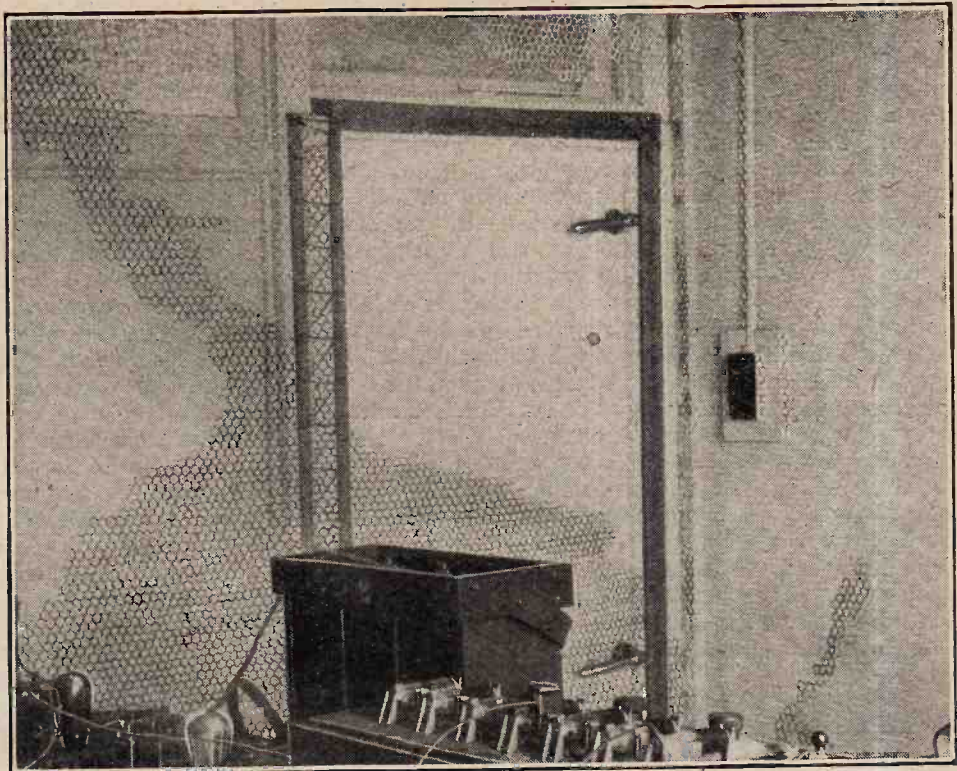


Fig. 8.—A corner of an experimental room lined throughout with galvanized iron wire netting.

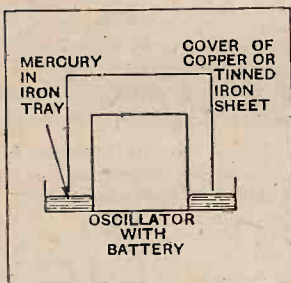


Fig. 9.—Experiment to show that screening is not complete until the screening box is closed by the mercury seal.

linked up with that of the penetration of alternating currents into a conductor on the basis of the well-known "skin effect" formula. From this formula it can be shown that the screening is the more effective the greater the ratio of the permeability to the resistivity of the conductor. Now, although the resistivity of iron is several times that of copper, it is possible at medium and low radio-

frequencies for the ratio of permeability to resistivity to be greater for iron than for copper, in which case iron would be a better metal to use for the complete screening of small spaces by the construction of closed boxes. This superiority can be nicely demonstrated by an experiment which can easily be carried out with the aid of a valve oscillator in the neighbourhood of a sensitive receiver.

Take any form of low-power valve oscillator, operating from, say, a six-volt battery, and place it in a shallow iron tray, which is then filled with mercury to a depth of about half an inch. Next construct two metallic boxes, without lids, and of a size to cover just easily the oscillator and rest on the bottom of the tray (see Fig. 9). One of these covers should be made of tinned iron sheet of about 2X gauge, and the other of copper sheet of the same thickness.

With its cover removed, adjust the oscillator to function on a suitable wavelength and tune in the resulting continuous wave on a sensitive receiver. It will probably be found that the resulting beat note is very loud and can be heard several yards from the telephones, even when the oscillator is placed at a distance of roof-top from the coil receiver.

An Interesting Experiment.

Now take the tinned iron box and place it gradually over the oscillator in the tray of mercury. As the box begins to envelop the oscillator it will be found that the intensity of the beat note in the telephones rapidly decreases, and it will be desirable to move the oscillator and tray up to within a foot or two of the receiving coil. In this position the note in the telephones will still be distinctly audible so long as a gap remains between the open end of the box and the mercury; but immediately the gap is closed and metallic contact is made over the whole of the open end of the box, the signal suddenly becomes inaudible. If the box is raised at one side only the signal suddenly reappears as soon as the

Effective Screening.—

surface of the mercury breaks contact with the metallic edge of the box. This effect is most marked and demonstrates in a very interesting manner the necessity for good metallic contact at all edges if anything approaching complete screening is to be attained.

A word of warning is necessary here, to the effect that mercury has a very destructive action on solder, and the seams of the boxes should be carefully inspected at times to make sure that they are still adhering together. A more satisfactory job for experiments of this nature is to utilise iron boxes with the joints welded over. If now the iron box be removed and the copper box placed over the oscillator it will be found that the signal in the telephones can still be heard when the box is resting on the tray and its open end is immersed in the mercury to the depth of half-an-inch.

Similar results will be obtained if the oscillator is placed inside the box and a metallic lid is soldered down all round. Such experiments are rather laborious, but they are a good test of the skill of the tinsmith, since, in the case of the iron box, it will be found that a gap or a "dry soldered" joint as short as half an inch will make all the difference in the ability to detect an external field from the oscillator.

The Practical Design of Screening Boxes.

These experiments show, therefore, that it is possible to screen a valve oscillator completely only by placing it inside a sealed box of tinned-iron sheet of sufficient thickness to prevent the direct penetration of the high-frequency magnetic field through it. In this respect iron is found to be far superior to copper, a result which is in complete accordance with the theory given very briefly above.

Although it is very difficult to make quantitative measurements, it can be deduced that the somewhat drastic screening methods mentioned above result in a reduction of the field intensity to about one-millionth of its original value.

In considering the application of the above principles to the practical design of screening boxes for oscillators or receivers, two further points must be borne in mind. The first concerns the increase in resistance of a coil forming part of a tuned circuit when a sheet of metal is brought up close to it. From the transformer theory which is applicable to such a case, it is evident that the increase of resistance of the coil is proportional to the mutual inductance with the sheet and also upon the resistivity of the metal forming the sheet. To avoid unnecessary increase in resistance of a coil which it is desired to screen from a neighbouring coil or circuit, it must either be kept at a reasonable distance from the screen or the latter must consist of material of high conductivity. It is generally considered that if a coil can be kept at a distance comparable with its own dimensions from the sides of the screening box or compartment, then iron sheet may be used with its accompanying advantages of low cost and high efficiency. If, however, the coil must be placed with one or both ends in close proximity to the screen, then these advantages must be sacrificed and copper employed for the material of the screen. Even in this case, however, reasonable separation of the coil from the screen should be allowed. Where it is practicable from other points of view it will naturally be advantageous to employ toroidal or other coils with a low external field.

The second point referred to above concerns the use of screens at audio-frequencies, in which case screening by eddy currents is not very simple. Fortunately, it is usual to have closed iron circuits with comparatively small leakage flux at these frequencies so that the magnetic field to be screened is very small. The "skin effect" formula indicates that to obtain the same screening at 100 cycles per second as is obtained at one million cycles per second by copper sheet $1/3$ cm. thick would require a thickness of some 26 cms. The alternating electric field from such stages will, however, be effectively screened, as was explained at the beginning of this article.

CORRESPONDENCE.

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

Correspondence should be addressed to the Editor, "The Wireless World," Dorset House, Tudor Street, E.C.4, and must be accompanied by the writer's name and address.

EMPIRE BROADCASTING.

Sir,—It is interesting to read in the Correspondence columns of your journal of the persistent demand for an Empire broadcasting service. Undoubtedly this is a long-felt want, and there are many thousands of people in the Empire who would be willing to contribute directly or indirectly to the upkeep of an efficient short-wave service.

For instance, listeners in India, apart from Calcutta and Bombay, have to depend entirely on short-wave reception for eight months in the year, and consequently have to wait till nearly midnight here for programmes.

Enthusiasts are grateful for the services of G5SW, PCJ, and Zeesen, but feel that the time is overdue for a better service from our Mother country, which doubtless would be a big stimulus to the wireless trade, as there are many would-be listeners to programmes from England at a reasonable hour here.

Simla, India.

D. W. GROVE.

RESPONSE CURVES.

Sir,—The article, "Response Curves," by Professor C. F. Jenkin, published in *The Wireless World* for August 20th, contains some references to the effect of connecting an aerial to a filter circuit. The fact that in one passage there is an implied reproach of my neglect to allow for the aerial in my own more theoretical articles on filters gives me, I think, the right to ask the favour of a few inches of your Correspondence columns.

One page 165, col. 1, line 8, Professor Jenkin says that "the coil in the first filter circuit has (as is usual) fewer turns than that in the second circuit, and the aerial is coupled to the first circuit, which affects its tuning."

I am ready to admit that it is usual to have fewer turns in the aerial coil when single-tuned circuits are used; filters are so new at present that the term "usual" can hardly be applied, but it is quite definitely *wrong* to have fewer turns in the first coil. If the aerial is correctly coupled *more* turns would be

needed if no trimming condenser were used, for a correctly coupled aerial introduces less capacity into the first circuit than the valve and valve-holder introduce into the second. The correct procedure, of course, is to use identical coils, tap the aerial into the first coil, and shunt the first tuning condenser with a trimmer.

The circuit diagram accompanying the article shows that Professor Jenkin connected the aerial, through a small condenser, to the top end of the first coil. He uses coupling condensers varying from 50 to 200 $\mu\mu$ F., and implies that this is the order of the capacity load transferred to the coil in normal conditions. With correct connections the first figure is high, the second fantastic.

If the aerial is tapped into the coil so that, say, one-third of the total turns lie between aerial and earth, the transferred capacity is one-ninth that of the aerial itself—perhaps, therefore, 30 to 35 $\mu\mu$ F. A tapping somewhere between one-third and one-quarter is usually best from the point of view of signal strength with a full-size aerial; if a smaller aerial is used more turns must be included in the aerial circuit, but as the aerial itself then has a smaller capacity the transferred capacity remains small.

It was after reasoning on these lines that I made no reference to transferred aerial capacity in my articles; the matter was not forgotten, but was gone into, found negligible in magnitude, and deliberately omitted.

A. L. M. SOWERBY.

MICROPHONE AUTOCRACY.

Sir,—There used to be a silly practice of people shouting into the microphone at dance halls, which was very rightly faded out; but for a sample of autocratic suppression at the other end of the scale I think the following would take some beating. On Wednesday, August 13th, Billy Mason was broadcasting dance music from the Café de Paris, and about five minutes before the close-down he said it was his last broadcast to the British public for the present, and he wished to thank his many listening friends for their kind wishes, and he hoped to have the honour of broadcasting to them again, all the boys . . . here he was faded out until he had finished, when the music was brought in again. I don't know what those who had a particular affection for Mason's band thought. I know what I thought. The close-down was announced by the announcer who says "Good-night" as though he were dismissing a lot of disobedient children; evidently it is even foolish to give the public the tone of voice most of them would appreciate.

Very often after the close-down I say: "Now let's go over to America for half an hour and listen to a cheery voice for a night-cap."

T. CLARK.

South Chingford.

INTERFERENCE WITH RADIO RECEPTION.

Sir,—With reference to my letter of July 14th re the above, an incident has come to my knowledge which shows what I may term the public-spirited way in which some firms deal with interference which may be caused by apparatus of their make. I cannot do better than give you an extract from a letter received from Messrs. J. and E. Hall, Ltd., makers of refrigerating machinery, etc., Dartford Ironworks, Kent:—

"We have had on other occasions similar complaints, and to overcome the trouble have fitted a condenser across the motor armature. This unit we have obtained from the Dabulier Condenser Company, who supply a condenser mounted in a cast-iron case specially designed for this purpose. We are ordering one immediately for earliest possible delivery consigned to your address, and we shall take it as a favour if you will arrange to have it fitted in circuit on our behalf."

I am sure if this spirit were universal a good deal of the avoidable interference would be eliminated.

JAMES NELSON,
Institute of Wireless Technology.

RE BROADCAST PROPAGANDA.

Sir,—Apropos this discussion I must emphatically disagree with Messrs. Munn and Rampton that the B.B.C. need more money.

Only a few days ago, following a recital of most excellent operatic gramophone records, I wrote the Corporation asking why, in the face of such a cheap means of broadcasting, they

persisted in their obviously costly and usually futile productions of opera from the Parlophone Studios?

They have honoured me with their usual printed acknowledgment.

This week I have listened to the Promenade Concert broadcasts, and say without fear of any intelligent contradiction that every item of any value so far given could have been broadcast from gramophone records of far greater musical value.

As an example, take Toscanini's orchestral recordings: these are decidedly superior to the noise made by any present-day flesh-and-blood British orchestra.

What listeners desire is the best, and all that is best is available on records by the world's finest artistes, and at what a saving!

Records are not confined to any one class of music or amusement, but cover the whole gamut, and in every section the summit of perfection is ready to hand.

Let the cobbler stick to his last and the British to their ballads, but for the love of Mike let us have foreign opera in the language and idiom in which it was originally composed. Foreign opera in English is a musical abortion.

What the B.B.C. wants money for is for more and/or better stations, and here is the solution to their financial worries.

Didsbury.

HERBERT S. COPPOCK.

THE POST OFFICE AND ELECTRICAL RADIATION.

Sir,—Regarding the statement that the Postmaster-General has no statutory powers to enforce the elimination of electrical interference with broadcast reception, the following problem may be of interest:—

Suppose I wish to install a low-power spark transmitter, very broadly tuned, which, when in operation, will interfere with my neighbours' reception of broadcast programmes. Moreover, let us say I wish to use this transmitter continuously during broadcasting hours (in fact, I may wish to short-circuit my key for several hours occasionally). Is it conceivable that the Post Office authorities will grant me a licence? I hardly think so!

Now, on the other hand, suppose I wish to install a machine which I know very well will cause exactly the same amount of interference as would my proposed spark transmitter. Is there anything to prevent me from suitably "keying" the radiating circuit so that I may emit signals? It may be argued that my machine has now become a spark transmitter. Suppose then I short-circuit my key? Is the machine still a transmitter or does the fact that I no longer chop up my radiation into dots and dashes alter the circumstances sufficiently to render me immune from all liability? Apparently the latter, but why?

Alton, Hants.

E. KEMP.

[The monopoly enjoyed by the Post Office is in communication—not the radiation of electrical energy. The wireless monopoly is infringed only when radiated electrical energy is utilised to convey a message.—EDITOR.]

"THE GREAT F.R.S."

Sir,—I was greatly interested to read, in your current issue, a review of Mr. Heckstall-Smith's elementary text-book of electricity, and beg leave to correct an erroneous impression which may be gathered from reading the review.

Your reviewer mentions that valuable classic, "Calculus Made Easy," by F.R.S., and implies that the author of this friend of many thousands was Professor Perry. This is not correct, the author being the late Professor Sylvanus P. Thompson. From 1910, when the book first appeared, it was published under the *nom de plume* of "F.R.S.," although it was an open secret as to who the actual author was. Editions subsequent to the author's death have been published under Professor Thompson's name.

This remarkable book has eased the lot of countless people, and your reviewer is quite correct when he suggests it as the next step after Mr. Heckstall-Smith's book.

Bolton.

T. TREVOR POTTS, Assoc. M.C.T., F.C.S.

[Our reviewer, to whom the above letter was shown, comments that he "is grateful, though astounded. His belief, now upset after very many years, was a current rumour at the time the remarkable book first appeared, and he had never heard it contradicted. It was probably based on the sturdy common-sense and practicality of the author's methods."—ED.]

READERS' PROBLEMS.

"The Wireless World" Supplies a Free Service of Technical Information.

The Service is subject to the rules of the Department, which are printed below; these must be strictly enforced, in the interest of readers themselves. A selection of queries of general interest is dealt with below.

The Effect of Stray Reaction.

Is it possible that a decrease in H.T. battery voltage could account for a falling-off in selectivity? My set is an H.F.-det.-L.F. four-valve combination, with separately tuned aerial circuit, S.G. high-frequency valve, anode bend detector without reaction, and two low-gain resistance-coupled L.F. stages. A month or two ago I could just separate the Berlin and Midland Regional stations, but now am quite unable to do so. The set is apparently unchanged, except that H.T. voltage has dropped from about 140 volts to 110 volts. J. D. H.

A decrease in the H.T. voltage applied to your H.F. valve could conceivably have this effect. Under the original operating conditions, with full anode voltage, this valve was probably much nearer the point of self-oscillation than it is at present, with the result that the associated tuned circuits have a higher effective resistance than formerly.

Wattage Dissipation.

A voltage of 200 is applied to the anode of my output valve, which passes a current of 20 milliamperes. How would this valve be rated in terms of milliwatts? P. P. B.

These voltage and current values, when multiplied together, give the wattage dissipated in the anode circuit of the valve—in this case 4 watts, or 4,000 milliwatts.

We rather think that you have in mind the much more involved question of power output rating, which has no direct connection with D.C. wattage dissipation. This matter could not be discussed in the course of a letter, and so we would refer you to our issue of December 4th, 1929, where an explanation of the method adopted in making this calculation was discussed.

Another Transformer Needed.

I have just obtained a complete A.C. rectifier unit with rated outputs of 180 volts 30 mA. and 60 volts 2 mA. Is there any way of using this instrument for filament heating as well as for the supply of H.T. current? T. J. P.

Your unit is clearly intended solely for the supply of anode and grid potentials, and it could not be used for feeding filament circuits. It may be, however, that it includes a power transformer with a low-tension output of 4 volts provided for the heaters of A.C. valves. If it does not, the most practical suggestion to make is that you should obtain an extra small transformer capable of giving this output.

Decapped Valves.

I am about to build the "Band-Pass Four," and, before starting, should like to know whether you think it would be worth while to remove the bases from the H.F. and detector valves. My aim is to obtain the maximum possible range, and I do not mind taking a little extra trouble to attain this object. G. McL.

There is little point in using decapped valves unless the associated tuned circuits are of exceptionally high dynamic resistance. In this particular case your efforts would be wasted, and, indeed, there would be some chance of impairing the performance of the set, as its filter circuits are designed for working into a load of a certain predetermined value.

Loss of Volume.

The volume obtainable from my four-valve receiver has fallen off considerably of late, and I now find that obvious distortion is produced when I attempt to operate it at the original intensity. My accumulator H.T. battery shows almost full voltage on measurement, so this can be ruled out as a source of trouble. M. T. K.

We would point out that a measurement of accumulator battery voltage made with a good high-resistance meter when the cells are not delivering current to the set is likely to be misleading. If it happens that you have not taken the voltage reading under normal "load" conditions, you should do so before condemning the valves.

Valve Repairs.

At times my receiver produces crackling noises, which have at last been traced to a noisy first-stage L.F. valve. Can anything be done to this valve, or will it be necessary for me to obtain a new one? H. J. P.

Generally speaking, it is impossible for an amateur to do any sort of valve repair, but instances have come to our notice where crackling has been produced by a broken connection in the leading-out wire between the pinch and the pin. In one particular case it was found that the end of the broken wire was making intermittent contact with the interior of the tubular contact pin; a satisfactory repair was quite easily effected.

Probably your best plan is to get your dealer to arrange for a test by the manufacturers. Are you quite sure that the fault is actually in the valve itself, and not in the apparatus associated with it? Unless a test by substitution can be made, it is fatally easy to be mistaken on this point.

An Apparent Anomaly.

I am a little puzzled over Fig. 1, in the article describing the "Regional One" in your issue for August 13th. In this diagram the voltage of the power transformer secondaries is marked as 250 volts, while the rectifying valve output is shown as 260 volts—greater than its input. A rectifying valve does not magnify, so I fail to see how it can deliver more volts than are fed to it. A. F.

There is no error, and the matter can easily be explained without going deeply into A.C. theory. Briefly, a power transformer is always rated in R.M.S. voltage, which means that the peaks of each alternation will attain a voltage nearly $1\frac{1}{2}$ times that of their rated "D.C." value. Thus, in spite of the fact that voltage is lost—not gained—in the rectifier, the actual output can be greater than the rated input.

Filters and Frequency Bands.

When practical designs for band-pass filters are given, it is generally stated that a separation of 10 kilocycles is allowed between the peaks. Does not this mean that, in a theoretically perfect filter, frequencies of above 5,000 cycles would be lost? Should not the filter be arranged to embrace a band of 20 kilocycles, so that all modulation frequencies, even those up to 10,000 cycles, could be retained? D. S. E.

In theory your statement is correct enough, but it must be remembered that a spacing of 10 or 12 kilocycles between peaks corresponds fairly closely to the actual frequency band allotted to each broadcasting station. Any attempt to retain the still higher modulation frequencies would defeat its own ends, as interference would often be produced.

RULES.

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(2.) Only one question (which must deal with a single specific point) can be answered. Letters must be concisely worded and headed "Information Department."

(3.) Queries must be written on one side of the paper and diagrams drawn on a separate sheet. A self-addressed stamped envelope must be enclosed for postal reply.

(4.) Designs or circuit diagrams for complete receivers or eliminators cannot ordinarily be given; under present-day conditions justice cannot be done to questions of this kind in the course of a letter.

(5.) Practical wiring plans cannot be supplied or considered.

(6.) Designs for components such as L.F. chokes, power transformers, complex coil assemblies, etc., cannot be supplied.

(7.) Queries arising from the construction or operation of receivers must be confined to constructional sets described in "The Wireless World"; to standard manufactured receivers; or to "Kit" sets that have been reviewed used in their original form and not embodying modifications.

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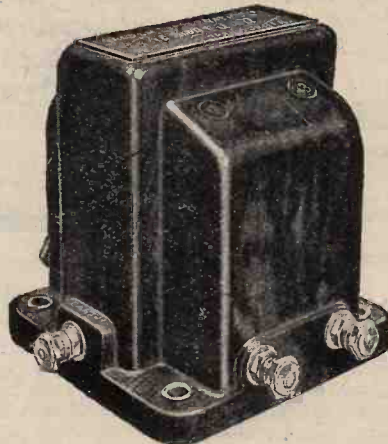
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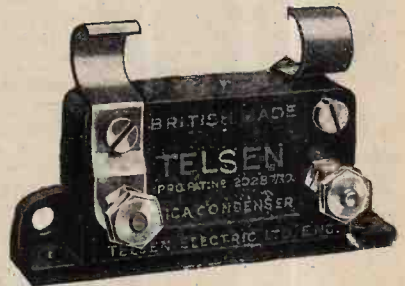
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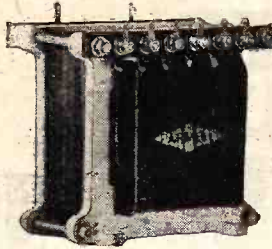
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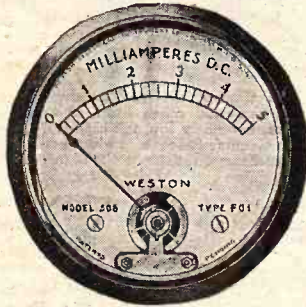


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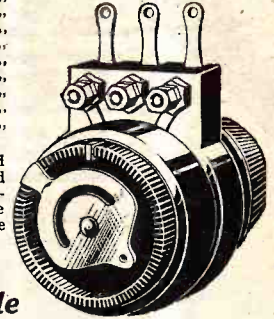
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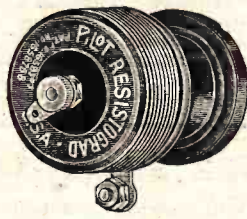
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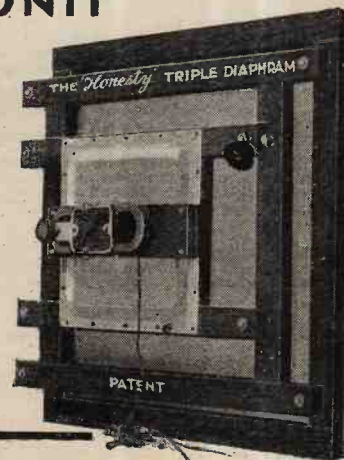
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WESTINGHOUSE RECTIFIERS

9 volts 1 amp.



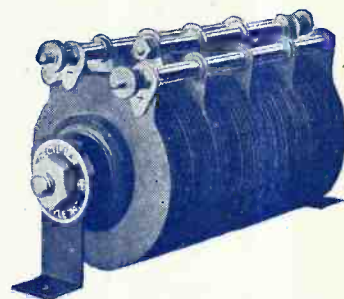
Type A.3. 23/6



METAL RECTIFIERS

represent the most convenient and satisfactory means yet devised for obtaining direct current from an A.C. Supply, and are used in large quantities on account of their reliability, durability and efficient performance by the leading manufacturers.

9 volts 2 amps.



Type A.4. - - 39/6

Full details of these Units and how to use them are given in our 32-page book "The All-Metal Way, 1930" which tells you all you want to know about A.C. Mains Units. Send 2d. stamp with your name and address.

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82, York Road, King's Cross, London, N.1

Telephone: North 2415-6-7-8.



IDEAL FOR RADIOGRAMS
NO INTERFERENCE
if you fit a
PAILLARD
ELECTRIC INDUCTION MOTOR

No brushes or commutator to cause interference. No belt. The motor runs smoothly and silently, without variation in the revolution speed even with largely fluctuating mains current. 12" velvet-covered turntable, automatic brake and cut-out. For 100-130 and 200-250 v. A.C. 7 3/8" x 5 1/2" x 5 3/8".

£4/17/6 (without Unit Plate, £4/10/0).

Super Pickup and Arm, £2/2/6.
Portable Gramophone Cabinet fitted with Paillard Motor, Super Pickup and volume control, £8/15/0 complete.

APOLLO GRAMOPHONE CO., LTD.,
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It would be
FATAL
to lose
CONTROL

Barbed wire—trenches—dug-outs—a field set and a thin strand of wire.

The difference between control and lack of control may spell life or death to an entire brigade.

It's a far cry from No Man's Land to the comforts of your home.

But even in your radio set . . . control plays a vital part . . . and it has been the privilege of CENTRALAB to furnish the volume controls of millions of radio receivers.

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Write for free Booklet,
"Volume Controls,
Voltage Controls,
their uses."

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'Phone: MAYFAIR 0578/9.

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“It sounds good to me...”



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TYPE 'K'
£6.15.0

Mullard
MASTER · RADIO

Advert. The Mullard Wireless Service Co., Ltd., Mullard House, Charing Cross Road, London, W.C.2.

Printed for the Publishers, LIFFE & SONS LTD., Dorset House, Tudor Street, London, E.C.4, by The Cornwall Press Ltd., Paris Garden, Stamford Street, London, S.E.1.

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4^D

The Wireless World

AND RADIO REVIEW

The Paper for Every Wireless Amateur

Wednesday, September 10th, 1930.



P.M.

**FIRST-
BECAUSE OF
THE FILAMENT**

Mullard
THE MASTER VALVE

EKCo

ALL-ELECTRIC RADIO

*"At all the
Best Receptions"*

Write for Free Booklet on "All-Electric Radio" and details of Easy Payments to:-
E. K. COLE, Ltd., Dept. W.
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Utility DIFFERENTIAL CONDENSER



Stocked by all good dealers and the best value in a Condenser of this type that you can possibly obtain. The capacity is .0001 mfd. and the design provides smooth reaction at all points of the scale. Fully guaranteed for efficiency and finish by "Utility" — makers of the Dial, Condensers and Switches that experienced constructors always choose. Illustrated list free for a p.c.

Other Prices:	'00015	7/-
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6'6

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Licensed under design Reg. No. 723271.

T.C.C.
CONDENSERS

7.C.C. CONDENSER
2 MF
PAT. 13345/25

Add. of Telegraph Condenser Co., Ltd., Water Farm Road, W.3. ♡ 5807

*Here's
more power
to your*

PORTABLE SET...



P.220A CHARACTERISTICS

There's no need to sacrifice quality to economy if you use this wonderful new valve in your portable set—it gives you both.

Filament volts	-	-	-	-	-	-	2.0
" amps	-	-	-	-	-	-	0.2
Max. H.T. volts	-	-	-	-	-	-	150
Amplification factor	-	-	-	-	-	-	6.5
Anode A.C. resistance (ohms)	-	-	-	-	-	-	1850
Mutual A.C. conductance (mA/V)	-	-	-	-	-	-	3.5

It is easy on H.T. and L.T. Batteries and the resulting tonal quality has to be heard to be believed.

PRICE 13/6

With Mazda valves in all positions your set will give a performance many times better than before.

Used as the output valve in an ordinary 2-valve loud speaker set it will give wonderful quality and sufficient volume for most domestic purposes.

The amazing

MAZDA

RADIO VALVES

**See the amazing
Mazda Valves on
the EDISWAN
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Incorporating the Wiring Supplies, Lighting Engineering, Refrigeration and Radio Business of The British Thomson-Houston Co., Ltd.

Radio Division:
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Showrooms in all the Principal Towns

EDISWAN

V.72

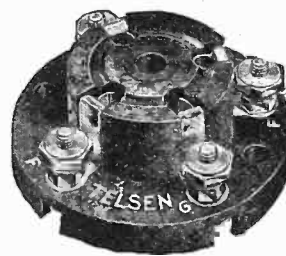
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**Every component
DEPENDABLE
in its
PERFORMANCE**

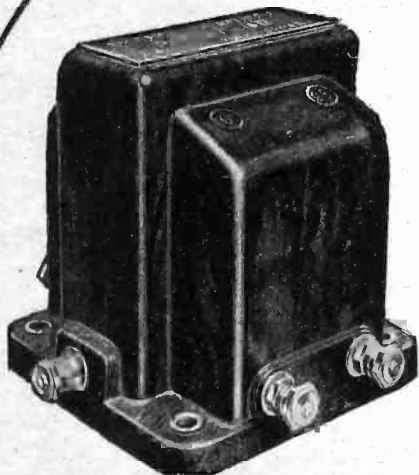


Telsen H.F. Chokes, designed to cover the whole wave-band range from 18 to 4,000 metres, extremely low self-capacity, shrouded in Genuine Bakelite. Inductance 150,000 microhenrys, resistance 400 ohms. Price 2/6 each.

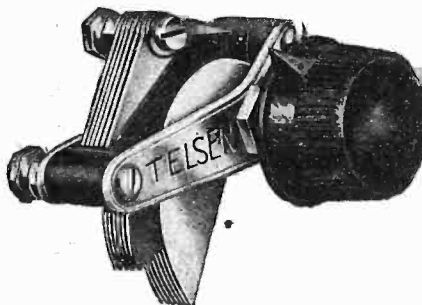
Telsen Valve Holders. Pro. Pat. No. 20285/30. An entirely new design in Valve Holders embodying patent metal spring contacts which are designed to provide the most efficient contact with the valve legs, whilst allowing the valve to be inserted or withdrawn with an easy movement instead of being subjected to undue strain, which often causes damage and loss of efficiency to the valves. Low capacity, self-locating, supplied with patent soldering tags and hexagon terminal nuts.



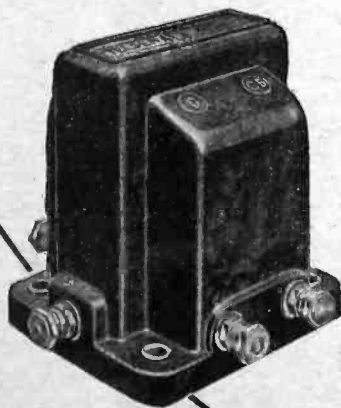
Price 1/- each.



Telsen "Radiogrand" Transformer, new model, shrouded in Genuine Bakelite, with new windings and core, fitted with earth terminal. Made in ratios 3 : 1 and 5 : 1. Price 12/6 each



Telsen Variable Condensers (Bakelite Dielectric). Particularly designed for use as a reaction condenser, may also be used as a neutralising condenser where large capacity is necessary. All vanes are insulated with Bakelite which eliminates the possibility of a short circuit between the moving and fixed vanes. Made in three capacities: .0005, .0003, .00015, supplied complete with pointer knob with one-hole fixing for panel mounting. Price 3/- each.



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NOW is the time for every radio enthusiast to commence building his new season's set: or perhaps in many cases it will only need revising to bring it up to present "Regional" requirements. In the Telsen range of components you are assured of the finest technical perfection it is possible to obtain; each component is the outcome of research into the "cream" of radio component design. No finer range of components could possibly be specified for any set; no finer range could be chosen for replacements of any kind; no finer range could be selected at any price! They are "Radio's Choice" for "Better Radio Reception."

**TELSEN
COMPONENTS**

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FAMOUS SINCE BROADCASTING BEGAN



Impedance Matching
Output Transformer.

Six Ratios—

8 : 1, 10 : 1, 12 : 1,
15 : 1, 20 : 1, 25 : 1,

Price
each
£1.2.6



Long before Broadcasting became what it is to-day, Varley's had won fame for their coil winding.

On this experience is founded Varley's latest achievement in radio. Varley Impedance Matching Output Transformer—a new component of advanced design—gives six different ratios. Accurately and without difficulty you can match loudspeaker and output valves.

Remember that Varley Components are descendants of a long line. Since radio came Varley ideal has been quality. The Varley Impedance Matching Output Transformer is the only answer to a modern radio problem.

STAND

No. 105

OLYMPIA

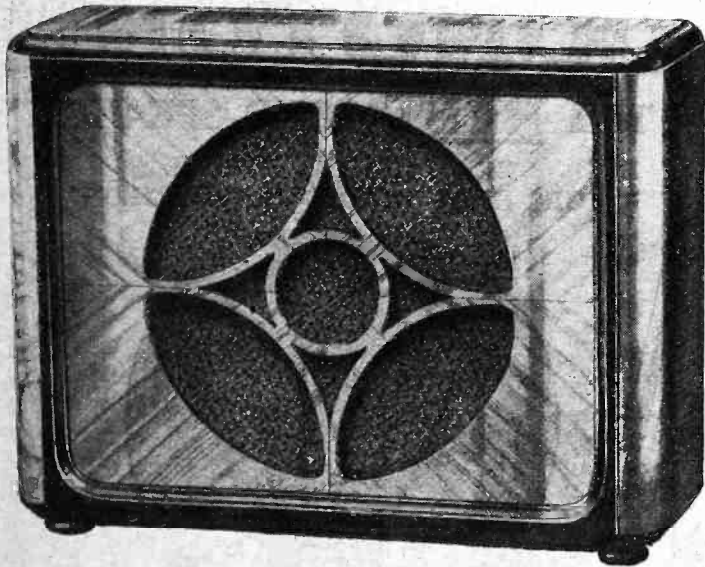
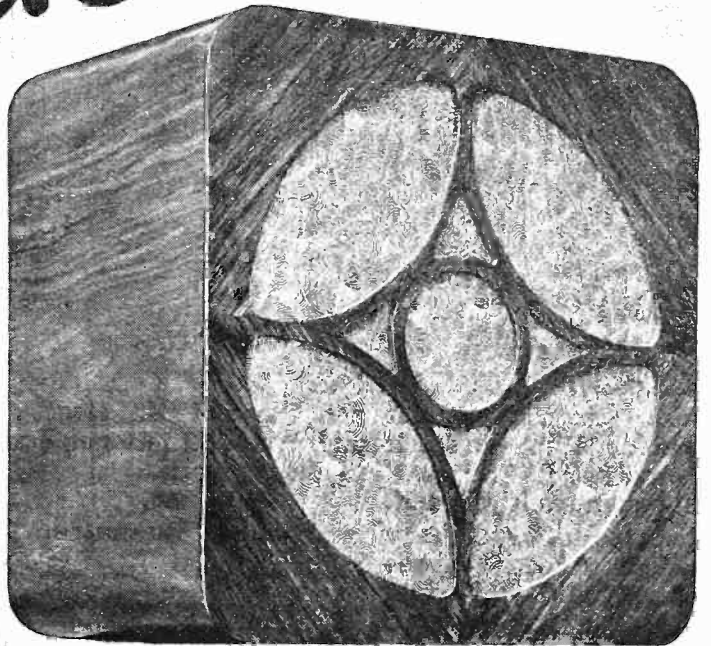
Sept. 19-27.

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Two wonderful Speakers!

These two new speakers represent all that is highest in loudspeaker reproduction. They are both fitted with the finest unit in the world, 66R, and they are both perfect pieces of the cabinet makers' art. Both are housed in beautiful walnut cases, the 51R being of unconventional design to suit the modern room.



**BLUE
SPOT
71R
£4.15.0**

**BLUE
SPOT
51R
£4.4.0**

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BRITISH BLUE SPOT
COMPANY LTD. •**

Blue Spot House, 94/96, Rosoman Street,
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Phone: Clerkenwell 3570. Grams: Bluospot, Smith, London.
Distributors for Northern England, Scotland and North Wales: H. C. RAWSON (Sheffield and London) Ltd., 100, London Road, Sheffield; 22, St. Mary's Parsonage, Manchester; 183, George Street, Glasgow.

Meet us at:

OLYMPIA, SEPT. 19-27—STAND No. 217.

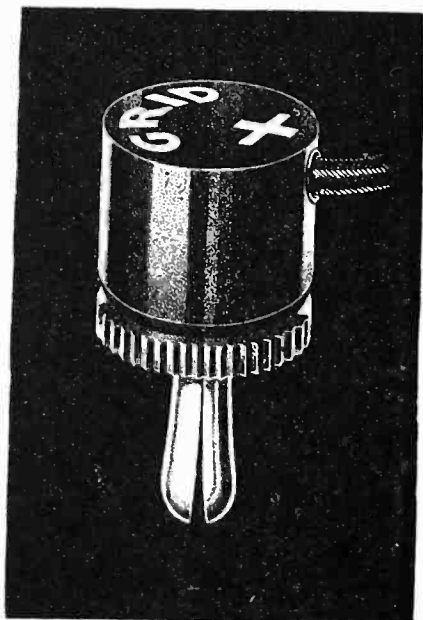
MANCHESTER RADIO SHOW, OCT. 8-18—STAND No. 30.

BLUE SPOT



FITS EVERY BATTERY SOCKET

— and it stays put

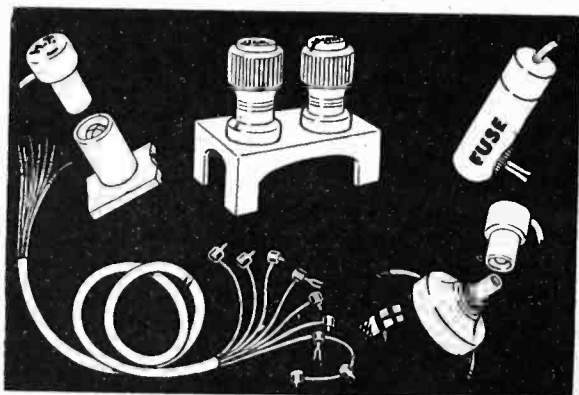


Here is the perfect Wander Plug—push it in and it STAYS “put” till you move it yourself. It grips ANY battery socket, too, because each Plug is tested in sockets larger and smaller than those of any battery made.

Special ‘D’ section hard-drawn wire prongs. Side entry for flex, which is grip-

- ped, fray and all. Head engraved—12 letterings to choose from.
- Price 3d.
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 Type “B” - - - - 6d.
 Type “M” - - - - 4½d.
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- TWIN PLUG & SOCKET** 1/6
 (Panel portion 6d. Flex Portion 1/-.)
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 (Also made in 5, 6, 7, 8 and 10 way.)
- The Belling-Lee Bakelite Terminal Mount** - Price 8d.
- The New Wanderfuse** .. 1/6
Spare Fuses (150 m/a) .. 9d. each.

STAND No. 134
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 OLYMPIA.

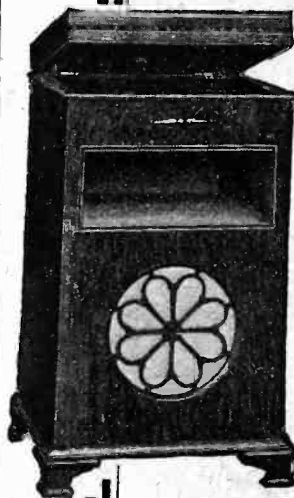


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FOR EVERY RADIO CONNECTION

Adv. of Belling & Lee, Ltd., Queensway Wks., Ponders End, Mdx.

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This Magnificent Radio - Gram CABINET



HOUSE your Set in the Camco “Waverley” Cabinet. Supplied with 15” baseboard. Loud Speaker compartment is 18” x 18” x 15”. Will take panels 18” x 7”. Height 38”. In Oak as illustrated, £5 10s.; Mahogany £6 15s. (Carriage extra). Send for 24 pp. Catalogue or see full range at our Showrooms:

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costs only **£5-10-0**

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DONOTONE

THE **BEST** LOUD SPEAKER

NEW IDEAL MODEL
 FOR REAL RADIO ENJOYMENT



Price **6 GNS.**

Diameter of Case, 18 inches; depth, 9 inches.
 DEMONSTRATIONS DAILY.

THE DONOTONE (Regd.) LOUD SPEAKER
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1923

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1930

AND LARGER VALVES

A Long Line of Famous

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POWER VALVES

The Valves with a Pedigree

Each has become the standard in its own class. Experts in sound reproduction always choose OSRAM POWER VALVES for reliability in performance, consistency in characteristics, and maximum undistorted output.

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A NEW BOOKLET

"OSRAM VALVES

for Power Amplification"

containing invaluable information of all types of large OSRAM POWER VALVES from 5 watts up to valves big enough for talking picture and public entertainment amplifiers, hints as to their use, explanation of characteristic curves and complete technical data.

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EVERYTHING **The G.E.C.** ELECTRICAL
your guarantee

THIS WILL SET YOU THINKING

PRICE
13/6
 FOR THE
 TRIPLE CAPACITY
 UNIT



NOW

**GET ONE TO-DAY
 AND YOU'RE WELL
 ON THE WAY TO
 SAVING THE COST
 OF A NEW BATTERY**

*The complete range of
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includes:

TRIPLE CAPACITY TYPE
 L.4903, 60 volt

Price **13/6**

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L.4920 60 volt
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 Price 12/11

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L.6095 6 volt
 Price 1/3

L.6096 9 volt
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 Price 3/3

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**AN ENTIRELY
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 THAT WILL GIVE YOU
 A MONTH'S
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THE NEW
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 TRIPLE CAPACITY
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You probably did not know that months and months of patient research could make such a wonderful change in H.T. Battery value as this! Now, for the first time, you can buy the New MAGNET Triple Capacity Battery which, at less than twice the price, gives three times the capacity of a standard small unit battery!

SOME SAVING THAT'S WORTH SAVING!

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Britain's
Best
DISCRIMINATING
ON
BRADMAN!



Of course it's a M^cMICHAEL!
—and he's taking it with him to Australia...

SOME OUTSTANDING DETAILS

1. Screened Grid Amplification rendering the set highly selective and wide in range.
2. Simple dial tuning and volume control making simplicity the keynote of its operation.
3. Fitted in handsome furniture hide suitcase with patent locking clips which makes the set not only extremely convenient for picnics and parties, but quite suitable for the most luxurious surroundings.
4. Low battery consumption ensuring economy of operation.

Owing to the high degree of selectivity in this, and our other Screened Grid Portable Receivers, we are

able to guarantee complete selectivity between all main B.B.C. stations under the new scheme of wavelengths, as proved by an actual test under the twin aeriæls at Brookman's Park, when both programmes were received separately without interference, and in addition a number of other British and foreign stations. This test was made on a standard "Super Range Four" receiver under an independent Press observer, and was repeated at half-mile intervals with similar results.

Ask at any high-class Radio store for a demonstration of this unique Receiver—or call at our London Showrooms.

National Radio Exhibition
Olympia - Sept. 19-27
Stand No. 57

L. M^cMICHAEL LTD

Manufacturers of Wireless and Scientific Apparatus
WEXHAM ROAD, SLOUGH, BUCKS.
Telephone: Slough 441-442. Telegrams: Radiether, Slough
London Showrooms: 179 STRAND, W.C.2 (Tel.: Holborn 2466)

CASH PRICE 22 GNS.
Including all equipment and Royalties. Or by our special "Deferred Payments on Hire Purchase Terms" system, £5 down and 10 monthly payments of £2:1:0

**THE M^cMICHAEL
SUPER RANGE PORTABLE FOUR**

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EVERYTHING **The S.E.C.** ELECTRICAL
your guarantee.

THIS WILL SET YOU THINKING

PRICE
13/6
 FOR THE
 TRIPLE CAPACITY
 UNIT



NOW

**GET ONE TO-DAY
 AND YOU'RE WELL
 ON THE WAY TO
 SAVING THE COST
 OF A NEW BATTERY**

*The complete range of
 "MAGNET"*
WIRELESS BATTERIES

includes:

**TRIPLE CAPACITY TYPE
 L.4903, 60 volt**

Price **13/6**

STANDARD UNIT TYPES

L.4920 60 volt
 Price **7/11**

L.4922 100 volt
 Price **12/11**

GRID BIAS BATTERIES

L.6095 6 volt
 Price **1/3**

L.6096 9 volt
 Price **1/9**

L.4908 16½ volt
 Price **3/3**

MADE IN ENGLAND.

**AN ENTIRELY
 NEW BATTERY
 THAT WILL GIVE YOU
 A MONTH'S
 FREE H.T.**

**THE NEW
 "Magnet"
 TRIPLE CAPACITY
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You probably did not know that months and months of patient research could make such a wonderful change in H.T. Battery value as this! Now, for the first time, you can buy the New MAGNET Triple Capacity Battery which, at less than twice the price, gives three times the capacity of a standard small unit battery!

SOME SAVING THAT'S WORTH SAVING!

Sold by all Wireless Dealers.

TRIPLE CAPACITY GIVES A MONTH'S FREE H.T.

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**Australia's
Best
&
Britain's
Best**

**DISCRIMINATING
DON
BRADMAN!**



Of course it's a M^cMICHAEL!
—and he's taking it with him to Australia...

SOME OUTSTANDING DETAILS

1. Screened Grid Amplification rendering the set highly selective and wide in range.
2. Single dial tuning and volume control making simplicity the keynote of its operation.
3. Fitted in handsome furniture hide suitcase with patent locking clips which makes the set not only extremely convenient for picnics and parties, but quite suitable for the most luxurious surroundings.
4. Low battery consumption ensuring economy of upkeep.

Owing to the high degree of selectivity in this, and our other Screened Grid Portable Receivers, we are

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L.M^cMICHAEL^{LTD}

Manufacturers of Wireless and Scientific Apparatus
WEXHAM ROAD, SLOUGH, BUCKS.
Telephone: Slough 441-442. Telegrams: Radlether, Slough
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CASH PRICE 22 GNS.

Including all equipment and Royalties. Or by our special "Deferred Payments on Hire Purchase Terms" system, £5 down and 10 monthly payments of £2:1:0

**THE M^cMICHAEL
SUPER RANGE PORTABLE FOUR**

PRELIMINARY ANNOUNCEMENT!

First Prize
£50
in Cash

SECOND PRIZE

Voucher for the purchase of apparatus to the value of £20 from firms exhibiting at the Olympia Show.

THIRD PRIZE

Similar voucher for £15.

FOURTH PRIZE

Similar voucher for £10.

FIFTH PRIZE

Similar voucher for £5.

The
Wireless
AND
RADIO REVIEW
World

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An Entry Form will appear in each of the Three Special Show Numbers.

(Dated Sept. 17th, 24th, and Oct. 1st).

ILIFFE & SONS LTD., LONDON, E.C.4.

If you have A.C. mains

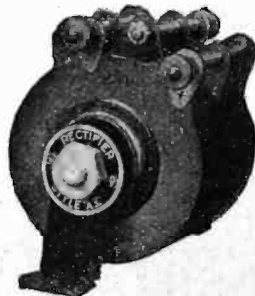
in your house, you have the cheapest and most reliable supply of current for your set, and



METAL RECTIFIERS

enable you to adapt this supply in the simplest and most reliable way.

Here are three of the popular units—for high tension, low tension, and grid bias—and there are, of course, several other types, suitable for all radio purposes



All the leading radio manufacturers are now incorporating the Westinghouse Metal Rectifier in their eliminators, chargers and mains sets. You can do the same.

Full details, circuits and instructions are given in our 32-page book,

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The Westinghouse Brake & Saxby Signal Co., Ltd.,
82, York Road, King's Cross, London, N.1.

EVERYTHING **The G.E.C. your guarantee** ELECTRICAL

FROM ONE END OF EUROPE TO THE OTHER

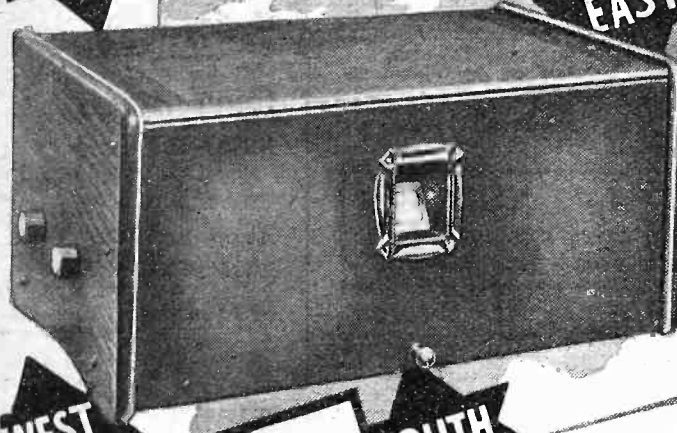
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EAST

WEST

SOUTH

ON THE NEW **Osram** MUSIC **4** MAGNET



- SPECIAL FEATURES**
- 1 The two Screen Grid stages give extreme selectivity and sensitivity with an unrivalled range.
 - 2 Enormous amplification with perfect stability is given by the complete shielding of H.F. Circuits.
 - 3 Equal efficiency guaranteed on both wave-length bands.
 - 4 Change of wave-length is effected by an external switch and the set need not therefore be opened.
 - 5 Maximum ease in tuning with a single knob controlling triple gang condenser.
 - 6 Assembly is the essence of simplicity.
 - 7 Volume control is not only provided as such, but to procure extreme selectivity.

Wherever you reside you may expect to receive dozens of stations with thrilling realism on the powerful "OSRAM MUSIC MAGNET 4." It has been tested up and down the country and everywhere results are the same . . . station after station is tuned in with full volume, perfect purity, and free from interference. Do not put up with an out-of-date receiver when you can get this equipment for only £11/15/0.

WRITE for POST FREE full-size Instruction Chart which will give you full information. Fill in the coupon below.

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You can either buy your "OSRAM MUSIC MAGNET 4" for cash or on these attractive HIRE PURCHASE terms: £1. 3. 6 deposit and 12 monthly payments of 18/6.

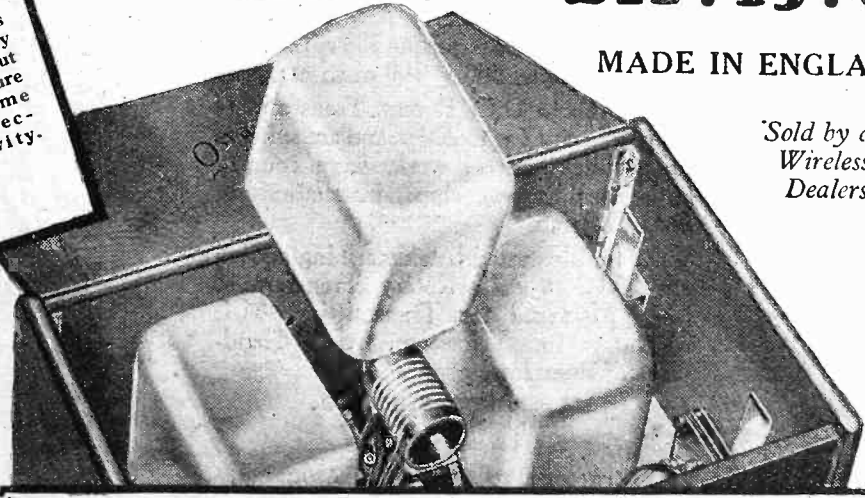
PRICE INCLUDING
Osram Valves, Gecophone Components and Polished Heavy Oak Constructor's Cabinet

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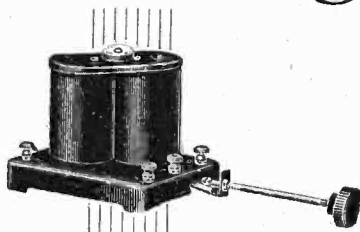
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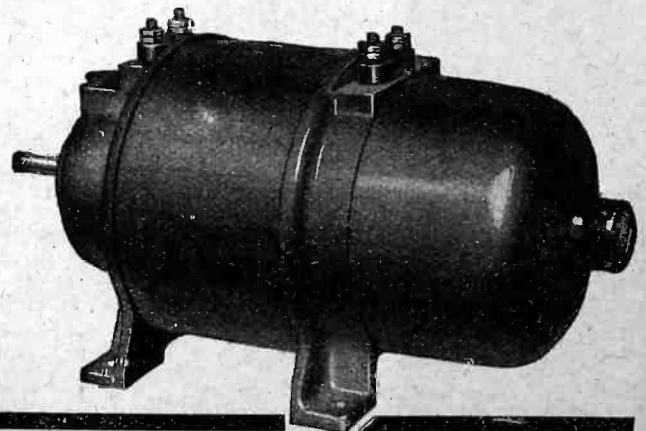
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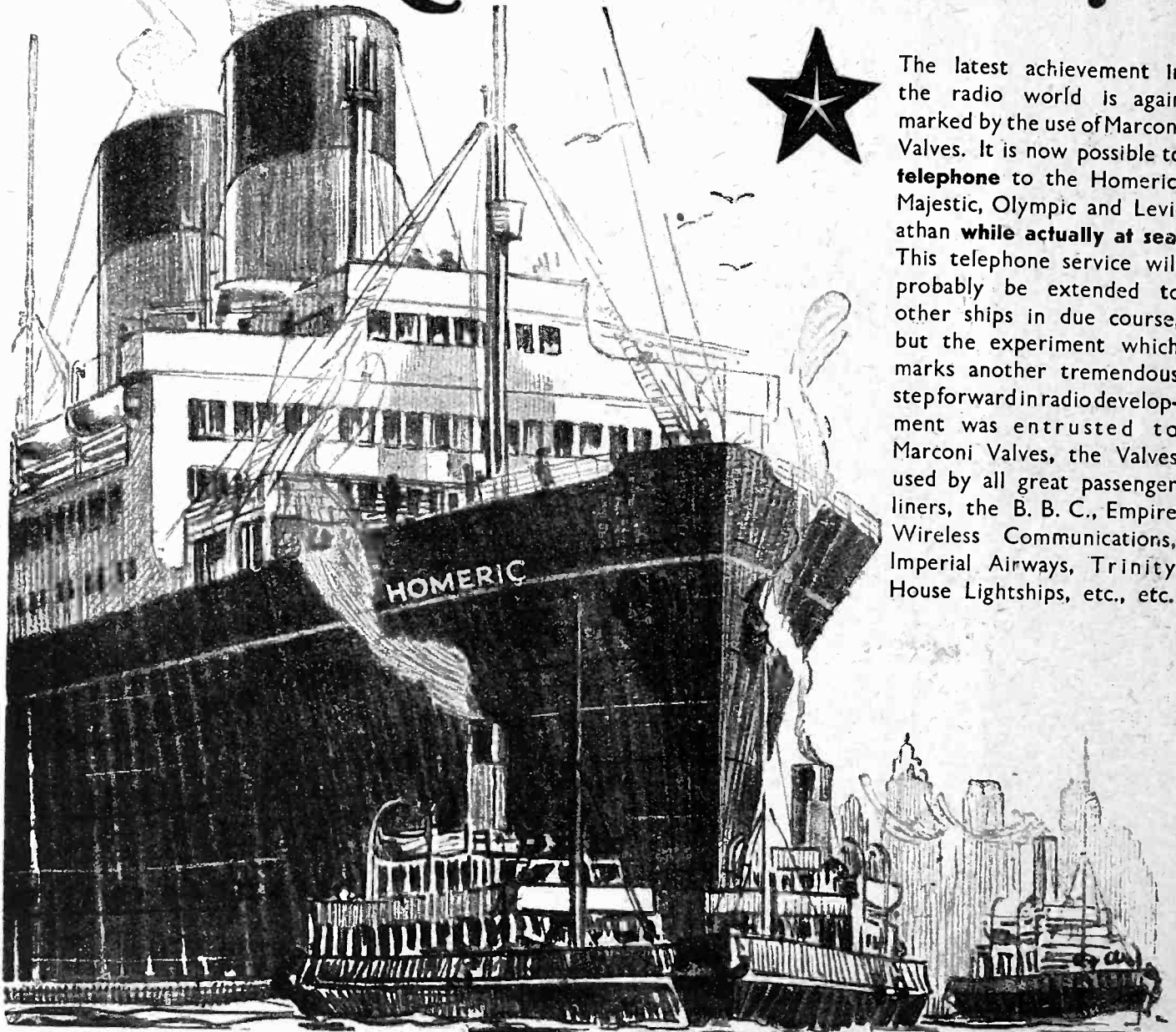
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The Wireless World

AND
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(18th Year of Publication)

No. 576.

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As many of the circuits and apparatus described in these pages are covered by patents, readers are advised, before making use of them, to satisfy themselves that they would not be infringing patents.

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OLYMPIA SHOW COMPETITION.

THE WIRELESS WORLD voting competition has now become an established feature of the annual Wireless Show, and, to judge from the number of entries in the Competition, its popularity has grown from year to year, whilst we are confident that its usefulness to the manufacturers as an additional guide to the public choice of the best at Olympia is fully realised.

The Olympia Show opens to the public this year on Friday, September 19th, so that the Show will be in full swing within a fortnight from to-day. As the Show grows from year to year the diversity of products increases and it becomes even more interesting to search for what is the best in the various classes into which, for the purpose of the Competition, we divide the exhibits as a whole.

The object of the Competition, it will be remembered, is to decide what, in the opinion of our readers, are the best products of British manufacture at the Exhibition. The Competition has again been organised on the basis

that every reader of *The Wireless World* shall be entitled to one vote for what he considers to be the outstanding single exhibit at the Show in any classification, and to vote also for the best item in each of the various classes into which the exhibits are grouped.

Our classification of apparatus is as follows:—

- (1) Receivers of all types, either mains or battery operated.
- (2) Radio gramophones.
- (3) Batteries of all kinds, including accumulators for both high tension and low tension.
- (4) Mains supply units, both D.C. and A.C.
- (5) Loud speakers of all types.
- (6) Valves.
- (7) Other apparatus, not classified above. Also amplifiers, component parts, such as transformers, condensers, tuning coils, resistances, etc.

How Readers Should Enter.

Details of the Competition will be found on the entry form which will be published in the next three numbers of *The Wireless World* amongst the advertisement pages, these three issues constituting the Special Show Numbers reviewing the Exhibition.

As before, we are offering cash and other prizes in connection with the Competition to the competitors whose votes agree with the opinion of the majority in the selection of the outstanding single exhibit, and also in the largest number of classes.

The Prizes will consist of:—

1st. £50 in cash.

2nd. A voucher for the purchase of apparatus to the value of £20 from the firms exhibiting at the Show.

3rd. A similar voucher for £15.

4th. A similar voucher for £10.

5th. A similar voucher for £5.

As in previous years, the voting is confined to products exhibited at the Olympia Show, and competitors are asked to bear in mind when completing their ballot forms that their choice should be guided largely by a consideration of the value of the apparatus at the price asked for it, rather than basing their decision on quality alone.

Entry forms should not be sent in until after the appearance of *The Wireless World* Exhibition Review Number, to be dated October 1st, but they must reach the Competition Editor not later than Monday, October 6th.

We are anxious that every reader of *The Wireless World* should enter for the Competition because, naturally, the value of the results must be proportional to the number of votes cast.

Pentode as Detector Amplifier

Measuring Power Output and Distortion.

By E. YEOMAN ROBINSON

(Chief Engineer, Radio Valve Department, The Cosmos Lamp Works, Ltd.)

THERE has recently been described in this journal a one-valve loud speaker set from which comfortably loud signals could be expected from the local station. This innovation in receiver design has been made possible by the advent of a pentode—the A.C./Pen.—which is capable of delivering as a power grid detector between a quarter and half a watt of undistorted A.C. energy to the loud speaker when the input grid swing is quite modest. When a single valve performs the dual rôle of detector and power amplifier the method of calculating power output is not the same as that for a triode functioning as an amplifier only. New fields of investigation have to be explored, and it is the purpose of this article to describe a series of measurements taken under working conditions which give a reasonably accurate determination of distortion and output.

It is believed that the set with detector-fed loud speaker will become of serious interest in view of the important advantages that accrue from the absence of low-frequency couplings. Low-frequency oscillation, hum and motor-boating are prevented with the minimum of smoothing equipment. For distant reception the detector may be preceded by one or more high-frequency stages.

In order to investigate the performance of an indirectly heated pentode valve as a power grid detector it is necessary to plot the dynamic detection characteristics. No simple method has yet been devised which will enable these characteristics to be derived from the ordinary anode current/anode voltage characteristics of the valve, but they can be determined quite accurately by the

following rather roundabout experimental method. The detection characteristics are dependent upon the load impedance of the anode circuit of the detector valve. Having decided upon the value of this impedance, the detection characteristics of the valve used with a

resistance coupling in the output circuit are determined, using the circuit shown in Fig. 1. In order to determine accurately the characteristics shown in Figs. 3 and 4 measurements were made at 50 cycles, and appropriate adjustments made to the by-pass condensers. Grid and anode by-pass condensers of 2 microfarads were employed which correspond to condensers of 0.0001 microfarad at a frequency of one million.

A characteristic similar to that shown in Fig. 2 is first obtained in which the anode current is plotted against the applied A.C. grid voltage. This is the characteristic of the valve used as a resistance-coupled amplifier. Supposing the unmodulated carrier wave is 3 volts, the operating conditions are represented at O. If the carrier wave is modulated 100 per cent. the applied A.C. grid volts will vary from 0 to 6. The dynamic characteristic of the valve as a detector will therefore be COC_1 (see Fig. 2). There is a very considerable D.C. voltage drop in the resistance R (Fig. 1), with the result that the anode voltage on the valve is not equal to the applied battery voltage. It is therefore necessary to compute the voltage which is actually applied to the valve anode when an unmodulated carrier wave is being received. This is effected by subtracting from the battery voltage the voltage drop in the resistance R for the current flowing at the mean point of the

ONE of the advantages of feeding a loud speaker directly from a power grid detector valve is the absence of couplings which are likely to pass on low-frequency disturbances. The very minimum of smoothing equipment, therefore, is effective in preventing hum, motorboating and L.F. instability when a receiver embodying such an output stage is operated from the mains. The measurement of power output and distortion for a valve performing the dual function of detection and power amplification cannot follow accepted practice, and it is the purpose of this article to describe a new method of calculation which takes into account the various depths of modulation likely to be met in broadcast reception.

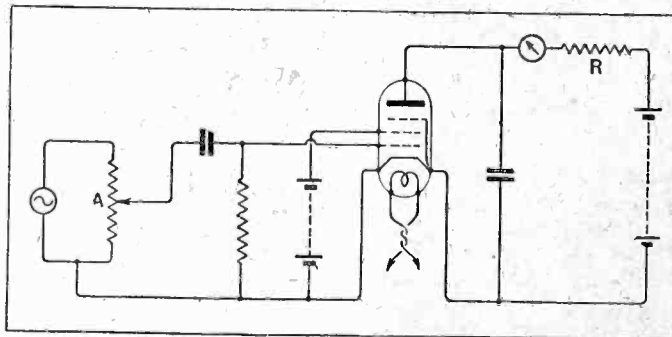


Fig. 1.—The circuit used for determining detection characteristics with resistance output coupling.



Pentode as Detector Amplifier.—

characteristic. Thus COC_1 (Fig. 2) is the dynamic characteristic of an A.C./Pen. valve when used with 500 volts H.T. and a resistance output circuit of 8,000 ohms for a carrier wave of 3 volts. The current at O is 46 mA., and the drop in the resistance is 368 volts, so that the curve COC_1 is also the dynamic characteristic for the valve when used with transformer output for a supply voltage of 132 anode volts for the same conditions, namely, 8,000 ohms load impedance and 3 volts RMS carrier wave. Similarly, CO_1C_2 is the dynamic characteristic with a 4-volt carrier wave for 500 volts H.T. and a resistance coupling of 8,000 ohms, or with transformer or choke output coupling with 156 volts H.T. and a load resistance of 8,000 ohms.

Second and Third Harmonic Distortion.

It will be seen, therefore, that the determination of the dynamic characteristics for a transformer or choke output circuit is a matter of trial and error. First, the dynamic characteristics for resistance coupling must

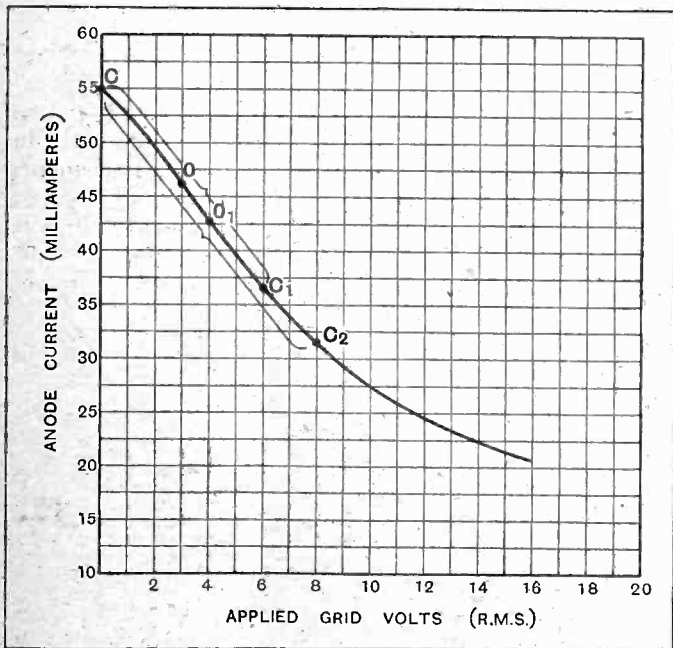


Fig. 2.—Dynamic characteristic of the A.C./Pen. valve as detector and power output valve combined. The load is 8,000 ohms.

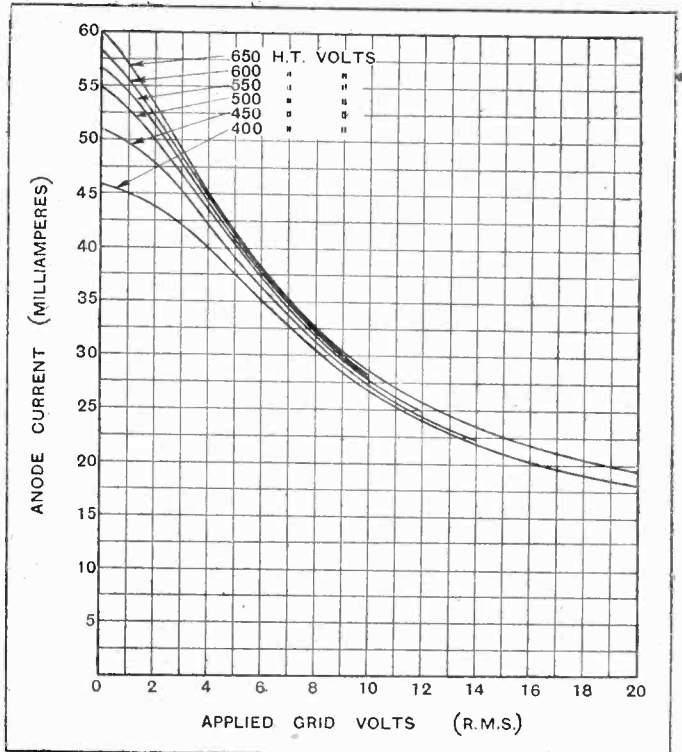


Fig. 3.—A family of detection characteristics with resistance coupling. The load is 8,000 ohms and the grid leak 1 megohm.

be determined; secondly, the permissible grid swing determined from a consideration of the distortion introduced, and finally, the equivalent battery voltage for transformer coupling computed. A family of characteristic curves using resistance coupling is therefore necessary. These curves are given in Fig. 3. The dynamic characteristics using transformer coupling have been computed for a battery voltage of 200 in the manner described above and are given in Fig. 4, in which the change in anode current is plotted against the applied A.C. grid voltage for various values of carrier wave. This information is also given in tabular form in Table I at the end of the article.

It will be seen that the maximum carrier wave which can be applied without more than 5 per cent. second harmonic distortion occurring when it is fully modulated is 5 volts R.M.S. It will also be noted that, with greater input than this, third harmonic distortion becomes of major importance. The undistorted power output of a P.240-type valve is 300-350 milliwatts with 150 volts H.T. With 100-120 volts H.T. the power output is considerably less, and that of the average battery-fed portable receiver is 160-200 milliwatts, so that compared with this standard the Mazda A.C./Pen., when used as a power grid detector, has very adequate power output. It should be pointed out, however, that it is not equivalent in practice to an ordinary output valve of 0.75 watt output, but rather

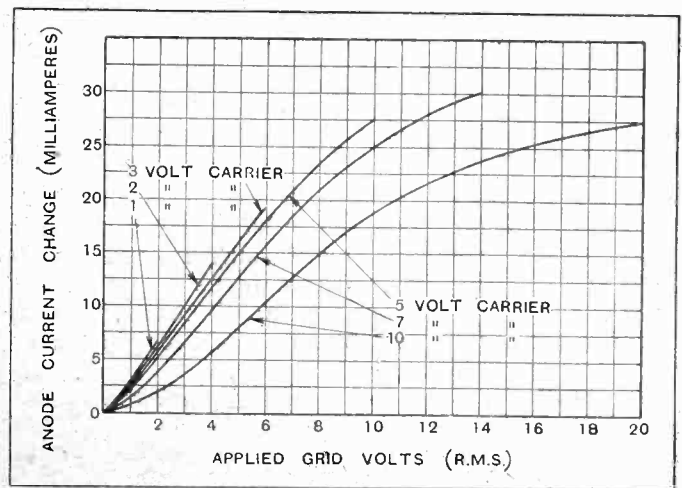


Fig. 4.—Dynamic detection characteristics of A.C./Pen. valve for various signal voltages. The following conditions were maintained during the measurements: anode voltage 200, screen voltage 200, load 8,000 ohms and grid leak 1 megohm.

can be applied without more than 5 per cent. second harmonic distortion occurring when it is fully modulated is 5 volts R.M.S. It will also be noted that, with greater input than this, third harmonic distortion becomes of major importance. The undistorted power output of a P.240-type valve is 300-350 milliwatts with 150 volts H.T. With 100-120 volts H.T. the power output is considerably less, and that of the average battery-fed portable receiver is 160-200 milliwatts, so that compared with this standard the Mazda A.C./Pen., when used as a power grid detector, has very adequate power output. It should be pointed out, however, that it is not equivalent in practice to an ordinary output valve of 0.75 watt output, but rather

Pentode as Detector Amplifier.—

to a valve of 0.4 watt output. The reason for this appears to be that the maximum power output is dependent upon the depth of modulation. If the maximum depth of modulation of the transmitter is 70 per cent. the power output from the valve is only 0.37 watt, assuming 0.75 watt for 100 per cent. modulation.

TABLE I.

Amplitude of unmodulated carrier wave (volts R.M.S.)	1	2	3	4	5	6	7	8	10
Power output for 100% modulation (milliwatts).....	46	195	380	520	760	900	900	900	750
Per cent. second harmonic distortion	2.2	3.5	2.5	1.0	4.5	10.0	13.5	15.0	18.0

Owing to the fact that the detection characteristic is linear, the valve, as compared with an anode bend or cumulative grid detector, is less selective, and if one tuned circuit is used in the receiver some reaction must be used to give a complete separation of the National and Regional transmitters. This is no disadvantage, but it does necessitate the use of a tapped aerial coil, so that when working on a large aerial the aerial coupling can be reduced to enable reaction to be employed without overloading the valve.

A further characteristic is that the valve is more sensitive when a very weak carrier wave is being received than when it is received at full strength. This leads to the set having a strange "feel" in that if one station to which the set is mistuned is heard very faintly, tuning-in to the carrier wave of another station "wipes out" the weak station.

When the valve is used to operate a loud speaker the screen volts and anode volts should not exceed 200. If, on the other hand, the valve is used as a power grid detector followed by a power output valve, best results are obtained by using a low auxiliary grid voltage of 30 or 50 volts and a high anode voltage.

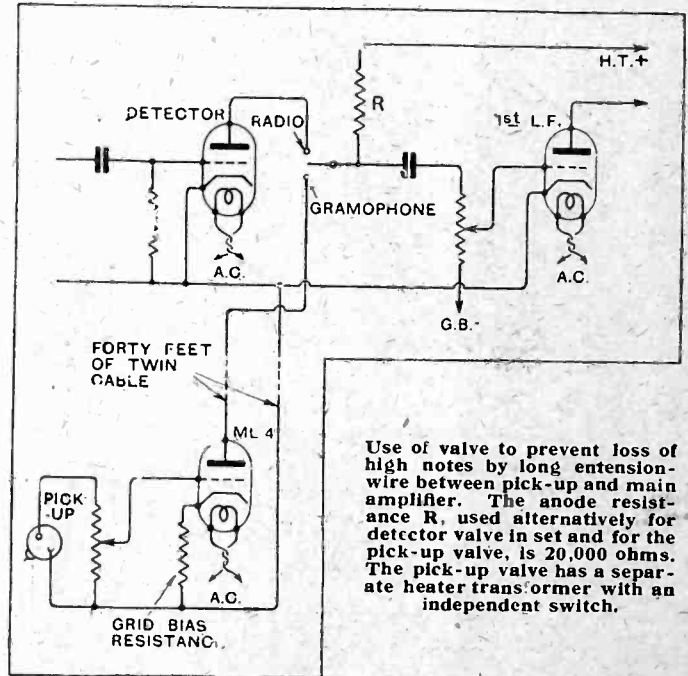
THE DISTANT PICK-UP.

It must often happen that the arrangement of a room in which it is desired to have both a wireless receiver and a gramophone working in conjunction with it is such that the two have to be separated by quite a considerable distance. It then becomes difficult to arrange for a suitable connection between the pick-up and the amplifier.

The capacity between the two wires is more than sufficiently large to by-pass all the upper notes provided by the pick-up, so that the final reproduction becomes intolerably "woolly," and the words of songs become almost entirely unintelligible. The capacity across the wires is, roughly speaking, of the order of 0.001 mfd,

in a piece of flex some 40ft. in length. While this capacity would be harmless enough if shunted across a low-resistance output, it would effectually kill all high notes when placed in parallel with the average pick-up, which, at the highest frequencies, may have an impedance rising to 30,000 ohms or more. To make matters worse, the writer had set his heart on the "Marconi-phone" pick-up, which has a much higher impedance than the bulk of such instruments.

Bearing in mind that it is not the capacity of the wire, in itself, that is harmful, but the conjunction of this capacity with a high-impedance source of high notes, attention was turned to the possibility of converting the high-impedance output into one of low impedance. Calculation showed that the capacity of the leads would not result in serious high-note loss if shunted across an output of impedance not greater than some 5,000 ohms. This figure could, of course, be reached by the use of a suitable transformer, but no transformer designed for the purpose was available. Instead, the pick-up was connected directly across grid and filament of a low-impedance valve, which was installed in the gramo-



phone itself. Since the A.C. resistance of the valve amounted to only a few thousand ohms under operating conditions, it was considered quite safe to connect its anode to the rest of the amplifier by the 40ft. connecting wire.

To economise in batteries (or mains equipment) it was arranged that the valve in the gramophone should be supplied with its anode current and grid-bias from the amplifier, with the result that no extra equipment other than a small bell transformer to supply the heater had to be purchased. The circuit of the whole arrangement, including the relevant parts of the wireless receiver and the switching employed, are shown in the accompanying diagram, below which various practical details are given.

A. L. M. S.

NOW THE AF7 TRANSFORMER

The need for a low-ratio transformer of superlative quality has been apparent for some time.

Many constructors requiring greater L.F. amplification than is practicable with one stage find that two stages with transformers of the old standard ratio give excessive amplification—and excessive amplification is liable to prove exceedingly troublesome, as is readily seen on consideration of the conditions.

Take first the case of a single L.F. stage employing the standard transformer ratio of 1:3½. The amplification factor of the modern detector valve is about 16, and that of an output valve of the P625 class is 6. This gives the total L.F. amplification from the detector to the output as:—

$$16 \times 3.5 \times 6 = 336.$$

This may be increased by using a transformer such as the AF6 which, with its higher ratio of 1:7, would give:—

$$16 \times 7 \times 6 = 672.$$

Compare the above with two stages, employing the same valves and transformers of the standard ratio. The total amplification from the detector to the output becomes:—

$$16 \times 3.5 \times 16 \times 3.5 \times 6 = 18,816$$

We believe these figures will be interesting, and perhaps surprising, to those who have not considered the question from this angle. What is required is some combination capable of giving appreciably more amplification than the single stage, but appreciably less than that obtained from two.

Several methods offered a solution, but after investigation of all the possibilities we decided that a transformer with a ratio of 1:1½ had, amongst others, one great advantage: the reduction in the secondary allowed us to increase the primary, thereby securing a primary inductance of 210 henrys when carrying 1 milliamp. This transformer is therefore clearly the most suitable transformer to follow an anode bend detector.

Compared with the figures given above, the total amplification using this transformer would be:—

$$16 \times 1.75 \times 16 \times 1.75 \times 6 = 4,704.$$

This new transformer is the AF7, price 30/-. It is available for push-pull, AF7c, price 34/-.



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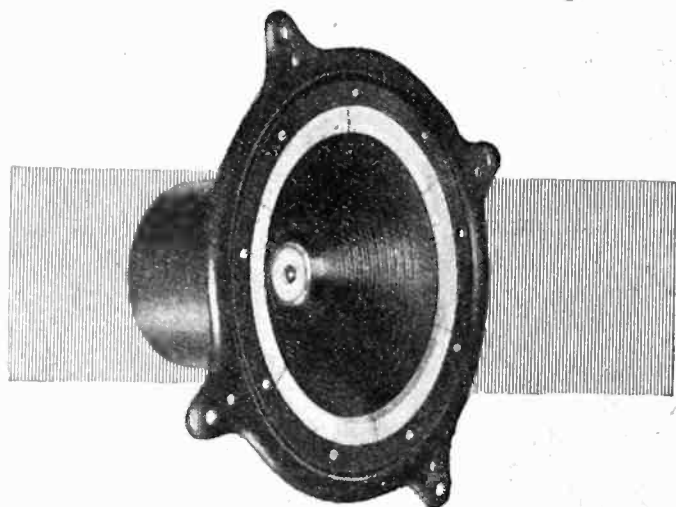
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The price is exceptionally reasonable when the remarkably fine reproduction is compared with that of other speakers and therefore offers excellent value for money. There are three other R.K. Reproducers—the Senior with built-in rectifier for use with A.C. mains, price £11 10s., and the Standard Senior, price £7 7s., and Junior Model, price £6 6s., all of which are obtainable through your radio dealer.

Ask your dealer for particulars of hire purchase terms.

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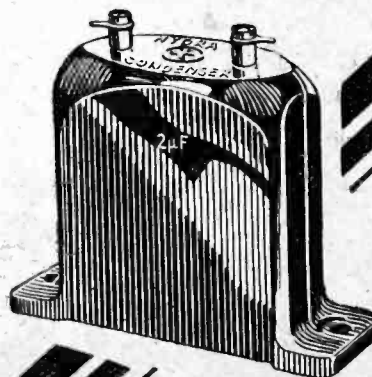
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BERLIN RADIO SHOW



Germany's Latest Sets.—New Telefunken Valve, Selenium Rectifier, Infra-red Sensitive Photo Cells, Electrostatic Loud Speaker.

New Apparatus Seen at the Stands.

By Our Staff Representative Visiting Berlin.

THE seventh annual Radio Exhibition in Berlin was opened on August 22nd by Dr. Bredow, the Secretary of State, who acts as Broadcasting Commissioner for the whole of Germany. The exhibition had been advertised far and wide in a very striking manner. For example, a fleet of boats was to be seen on the Havel near Wannsee, a popular Berlin resort, with masts resembling the well-known broadcasting tower with the restaurant halfway up, which forms such a striking landmark of the Exhibition. The leading boat carried a loud speaker and radiated music; the others contented themselves with the distribution of balloons, some of which contained free tickets for the show. A week before the opening of the Exhibition I visited a cinema at Weimar, in Thuringia, and this boat display formed an item of the topical news film; in this way the propaganda had doubtless reached every town in Germany. The opening was noteworthy because, in addition to the beautiful music—the real thing—which was provided by a magnificent orchestra, Professor Einstein gave an address in which he reminded the company that the source of all technical achievement is the divine curiosity and research of the experimenter. He recalled the names of Maxwell, Hertz, and others, and made a humorous reference to those who availed themselves of the wonders of science without understanding anything more of their spirit than does the cow of the botany of the grass which she devours with such relish.

For the first time the Exhibition included both radio and "phono," if one dare use the latter term to denote every known method of the reproduction of sound. This

has led to a very great increase in the size of the Exhibition. Occupying four sides of a square, the Exhibition buildings consist of six halls, providing 270,000 square feet, the number of exhibiting firms being 350. It should be said at once that a great amount of space is taken up by the exhibits of the Imperial Post Department and by the Broadcasting Company. The exhibition was really a combination of a trade show on the lines of the Olympia Show with a national cultural exhibition. The latter occupied nineteen rooms, in some of which one could hear gramophone reproductions of strange foreign music such as Gurkha songs, Tibetan temple music, Scottish bagpipes, a Madagascar chorus, and so on, the players being

projected on a screen. I was disappointed to see that the bagpipes were played by a man in trousers. In other rooms one could hear speeches by Edison, Berliner, Ebert and Hindenburg; in others short extracts from the leading historical broadcasts of the year in sport, politics, etc. Seven rooms were devoted to an exhibition of historical apparatus showing the development of the gramophone and talking film.

The exhibit of the Broadcasting Company was devoted very largely to the subject of interference, its causes and cure. This subject has become of paramount importance, and every effort is

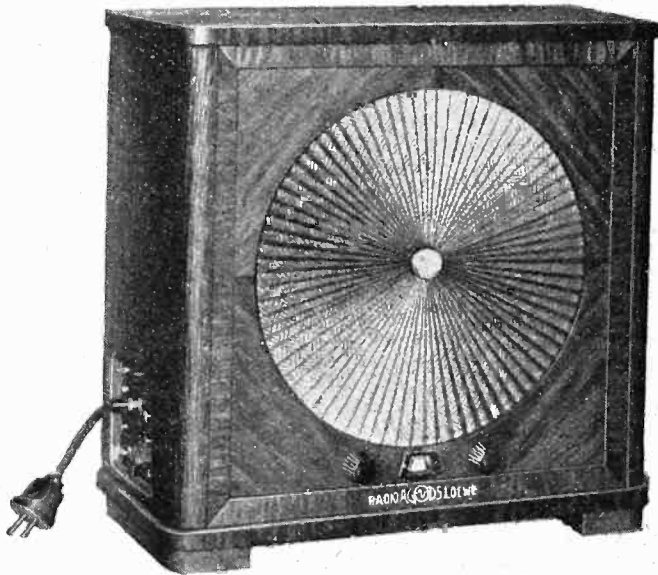
being made to educate the public in the matter. In the larger centres of population, where the people live mainly in large blocks of flats and where electrical apparatus is used for many purposes, the interference with broadcast reception has become a very serious problem, more especially with sets supplied from the mains. The Broad-

BERLIN'S annual radio show is of unusual interest. New apparatus like the "rod" valve, the electrostatic loud speaker, the copper-oxide photo cell and the selenium rectifier to be seen this year are entirely novel, while an opportunity is afforded of comparing the receiving sets of this country with Germany's latest products.

The absorbing of the gramophone, which in its present-day form depends so much upon radio development, into the wireless exhibition reveals an important tendency towards the combining of all sound reproduction under the term "Phono."

Berlin Radio Show.—

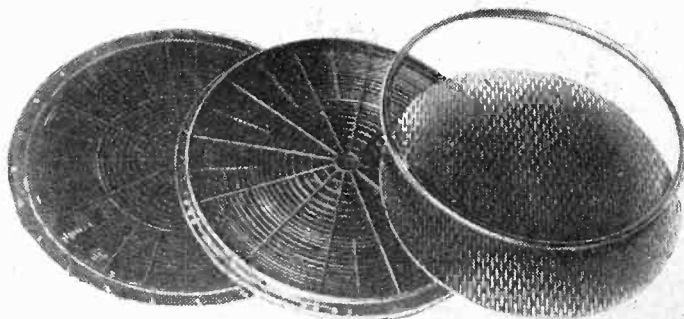
casting Company has organised a body of volunteers who look into every reported case of interference, trace the cause of the disturbance, and give advice as to its elimi-



An all-mains three-valve set selling at six guineas. In addition to the A.C. rectifying valve a three-element valve is included, two units of which are of the screen-grid type.

nation. They have issued a number of pamphlets dealing with the problem, and at the exhibition had fitted up a number of ingenious diagrams in which the various current paths could be illuminated by turning a switch, with the object of helping the layman to understand why such an apparatus as a vacuum cleaner can cause interference to a neighbour's wireless reception, and how it is possible by means of chokes and condensers to eliminate the trouble at its source. Several firms specialise in the supply of disturbance preventers. It was stated that in the month of June 6,322 cases of disturbance had been reported, of which 3,705 had been cured; these were classified as follows: high-voltage lines and networks, 99-24; electric trams and railways, 435-118; oscillation due to reaction, 896-572; motors, 1,150-542; high-frequency apparatus, 1,322-898; miscellaneous, 2,410-1,551; the first number being the cases reported, and the second the cases satisfactorily dealt with.

A model tramcar ran backwards and forwards on a short track, the bow contact being of metal when running in one direction and of carbon when running in the other direction. A near-by wireless receiver with

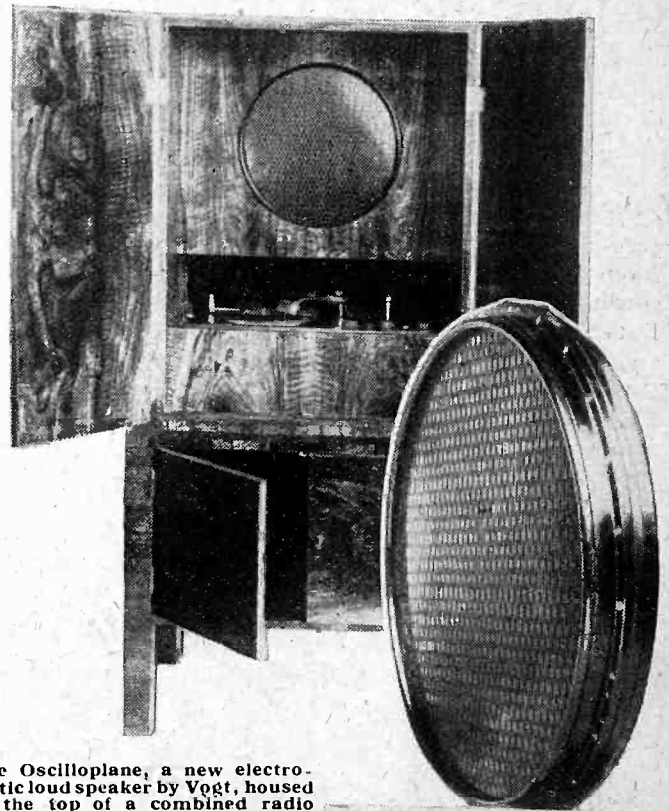


Dismantled Oscilloplane loud speaker, showing the bakelite metal-coated plates, dust screen and ring.

a loud speaker was relatively silent when the carbon contact was in use, but very noisy when the metal contact was used. On expressing the view that this exhibit, although interesting, could have little propaganda value beyond making the public angry with the tramway companies, I was told that this was the object, as the latter could only be forced by public opinion to adopt protective measures. Two of the booklets referred to above deal exclusively with the disturbances caused by electric trams and railways.

Broadcasting Company's Technical Exhibits.

A very interesting exhibit by the Broadcasting Company was a complete installation of the apparatus employed to control the degree of modulation both on the low-frequency side to avoid distortion due to overloading microphones and amplifiers, and on the high-fre-



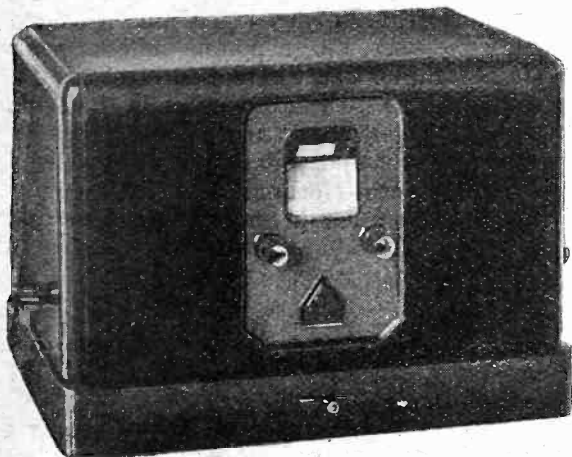
The Oscilloplane, a new electrostatic loud speaker by Vogt, housed in the top of a combined radio gramophone. An enlarged view of the Oscilloplane is shown on the right. The elevated position of the loud speaker is a good feature.

quency side to avoid over- or under-modulation. Here and throughout the exhibition one noticed how the gramophone record and pick-up was utilised for the purposes of demonstration. Very few of the multiplicity of sounds heard emanating from what would have been silence cabinets had their doors been closed had their origin in a radio wave; even if there had been no separate gramophone section the exhibition could rightly have been called a radio and phono show.

An exhibit of the Broadcasting Company which caused great interest was the actual production of a record on a wax blank from a voice in an adjacent microphone, the record then being played back through a loud speaker.

Berlin Radio Show.—

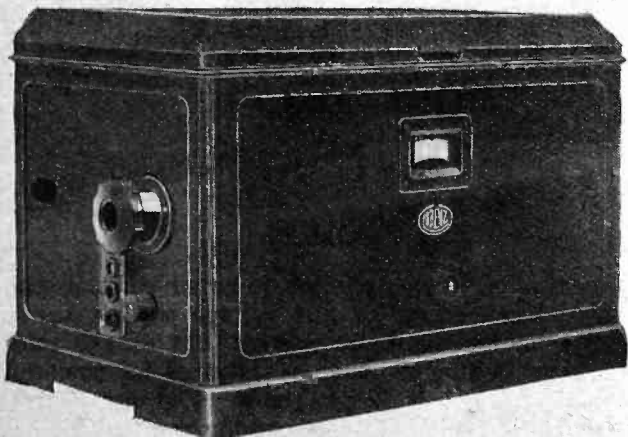
A large room was devoted to television, demonstrations being given by two companies, viz., the Fernseh A.G. and the Telehor A.G., the former being associated with Baird and the latter with Mihaly.



A somewhat unusual feature is the inclusion of a switch giving alternative anode bend or leaky grid detection. The Mende three-valve receiver.

Before leaving the cultural and turning to the trade section we should like to mention that a large reading room was provided with wireless papers classified according to language. The section headed England and Ireland contained 16 copies of various papers, all but one published in London, the exception being published in New York; there is apparently some doubt as to the geographical situation of the latter city.

On enquiring at most of the stalls as to whether they had anything new of importance, I was answered by a shrug of the shoulders. Striking novelty there was none, with the exception, perhaps, of the new Telefunken valve or "rod" as they prefer to call it, but as compared with previous years, there was a marked improvement in the design of sets, both externally and internally. The all-mains type predominated. One of the most striking features was the almost entire absence of portable sets, only four or five firms appearing to devote any attention to this type of receiver.

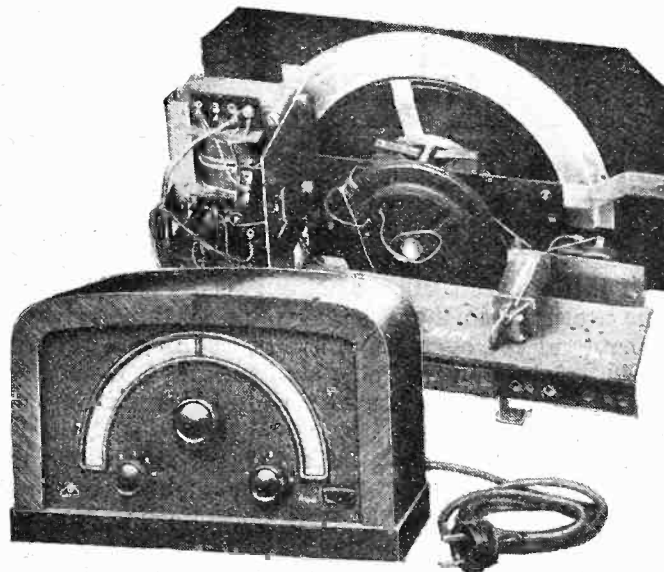


The Lorenz receiver fitted with a control which enables resistance to be inserted in the tuned circuits. By this means excessive sharpness of tuning can be avoided when long range reception is not required.

The lowest priced three-valve all-mains set with loud speaker was the Loewe set shown on the previous page, which retails at six guineas. It appears to have only two valves, one being the rectifier, but the other is the well-known Loewe multiple valve, containing three elements in a single bulb, two of which are of the screened-grid type. Nearly every firm had a three-valve all-mains set with built-in loud speaker; some consisted of detector and two low-frequency stages, others of a high-frequency stage, a detector and a pentode output stage; most firms build both types.

The New Telefunken Valve.

The principal novelty of the exhibition was undoubtedly a new type of valve which, because of its shape, has been called the Telefunken "rod" or "staff," but which is distinguished from the usual valve by having no grid, the control being exercised by an external metal coating. The idea is not new, as de Forest patented this in 1906, a year before it occurred to him to insert a grid between the anode and cathode. With a valve of the ordinary shape the amplification is too small to make



A Siemens and Halske receiver with a single tuning scale covering a wave range of 200 to 2,000 metres. Tuning is by ganged variometer and condenser.

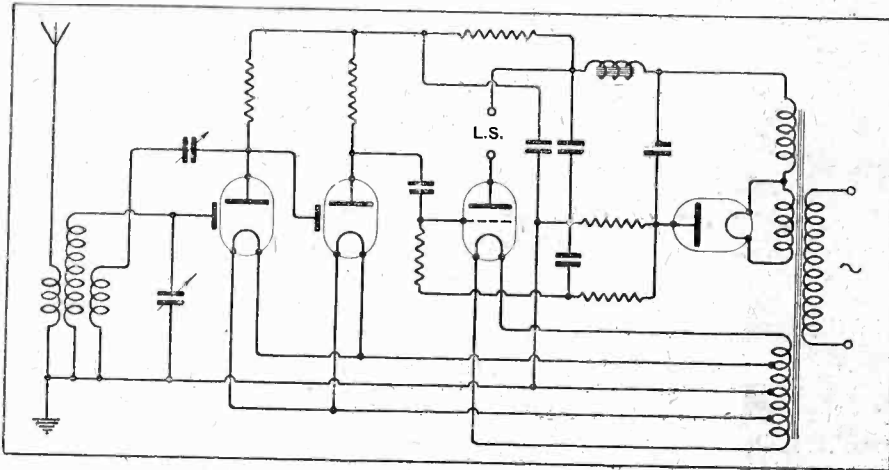
the idea practicable, hence the peculiar construction which has been adopted. The glass tube, about 4 or 5 in. long, is squashed flat, while the cathode consists of a straight filament running from top to bottom at one side of the flattened section, and at the other is the anode of sheet metal bent into an oval shape and pinched by the glass walls, thus giving it mechanical support. The control electrode consists of a metal coating squirted on to the glass and entirely surrounding it. It is impossible to obtain static characteristic curves for such a valve, because if a positive voltage be applied to the coating it attracts a negative electron charge on the inner wall, which neutralises its effect. For the same reason the grid bias is of no account, and one can connect the coating directly to the anode of the preceding valve without any condenser, which simplifies and cheapens the set. For high-frequency amplification and detection the valves are

Berlin Radio Show.—

made soft, but for audio-frequency amplification they are made with a high vacuum. The type of glass employed for making the valve is important, since the insulation resistance and consequent leak through the glass wall between the outer coating and the inner layer of ions and electrons plays an important rôle; it is this leak that makes the gas-filled valves unsuitable for audio frequencies. One rather unexpected but very important advantage of this valve is that the filament, which takes 0.2 ampere at 1 volt, can be supplied with alternating current without any trace of hum. Notwithstanding this, it is claimed that it amplifies the low audio frequencies. This valve is not only cheaper than other types, but lends

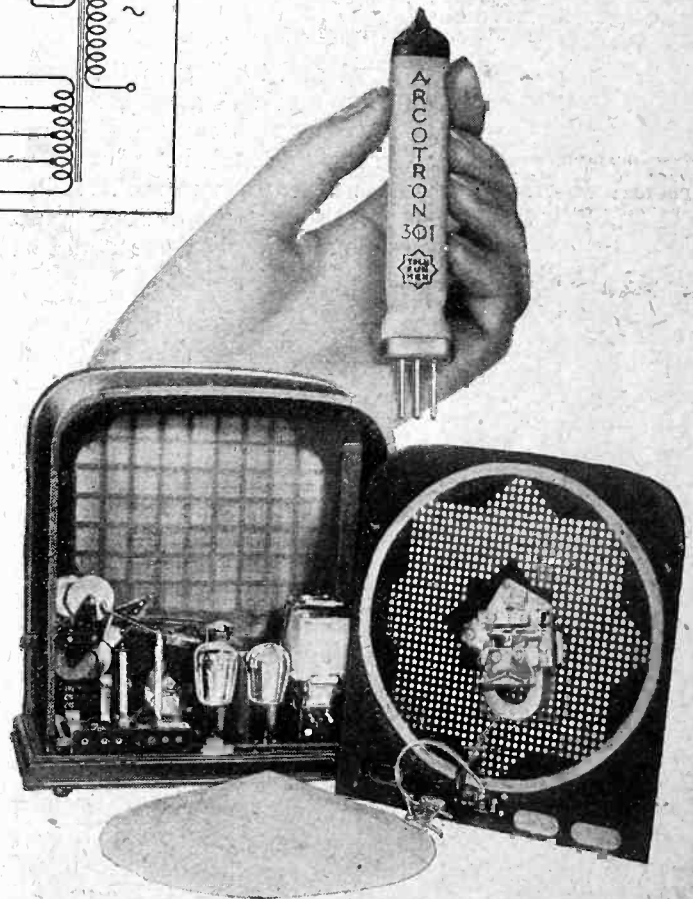
Specially small rectifiers have been developed for insertion in the cases of moving-coil instruments to enable them to be used for the measurement of alternating voltages; the constancy and reliability of the selenium rectifier holds out great promise of its successful application to A.C. measurements.

The same firm have developed the so-called dry electrolytic condenser, i.e., a porous material soaked in electrolyte separating two aluminium electrodes. These condensers are made by winding strips in the same way that Mansbridge condensers are made. It is claimed that, providing the stated voltage is not exceeded, these condensers never need reforming, and that they preserve their capacity when left in storage for long periods.



Circuit of the Telefunken 12 W three-valve all-mains set showing the use of "Rod" valves as detector and L.F. amplifier.

Telefunken type 12 W all-mains three-valve set with built-in four-pole loud speaker. The new "Rod" type valves can be seen on the left. This valve is the principal novelty of the exhibition and its size can be judged from the illustration.



itself to the construction of cheap sets. Valves of this type are fitted in the Telefunken 12 W three-valve receiver, and the circuit shows their use in the first two stages. A built-in four-pole loud speaker is included in this receiver, and, arranged for all-mains working, retails at eight guineas.

An interesting novelty was the set shown by the Mende Co. This set is fitted with a knob whereby one may employ either anode-bend detection if the station is near, or the more sensitive leaky grid detection when receiving a distant station. Another somewhat similar device has been introduced by the Lorenz Company into their high-grade five-valve receivers; by means of a knob one can introduce resistance into the tuned high-frequency circuits, and thus improve the quality when great selectivity is not found essential.

Selenium Rectifier.

An interesting exhibit was that of the Süddeutscher Apparate-Fabrik. This firm has developed the selenium rectifier, a dry metal rectifier which it is claimed is superior to the copper-oxide type. Thin sheets of selenium have a layer of metal squirted on to them on one side, a sheet of foil being pressed against the other side. Such an element possesses unilateral conductivity up to a potential of 20 volts, the back current being less than 0.1 per cent. The efficiency of the rectifier is from 60 to 65 per cent. The high voltage per element makes the selenium rectifier peculiarly suited for the construction of high-voltage rectifiers.

The maximum voltage appears to be 12 volts, a 3,000-microfarad condenser for this voltage costing 14s. A special type for the same voltage, but of 150 microfarads, and costing 2s. 6d., is intended for smoothing grid-bias circuits; it weighs only 35 grammes. The larger sizes are suitable for smoothing rectified filament-heating current.

The only firm showing any novelty in audio-frequency

Berlin Radio Show.—

transformers was Dietz and Ritter, of Leipzig, whose "Korting" transformer, with a ratio of 3 or 4 to 1 and a weight of 300 grammes, showed excellent characteristic curves. Its main interest lay in the claim that



Few portable sets were to be seen. The Ideal Blue Spot five-valve portable. It is a superheterodyne.

it utilised iron, which was free from the defects of Permalloy and similar alloys. Further particulars could not be obtained.

Constant-output Transformers.

This firm also exhibited what must be regarded as one of the important novelties of the exhibition, viz., a transformer which, on a given load, maintained an approximately constant secondary voltage when the primary voltage varied from 180 to 280 volts. Each transformer must be specially adjusted for the load on which it has to work. Patent considerations prevented any explanation being given beyond the facts that it depended on the knee of the saturation curve and that a condenser was involved. The secondary voltage in a given case was 212 for a primary voltage of 180; it rose to 223, and then fell to 210, as the primary voltage was increased to 280. Such a transformer should prove useful to those who have a mains supply subject to large fluctuations, but the dependence of the regulation on the load will prove a serious drawback in many cases.

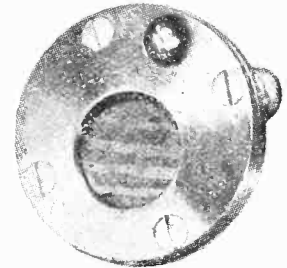
The Rectron Company exhibited a device whereby on switching on an all-mains set the anode voltage is not applied to the valves until the filaments are heated. The anode circuit contains a switch operated by a bimetallic strip, which is heated by a coil connected across the low-voltage secondary of the transformer. The time taken for this switch to operate allows the valve filaments to become heated.

A 25

The Blue-Spot Ideal Company exhibited a new type of electrostatic loud speaker which has been developed by Hans Vogt, of talking-film fame. The patent rights of this speaker are held by the Oscilloplan-Holding A.G., and the English rights have been acquired by the Graham Amplion Co. We were greatly struck by the excellent quality of reproduction, which was certainly equal to anything heard at the Exhibition. It combined clear, high notes without any unpleasant shrillness and deep bass without boom.

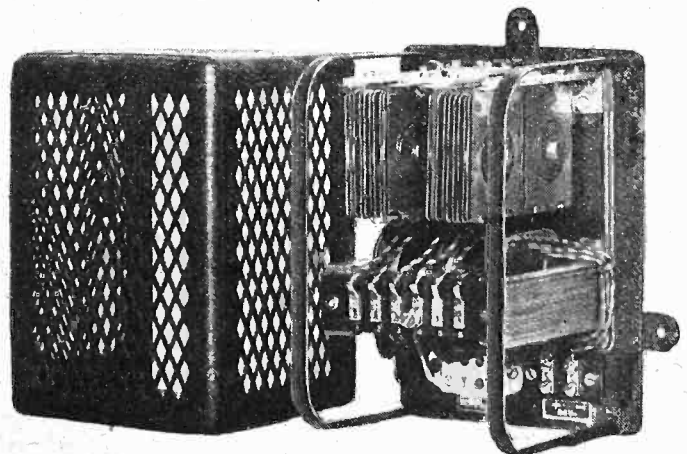
A very thin metal diaphragm, but a minute fraction of a millimetre thick, and a foot in diameter, is stretched

New type of photo-electric cell making use of copper-oxide plates very similar to those used in rectifiers. Rapidity of action, sensitiveness to infra-red light and the fact that an enclosing globe is not necessary are among its advantages. Exhibited by Radiosender G.m.b.H.



between two bakelite-moulded, ribbed discs about 2 mm. apart. The faces of these discs are made conductive by means of graphite and treated with a special varnish. A special high-vacuum rectifier maintains a potential of 800 volts between the diaphragm and these faces; the audio-frequency voltage causes an increase of potential on one side and a decrease on the other, thus causing the diaphragm to vibrate. A novel feature is the gradation in the size of the air holes in the bakelite discs, which decrease towards the centre, and thus provide increased air cushioning where the amplitude would normally tend to be excessive. The quality obtained was certainly very striking. This loud speaker was not on sale as a separate unit, but only as a part of the complete sets exhibited by the company.

One of the attractions of the exhibition was provided by the giant Blatthaller loud speaker, which Siemens and Halske installed at the top of the wireless tower. The announcements which it gave out could be heard far beyond the limits of the Exhibition. It is claimed that it can be heard up to a distance of twenty kilometres. The "membrane" consists of corrugated aluminium



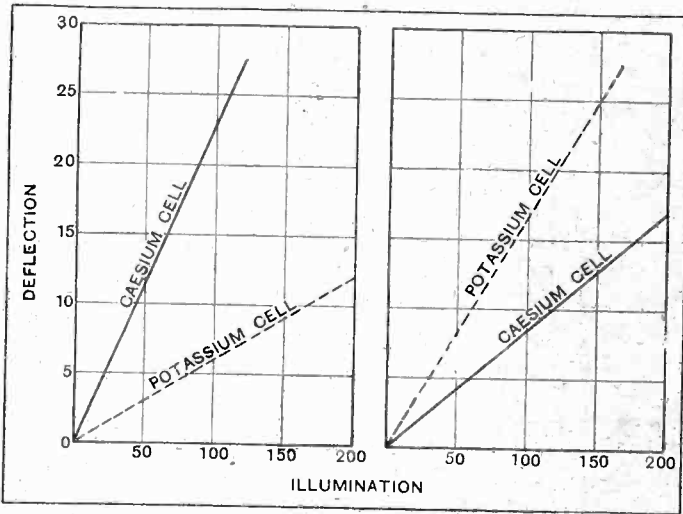
Selenium rectifier produced by the Süddeutscher Apparate-Fabrik. The output is 0.35 ampere.

Berlin Radio Show.—

sheet 1.5 mm. thick, and its extreme movement is 2 cms. The principal novelty on the Siemens and Halske stand was the large scale which was fitted to all their sets, the pointer of which carries a small lamp which brightly illuminates the portion of scale of interest at the moment. A further novelty was the covering of the whole range from 200 to 2,000 metres by means of the 180-degree rotation; it is this, of course, that makes the large scale essential. This range is obtained by causing the spindle to operate a condenser and a variometer simultaneously. In the type shown in the illustration, the variometer is of the flat type with "D" shaped coils. Similar sets were shown with three and four valves; in this case the two spindles are geared together by an endless steel band, each spindle operating a condenser and variometer.

Short-wave Receivers.

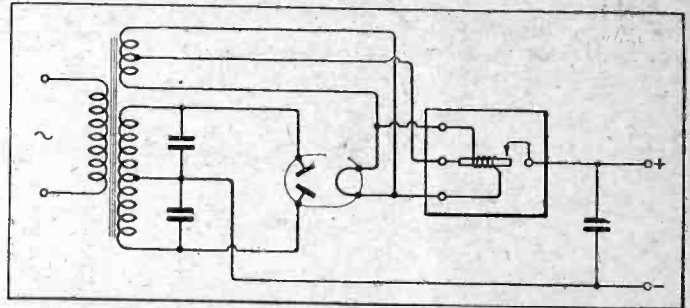
Little attention appears to have been given to the reception of short waves, but a very simple set was exhibited by the Telefunken Company. This was on the lines of an ordinary three-valve broadcast receiver,



Relative sensitivity of potassium and caesium photo-electric cells. Left—glow lamp as source of light. Right—mercury paper lamp as source. By the use of the caesium cell which was exhibited by Otto Pressler of Leipzig, less amplification is necessary in talking film apparatus.

except that special care had been given to the design of the coils and condenser of the high-frequency stage. The range from 13.9 to 100 metres was covered by five coils, which were corrected to a five-way switch. The condenser was unusual, in that its rotor had twelve posi-

tions, moving from one to the other with a spring snap. Intermediate positions were obtained by a small movement of the stator, corresponding, however, to a 360° rotation of the adjusting knob. It was claimed that the set was capable of accurate calibration, and that this was not affected by the aerial. Another type had two ranges, viz., 13.9 to 50 and 200 to 550 metres. These



Heat-operated relay of the Rectron Company arranged to delay the switching on of the H.T. supply to a receiver fitted with indirectly heated valves.

sets are built for battery supply, and have a screened grid output valve designed to supply the high-resistance winding of the Arcophon 4Z loud speaker.

There was an enormous choice in gramophone pickups. The Loewe Company use no needle-clamping screw, but trust to the magnetic field to hold the needle in position. This reduces the weight of the moving part and puts up its resonant frequency, so that it is in the neighbourhood of 7,000 or 8,000.

Photo-electric Cells.

One of the best-known makers of photo-electric cells, Otto Pressler, of Leipzig, showed a large variety of cells for various purposes. This firm claim to have brought the caesium cell to a high degree of perfection; it has the advantage over the potassium cell of being very sensitive in the yellow and infra red, whereas the latter has its maximum sensitiveness at the violet end of the spectrum. It is claimed that the use of a caesium cell in the place of a potassium cell may save one stage of amplification in talking film apparatus.

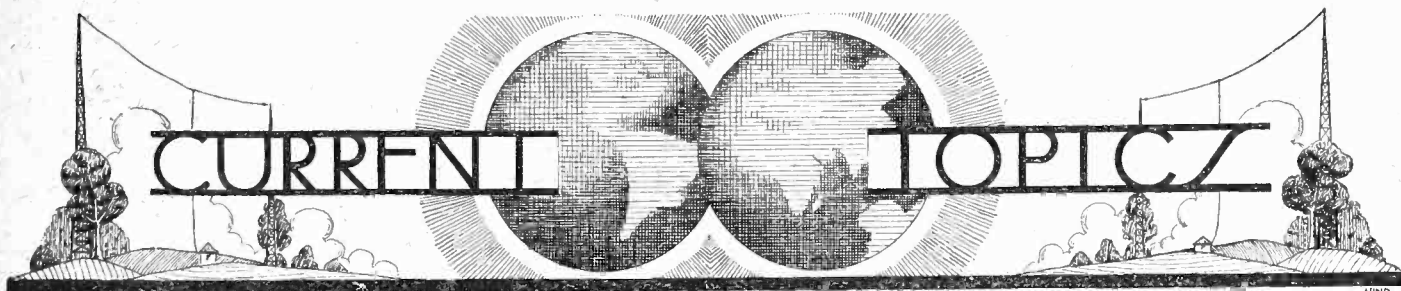
Radiosender G.m.b.H., of Berlin, exhibited a very novel type of photo-electric cell. They found that the copper oxide plates used in their rectifiers acted as photo-electric cells with a decided maximum of sensitiveness in the infra-red and with great rapidity of action. There is no enclosing globe, the light simply passing through the hole in the front plate and falling on the oxide surface which is exposed to the air.

OLYMPIA RADIO SHOW

SEPTEMBER 19th to 27th

**THREE
SPECIAL
ISSUES**

Next Week - - FORECAST—First Details of New Apparatus
 Sept. 24th - - FULL REPORT OF THE SHOW
 Oct. 1st - - THE NEW DESIGNS REVIEWED



Events of the Week in Brief Review.

DECLINE IN GERMAN LICENCE FIGURES.

On June 30th the number of licensed listeners in Germany amounted to 3,224,944, showing a decline of 13,452 on the preceding quarter.

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THE TRUTH ABOUT OSLO.

The trials with the Oslo new 60-kilowatt transmitter have not given satisfaction. The tests are temporarily suspended, and we understand that two or three weeks must elapse before the requisite modifications can be completed.

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HAVE YOU HEARD THIS ONE?

With the call letters PFI-IDZ, the Idzerda Radio Works at The Hague broadcast experimental transmissions every Saturday night between 11.40 p.m. and 1.40 a.m. on 299 metres. Short broadcasts of talks and gramophone music are made, the announcer informing listeners between items that they originate from Idzerda Radio, Den Haag.

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RADIO REPAIRS BY THE BLIND.

A blind student has just passed successfully through the gramophone and radio service course held at the "H.M.V." mechanics' school, Hayes, Middlesex. He is Mr. J. H. MacMichael, a music dealer, of Alloa, Clackmannanshire. Mr. MacMichael felt his way about the parts of the instruments on which he received instruction, and did the best work in his class, needing only the help of a boy to read the meters.

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POLYTECHNIC WIRELESS COURSES.

Classes in wireless and high-frequency engineering will re-open at the Polytechnic, 307-311, Regent Street, London, W.1, on September 22nd. The facilities include a transmission laboratory with a complete commercial installation for telegraphy and telephony (6RA). Radio instruction can also be obtained at the Northampton Polytechnic Institute, St. John Street, London, E.C.1.

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THE OLDHAM-U.S.L. BATTERY.

Behind the announcement of Mr. John Oldham that the Oldham battery will in future be sold as the "Oldham-U.S.L. battery," lies an interesting history of successful efforts by the British organisation to co-operate with one of the largest battery producing concerns in the world, viz., the U.S.L. Battery Corporation of Niagara Falls, America. While making available fresh sources of research and

production facilities, the new arrangement does not affect the nationality of the Oldham firm, which, established in 1865, remains entirely British in regard to capital, labour, and material used.

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PROHIBITION: RADIO VARIETY.

Amateur transmission, except by clubs, is forbidden in Germany. The latest estimate places the number of illicit amateur transmitters at 1,500.

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A POWERFUL STATION.

If the new Radio Paris 60-kilowatt transmitter at Essarts-le-Roi fulfils expectations, writes a correspondent, France will at last have a national station covering the greater part of the country.



"STEREOSCOPIC" BROADCASTING. A double microphone shown at the Berlin Radio Exhibition by the Reich Rundfunk Gesellschaft. It is claimed that, by introducing a slight phase difference, the microphone gives the listener a sense of direction.

There is a faint suggestion, however, that the sponsors of the new transmitter are over-estimating its capabilities, since they state that "excellent reception will be obtained by crystal sets within a zone of 315 miles."

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DUAL TRANSMITTERS FOR HUNGARY.

We understand that plans are maturing for the construction at Budapest of a powerful new broadcasting station, modelled on the lines of the British Regional stations. Two programmes will be transmitted simultaneously

HAPPY HERTS.

"A radio set in every other home," is the record claimed for the counties of Hertfordshire, Oxfordshire, and Surrey. The percentage of families holding radio licences is 55.4 in Hertfordshire, 53.9 in Oxfordshire, and 50.2 in Surrey.

The average all over the country is 30.9, with Durham lowest at 10.9.

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TELEVISION TESTS FROM BERLIN.

On 419 metres (716 kc.), with a power of 1.7 kW. in the aerial, the Berlin Witzleben (Germany) transmitter carries out a regular series of television transmissions, according to the following time-table: From 13.00 to 13.30 B.S.T. daily (Monday to Friday inclusive), with extra transmissions from 09.00 to 10.00 B.S.T. on Mondays, Wednesdays, and Fridays; on Saturdays a special test is also made between 01.00 and 02.00 B.S.T.

The Königswusterhausen high-power station relays these experiments and also transmits its own tests on Thursdays (01.45-02.45), and on Saturdays from 09.00-10.00 B.S.T. The wavelength utilised is that adopted for the programmes, namely, 1,635 metres (183.5 kc.) and the power is 35 kW.

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A WIRELESS COLOUR-SCHEME.

To rob wireless repair work of one of its greatest bugbears is the object of the new standard colour code incorporated in H.M.V. and Marconiphone instruments at the coming Radio Exhibition. To diagnose the trouble in a refractory receiver the service man has first of all to identify the various circuits amid the maze of wires in the instrument, and this is sometimes the hardest part of his task.

The colour coding system has been in use by the telephone industry for many years and has been used sporadically for constructional purposes by various manufacturers. The "H.M.V." system, however, represents the first attempt to standardise the code, so that a dealer seeing a brown wire in a 1930 instrument will know that a brown wire will identify the same circuit in a 1940 model.

The code is being released generally to the wireless and music trades, and will be introduced into all "His Master's Voice" and Marconiphone service manuals. We understand that credit for the preparation of the code is largely due to Mr. Whitehouse, of The Gramophone Company.

..... PRACTICAL HINTS & TIPS

ALTHOUGH considerable attention has been directed to the need for taking certain precautions when a D.C. mains supply is used for anode current feed, it seems that these measures are often neglected. According to the producers of the

**BURNT-OUT
AERIAL GRID
TRANSFORMERS.**

Ferranti "kit" set, aerial-grid transformers made by that firm are

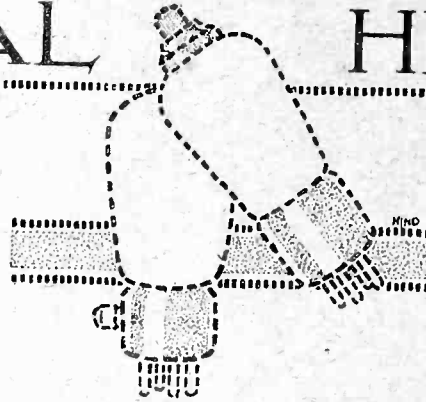
constantly being returned to them as defective; an examination almost always shows that one or both of the primary windings are burnt out, and further investigation of the conditions of use generally brings to light the fact that the customer's set is fed from D.C. mains with a positive earth.

Now, these burn-outs are due to more or less complete short-circuits between aerial and earth. It is generally realised that some precaution (as a rule in the form of an added condenser in the earth lead) must be taken in order to isolate the mains from earth, but this affords hardly sufficient protection in all cases.

A consideration of Fig. 1 will show how the trouble under consideration may arise when the receiver is joined to positively earthed mains. An aerial short-circuit is indicated by a dotted line, and it will be seen that there is direct continuity, via "earth," through the feed wires and the transformer primary; this in spite of the presence of the protective condenser C.

The remedy is simple. All that is necessary to ensure complete immunity from the sort of trouble is another fixed condenser; a capacity of 0.001 mfd. is almost always amply large, and a component with mica dielectric should be chosen. The condenser is inserted between the aerial lead-in wire and the aerial terminal of the set.

Although the Ferranti "kit" set has been used as an illustration, it must be pointed out that these precautions are applicable to every type of receiver. Before leaving the sub-



ject, it should be pointed out that an aerial short-circuit may also cause damage to smoothing chokes and voltage-absorbing resistances, and that these accidents are as often as not due to the operation of lightning safety switches or similar devices. Finally, it should be realised that an aerial at a potential of perhaps as

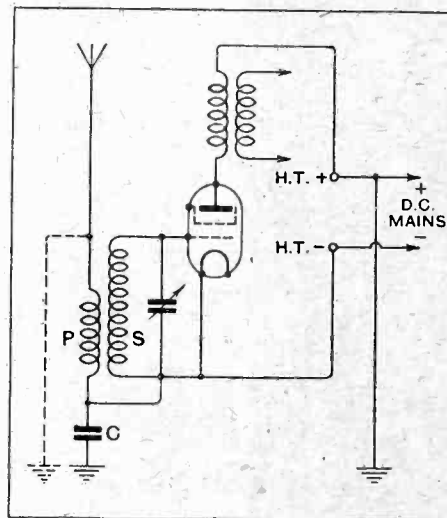


Fig. 1.—Simplified diagram showing how an aerial short-circuit may cause damage to a receiver fed from positively earthed D.C. mains.

much as 240 volts with respect to earth is a possible source of danger to anyone who may touch it.

A PROPER appreciation of the properties of band pass filters, combined with the preparation of precise data for their practical application, is probably one of the most important advances in the world of wireless during the past year. But the undoubted success of these devices should not be allowed to lead us to ignore the fact that a certain price has to be paid for the advantages of "flat-topped" tuning curves.

As a rule, a filter will be rather

less selective—as the term is generally understood—than a two-circuit tuner, although it is not easy to

**FILTERS AND
TWO-CIRCUIT
TUNERS.**

arrive at a fair basis of comparison. At the root of the matter is the fact that the component circuits of a filter cannot be made very "good." Further, it is bound to provide rather less signal strength—the actual loss may be about 30 per cent.—as compared with the other arrangement when properly adjusted with optimum coupling between its circuits.

This is the debit side of the band-pass filter account; to its credit, we have the very important advantage that its two circuits may be controlled by a single dial—indeed, they *must* be in a really practical design. This makes for easy operation, while the adjustment of an ordinary two-circuit tuner calls for a certain amount of dexterity, even if one is aiming at nothing more than maximum signal strength. To obtain from it a broad resonance curve, such as is automatically provided by a properly designed and adjusted filter, requires more than the ordinary degree of skill.

THE introduction of a single-valve loud speaker set, as described in *The Wireless World* for August 6th and 13th, opens up a pleasant prospect to those of us who believe that the future trend of broadcast receiver design will be towards simplicity—but without the sacrifice of the really desirable features that we now consider to be essential for a satisfactory performance.

**A RADICALLY
NEW
RECEIVER.**

The new set certainly comes as a wholesome corrective to the present-day tendency towards elaboration. Designers in the past have been attracted by the idea of driving the loud speaker directly from the detector, but until the new and highly efficient A.C. pentode was intro-

Hints and Tips.—

duced have been unable to put their aspirations into practice. Readers may be reminded that the power pentode detector is capable of delivering up to 350 milliwatts of L.F. energy to the loud speaker—quite as much as the output of most of the super-power valves ordinarily used for domestic reception—when an H.F. signal of 5 volts is fed to its grid circuit.

We must not expect too much from a single valve. Its first and most obvious limitation is that of range, and the radius of action of the set referred to is given as a maximum of 30 miles from a high-power station. This figure will be considerably reduced when its sensitivity is considered in relation to an ordinary "main" station of average power, or where receiving conditions are below the average.

and consequently this principle is available to those who live at a distance from any transmitting station or to those who need a greater choice of programmes than can be provided by an unaided detector. It is the purpose of this note to offer a few suggestions as to how the "Regional One" may be converted into a "Regional Two" with a much more extended range—but with some inevitable sacrifice of its pristine simplicity.

There is no need to abandon the more attractive features of the set, such as its band-pass input filter and inexpensive and compact eliminator; these can be retained by following the general lines of the circuit given in Fig. 2, where those components of the receiver which may still have unchanged values are indicated by their original reference letterings. Strictly speaking, filter circuits of lower re-

ductive relationship with the H.F. transformer secondary. This latter component will be chosen with regard to the user's needs in the matter of sensitivity; any intervalve coupling of sound design will serve, as the design of this part of the circuit is governed by accepted practice.

Positions of essential inter-circuit screens are indicated, but, where high amplification is aimed at, it would be essential to enclose the intervalve coupling components in a metal box. There is no need to budget for a greater eliminator output than that provided in the original design, as the drop in voltage due to the demands of the added H.F. valve is positively negligible. The 30,000-ohm resistance shown for regulating the anode voltage fed to this valve will be correct for the average specimen likely to be used.

A set of this kind is hardly com-

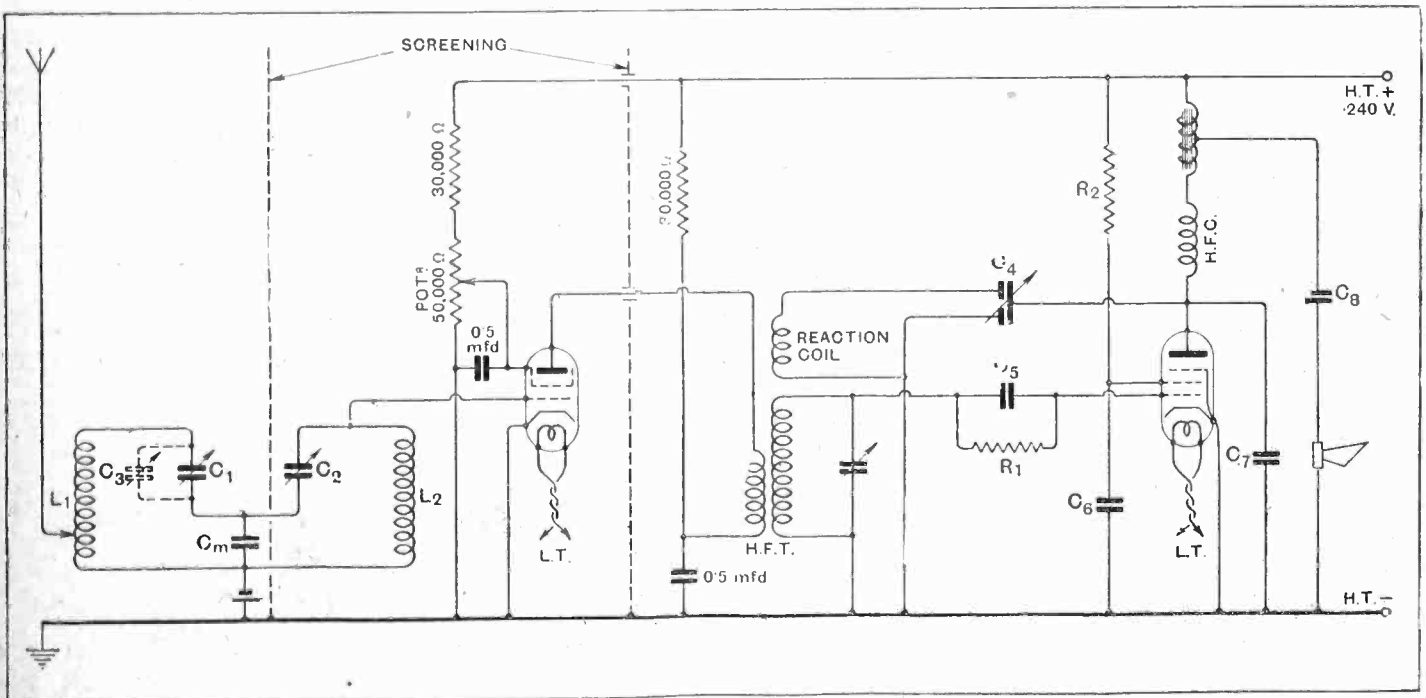


Fig. 2.—The "Regional One," modified for medium-distance reception by the addition of an H.F. stage.

But having overcome the major problem of direct loud speaker feed, the question of maintaining a sufficient signal voltage on the detector grid fades into insignificance. Theoretically, under any conditions or at any range, this can be done by the usual expedient of fitting an H.F. amplifier to provide the necessary magnification. Practically, the range of a "power detector" set is no more limited than that of any other,

sistance, with more clearly defined peaks, would be permissible in a set with another single tuned circuit—that of the H.F. amplifier—to fill up the depression between the peaks. Of course, condensers C₁ and C₂ would be ganged in any case.

No reaction coil is needed for the second filter coil L₂; instead, regeneration must be provided between plate and grid circuits of the detector, and so this coil will be placed in in-

plete without some kind of pre-detection volume control; the amateur may follow his own inclinations in this matter, but it is worth while remembering that, if a series aerial condenser is chosen—and one might do worse—the trimming condenser for the input circuit should be mounted in an accessible position, so that an adjustment may readily be made to compensate for variations in effective aerial capacity.

TWO NEW S.G. VALVES

The Cossor 220 S.G. and 215 S.G. Valves Reviewed.

ALTHOUGH the screened valve in the indirectly heated class has lately shown remarkable progress, hitherto the same could not be said of the battery type. The two new Cossor S.G. valves with 2-volt filaments reviewed in this article are a welcome addition to the range of high-frequency amplifying valves. Their characteristics mark an important advance for not only is the interelectrode capacity extremely low but there is also the added advantage that grid current does not flow until the grid is positive. A high mutual conductance is maintained under working conditions and the high-frequency losses in the valve base are negligible. A stable stage gain of well over 300 times can be attained with well designed circuits.

THE rated characteristics of the two new screen-grid valves with which the present review deals are given by the makers as follows:—

	215 S.G.	220 S.G.
Filament volts	2.0	2.0
Filament current	0.15 amp.	0.20 amp.
A.C. resistance (impedance)	300,000 ohms.	200,000 ohms.
Mutual conductance, or slope	1.1 milliamps per volt.	1.6 milliamps per volt.
Max. anode volts	150	150
Screen-grid volts	60 to 80	60 to 80
Residual anode-grid capacity, of the order of	0.001 μ F.	0.001 μ F.

It will be observed that the 215 S.G. has rated characteristics not markedly different from those of many other screen-grid valves on the market, except that the residual capacity is considerably lower than the average. This latter point should make it possible to use quite low-loss coils with the valve without any appreciable danger of oscillation, provided, of course, that the screening external to the valve is sufficiently good.

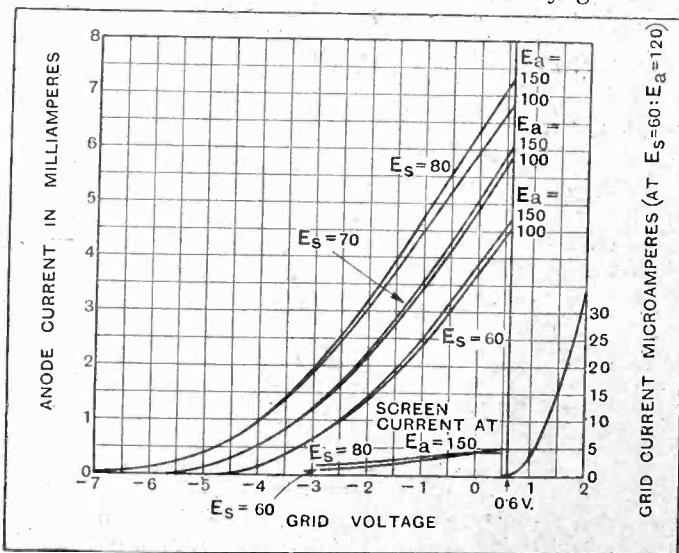


Fig. 1.—Grid-volts anode-current curves of Cossor 215 S.G. valve. It is especially to be noticed that grid current does not start until the grid is made just over half-a-volt positive. The valve therefore needs no grid bias. The screen current is low, as it should be.

In the 220 S.G. we have a valve which combines an unusually high mutual conductance with moderately low A.C. resistance, which should make it especially suitable for use with coils that make no particular claim to low resistance. The exceptionally perfect screening

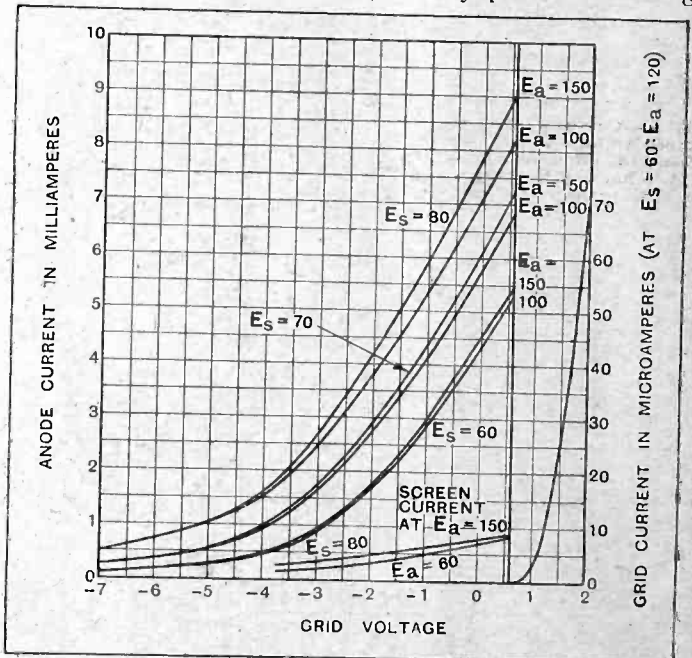


Fig. 2.—Cossor 220 S.G. valve. Grid-volts anode-current curves. The characteristics of this valve are similar to those of the 215 S.G.

that characterises the 215 S.G. is, of course, a feature of this one also.

Measurement of the mutual conductance and A.C. resistance at $E_s=60$, $E_a=120$, and $E_g=0$, which are the voltages usually applied when taking the characteristics of screen-grid valves for catalogue purposes, gave the following results:—

	215 S.G.	220 S.G.
Mutual conductance	1.48 milliamps per volt.	1.76 milliamps per volt.
Anode A.C. resistance	520,000 ohms.	330,000 ohms.
Amplification factor	770	570

Two New S.G. Valves.—

These figures are in both cases definitely better than those claimed by the makers; although the A.C. resistance is higher than they state, this is more than offset by the corresponding rise in amplification factor, as can be seen by the fact that the slope actually found, which is a good measure of the amplifying powers of a screen-grid valve, is greater than the maker's figures.

Figs. 1 and 2 give a fairly full set of curves, plotted in the form of mutual conductance curves (grid volts— anode current) for the two valves. Attention is very

will be seen that unless the input to the valve is kept very small, rectification, with consequent loss of selectivity, may occur. This can be combated either by using a small negative bias, which will permit the valve to accept a larger input before rectification begins, or by preceding the valve with a band-pass filter, which will keep the input from an unwanted station down to a low value. The latter method is strongly to be preferred, as it retains unimpaired the amplifying powers of the valve. The more "low loss" the tuned circuit that follows the valve, the more troublesome this source of unselectivity is likely to be.

Curves for the 215 S.G. are not given, for reasons of space; they are very similar to those of the 220 S.G., and one can draw the same morals from them.

Figs. 5 and 6 may be regarded as giving a summary of all the preceding figures; they show the variation of amplification factor, A.C. resistance, and mutual conductance of the two valves with changes in screen-grid voltage. In compiling these curves it was assumed that the anode voltage would be 150, with zero grid bias, as these are the best conditions under which to work the valve. A drop in anode voltage to 120 would not alter the curves to any very serious extent, except perhaps towards the extreme right of the diagrams. In making any calculations during the designing of a set, it is the

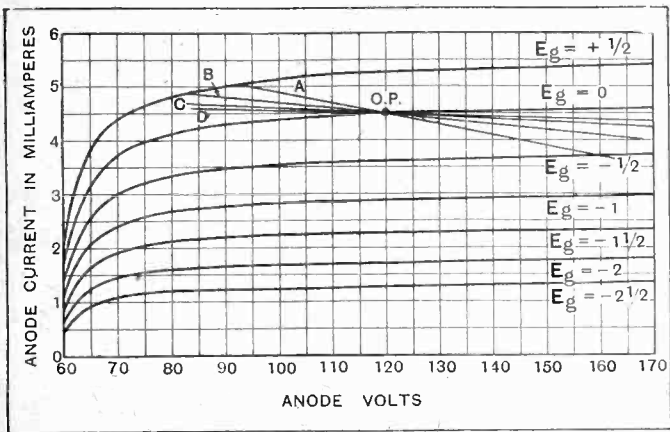


Fig. 3.—Cossor 220 S.G. Anode-volts anode-current curves for a screen voltage of 60. Load lines corresponding to anode circuits of several different values of dynamic resistance R are plotted: if R is high, only a very small grid swing can be accepted. The 215 S.G. gives very similar curves. The anode voltage is not taken low enough to show the negative resistance "kink."

particularly drawn to the curves representing the grid current, for these two valves are, we believe, unique in the fact that the control grid can be made positive to the extent of over half a volt before grid current begins to flow. It is in consequence possible to operate the valve with zero grid bias, which not only avoids the necessity for accommodating a dry cell in some inaccessible corner of a screening box, but in addition enables the high figures of mutual conductance which have just been quoted to be realised in actual practice in the set. With the majority of screen-grid valves the need for biasing the grid negatively to avoid grid current results in a serious drop in mutual conductance.

Rectification Affects Unselectivity.

With both valves, the screen current, which is also plotted in Figs. 1 and 2, is commendably low. The bulk of the energy drawn from the anode battery is therefore consumed in the anode circuit, where it can do most good. The fact that the anode current is rather high is, perhaps, a drawback; it is, however, probably an inevitable condition for getting high slope. At the most, it is a small fraction of the total current consumed by any set with pretensions to adequate output.

Figs. 3 and 4 give the impedance curves (anode volts— anode current) of the 220 S.G. with two different values of screen-grid voltage. The operating point suggested with each of the two voltages is marked as O.P. in the diagrams, and through this point load-lines have been drawn corresponding to anode circuits (coils) of several different values of dynamic resistance. It

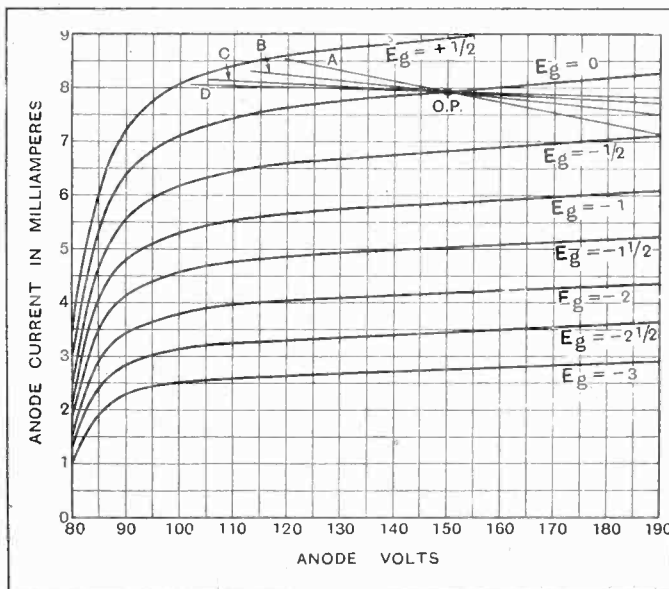


Fig. 4.—Cossor 220 S.G. valve. Anode-current anode-volts curves for a screen-grid voltage of 80. Load lines are plotted for anode loads of several dynamic resistances R. If tuned circuits of very low loss are to be used, it will be advisable, in the interests of selectivity, to apply about 1/2-volt of negative grid bias.

values given on these curves, and not the rated values, that should be taken.

It will be noted that with the highest operating voltages the mutual conductance of the 220 S.G. rises to 2.0 milliamps per volt, and that of the 215 S.G. to 1.66 milliamps per volt. These figures are in each case exceptionally good, and will result in achieving unusually good amplification with coils of but moderate efficiency. In calculating the stage gain attainable with any given

value of screen-grid voltage, the formula $A = \mu \frac{R}{R + R_0}$

Two New S.G. Valves.—

will normally be used (where R is the dynamic resistance of the tuned circuit following the valve), but when R_0 exceeds one megohm or thereabouts the simpler formula

$$A = \frac{gR}{1,000}$$

will generally be found sufficiently accurate.

For this reason the curves for μ and R_0 have been allowed to run off the diagrams, so that g only is given for the lower screen-grid voltages.

Measurements of stage gain have not been made, but calculation gives the following values, which may be

A.C. resistance, and consequent higher amplification factor. Further, it will be noticed that the less efficient coils require a much higher screen-grid voltage for greatest amplification; the valve has to supply much more power to compensate for the losses in the tuned circuit in these cases.

We have several times had occasion in the past to criticise very unfavourably the magnitude of the losses introduced into the grid circuit of a screen-grid valve by the material of which the base is made. It is therefore with real pleasure that we find the high-frequency losses in the base of both the two valves here tested to be negligible. In figures, our measurements gave the result that in connecting either valve across a tuned circuit the losses incurred at 250 metres were less than those resulting from connecting a five-megohm grid leak in the same position. With even the most ultra-low-loss circuit, decapping these valves would result in increasing the signal strength by 10 per cent. at the most; with some valves we have tested the same procedure would raise signal strength 150 per cent.

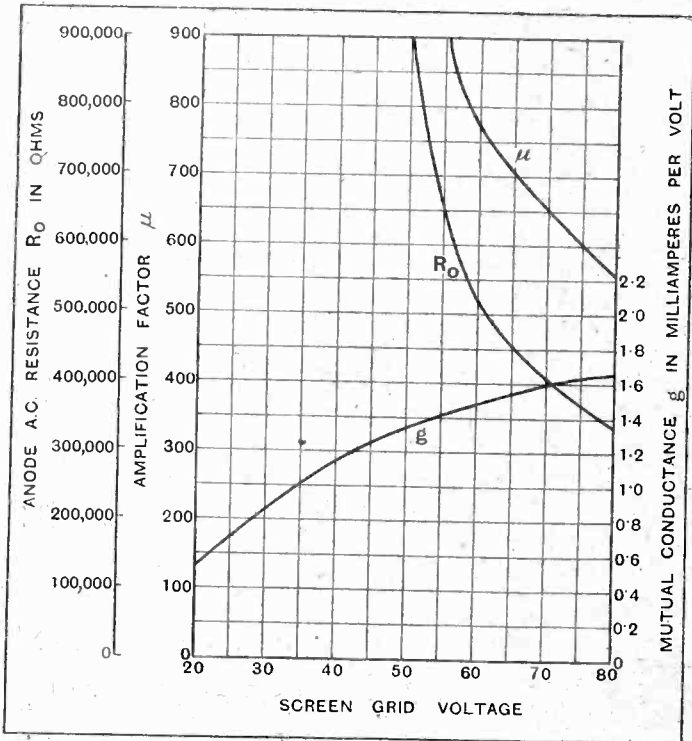


Fig. 5.—Cossor 215 S.G. valve. Variation of A.C. resistance, amplification factor and mutual conductance with screen-grid voltage. Measured at zero grid bias, with anode volts 150, which gives optimum working conditions.

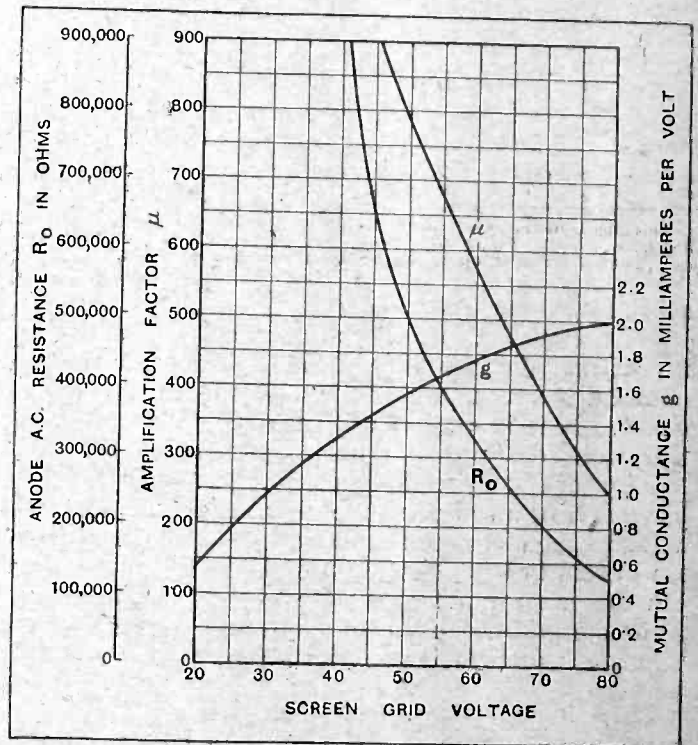


Fig. 6.—Cossor 220 S.G. valve. The variation of A.C. resistance, amplification factor and mutual conductance with changes in screen-grid voltage. Measured at zero grid bias, anode volts 150, which gives optimum working conditions.

relied upon within fairly close limits. They are correct for tuned-anode or tuned-grid circuits with coils of the dynamic resistance named; the description of the coil is a rough guide only.

Coil.	220 S.G. Valve.		215 S.G. Valve.	
	Gain.	Opt. S.G. Volts.	Gain.	Opt. S.G. Volts.
4 in. Litz R. 460,000.	450	30	420	50
3in. Litz R. 225,000.	246	45	240	55
1½in. solid wire . R. 100,000.	135	60	125	70
Good plug-in . . . R. 50,000.	75	65	70	80

It will be noticed, first, that the 215 S.G. gives very nearly as great an amplification as the 220 S.G., in spite of its lower slope. This is, of course, due to its higher

To take full advantage of this most excellent feature, the user of either of these valves must be positively fussy in his choice of valve holder; it must be made of ebonite throughout, and should be of skeleton construction at that. No holder built up from large chunks of synthetic insulating compound of unknown composition should be even considered; if such holders *must* be used, they should be put on the L.F. side of the set where they can do no harm.

Finally, we made an estimate of the residual anode-grid capacity which, it will be remembered, is claimed to be of the order of 0.001 $\mu\mu\text{F}$. We could not confirm

Two New S.G. Valves.—

this extremely low figure; our measurement, though rough only, is thought to be sufficiently accurate to show at least that the residual capacity is somewhat higher than 0.001 $\mu\mu\text{F}$. Our actual results were 0.004 $\mu\mu\text{F}$ for the 220 S.G., and 0.003 $\mu\mu\text{F}$ for the 215 S.G., though they cannot be relied upon implicitly. By winding copper gauze round the valves, and earthing this little auxiliary screen, we were able to make an appreciable reduction in the residual capacity, which dropped by about 25 per cent. in each case.

It is only fair to point out that these figures are only disappointing in view of the extremely low value claimed; taken on their merits they represent a perfection of screening considerably in advance of the average. We would venture the statement that the screen-

ing is more thorough than in any other battery-heated valve, were it not that we do not yet know what the forthcoming Show will produce in the way of new screen-grid valves; such a statement might become obsolete before being published.

If we accept the values of 0.0035 $\mu\mu\text{F}$ and 0.0025 $\mu\mu\text{F}$ as being fairer to the valves than the values actually found, we conclude that the stage gain attainable before oscillation sets in is about 300 times with the 220 S.G. valve, and about 350 times with the more perfectly screened 215 S.G. Comparison of these figures with the table showing the amplification to be expected with different coils will make clear that unless coils of the very lowest losses are used there will be no trouble from oscillation, so long at least as only one stage of amplification is attempted.

Valve.	Max. Anode Voltage.	Optimum Screen Voltage (depends on coils used).	Average Anode Current (mA.).	Amplification Factor.	A.C. Resistance.	Anode-Grid Capacity ($\mu\mu\text{F}$).	Max. Stage Amplification Unneutralised	H.F. Performance Factor.	Optimum Transformer Ratio.	Stage Amp. with 3 to 1 Transformer.	Price.
COSSOR. 215 S.G.	150	70	5.0	650	400,000 ohms	.0025	360	103	1	127	20/-
220 S.G.	150	60	4.5	570	330,000 ohms	.0035	306	100	1	133	20/-

This table is on the lines of the "Wireless World Valve Data Sheet" (Dec. 4th, 1929) and gives the characteristics of the valves under actual working conditions with the screen-grid voltage shown. With comparatively low-impedance valves such as these, no one screen-grid voltage can yield best results under all conditions of use, so that some of the figures shown above are susceptible of appreciable improvement.

THE "TANNOY" RADIO GRAMOPHONE.

A Well Designed Mains-fed Receiver-amplifier.



MANY so-called radio gramophones at present offered to the public do not justify their title; they are essentially electrical-reproducing gramophones in which the radio section is a subsidiary part capable of receiving only one or two powerful local stations. This criticism cannot be levelled at the "Tannoy" radio-gramophone, for the radio side includes an efficient H.F. stage which provides a range and variety of broadcast

reception capable of rivalling the best library of gramophone records.

The receiver is normally operated with an outside aerial with aperiodic coupling to the tuned grid circuit of the screen-grid H.F. valve, but provision is made for using the perforated metal grille in the back

panel as a small-capacity aerial where it is desired to move the set from room to room. This miniature aerial is joined directly to the grid of the H.F. valve.

The valve filaments are A.C. heated, the screen-grid, detector and first L.F. indirectly, and the power valve—a P.X.4—directly. Automatic grid bias is provided throughout.

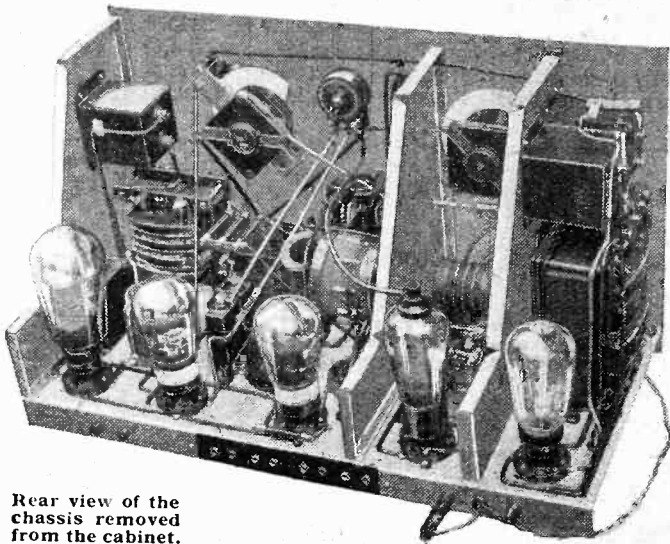
Transformer coupling is used between the screen-grid H.F. valve and the power grid detector, capacity controlled reaction being applied to the transformer windings.

The first L.F. valve is resistance coupled, the grid leak taking the form of a potentiometer volume control. The input from the gramophone pick-up is applied to the grid of the detector, so that the post-detector volume control serves for both gramophone and broadcast reproduction. Infiltration of radio signals during gramophone reproduction is prevented by a special arrangement of the contacts on the centralised control switch, and the change of bias necessary to convert the detector into an amplifier is performed by the same movement of the switch. A pre-set potentiometer across the pick-up windings enables the volume of gramophone

The "Tannoy" Radio Gramophone.—

phone reproduction to be set at any desired level independently of the variable volume control. Refinements of this kind are unusual and indicate that the designers have spared no pains to make the circuit technically as sound and up to date as possible. Support for this contention is provided by the coupling between the first L.F. stages and the power valve, in which a filter is used to divert the D.C. component of the anode current from the primary winding of the intervalve transformer.

A "Rola" moving-coil loud speaker is built into the base of the cabinet and is coupled to the P.X.4 output valve through a step-down transformer. If desired, an additional external loud speaker can be connected to the output circuit through a condenser built into the set, the primary of the output transformer serving as the anode choke.



Rear view of the chassis removed from the cabinet.

Anode current for the valves is derived from a U5 rectifier and is first passed through the loud speaker field winding, where it is smoothed while providing the necessary flux for the moving coil. Each anode circuit, with the exception of the output stage, is efficiently decoupled.

We have heard this instrument in operation at the works of Tannoy Products, 1-7, Dalton Street, London, S.E.27, and there can be no doubt that the performance justifies the care displayed in the design of the circuit. An extended test on the medium-wave band was not possible as the visit was made during the early afternoon, but, judging from the general feeling of liveliness in the controls and the negligible degree of reaction necessary to bring 5GB up to full loud speaker strength, there is every reason to believe that the range after dark should be sufficient to give a wide selection of Continental programmes. The long-wave range was, of course, less affected by daylight, and Huizen, Radio Paris, etc., came in with power in hand.

The quality of reproduction from both radio and gramophone was well up to the standard which one demands from an instrument of this class. The upper frequencies were well represented, without over-emphasis of needle scratch or sibilants in speech, and

the bass was full without undue tendency to "booming." As a special test for transients, pianoforte and xylophone records were played through, at our request, at a fairly high volume level; no evidence of cracking could be detected, credit for which must be shared by the loud speaker and the power handling capacity of the output valve.

The excellence of the gramophone reproduction is in no small measure due to the steady running of the Paillard induction motor and the small background noise consequent upon the absence of brushes.

The chassis layout gives easy access to the valves, which project through holes in the cover plate, and the chassis construction and wiring bear the stamp of a sound engineering job.

There are three types of cabinet work, and the prices are as follows: Oak, 55 guineas; walnut or mahogany, 60 guineas; de luxe model (quartered walnut panels), 65 guineas. Each individual model is given an extended test and kept under observation for permanence of valves for several days before despatch.

CHECKING THE SCREENS.

IT is not uncommon for a high-frequency amplifier, especially if it should contain more than one stage, to show a decided tendency towards instability when it is first built. The possible causes of this are many and various, the two most likely ones being inter-stage coupling, due to insufficient decoupling of the various battery leads, and imperfections in the screening system.

It is not very generally realised that, while a small hole in a screen is usually quite harmless, an imperfect electrical contact along one edge of a screening-box results in a very serious decrease in the efficiency of the screening. The difficulty of detecting a bad contact of this kind is often very considerable, and much time may be spent in searching for it.

The present note does not offer any new suggestions for tracing "leaks" in the screening system, but is written to draw attention to a simple and reasonably reliable means of determining whether instability is due to imperfections of screening or to interstage coupling along battery leads. If a frame aerial is connected to the receiver, it may be found that the set is stable when the frame is pointing in one direction, but oscillates when the frame is rotated. In this case one may at once be sure that the coils and wiring are not being isolated completely by the screening-boxes within which they are placed, but are giving rise to external fields which can affect the frame. The assumption may then quite confidently be made that the screening system is not so good as it should be, and that a detailed search for imperfections is likely to be well worth while. If, on the other hand, rotating the frame is found to have no effect on stability, the screening may be exonerated from blame, and resort to a more effective decoupling system is indicated. In overhauling this, attention should not be restricted to the H.T. leads; in addition, the grid connections often require to be decoupled, and it is sometimes even necessary to "tie down" the L.T. + leads with a 1-mfd. condenser.

WIRELESS THEORY

SIMPLIFIED

By
S. O. PEARSON,
B.Sc., A.M.I.E.E.

(Concluded from
page 226
of previous issue)

Comparison of Anode Bend and Leaky Grid Detection.

ALTHOUGH the merits of a valve as a detector can be determined from the D.C. or static characteristic curves on the lines already described, the process is rather laborious, and accurate information is obtained much more easily from an experimentally determined curve showing the mean anode current for various amplitudes of alternating voltage applied to the grid circuit.

The apparatus necessary for finding such A.C. characteristic curves is quite simple, the only component that has to be made up specially being a resistance divided into ten equal parts. It is not as a rule easy to measure alternating voltages below four volts or so, and the sub-divided resistance enables known fractions of a known or measured voltage to be tapped off. If the valves to be tested are of the A.C. indirectly heated cathode type, a transformer with a 4-volt secondary winding will probably be available, and the subdivided resistance as well as the heater circuit can be connected across this winding. In any case, a source of alternating current will be necessary. The potential divider can be simply constructed by connecting ten equal resistance wires between eleven terminals on a board, each resistance being anything from 2 to 10 ohms.

A suitable circuit for obtaining the A.C. characteristic curve under both anode bend and leaky grid rectifying conditions for an A.C. valve is shown in Fig. 1. For a filament valve the same circuit would be used, except that the filament itself would be heated by current from an accumulator. With the switch closed on contact A the conditions are set for anode bend rectification, the grid-bias battery GB being brought into the grid lead to provide the necessary negative grid bias. On contact G the grid battery is cut out and the grid-leak resistance is connected across the grid condenser C.

The value of the voltage V across the ends of the potential divider P can be fairly accurately estimated if the rating of the mains transformer is known. If a low reading A.C. voltmeter is available so much the better. Any fraction, in tenths, of the voltage V can be

applied to the grid circuit of the valve; for instance, if V is 4 volts (R.M.S. value) and connection is made to the centre terminal of the potential divider, five-tenths of 4 volts, that is 2 volts, will be applied to the grid circuit. This is an R.M.S. value, and if the amplitude is required it is only necessary to multiply by $\sqrt{2}$ or 1.414, assuming a sine-shaped wave. So in the example given the amplitude or peak value of the voltage obtained is $2 \times 1.414 = 2.83$ volts.

Practical Measurements.

Measurements conducted in this manner have been made on a general purpose valve of the indirectly heated cathode class, the actual valve chosen being a Mazda AC HL. For anode bend rectification the plate voltage was maintained at 100, and the negative grid bias was 3 volts. The anode current as measured by a moving-coil milliammeter was noted for different values of alternating voltage applied to the grid. Although the anode current will actually contain an alternating component, the moving-coil instrument will indicate the mean or D.C. component only. The results obtained are given in the form of a curve in Fig. 2.

the voltage applied to the grid being expressed in terms of the amplitude or peak value.

With anode bend rectification the anode current is a minimum when no alternating or signal voltage is applied to the grid, but the mean current increases as the signal voltage is raised. The change of plate current from the normal value, produced by an applied alternating voltage at the grid, is sometimes called the rectified current, although this term is not strictly correct when applied in this manner. The change of

anode current caused by different amplitudes of voltage applied to the grid of the valve has been deduced from the curve of Fig. 2, and these values are shown by the lower curve of Fig. 4. But before considering the merits or otherwise of this curve the practical determination of the corresponding curve relating to the leaky grid method of rectification will be briefly touched upon. We shall then be in a position to make a fair

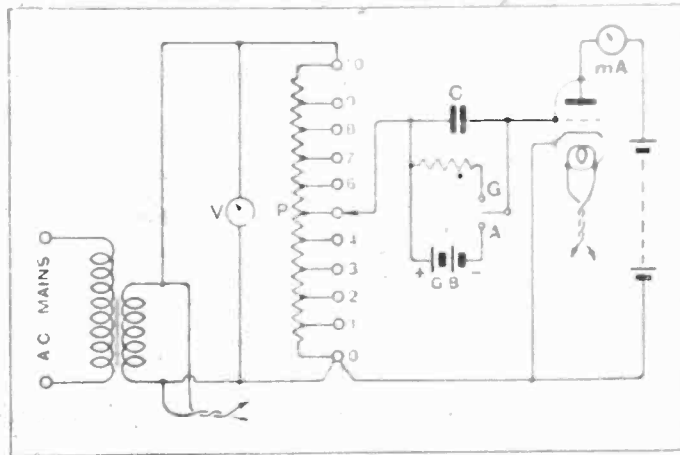


Fig. 1.—Practical circuit arrangement for determining experimentally the A.C. curves of a valve. The switch enables measurements to be made under conditions of either anode bend or leaky grid rectification. For a filament valve the filament would be heated by current from an accumulator.

Wireless Theory Simplified.—

comparison of these two popular models of rectification under working conditions.

A Necessary Precaution.

In obtaining the A.C. characteristic curve for grid rectification, the procedure is precisely the same as for anode bend rectification—the switch arm is merely put over to contact G instead of A in Fig. 1, and readings

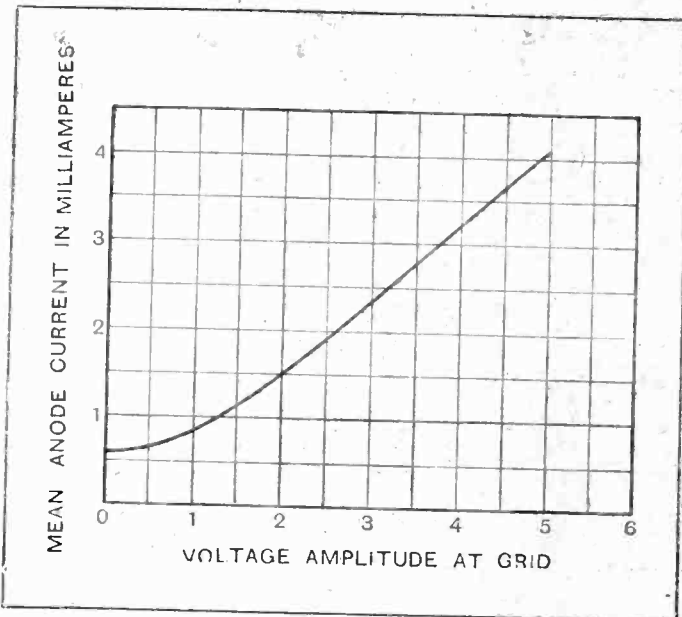


Fig. 2.—Anode bend detection. Curve showing how the mean anode current depends upon the amplitude of alternating voltage applied to the grid of an AC/HL valve with an anode potential of 100 volts and grid bias of -3 volts.

are then taken in the same manner. But it must be remembered that we are dealing with a 50 cycle alternating voltage and not a radio frequency, and for this reason it is not permissible to employ the same value of grid condenser capacity as would be used under normal receiving conditions. The reactance of the condenser should be of the same order of magnitude as that obtained at the high frequency in an actual receiving set. At 300 metres, or 10^6 cycles per second, a 0.001 mfd. condenser has a reactance of just over 1,500 ohms, and at 50 cycles per second a 2-mfd. condenser would have the same reactance.

Since an unmodulated voltage is employed for obtaining the A.C. characteristic curves, the time constant of the shunted grid condenser does not come into the question. It was found that increasing the capacity of the grid condenser above 1 microfarad made no perceptible difference to the readings, but that the rectifying properties began to fall off rapidly if the capacity was reduced below 0.5 mfd. In the actual measurements a 1-microfarad condenser and a grid-leak resistance of 0.25 megohm were employed. No grid bias was used, and the anode potential was maintained at 100 volts.

The curve of Fig. 3 shows the values of mean anode current obtained with various amplitudes of alternating voltage applied between the cathode of the valve and the left-hand side of the grid condenser. In contrast

to the case of anode bend rectification, the anode current here has its maximum value when there is no applied alternating voltage, and then falls in the manner shown by the curve as the amplitude of the alternating voltage is increased from zero. The normal value of anode current is 6.1 milliamps, and by subtracting from this the value of the mean current for any particular voltage, the change in anode current produced by that voltage is obtained. The changes of anode current produced by various amplitudes of applied alternating voltage when the conditions are set for grid rectification are shown by the upper curve of Fig. 4.

Conditions for Distortionless Rectification.

When radio telephony is being received the high-frequency voltage applied to the grid circuit of the detector valve has its amplitude varied or modulated in accordance with the low-frequency variations representing the actual speech or music, and it is these low-frequency variations which must be reproduced faithfully on the anode or output side of the detector valve, the radio-frequency component being suppressed or eliminated from the voltage to be passed on to the grid of the next valve.

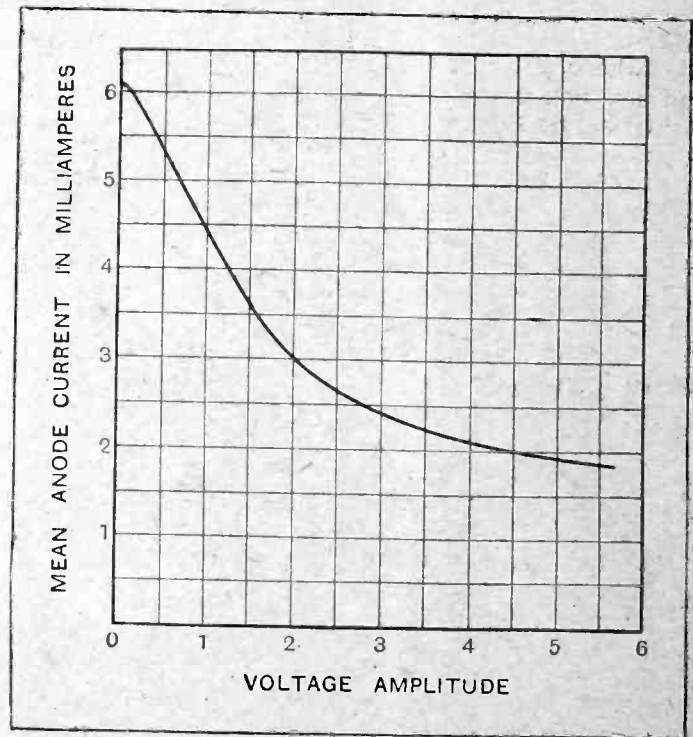


Fig. 3.—Leaky grid detection. The curve shows the mean anode current with various amplitudes of alternating voltage applied between the cathode and grid condenser. The valve is the same one to which Fig. 2 refers. The test frequency is 50 cycles, grid condenser 1 mfd., grid leak 0.25 megohm.

If the detector is to function without introducing any distortion of the low-frequency wave shape, the change of mean anode current must be exactly proportional to the change in amplitude of the voltage applied to the grid circuit. Now as the depth of modulation of the high-frequency waves is always less than 100 per cent. for ordinary broadcasting, it follows that

Wireless Theory Simplified.—

no distortion will be introduced if the curve showing the change of anode current against applied grid voltage (Fig. 4) is straight over the range through which the amplitude of the high-frequency voltage varies. The point is that the curve need not be straight over its whole length, unless the modulation reaches a depth of 100 per cent., in which case the amplitude of the high-frequency voltage would vary between zero and an upper limit equal to twice the unmodulated value. But this latter condition is rarely met with in practice.

The Two Methods Contrasted.

Turning now to the curves of Fig. 4 we see at a glance that each has a portion which is moderately straight, but that they differ rather widely in character; with leaky grid rectification the straight portion of the curve is near the lower end, whereas for anode bend detection the straight portion is at the upper end, the straight part not being reached until the voltage amplitude exceeds 2.5 volts. Below this figure there is a pronounced bend.

Now let us consider these curves in turn and see to what extent they fit in with the conditions necessary for distortionless rectification of a modulated wave; taking the leaky grid rectification curve first we see that it is practically straight between voltage amplitudes of 0.25 and 1.5 volts. The middle of this straight part or operating range thus occurs at a voltage midway between these points, namely, at about 0.875 volt. Thus if the voltage amplitude due to the unmodulated carrier wave were adjusted to 0.875 volt (by means of a pre-detector volume control) a degree of modulation allowing the voltage amplitude to swing between 0.25 and 1.5 volts could be permitted without introducing distortion due to curvature. Half this maximum permissible variation of amplitude is $\frac{1.5-0.25}{2} = 0.65$ volt,

which is about 75 per cent. of the carrier voltage. Hence a depth of modulation as high as 75 per cent. could be dealt with without noticeable distortion. This is excellent and meets all the requirements of modern broadcasting.

Analysing the anode bend curve in the same way we find that the conditions are not nearly so good; the straight portion of the curve occurs above 2.5 volts, and therefore to allow (theoretically) the same percentage modulation as before, namely, 75 per cent., without distortion, the mean or carrier voltage amplitude would have to be set at 11 volts. This figure is

quite impractical, not only on account of the high degree of radio-frequency amplification that would be required, but also in view of the fact that grid current flows immediately the voltage amplitude approaches to the value of the grid-bias voltage employed. In this case the grid bias used was -3 volts, and since for this valve grid current commences when the grid potential is about -0.5 volt, grid current will flow whenever the amplitude of the applied alternating voltage exceeds about 2.5 volts. To prevent grid current then, the valve would have to be operated so that range of amplitude variation falls well within the curved portion of the graph and distortionless rectification would be impossible.

On the leaky grid rectification curve the upper limit of the working range is determined by the curvature, but with anode bend detection the upper limit is determined by the voltage amplitude at which grid current commences. Thus the conditions of anode voltage and grid bias under which the lower curve of Fig. 4 were obtained are not suitable for efficient rectification.

To obtain a higher range of oscillation voltage amplitude without the occurrence of grid current, a higher negative grid bias would be necessary, and this, in turn, calls for a higher value of anode potential in order that the valve shall work on the lower bend of the grid voltage/anode current curve. In any case, with anode bend detection the valve can never be worked entirely over the straight portion of the A.C. curve, and for this reason the percentage modulation which can be dealt with satisfactorily is relatively low.

Controlling Factors.

In case the foregoing remarks should appear to savour of an argument in favour of leaky grid over anode bend detection in general, it should be pointed out that the comparison only refers to the particular type of A.C. valve chosen as an example. With a filament valve of the usual type the disparity is not nearly so great; in fact, until quite recently it has been usual for designers of sets to recommend anode bend detection where quality of reproduction was the first consideration. The A.C. indirectly heated cathode valve lends itself better to leaky grid detection because the grid current curve has a much sharper bend (due to the equipotential cathode) and rises much more steeply. This property enables the newer type of valve to give efficient rectification with the use of a much lower capacity grid condenser and a lower resistance leak, with the result that the time lag inherent in the grid circuit

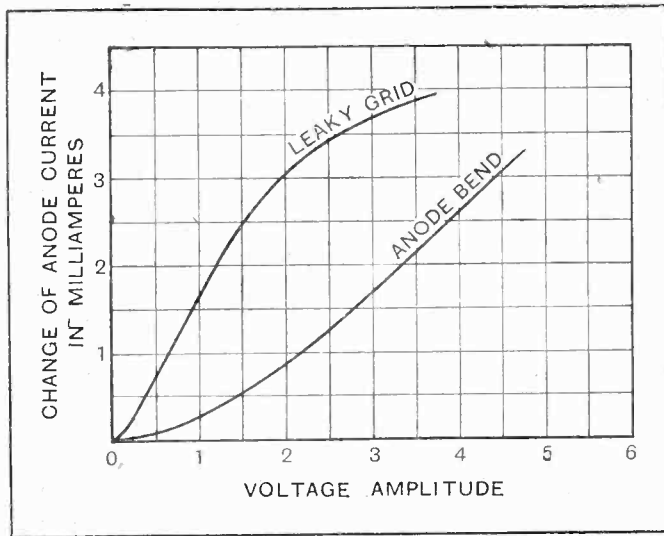


Fig. 4.—The curves show the actual change of mean anode current produced by various amplitudes of voltage applied to the grid circuit both for anode bend and leaky grid rectification. The relative merits of the curves are discussed in the text.

Wireless Theory Simplified.—

is very much less, and there is in consequence no serious loss of high-note frequencies.

However, the suitability of either method is not determined alone by the quality of reproduction. The effect of the detector on the efficiency of its tuned grid circuit and the conditions in the anode circuit as regards A.C. resistance are also factors which have to be taken into consideration. The leaky grid detector depends for its action primarily on the flow of grid current, and therefore naturally has a greater damping effect on the preceding tuned circuit than an anode bend detector

adjusted to function without the flow of grid current. On the other hand, with grid rectification the detector valve is operated over the straight and steepest part of the anode current characteristic curve so that the differential or A.C. resistance of the valve is a minimum, whilst with anode bend detection the valve is operated at or near the lower bend of the anode characteristic curve where the slope is relatively small and the A.C. resistance is therefore very much higher. As regards coupling to the succeeding valve, the method of rectification where there is the lower anode A.C. resistance has the advantage.

OPERATING A.C. SETS FROM D.C. SUPPLY.

The Crypto Rotary D.C. to A.C. Converter.

EXPERIMENTERS and others whose electric supply is of the direct-current type must find it difficult to keep abreast of the times now that A.C. sets, eliminators, and other associated equipment is so widely used. To afford those so placed an opportunity to extend their activities into this field, a number of rotary converters, the function of which is to provide an A.C. supply, have been developed. The machines made by the Crypto Electrical Co., Ltd., Acton Lane, London, N.W.10, are excellent examples.

The sample which we tested was rated at 400 V/A. output, giving a nominal voltage of 220 at 50 cycles. This machine is wound for a 220-volt D.C. supply, but they can be obtained to suit all standard mains voltages.

This model has a double-wound armature with a 48-section commutator at one end and two slip rings at the other end. Carbon brushes of generous dimensions are fitted.

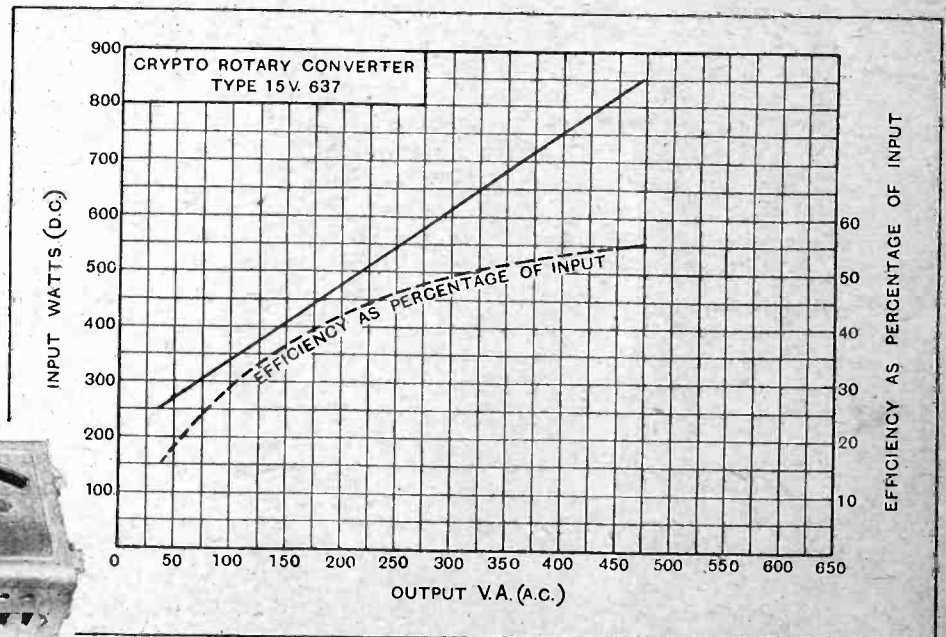
On an extension of the armature spindle is mounted a fan which maintains a constant current of air through the armature tunnel and prevents heating of the coils. The effectiveness of this was demon-

The current drawn from the D.C. mains was measured at various output loads, and these are tabulated below:—

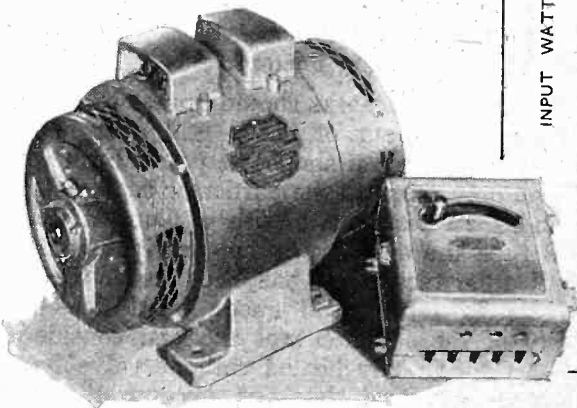
D.C. Input.			A.C. Output.		
Volts.	Current in Amps.	Watts.	Volts.	Current in Amps.	Volt/Amps.
215	1.16	250	250	0.15	37.5
215	1.33	286	247.5	0.25	61.9
215	2.0	430	235	0.7	164.5
215	2.4	515	227	1.0	227
215	2.84	610	218	1.35	294
215	3.22	694	209	1.7	355.5
215	3.5	755	200	2.0	400
215	3.96	850	188	2.5	470

Some practical tests were then undertaken. When supplying current to gramophone amplifiers and the more simple type of wireless receivers, there was no trace of interference, but when used in conjunction with a sensitive receiver, incorporating H.F. stages, a noticeable background of hum appeared. This was rendered less vicious by including the special anti-interference units, types A.I.F.8 and A.I.F.Z, made for use with this machine by the Dubilier Condenser Co. (1925), Ltd. Even so, a small residuum of disturbance was left which became apparent when the set was adjusted to a condition of maximum sensitivity.

By expressing the output volt/amps—



Curves showing relationship between input watts and output volt/amps. The broken line curve gives the efficiency as a percentage of the input watts.



Crypto D.C. to A.C. rotary converter type 15V637 rated at 400 V/A output at 100 volts 50 cycles.

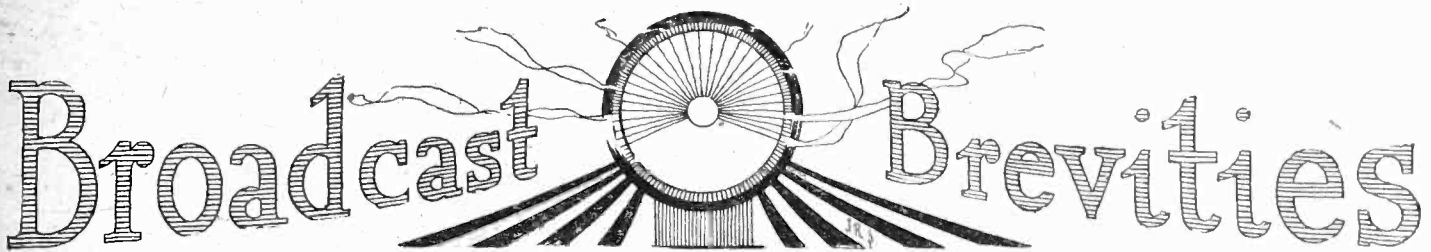
strated by the fact that after a lengthy run on full load there was no appreciable rise in temperature in the coils or in the frame.

as a percentage of the input watts, we get a curve as shown by the broken line on the graph. The full-line curve is the relationship between the input and the output. On full load, 400 V/A, the efficiency is 53 per cent.

In addition the machine should find a wide application in many kinds of A.C. tests.

The price of the converter, which is built on very generous lines, is £14 13s., and the starter costs £1 7s.

Broadcast Brevities



By Our Special Correspondent.

Western Regional.—Tatsfield Again.—Dominion Programmes for Britain?

Queer Happenings on the Quantocks.

Who are these mysterious strangers on the Quantock Hills, near Minehead? Discerning holiday-makers declare that they are neither tourists nor natives, and, further, that they pronounce the name of the neighbouring village of Cothelstone as Cot-hélston. Now this is the pronunciation recommended by the B.B.C.

Are the strangers B.B.C. engineers?

o o o o

A Site for Western Regional?

Is it possible that they are searching for a site for the Western Regional station? Recently I have heard the opinion expressed at Savoy Hill that the Cardiff area, originally chosen for the station, is too far north, in view of the fact that the Northern Regional station will cover a large portion of the Principality. If the Western Regional station were placed in North Somerset, not only would the possibility of a clash be avoided, but Devon and Cornwall would be assured of a much better service.

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Almost a Certainty.

We may be fairly certain that the strangers are indeed B.B.C. engineers and that the Quantock Hills are considered a very suitable locality for the new station.

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The America's Cup.

The engineers at the Tatsfield receiving station will make a determined effort to give British listeners a relay of the U.S. National Broadcasting Company's running commentaries on the races for the America's Cup. The commentator will be Mr. Samuel Wetheril, associate editor of the American journal, "Yachting."

o o o o

Tatsfield on Trial.

The *Shamrock V* and its rival will fight their first battle on Saturday next, September 13th. The B.B.C. will attempt to pick up the short-wave transmission from Schenectady between 5 and 5.10 p.m. (B.S.T.), when the commentator will describe the start of the race. If possible another ten-minute relay will be staged between 10 and 10.30 p.m., when the yachts are approaching the winning post.

o o o o

Thrills on the Atlantic 'Phone.

Six more races may be necessary to determine ownership of the Cup, which will be secured by the yacht which first

wins four races. So we may expect an exciting relay each evening from September 15th to 20th. I understand that in the case of the deciding race the B.B.C. will employ the transatlantic telephone service via Rugby to ensure satisfactory reception.

o o o o

Empire Premiers at the Microphone.

The forthcoming Imperial Conference is to be "covered" by a series of weekly talks which, in all probability, will be given by the Prime Ministers of the various Dominions. I understand that Mr. Ramsay MacDonald will open the series with a broadcast address on the aims and scope of the Conference.

o o o o

Dominion Programmes for Britain?

Empire broadcasting has already received full discussion at the Colonial Conference, and will merely be the subject of a report, though it is possible

that the Dominion delegates may offer suggestions on the question of payment for the service. There is a strong feeling in some quarters that the best arrangement would be a scheme of reciprocal transmissions in which the Dominions would contribute a share of the programme material.

o o o o

Talks from Geneva.

The running commentary to-day (Wednesday) on the ceremonial opening of the League of Nations Assembly at Geneva will be followed to-morrow and the three succeeding Thursdays by talks direct from Geneva given by members of the British delegation. Fortunately there will be no singing, so the B.B.C. will be saved the trouble of arranging an elaborate land-line system such as is used for foreign concerts. The ordinary Continental telephone will be employed.

Before the close of the session, listeners in Britain will hear a talk by the Foreign Secretary, Mr. Henderson.

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An Electric Violin.

An electrically played violin is, I believe, a real novelty, so those fortunate listeners who can tune in the National programme at noon to-day (Wednesday) should have something to talk about when the workers return in the evening. With their characteristic willingness to perform experiments, the B.B.C. have placed a studio at the disposal of the makers of the Mills Violano Virtuoso, an instrument which combines an electric piano with an electric violin. Selections will be given between 12 and 12.45 p.m.

o o o o

Pianists, Violinists, 'Cellists.

The list of soloists who will appear at the B.B.C.'s winter series of Symphony Concerts at the Queen's Hall reads like a directory of the world's musical talent. To take only the pianists, we find Backhaus, Bartok, Cortot, Dohnanyi, Gieseking, Myra Hess, Lamond, Moesewitsch, Rubinstein, Samuel, Solomon, and Stravinsky. The solo violinists include Busch, Catterall, Sammons, and Szigeti, and solo 'cellists Casals and Suggia. The names of vocalists would fill another long paragraph.

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Why Worry?

This should be a memorable winter for musical listeners, who, with all due deference to Sir Hamilton Harty, consider that wireless music is not "an imperfect and debased substitute for the real article."

FUTURE FEATURES.

National (261 and 1,554 metres).

SEPTEMBER 15TH.—"Alice Through the Looking Glass," a play adapted from Lewis Carroll's book.

SEPTEMBER 17TH.—Orchestral concert.

SEPTEMBER 18TH.—Caernarvon Choral Society—Concert from Cardiff.

SEPTEMBER 20TH.—Vaudeville programme.

London Regional.

SEPTEMBER 14TH.—Orchestral concert.

SEPTEMBER 15TH.—Vaudeville programme.

SEPTEMBER 16TH.—"Alice Through the Looking Glass."

SEPTEMBER 17TH.—"Here's a Health . . ." a light-hearted feature of songs of revelry both Ancient and Modern.

SEPTEMBER 19TH.—"Music of the Country-side," Instrumental concert.

SEPTEMBER 20TH.—Police Band concert.

Midland Regional.

SEPTEMBER 18TH.—Choral concert.

SEPTEMBER 20TH.—Military Band concert.

West Regional (Cardiff).

SEPTEMBER 14TH.—Orchestral concert of Works by Mozart.

SEPTEMBER 20TH.—Military Band concert relayed from Bristol's Annual Exhibition at Colston Hall, Bristol.

North Regional (Manchester).

SEPTEMBER 14TH.—Concert of Old English Music.

SEPTEMBER 17TH.—"George Proposes," a comedy (James Hodgson).

SEPTEMBER 18TH.—Songs of Lakeland.

Glasgow.

SEPTEMBER 20TH.—Eye-witness Account of the Scottish League Association Football Match, Celtic v. Rangers, by Mr. Campbell Bilney.

Belfast.

SEPTEMBER 15TH.—Wagner Orchestral programme.

SEPTEMBER 18TH.—"St. Patrick's Day, or The Scheming Lieutenant," a farce by Richard Brinsley Sheridan.

READERS' PROBLEMS.

"The Wireless World" Supplies a Free Service of Technical Information.

The Service is subject to the rules of the Department, which are printed below; these must be strictly enforced, in the interest of readers themselves. A selection of queries of general interest is dealt with below.

A.C. Valves for D.C. Supplies.

I am a comparatively new reader of your journal, and should be obliged if you would tell me if you have ever described a three-valve H.F.-det.-L.F. set in which indirectly heated valves are connected in series for feeding from a D.C. mains supply. Please refer me to any back numbers in which sets of this type have been discussed. H. M. T.

We have never described a three-valve set of this type, but a modified version of the "New Foreign Listeners Four" with A.C. valves arranged for D.C. mains feed was discussed in our issue of May 28th. This was a four-valve set, but with the help of information given on the series connection of indirectly heated valves, it should be possible for you to modify some other design to meet your needs.

Adjustable Free Bias.

I am going to make a set similar to the "All D.C. Three," as described in your issues of August 20th and 27th, but wish to make provision for using a pentode output valve, which consumes the same filament current as the triode specified, but requires a different value of grid bias. Will you please tell me how to arrange for adjustable negative bias for this valve? C. R. M.

The easiest and simplest way of solving your problem is to make a number

RULES.

The free service of THE WIRELESS WORLD Technical Information Department is only available to registered readers and subscribers. A registration form can be obtained on application to the publishers.

(1.) Every communication to the Information Department must bear the reader's registration number.

(2.) Only one question (which must deal with a single specific point) can be answered. Letters must be concisely worded and headed "Information Department."

(3.) Queries must be written on one side of the paper and diagrams drawn on a separate sheet. A self-addressed stamped envelope must be enclosed for postal reply.

(4.) Designs or circuit diagrams for complete receivers or eliminators cannot ordinarily be given; under present-day conditions justice cannot be done to questions of this kind, in the course of a letter.

(5.) Practical wiring plans cannot be supplied or considered.

(6.) Designs for components such as L.F. chokes, power transformers, complex coil assemblies, etc., cannot be supplied.

(7.) Queries arising from the construction or operation of receivers must be confined to constructional sets described in "The Wireless World"; to standard manufactured receivers or to "Kit" sets that have been reviewed used in their original form and not embodying modifications.

of tapplings—half a dozen should be ample—on the existing bias resistance (denoted by R_7 in the published diagrams).

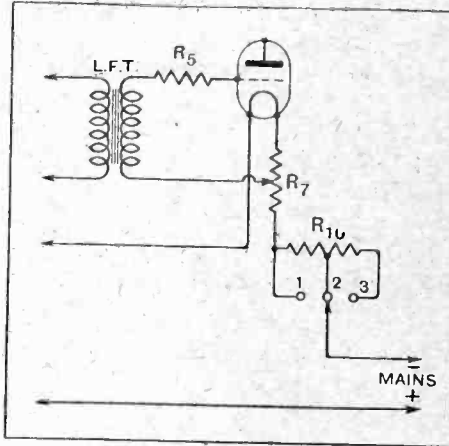


Fig. 1.—D.C. for filament heating and negative bias: how provision may be made for adjusting grid voltage.

Instead of taking the output grid return lead directly to the negative end of this resistance, it should be joined to one of the tapplings, as shown in Fig. 1.

As a guide to the correct position for this connection, it may be pointed out that from 7 to 8 volts will be given if the lead is joined to the centre point of the resistance as it is unlikely that a lower negative voltage than this will be required, your tapplings might all be fitted between this point and the end remote from the valve filament.

Natural Wavelength of Electrical Interference.

I am troubled by electrical interference, which seems to be mainly confined to the upper end of the medium broadcast waveband. Is this a normal effect? I find it rather hard to see why induced low-frequency currents should be "tunable" in this way, and should expect the parasitic noises to be equally prevalent over the whole of both wavebands covered by my set.

H. L. R.

It is by no means unusual to find that interference of this nature is more or less restricted to one wavelength, or to a narrow band of wavelengths, as it is often due to high-frequency impulses generated by electrical machinery, such as sparking contacts, commutators, etc. The natural wavelength of these impulses is, of course, determined by the capacity and inductance of the circuits associated with the offending piece of apparatus

Fixed Resistances.

Will you please tell me how to estimate the value of fixed resistances wound with Eureka wire on cylindrical formers?

W. H. J.

The first step is to ascertain the length of wire by multiplying the actual number of turns by 3.14 times the diameter. Unless the coil is of the single-layer type, it will be necessary to take the mean diameter as a basis.

Having then ascertained the thickness of wire, either with a micrometer or wire gauge, the total resistance can be estimated with the help of tables published in most electrical text books (including *The Wireless World Diary*), or supplied by the manufacturers.

If you have access to a set of copper wire tables only, it is useful to know that the figure applicable to this metal may be converted for Eureka wire by multiplying it by 29.

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Pot Magnet Current.

The pot magnet winding of my moving-coil loud speaker consumes 1 amp. at 6 volts, and is fed by an accumulator. Would it be practicable to supply current to it from my 240-volt D.C. mains by interposing a suitable resistance? I realise that this plan would be rather extravagant; can you give me some idea of the sort?

C. N. M.

This scheme is practicable enough, but, if put into practice, will be found to be extremely wasteful. Consumption will amount to 240 watts, and so a unit will feed the winding for very little more than four hours.

We suggest it would be much better to rewind your magnet with fine wire to suit the mains voltage. Even if you are unable to do this work yourself, the cost of having it done for you would soon be saved.

FOREIGN BROADCAST GUIDE.

RABAT (Morocco).

Geographical Position: 34° 2' N, 6° 50' W.
Approximate air line from London: 1,260 miles.

Wavelength: 416 m. Frequency: 720.3 kc.
Power: 10 kW.

Time: Greenwich Mean Time. (Morocco does not adopt B.S.T.)

Standard Daily Transmissions.

13.30, 17.00, 20.30 B.S.T. gramophone records; 21.00 main evening programme; 22.00 or 23.00 relay of foreign transmissions or gramophone records, or dance music from Rialto (Casablanca).

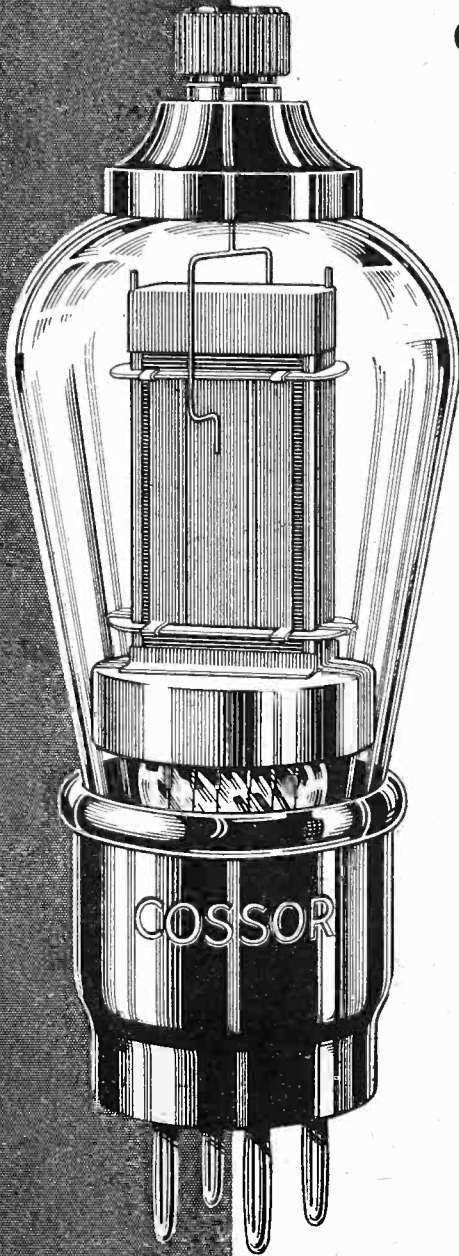
Man and woman announcers. Call: *Allo! Allo! Ici la station de radiodiffusion de l'Office Cherifien de Radio-Moroc a Rabat.*

Interval Signal: Metronome.

Closes down with usual French formula and *La Marseillaise.*

Highest *effective* amplification

yet attained with a
Screened Grid Valve



Radio technicians know that it is useless to expect a substantial stage gain from any Screened Grid Valve—however good its other characteristics—which has a high inter-electrode capacity. Cossor engineers have been striving for months past to reduce the self-capacity of Cossor Screened Grid Valves to a negligible figure. So successful have they been in their efforts that the new Cossor 215 S.G. has an inter-electrode capacity of only .001 micro-microfarads—so small, in fact, that none but the most elaborate and specially-designed apparatus can measure it. As a result, this new Cossor Valve permits a degree of effective amplification which a year ago would have been considered utterly impracticable. No other make of Screened Grid Valve has such a low inter-electrode capacity or can, therefore, equal the remarkable stage gain which it permits.

THE NEW
COSSOR
215 S.G.

Cossor 215 S.G. 2 volts, .15 amp.
Impedance 300,000. Amplification
Factor 330. Mutual Conductance
1.1 m.a./v. Normal working
Anode Volts 120. Positive
Voltage on
Screen 60-80. Price **20/-**

Record low inter-electrode capacity

5885

MISCELLANEOUS ADVERTISEMENTS.

NOTICES.

THE CHARGE FOR ADVERTISEMENTS in these columns is :
12 words or less, 2/- and 2d. 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 **THURSDAY MORNING** (previous to date of issue) at the Head Offices of "The Wireless World," Dorset House, Tudor Street, London, E.C.4, or on **WEDNESDAY MORNING** at the Branch Offices, 19, Hertford Street, Coventry ; Guildhall Buildings, Navigation Street, Birmingham ; 260, Deansgate, Manchester ; 101, St. Vincent 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 **LIFFE & 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 000, c/o "The Wireless World." Only the number will appear in the advertisement. All replies should be addressed No. 000, c/o "The Wireless World," Dorset House, Tudor Street, London, E.C.4. 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 unknown persons 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, Tudor Street, London, E.C.4, and cheques and money orders should be made payable to Liffe & 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.

RECEIVERS FOR SALE.

SCOTT SESSIONS and Co., Great Britain Radio Doctors.—Read advertisement under Miscellaneous. [0264]

HIRE a McMichael Portable Set, by day or week, from Alexander Black, Wireless Doctor and Consultant, 55, Ebury St., S.W.1. Sioane 1655 0328

STRAIGHT Five Portable, makers' 12 months' guarantee ; 8 guineas, complete.—Mosby, 507, London Rd., Sheffield. [1169]

PHILIPS 2515 2-valve Set, 240v. A.C., used about 3 months, perfect ; £8/15, or highest offer.—Box 7386, c/o *The Wireless World*. [1361]

IDEAL HOME Receiver ("Wireless World" March 19th, 1930). London made to specification, lock-up table cabinet ; £12, or nearest ; valves included ; cost £17.—Blood, Church St., Eye, Suffolk. [1354]

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

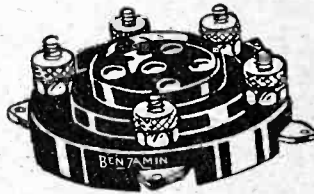
WITHOUT FEAR—

Send your material for credit—where radio part exchange began. A service ruled only by economics, above bargaining or petty gain.

Particulars from the Secretary.

HONOR OMNIA **APPLEBY'S**,
SUPER Chapel St., Marylebone, London

THE 5-PIN



An anti-microphonic valve holder whose five sockets are designed specially to give an excellent grip contact either with solid or split-pin valves. Many constructors are getting first-class results when using this holder for the new solid four pin valves. Terminals numbered and tinned tags in one piece with grip sockets. Write for the Benjamin Radio Catalogue. **1/9**

THE BENJAMIN ELECTRIC LTD.
Tariff Rd., LONDON, N.17 Tottenham 1500

BENJAMIN

SEND TO-DAY
FOR OUR FREE
36 PAGE
BOOKLET
"SOUND
ADVICE."



Super Power Moving
Coil Speaker.

The Finest
High-grade
Speaker in
the World

PERFECT
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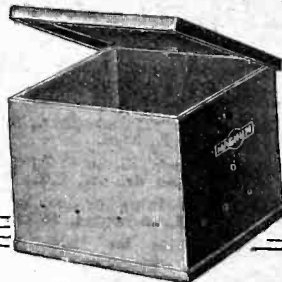
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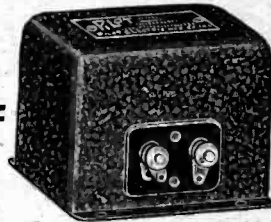
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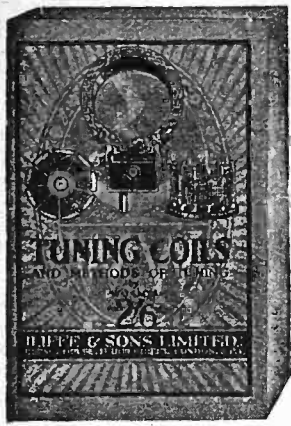
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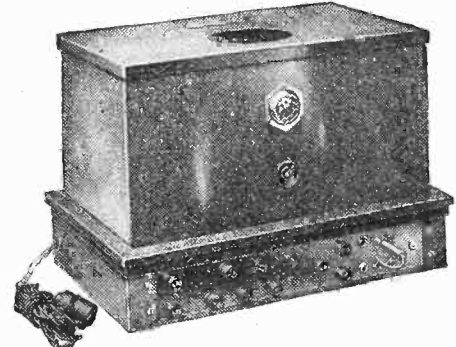
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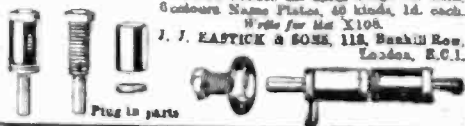
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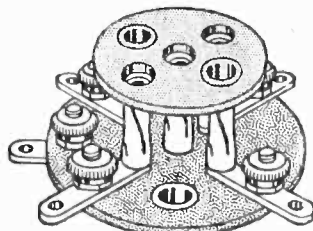
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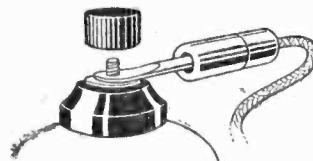
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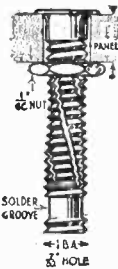
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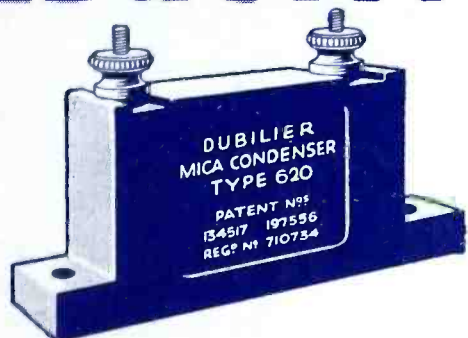
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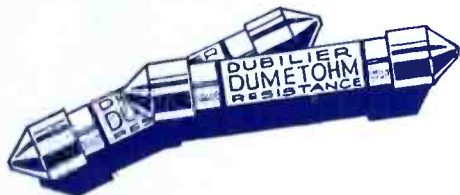
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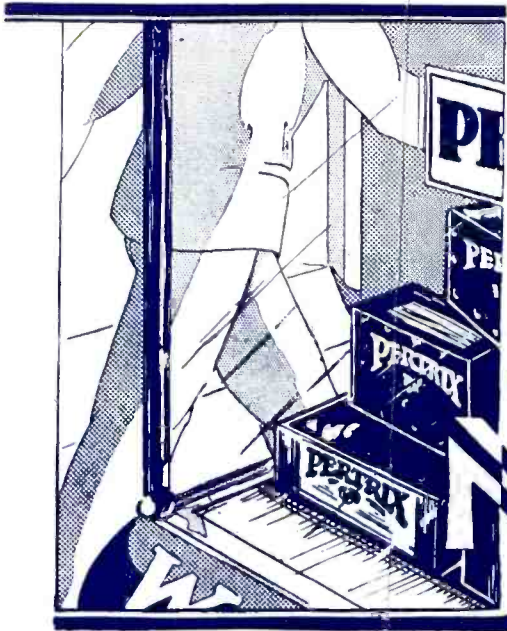
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PERTRIX NON-SAL-AMMONIAC DRY BATTERIES

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The Wireless World

AND RADIO REVIEW

4^D

The Paper for Every Wireless Amateur

Wednesday, September 17th, 1930.



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Look for the new season's models of the World famous Telsen Transformers. They have been entirely redesigned embodying new windings and core, fitted with earth terminals and shrouded in Genuine Bakelite Mouldings. Ask your dealer for the New Telsen Transformers NOW!

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Latest Model: easily breaks 3 Amps @ 250 V. "Q.M.B." Action: Indicating: Live Parts Insulated from Lever: One Hole Fixing: Nickel Finish. Small: Neat: Efficient: Guaranteed fully.

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SELF-LOCATING
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1/- each

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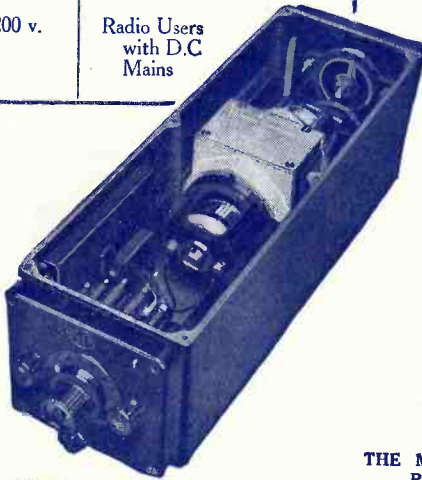
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requiring
 150 v. 15 m.a. 300 v. 50 m.a.
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Operate from	for
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—and as usual the latest development comes from Ferranti. The new magno-dynamic (moving coil) speaker embodies years of experience and research work. It is likely that the full possibilities of permanent-magnet speakers have now been exploited and incorporated in the Ferranti model.

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Oak	£18	5	0
Mahogany ..	£20	0	0
Walnut ..	£20	0	0

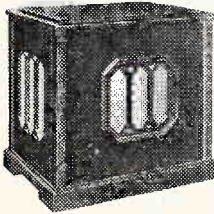


Table Model.

Oak	£15	5	0
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Table Model.

Metal case, covered with Rexine in choice colours, nicely figured, in Brown, Blue or Grey. .£12 10 0

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THE WHOLE COUNTRY'S RAVING

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Osram

MUSIC 4 MAGNET

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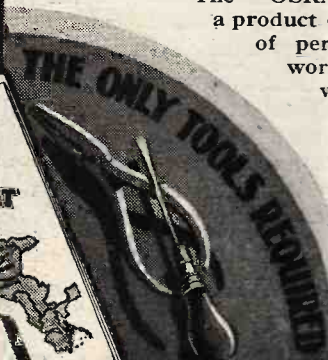
Sold by all Wireless Dealers

Because the public have been quick to realize that this assembly kit offers better value and a better performance at a lower price than the usual standards of radio value. For an outlay of only £11 . 15 . 0 you can make up this powerful receiver that will bring in the whole of the best home and continental stations with such power and purity that will give you the utmost of radio enjoyment.

The "OSRAM MUSIC MAGNET 4" is a product of the G.E.C.—your guarantee of perfect satisfaction. It is the world's best circuit, with the best valves (OSRAM) and the best components (GECOPHONE). Not the least attractive features are the fine solid oak cabinet, tasteful front panel and sunk station indicator calibrated in wavelengths.



Learn all about the "OSRAM MUSIC MAGNET 4" by sending for POST FREE Instruction Chart. Fill in the coupon on the page opposite.



THE SET THAT BRINGS THE CONTINENT TO THE

Advt. of The General Electric Co. Ltd., *Maryt House, Kingsway, London, W.C.2*

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A pleasure to assemble and then the **BIG** **THRILL**

You will not experience the slightest difficulty in assembling the "OSRAM MUSIC MAGNET 4." You will be directed step by step by a full size instruction chart. Results are certain. Afterwards the big thrill. Station after station you will tune in—whenever you want and whatever you want. This is real radio enjoyment.

SPECIAL FEATURES

- 1** The two Screen Grid stages give extreme selectivity and sensitivity with an unrivalled range.
- 2** Enormous amplification with perfect stability is given by the complete shielding of H.F. Circuits.
- 3** Equal efficiency guaranteed on both wave length bands.
- 4** Change of wave length is effected by an external switch and the set need not therefore be opened.
- 5** Maximum ease in tuning with a single knob controlling triple gang condenser.
- 6** Assembly is the essence of simplicity.
- 7** Volume control is provided not only to act as such, but to procure extreme selectivity.

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You can either buy your "OSRAM MUSIC MAGNET 4" for cash or on these attractive **HIRE PURCHASE** terms:

£1 : 3 : 6 deposit
12 monthly payments of
18/6

PRICE
£11-15-0
INCLUDING
OSRAM VALVES
GECOPHONE
COMPONENTS
AND POLISHED
HEAVY OAK
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Please send Instruction Chart to—
Name _____ Address _____

The "Osram Music Magnet 4" Instruction Chart
The General Electric Co. Ltd.
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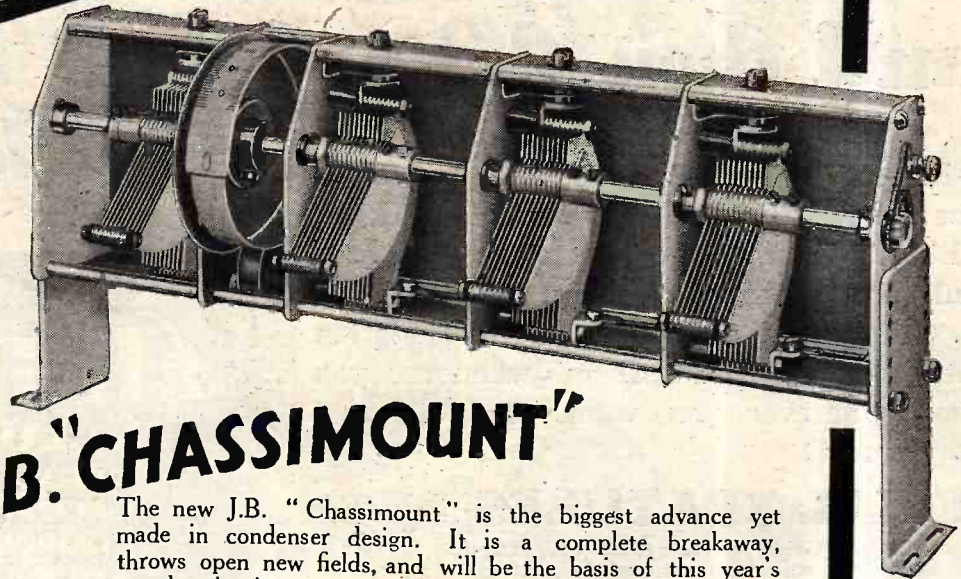
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NATIONAL RADIO EXHIBITION see the "OSRAM MUSIC MAGNET 4" on G.E.C. Stands Nos. 86 and 46 Ground Floor, New Hall

RADIO'S NEWEST TUNING DEVICE

The NEW J.B. "CHASSIMOUNT"

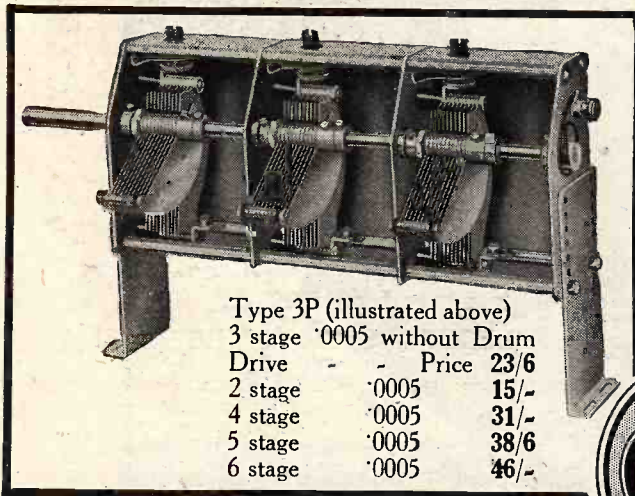


The new J.B. "Chassimount" is the biggest advance yet made in condenser design. It is a complete breakaway, throws open new fields, and will be the basis of this year's popular circuits.

Two, three, even six tuned circuits—one knob controls them all, keeps them perfectly in tune, and brings in station after station.

Once again J.B. lead the way. J.B. precision has made the "Chassimount" possible and ensured the various condenser units matching over the whole range.

The J.B. "Chassimount" is built and designed as a unit. Each stage is adequately screened and has a special device which balances out all stray capacities. AND IT COSTS LESS THAN SEPARATE CONDENSERS.



Type 3P (illustrated above)
3 stage '0005 without Drum
Drive - - Price 23/6
2 stage '0005 15/-
4 stage '0005 31/-
5 stage '0005 38/6
6 stage '0005 46/-

See it at Olympia—Stand No. 63.

Type D4 (Illustrated above)

4 stage '0005 with Drum Drive
Price - 42/6

2 stage '0005 26/6

3 stage '0005 35/-

5 stage '0005 50/-

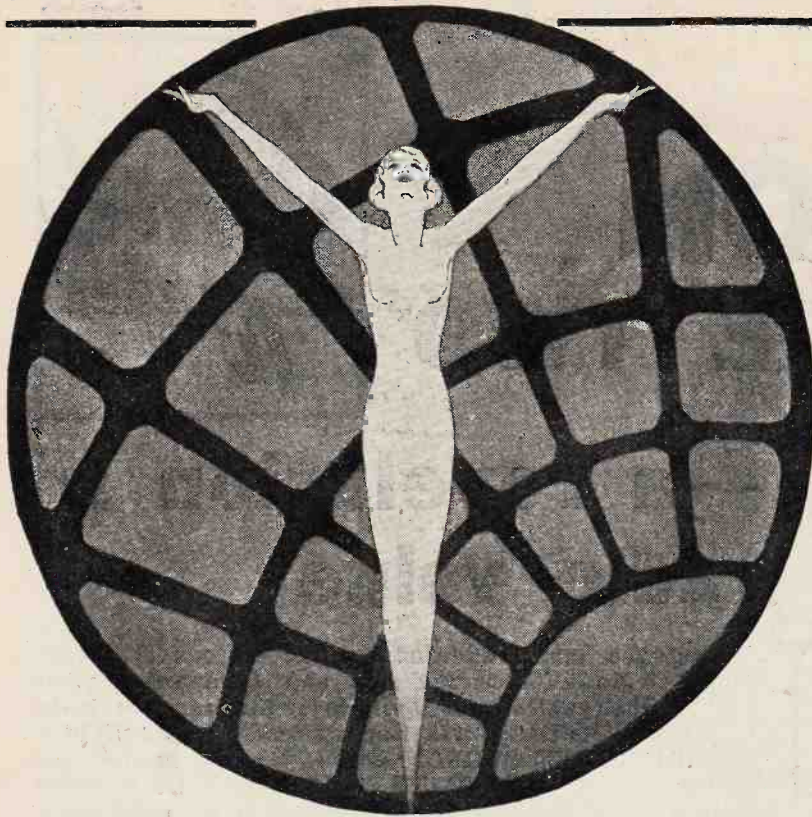
6 stage '0005 57/6



PRECISION

INSTRUMENTS

Advertisement of Jackson Brothers, 79, St. Thomas' Street, London, S.E.1. Telephone: Hop. 1837.
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THE LURE of the ETHER

The whole broadcast waveband calls you. Enjoy its rich variety of programme at will—the ultra selectivity of the McMichael Super Range Portable Four is the key. It will bring in the station you desire with a power of volume and beauty of tone hitherto unrealised.

This magnificent portable is perfected to a fine degree—the result of many years of radio research. Not only accomplishing a most satisfactory performance, but possessing the additional advantages of real portability and refined appearance, the McMichael Super Range Portable Four proves absolutely supreme.

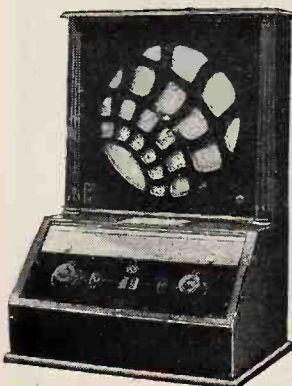
Here are some outstanding details:

1. Screened Grid Amplification rendering the set highly selective and wide in range.
2. Single dial tuning and volume control making simplicity the keynote of its operation.
3. Low battery consumption ensuring economy of upkeep.
4. Fitted in a handsome furniture hide suitcase with patent locking clips which makes the set not only extremely convenient for picnics and parties, but quite suitable for the most luxurious surroundings.

The McMICHAEL SUPER RANGE FOUR (TABLE MODEL)

A model for the home where an outdoor aerial and earth are not desirable. Comprises a handsome walnut cabinet on a directional turntable, fitted with an exactly similar circuit to the suitcase Portable. The whole is completely self-contained with frame aerial and Loud Speaker ready for immediate use. An additional aerial and earth may be attached to add to the normal and very remarkable range.

Cash Price 26 GNS.
(Including all equipment and Royalties.)



The McMICHAEL SUPER RANGE PORTABLE FOUR

Owing to the high degree of selectivity in this, and our other Screened Grid Portable Receivers, we are able to guarantee complete selectivity between all main B.B.C. stations under the new scheme of wavelengths, as proved by an actual test under the twin aerials at Brookman's Park, when both programmes were received separately without interference, and in addition a number of other British and foreign stations. This test was made on a standard "Super Range Four" receiver, under an independent Press observer, and was repeated at half-mile intervals with similar results.
Ask at any high-class radio store for a demonstration of this unique receiver—or call at our London Showrooms.



CASH PRICE 22 GNS.

Including all equipment and Royalties. Or by our special "Deferred Payments on Hire Purchase Terms" system, £5 down and 10 monthly payments of £2:1:0

L.M. MICHAEL LTD

Manufacturers of Wireless and Scientific Apparatus
WEXHAM ROAD, SLOUGH, BUCKS.

Telephone: Slough 441-442. Telegrams: Radiether, Slough. London Showrooms: 179 Strand, W.C.2 (Telephone: Holborn 2466).

NATIONAL RADIO EXHIBITION, OLYMPIA—SEPTEMBER 19-27—STAND No. 57.

See the BURTON EMPIRE TWO



**THE BURTON
EMPIRE TWO**

(Valves extra.)

57'6

A compact little receiver of very attractive appearance, designed to give good reception of local station programmes. Tuning is effected by a drum drive condenser, combined with a volume control. Two push-pull switches provide for changing wave range, and for switching on and off. Contained in Moulded Bakelite Cabinet.

—a revelation in radio value

Among the latest additions to the famous BURTON range of Radio Receiving sets and Component parts which will be exhibited at Olympia for the first time, is the BURTON EMPIRE TWO, Battery model, the BURTON EMPIRE THREE SCREEN GRID, Battery model, and the BURTON ALL-MAINS TWO and THREE valve models Considered in conjunction with the high-grade BURTON standard of material, workmanship and finish, and the unrivalled results obtained from Radio products of our manufacture, these new models represent the most remarkable value ever offered.

If you are at the Radio Exhibition don't fail to call at the BURTON stand and see them for yourself, or write NOW for latest illustrated catalogue.

C. F. & H. BurTon, Progress Works, Walsall, Eng.



£8.12.6

THE BURTON SCREEN GRID THREE

(Valves extra.)

A highly selective 3 valve receiver incorporating a screen grid high frequency stage and a detector, transformer coupled to a power output valve. Adequate volume is obtained without the use of a pentode. Tuning is effected by a single drum dial driving a pair of ganged condensers. A small auxiliary condenser is provided to give fine tuning. Wave range switching is effected by a single switch, which also serves to switch the set on and off. Reaction is by a differential condenser system which gives very smooth control, and entire freedom from troublesome hand capacity effects.

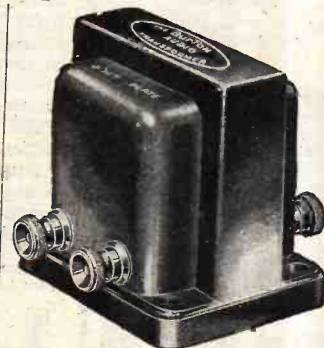
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SINGLE CONDENSER.

Complete with fast and slow motion drum control
12/6 each.

Ditto with plain drum control.
10/6 each.



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A neat and compact instrument of the highest efficiency, being carefully wound to give correct ratios. Enclosed in neat moulded case.
TYPE B/3. ratio 3-1 **10/6 each.**
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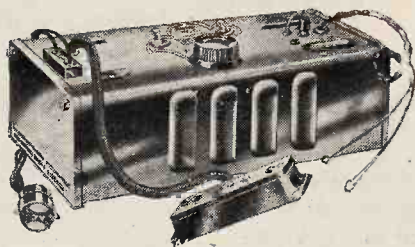
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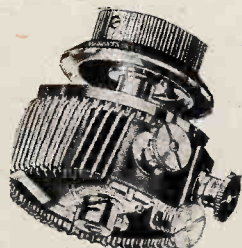
A GROWING POWER IN MAINS RADIO

MAINS UNITS

Regentone Mains Units have been instrumental in showing tens of thousands of the radio public the simple way to make their sets, even their Portable sets, All-Electric. The first Combined Mains Units to fit inside a Portable were made by Regentone. Now leading British Set Manufacturers recommend Regentone Combined Mains Units for use in their set—they have proved the reliability and satisfaction which every day make Regentone a still greater power in Mains Radio.



COMBINED MAINS UNIT
(H.T. with L.T. charger).
A.C. Model £5.17.6
D.C. Model £3.19.6



THE NEW REGENSTAT. The only totally wire-wound variable resistance of high ohmic value capable of handling power for Wireless Receiving purposes. Complete range of values. Price 9/6 and 11/6



4-VALVE ALL-ELECTRIC RECEIVER (for A.C. supplies). 4 Valves (2 stages, Screened Grid, H.F.) Single knob control. Long and short waves. Rectification by Westinghouse Metal Rectifiers. Walnut Cabinet.

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The home constructor knows the value of mains components made by a firm specialising in all-electric radio. These components are themselves the 'bits' that go to make up Regentone Mains Units—there can be no greater recommendation than this.

Mains Receivers

The new Regentone 4-Valve All-Electric Receiver (for A.C. supplies) has the same outstanding performance and reliability as the famous Regentone Mains Units. It is made by a firm which has specialised for years in the study of all-electric radio. It is a good receiver—a superlatively good receiver possessing to a marked degree simplicity of control (one knob tuning), selectivity, tonal quality, volume, range, and beauty of cabinet design. It is the Receiver for the discerning few who insist on the best. Price complete 30 guineas.

Write for our new Art Booklet—"The Simple Way to All-Electric Radio"—free on application.

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FOLLOW THE ARROW ~

for the valves with the better performance

This year at the National Radio Exhibition at Olympia, thousands will visit the G.E.C. Stand where the world-famous range of OSRAM VALVES will be on view. Follow the crowds to Stand No. 46 and learn why OSRAM VALVES give better performance at no extra cost.



Ground Floor
NEW HALL

Osram Valves

MADE IN ENGLAND

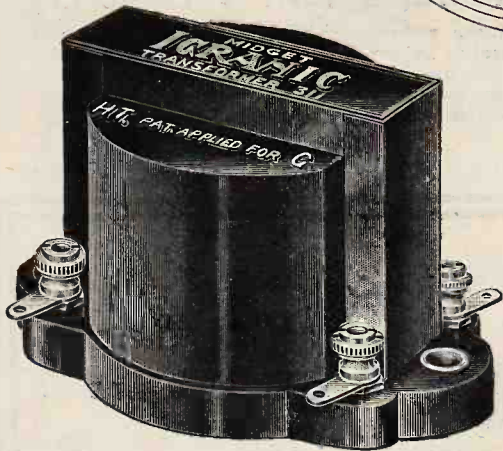
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Write for the "OSRAM WIRELESS GUIDE" 1930 Edition, sent post free on request.

Adv. of The General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.

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**IGRANIC
MIDGET
10'6**

**NOW SOMETHING
REALLY NEW IN
TRANSFORMERS**

The trend of modern receiver design calls for smaller components without sacrifice of efficiency. The new Igranitic MIDGET L.F. Transformer is a masterpiece in miniature. No refinements—electrical or constructional—have been sacrificed for size.

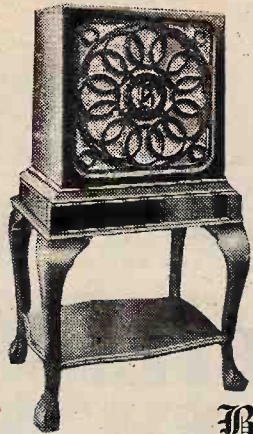
Study its star points. Remember that its efficient performance has been proved by many exhaustive laboratory and practical tests. It is the Transformer you have been waiting for.

THE STAR POINTS

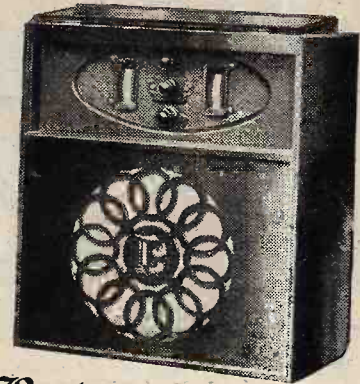
- ★ 1. Size $2\frac{7}{8}$ " \times $1\frac{7}{8}$ " \times $1\frac{3}{4}$ ".
Weight $6\frac{1}{2}$ ozs.
- ★ 2. Patented bi-metal core of new nickel alloy, which does not permit other than a very small polarisation.
- ★ 3. Primary inductance of over 60 henries.
- ★ 4. Case of polished Bakelite.
Ample material surrounds fixing holes.
All terminals clearly marked.



*Inspect this "Masterpiece in Miniature" at our
Stand No: 240, New Empire Hall, Olympia.*



The Greatest Achievements of a Great Firm



Brown Grosvenor Moving Coil Receiver

Handsome walnut cabinet. Pitch control fitted. Price, fitted with 6 volt field coils and high resistance speech coil, £17. 17. 0. Fitted with permanent magnets and high resistance speech coil, £20. 0. 0. Energized direct from A.C. mains, complete with rectifier and high resistance speech coil . . . £21. 0. 0.

Brown Screen Grid 4 Valve Portable Set

In handsome walnut cabinet. Ball-bearing turntable, special Brown Movement for Portable Sets, coils covering all wavelengths. Provision for connecting to additional speaker and pick-up. Complete with valves, batteries, unspillable accumulator . . . £19. 19. 0.

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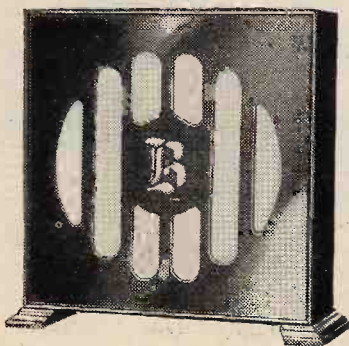


NEW Receivers

100% BRITISH THROUGHOUT

Brown Austral Loud Speaker

Placed on market for first time after an overwhelming success in Australia. An unusually good loudspeaker for the price. Dimensions: 12½" high, 11½" wide, 4" deep. Supplied in oak only. Price . . . £2. 10. 0.



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STAND 78

S. G. BROWN, LTD., Western Avenue, N. Acton, London, W.3.

Brown Royal Loud Speaker

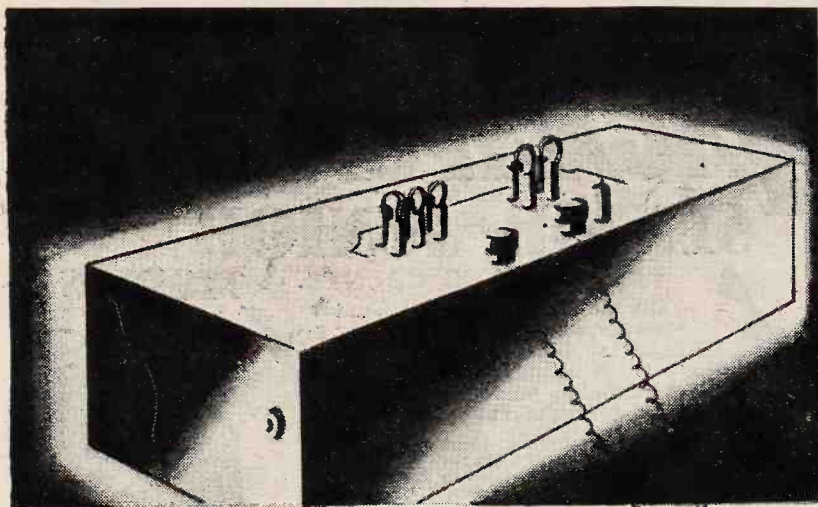
Cabinet designed to avoid box resonance common to a number of speakers. Gives remarkably clear reproduction. Fitted with the famous Brown "Vee" Movement and Duplex diaphragm. Price, mahogany only . . . £12. 10. 0.



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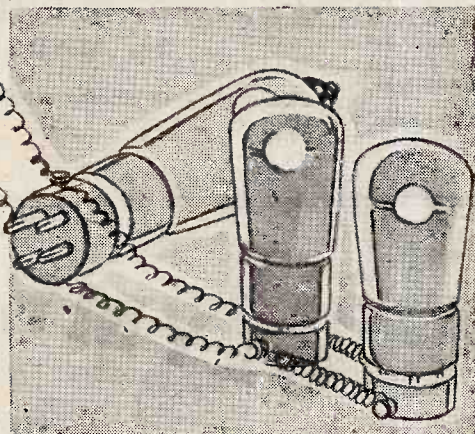


Make your Battery set All-Electric

The Six-Sixty A.C. mains conversion equipment is suitable for any Battery receiver

*No internal wiring alterations.
Specially selected Six-Sixty A.C.
Valves and Six-Sixty 4/5 pin
valve holder adaptor.*

The new Six-Sixty A.C. mains equipment enables you to turn your present battery receiver into an all-mains A.C. operated set. No need to scrap a satisfactory set—just adapt it. *The dimensions of the complete Six-Sixty conversion equipment do not exceed those of the previous batteries*, while the unit is specially designed to co-operate with specially selected Six-Sixty A.C. valves. Nowhere else can you obtain this advantage—valves and mains-conversion unit built by the same manufacturer to suit each other and work together.



The Unit can be obtained correctly built for any A.C. house supply. It is fitted with L.T. terminals giving 4 volts and up to 5 amps. H.T. tappings of 60, 75, 100, 120, 150 and 200 volts and Grid Bias tapping of —1.5 to —20 volts are provided—any three H.T. or two G.B. values being available for use simultaneously. Automatic Grid Bias is provided—the most modern and expensive arrangement. A further advantage is that the H.T. leads from the set are not removed when once inserted.

Dimensions, 13" x 5½" x 4". Price complete, from £8 5s.
Mains Unit alone £6 6s.

Made by the makers of the famous Six-Sixty Valves.

Write for leaflet giving particulars of complete range, including new Six-Sixty Valves, Six-Sixty Cone Speaker Assembly and Cone Speaker Paper, Six-Sixty Turntable, Six-Sixty Valve and Set Tester, Six-Sixty Valve Adaptors, Six-Sixty Gramophone Pick-up Attachments, Six-Sixty Grid Leaks and Holders.

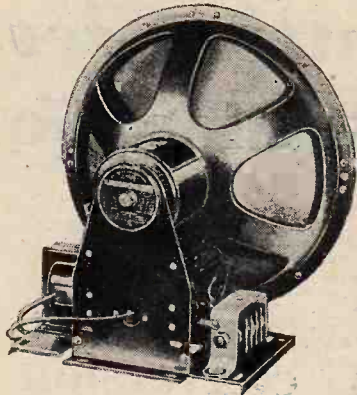
SAY SIX-SIXTY

STAND No. 58, OLYMPIA.

Six-Sixty Radio Co., Ltd., Six-Sixty House, 17/18, Rathbone Place, Oxford Street, W.1. Telephone: Museum 6116/7.

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and NOW the **MAGNAVOX** SENIOR^{AND} JUNIOR



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10 1/2" Cone.

No.	Field Voltage.	Price.
117	110-190 D.C.	- £6.10.0
119	180-190 D.C.	- £6.10.0
211	6-12 D.C.	- £6.10.0
411	105-120 v. 50 cy.	A.C. £9.15.0
415	220-240 v. 50 cy.	A.C. £9.15.0

PERFORMANCE COUNTS. MODELS

The Moving Coil type of Loud Speaker was originated by the Magnavox Company—and we have to thank their engineers for maintaining proved world leadership for the last 15 years.

The new Magnavox Dynamic Speaker is the only unit capable of giving a perfectly natural reproduction which cannot be distinguished from the original. There are positively no other loud speakers, irrespective of cost, which can possibly compare with a Magnavox in design, construction, and quality of reproduction.

Write for the new Dynamic Booklet and special folder.



JUNIOR MODELS.
7 1/2" Cone.

No.	Field Voltage.	Price.
116	110-190 D.C.	- £5.7.6
118	180-190 D.C.	- £5.7.6
210	6-12 D.C.	- £5.7.6
410	105-120 v. 50 cy.	A.C. £8.5.0
414	220-240 v. 50 cy.	A.C. £8.5.0

THE ROTHERMEL CORPORATION Ltd.
24, MADDOX STREET, LONDON, W.1.

'Phone: MAYFAIR 0578/9.

Continental Sales Office: 27, Quai du Commerce, Brussels, Belgium.

VISIT OLYMPIA—and go straight to Stand 118. There you will see the largest range of British made condensers—all by Polar.

SLOW MOTION DIFFERENTIAL.
For very accurate differential control, enabling small and sensitive adjustment. Smooth and silent action; no hand-capacity. Insulated spindle and insulated between vanes. Fitted with knob pointer.

'0001 each side -	-	-	7/6
'0015 " " -	-	-	7/6
'0025 " " -	-	-	8/-
'0003 " " -	-	-	8/6

POLAR "UNIVERSAL."
A condenser which, in addition to being perfectly fitted for normal use, is specially adapted for ganging. It is unaffected by the withdrawal of the spindle and when ganged the space between each unit can be varied. Locked rotor vanes ensure accuracy and four lugs are provided for rigid fixing. Suitable for left or right hand drum control or one hole panel fixing.

'0005 -	-	7/6	'0003 -	-	7/-
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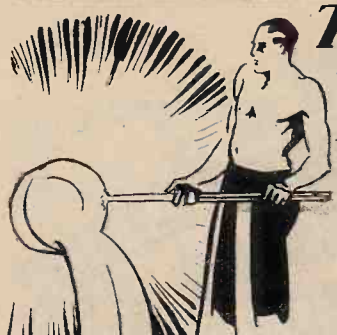
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WINGROVE & ROGERS LTD., 188-9, Strand, London, W.C.2. Polar Works, Old Swan, Liverpool.

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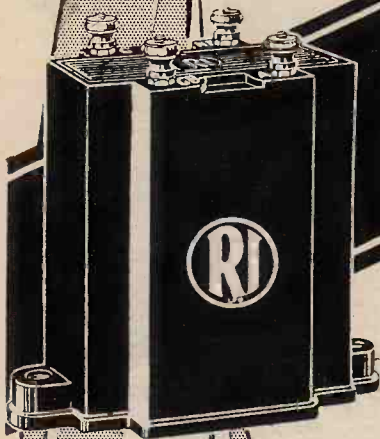




The METAL of MELODY

This is the nickel age. As in all branches of science so in radio, nickel is the symbol of efficiency—it is the key to perfect radio reception.

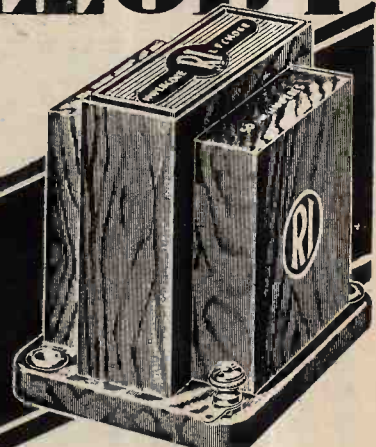
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STAND 61
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HYPERCORE The first L.F. choke with nickel-iron core. Less than half the size and weight of chokes with silicon iron cores yet will pass 50 milliamps. **17'6**

HYPERMITE A transformer with core of new nickel alloy, yet sold at a price within the reach of all. Amazingly high inductance—over 50 henries. **12'6**

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Nickel-Alloy Cores



are the secret of the success of the famous R.I. trio—"Hypermu," "Hypermite," and "Hypercore."

Your set needs their help. You cannot know what your set is capable of until you have equipped it with the nickel-iron trio. Fit either or all of the three to-day, and you will be amazed at the tremendously improved reception—the lifelike fidelity, the tremendous volume and the purity of the sound.

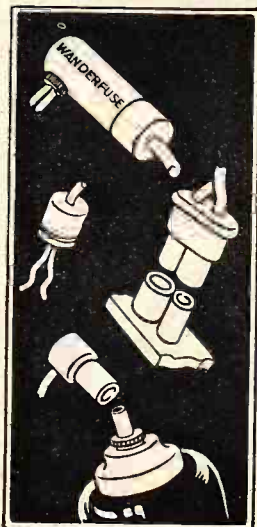
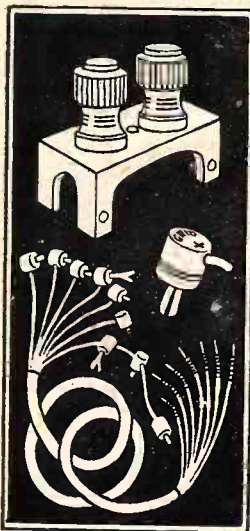
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THEY'RE BEST FOR EVERY SET



Whether your set is battery-driven or an All-Mains Model, the Belling-Lee Safety Plug and Socket will make costly short-circuits impossible. It is the last word in safety—even when disconnected it is fully insulated. High and low Voltage Plugs cannot be interchanged in error: and BOTH parts are clearly engraved in white. 26 different indications—fitted without tools—soldering unnecessary. Ample contacts—side STAND No. 134 National Radio Exhibition, Olympia.

entry for flex—a special device grips both wire and fray.

Price 9d.

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The new Terminal Mount, Price 8d. The new "Wanderfuse," Price 1/6. Spare fuses (150 m/a) 9d. each.

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- Type "B" 6d.
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- Indicating Spade Terminal 4½d.
- S.G. Anode Connector 6d.
- Battery Cords, 9 way 5/9

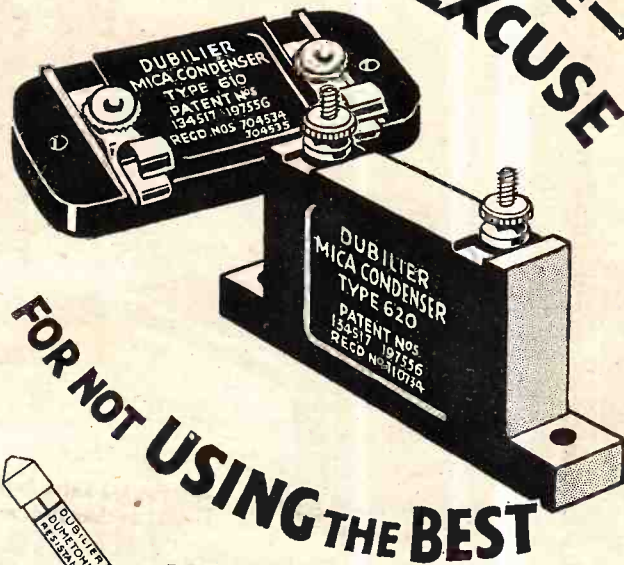
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FOR EVERY RADIO CONNECTION

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USE ALSO DUMETOHMS —THEY'VE BEEN REDUCED TOO! FROM 2/6 to 1/9

Increased demand has made it possible to reduce the cost of producing the world-famed Dubilier Condensers and grid leaks, an advantage which we are handing on to you!

The extreme accuracy and constancy of Dubilier Condensers is well known and users are assured that the standard will be maintained.

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PRICES

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'00005 to '0009	- 1/8	'003, '004, '005	- 2/3
'001 and '002	- 2/-	'006	- - - 2/6
'01	- - - - -		3/-

DUBILIER

MICA CONDENSERS

We are exhibiting at Stand 50, THE NATIONAL RADIO EXHIBITION, Olympia (New Hall), September 19-27th, 1930. Dubilier Condenser Co. (1925) Ltd., Ducon Works, Victoria Road, North Acton, London, W.3

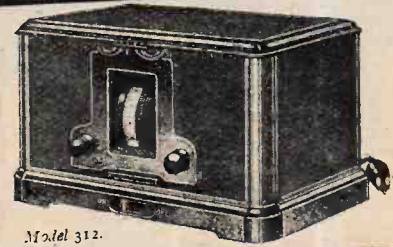
1931 "EKCO" TABLE

The accepted Encyclopaedia of All-Electric Radio!

ALL-ELECTRIC RECEIVERS			REMARKS	PRICE COMPLETE	
MODEL				D.C.	A.C.
Model 312	Detector and Pentode Valves		Cabinets of "Tenacit Bakelite" in three tones; dark jade, dark mahogany and medium oak to match any furnishing scheme. Set and Speaker together form one symmetrical unit.	£14-10-0	£14-10-0
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"EKCO" LOUD-SPEAKERS				£4-10-0	
"Ekcone" L.S.1	Incorporates balanced armature movement			£8-12-6	£11-0-0
"Ekcoil" L.S.2	Incorporates very latest type moving-coil unit				
ALL-POWER UNITS					
MODEL	OUTPUT		REMARKS	PRICE	
	H.T.	L.T.		G.B.	D.C.	A.C.
C 1. A	60 m/a., 4 tappings S.G.; 0-120 var., 120/150-v. and POWER.	3 to 1 amp. max. at 2, 4 or 6-v.	7 tappings up to 21-v.	—	£17-15-0
C 2. A	20 m/a., 3 tappings S.G.; 60 and 120/150-v.	2 to 5 amp. max. at 2, 4 or 6-v.	5 tappings up to 12-v.	£6-17-6	£10-17-6
C 2. B	25 m/a., 4 tappings S.G.; 60; 120/150-v. and 170-v.	2 to 4 amp. max. at 2, 4 or 6-v.	5 tappings up to 12-v.	—	£6-0-0
CP. 1	20 m/a., 3 tappings S.G.; 0-120 var. and 120/150-v.	25 amp. at 2, 4 or 6-v. (Trickle Charger)	—	—	£6-0-0
ACV	30 m/a., S.G. and 150-v.		(Raw A.C.) 4-v. From 2 to 4 amp. 6-v. from 25 to 1 amp.	Accessory to Model A C V £1-5-0	
CONTROL UNIT					
H.T. UNITS					
MODEL	CURRENT OUTPUT	VOLTAGE TAPPINGS		PRICE	
2 F. 10	10 milliamperes. For 1-3 Valve Sets or those not requiring more than 10 m/amps	60 and 120		£1-19-6	£3-10-0
2 A. 10	20 milliamperes. For 1-5 Valve Sets or those not requiring more than 20 m/amps	S.G.; 60; 120/150		£1-17-6	£3-19-6
3 F. 20		S.G.; 0-120 var.; 120/150		£2-10-0	£4-12-6
I V. 20 (Portable)	30 milliamperes For Multi-valve Sets or those not requiring more than 30 m/amps	S.G.; 0-120 var.; 120/150; 150/170		£2-19-6	£5-15-0
1 V. 30		S.G.; 0-120 var.; 120/150; POWER		£3-15-0	£8-10-0
4 T. 60	60 milliamperes. For Multi-valve Sets or those not requiring more than 60 m/amps			—	—
4 A. 60				—	—
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T. 500	Trickle Charger	Charges 2, 4 or 6-v. Acc. From A.C. Mains at 5 amp.		—	£2-12-6
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L. T. 1	L.T. Unit	2-6 volts from 3 amp. min. to 1 amp. max.		—	£8-15-0
I. Tr.	Isolating Transformer	For isolating speaker, etc., from set when using a Power Supply Unit		15s. 0d.	



Visit us at Olympia
SEPT 19-27
STAND NO 48



Model 312.

Plug-in - that's all! ALL-ELECTRIC RADIO

Write for details of Easy Payments to E. K. COLE, Ltd., Dept. W., "Ekco" Works, Southend-on-Sea.

SOLVES EVERY RESISTANCE PROBLEM

CLAROSTAT



"VOLUME CONTROL"

For many years this splendid Volume Control has been extremely popular with the Public. It is regularly specified by all the Radio Journals, giving proof of its efficiency.

Single-hole-fixing: Noiseless: Small and Neat: Fits panels up to 1": Baseboard Bracket with each: Reasonably priced at **6/6**

"The Midget Clarostat," electrically & mechanically identical to the "Volume Control," but with Soldering Tags and without Baseboard Bracket.

Same size, same Resistance Range, same usefulness, only **5/-**



"POWER"—35 Watts

Will comfortably dissipate 35 Watts continuously. Ideal for super-eliminators, amplifiers, radiograms, chargers, etc. For use up to 550 volts.

"Store Types" (N.P.) **12/6**

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All should write for a copy of our New 48-page Book on Mains Units, etc., over 100 Illustrations, including many most valuable circuits of interest to every "RADIO" enthusiast. Ask your Dealer for a copy of this wonder Book, or send a p.c. direct to us.



NEW WONDERFUL VOLUME CONTROLS

The New "Clarostat" genuine Wire High-Resistance Potentiometer Volume Controls are now ready. Made in 20 different ranges. Our book contains 24 new circuits regarding them. They make a decided step forward in the design of correct Volume Controls.

Prices from **5/- to 8/6**



"STANDARD"

Universal Range; 100 ohms to 5 megohms; dissipates 15 w. at 230 v. or 20 w. at 120 v. (See "Wireless World" tests); the accepted control for Eliminators. Also made in a wide variety of other ranges, replacing bothersome fixed resistances. After six years selling better than ever.

"Store" Types (N.P.) **9/6**
"M" Types (Brass Finish) **8/6**

THIS IS NOT THE WHOLE STORY. THERE ARE MANY OTHER TYPES.

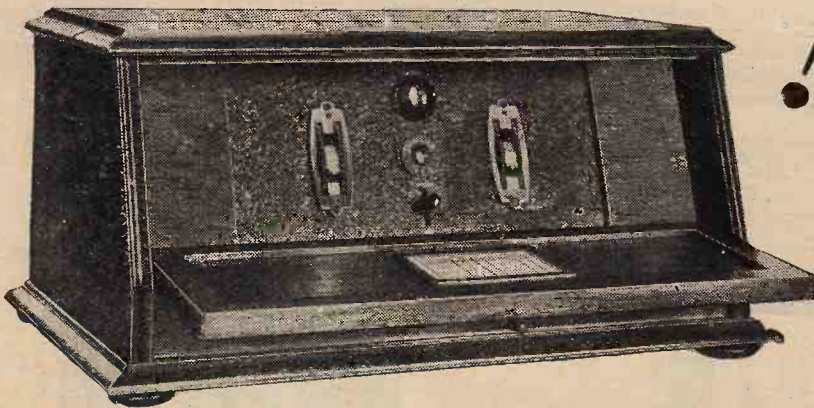
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76, OLDHALL ST., LIVERPOOL. & 40, BUCKINGHAM GATE, LONDON, S.W.1.

'Phone: Central 4641.

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640 MILLIWATTS

FROM THIS SET



Here is a reasonably priced all-from-the-mains receiver which will deliver '64 watts of audio frequency energy to the loud speaker—more than enough for average domestic purposes. Quality of reproduction is remarkably fine and will do justice to any Reproducer.

The Dubilier all-electric set is economical to run, too, maintenance costing only a few pence monthly.

It is just the set for your non-technical friends.

If unobtainable from your dealer, write direct to us giving his name and address.

PRICE: A.C. or D.C. MODEL **£25** GENEROUS HIRE PURCHASE TERMS

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OLYMPIA, SEPT. 19-27—STAND No. 217.

MANCHESTER RADIO SHOW, OCT. 8-18—STAND No. 30.

• **THE BRITISH BLUE SPOT COMPANY LTD.** •

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NEW INCREASED RANGE of the famous TELSEN COMPONENTS

WITH NEW FEATURES

New and Cheaper Radio awaits you on the Telsen Stand at Olympia! There you will see the latest designs in Radio Components — components which have been designed to meet modern broadcasting conditions for several years ahead.

Every component is the result of careful research into modern radio engineering—manufactured by one of the largest and most up-to-date radio works in the country.

The new Telsen Range is also the natural outcome of research into the manufacture of "First-class Components" at a "Popular Price" . . . it is now possible to build the finest set in the world and yet keep the overall cost well within the reach of your pocket . . . no more costly sets!—but greater and better sets! . . . with Telsen Components.

The complete Telsen Range includes Transformers, Variable Condensers, Fixed (Mica) Condensers, Valve Holders and H.F. Chokes, etc.

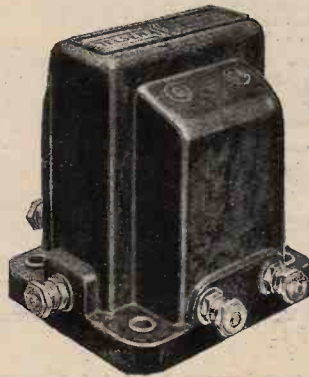
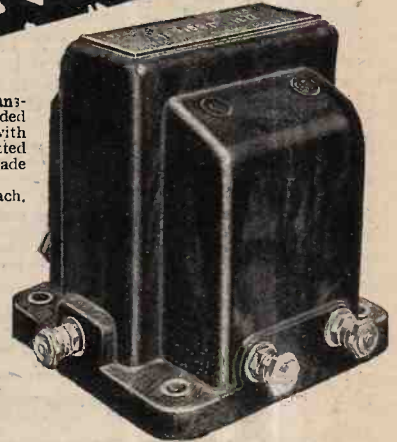
The Range is so scientifically designed right down to the smallest detail, and has a beauty of finish only associated with the highest-priced components, that no real enthusiast will ignore its claims . . . as "Radio's Choice" . . . for "Better Radio Reception."



INCORPORATE TELSEN COMPONENTS

- H. F. CHOKE.
- VALVE HOLDER
- GRID LEAK
- TRANSFORMER.
- MICA CONDENSER

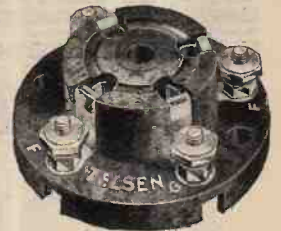
Telsen "Radiogrand" Transformer, new model, shrouded in Genuine Bakelite, with new windings and core, fitted with earth terminal. Made in ratios 3-1 and 5-1. Price 12/6 each.



Telsen "Ace" Transformer, the ideal model for all Portable Sets and where space is limited, gives perfect reproduction throughout the musical range. Shrouded in Genuine Bakelite with new windings and core, fitted with earth terminal. Made in ratios 3-1 and 5-1. Price 8/6 each.



Telsen H.F. Chokes, designed to cover the whole wave-band range from 18 to 4,000 metres, extremely low self-capacity, shrouded in Genuine Bakelite. Inductance 150,000 microhenries, resistance 400 ohms. Price 2/6 each.



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ADVT. OF TELSEN ELECTRIC CO. LTD., BIRMINGHAM.



The ORIGINAL Jelly Acid Battery

The popularity of the C.A.V. Jelly Acid Battery is not explained by the mere fact that it contains jelly electrolyte—there are other jelly electrolyte batteries! There are three reasons why the C.A.V. is the most effective non-spillable yet produced.

The Jelly Acid. Its composition is unknown outside our own laboratories. It maintains perfect contact with the whole of the plate surfaces, yet allows unrestricted gassing when on charge. It is chemically pure, and allows maximum conductivity.

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The Plates. These have been specially developed to give the utmost possible capacity when used with C.A.V. Jelly Acid.

The Whole. The C.A.V. is the lightest, cleanest, and most compact non-spillable on the market. By avoiding cumbersome acid traps, the greatest possible capacity for bulk is obtained.

C.A.V. Vandervell & Co. Ltd.
ACTON, LONDON, W.3

Obtainable from our Depots and Battery Agents throughout the country and from all Radio Dealers.



Compact, Clean & Non-Spillable

We issue a useful booklet on the care and maintenance of C.A.V. non-spillable batteries. Would you like a copy? Free on request to Dept. H.4



The Ideal Donotone The Best LOUDSPEAKER

For true fidelity of tone-quality the IDEAL Donotone stands alone. The wonderful tuned gongs give such depth and brilliance of definition, to both speech and music, that it is difficult to imagine that one is listening to a Loudspeaker. Write for catalogue W, which gives full particulars.



£6.6.0

Diameter of case 18 in., depth 9 in.

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'Phone: Holborn 0523.

STAND No. 139

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The **Wireless**
AND RADIO REVIEW **World**

**OLYMPIA SHOW
COMPETITION**

DIRECTIONS AND RULES.

1. Enter on the form, in the spaces provided, the names of the manufacturers and the official description of what you consider the best apparatus at the Show, based on a consideration of value at the price asked.
2. Write your name and address clearly and in ink on the entry form in the space provided, and send the completed entry form after Wednesday, October 1st, and not later than Monday, October 8th, to: The Competition Editor, The Wireless World, Dorset House, Tudor Street, E.C.4.
3. The prizes will be awarded to the competitors who correctly forecast the outstanding single exhibit (No. 8 below), as decided by the majority of votes, and have also the largest number of correct forecasts in the other classes of apparatus.
4. No correspondence can be entered into in connection with the Competition, and the Editor will not be responsible for any entries lost in the post or otherwise. Only one entry form to be sent in by each competitor.
5. The decision of the Editor must be accepted as final on all questions arising out of this Competition.

FIRST PRIZE: £50 in Cash

2nd.—A voucher for the purchase of apparatus to the value of £20 from firms exhibiting at the Olympia Show.

**FREE
ENTRY FORM**

3rd.—A similar voucher to the value of £15.
4th.—A similar voucher to the value of £10.
5th.—A similar voucher to the value of £5.

Enter your choice of the best apparatus at the Show in each of the following classes:—

DEFINITION OF CLASS.	NAME OF MANUFACTURER.	OFFICIAL DESCRIPTION OF APPARATUS.
1 Receivers of all types, either Mains or Battery operated.		
2 Radio Gramophones.		
3 Batteries of all kinds, including accumulators for both high tension and low tension.		
4 Mains supply units, both D.C. and A.C.		
5 Loud speakers of all types.		
6 Valves.		
7 Other apparatus not classified above, also amplifiers, component parts such as transformers, condensers, tuning coils, resistances, etc., etc.		
and 8 The outstanding single exhibit at the Show, irrespective of the class to which it belongs.		

I agree to accept the rules and declare that this is the only entry form that I have completed.

NAME (In Block Letters).....

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Author of "Wireless Telegraphy and Telephony," etc.

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This volume provides a complete theoretical course for the P.M.G. Certificate.

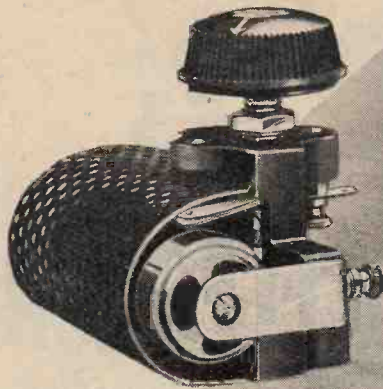
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GET THE BEST OUT OF RADIO



*Power
Potentiometers
complete range
Prices from
9/6 to 11/6*

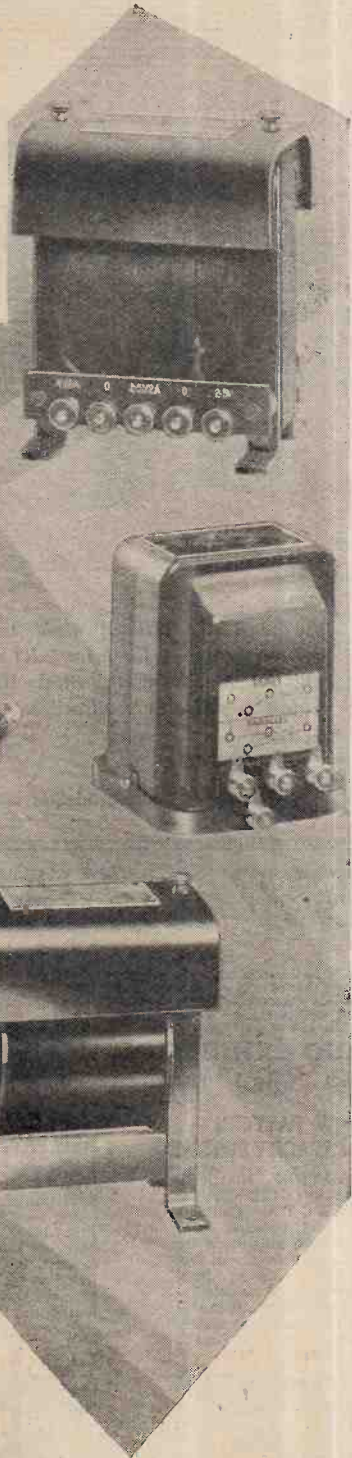
To get the best out of radio you must put the best into your set. Varley Components have twenty-five years' experience behind them. Experience spells progress, and progress means ultimate achievement.

The Varley Power Potentiometer is the latest development in Power Control. Ideal for high voltage eliminators, the resistance element cannot "pack," and a spring loaded contact arm ensures an efficient and dependable connection.

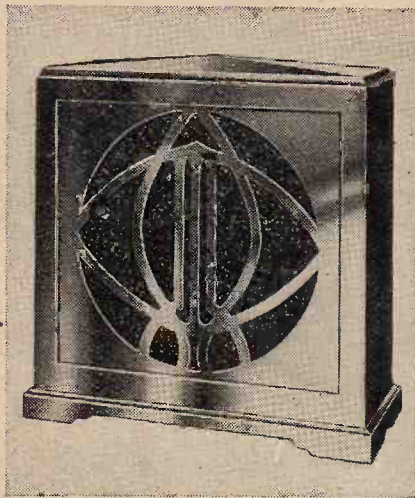
Remember that when you buy Varley Components you buy quality—the results of twenty-five years' research—perfect efficiency.



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



**STAND
No. 105
OLYMPIA
Sept. 19-27.**



Reg. design

Model Z.20. Without doubt the most attractive speaker at the price. Its reproduction will delight the most critical listener. Its cabinet is particularly attractive.

In OAK - - - - - £7 : 15 : 0
 MAHOGANY - - - - - £8 : 5 : 0

Other Celestion models from £3.

Remember it is your loud-speaker which has the *final word* in the quality of your radio and choose CELESTION. Made by the firm which has specialised for nearly five years in Sound-reproducing instruments.

Stand No.

53

RADIO EXHIBITION - - OLYMPIA

CELESTION

The Very Soul of Music

CELESTION LTD., Kingston-on-Thames

Woburn

NEW and IMPROVED

"Utility" Instruments offer you greatest value—and they're fully guaranteed. Most popular sets incorporate them, and all high-class dealers stock. Write for Illustrated List and-if you visit London see RADIO EXHIBITION STAND 60 NUMBER

Utility

WIRELESS INSTRUMENTS

NEW PATTERN ANTI-CAPACITY SWITCH

OXIDISATION effectively combated by SOLID SILVER CONTACTS. Contacts mounted on Bakelite base, and provision also made for connection by means of terminals or soldering lugs. Lever operated—one hole fixing—very compact (inside panel sizes two-pole type only 1 1/2" deep x 2 1/4"). Finish: Nickel Plated.

PRICES

W.215/2	2-pole changeover	5/6
W.215/3	3 " "	6/6
W.215/4	4 " "	7/6
W.215/6	6 " "	9/6



NEW PATTERN DRUM DIAL

Makes a full revolution thereby giving a very open scale and a reduction of 2—1. Price includes nicely moulded finger plate. For time being, this Dial supplied only with our make of Condensers, but designs in hand for fixing to all types. (We stock a special lighting bracket for illuminating this Dial—extra price, 9d.)

PRICES

Cat. No. W.270 with .0005 Mite Condensers	14/-
Cat. No. W.271 with .0003 Mite Condensers	13/6



"MITE" DOUBLE CONDENSERS

(Pat. Nos. 323108, 326500)

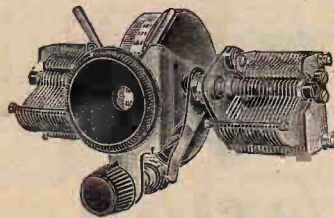
NEW BALANCING DEVICE

(P.P. No. 23752/29)

with new patented method of balancing out stray capacities in circuits tuned by a double gang Condenser. Condenser units are our standard Mite pattern. 3" Drum Dial and balancing knob on panel.

PRICES.

W.213. Double .0005 with 3" Drum Dial	22/6
W.214. Double .0003 with 3" Drum Dial	21/6



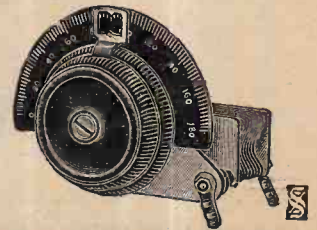
"MITE" CONDENSERS

Diminutive, and designed on low loss principle—still a first favourite. Centre spindle revolves on ball bearings and perfect electrical continuity is ensured by an unique INTERNAL CONNECTION. .0005 capacity occupies space only 2 1/4" x 2 1/4" x 2" when vanes are fully extended.

PRICES

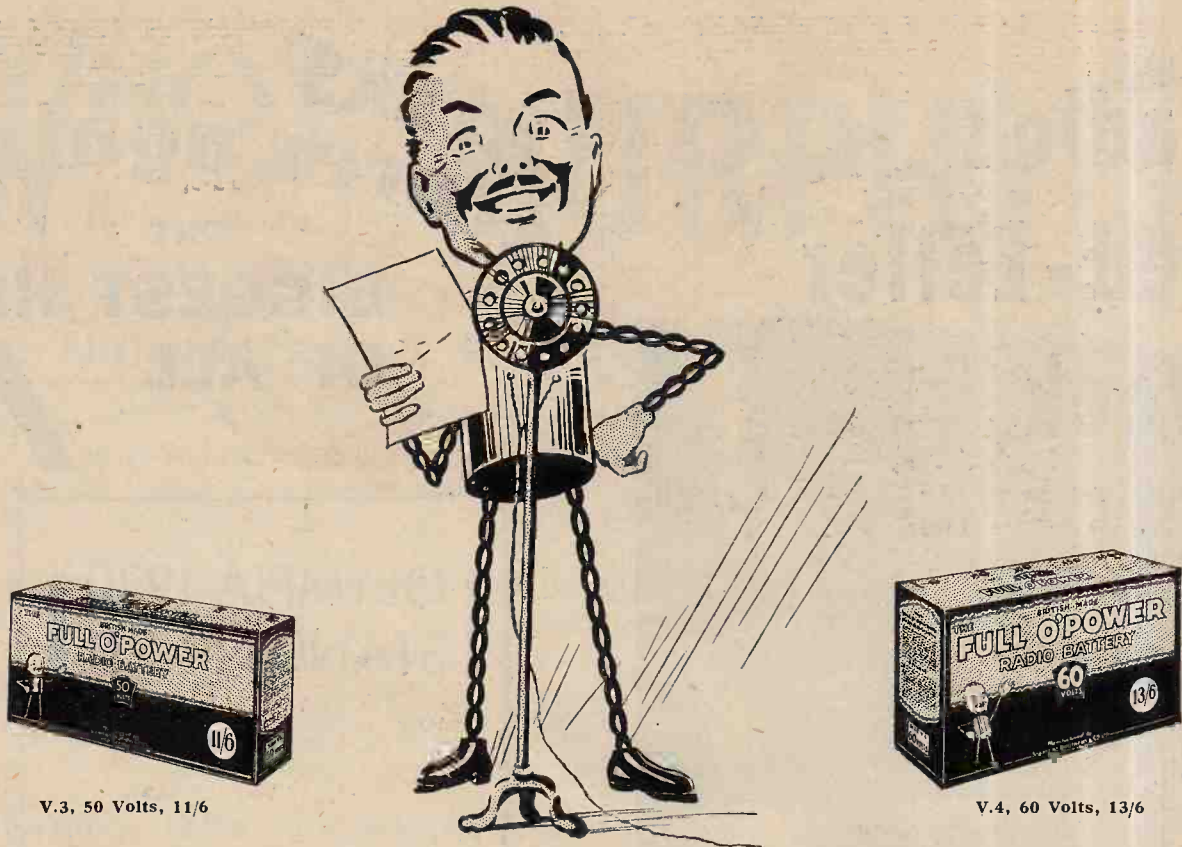
CAT. No.	CAP.	With 3" Dial.	Less Dial.	With Vermer.
W.197	.0005	7/6	6/6	10/-
W.198	.0003	7/-	6/-	9/6
W.199	.0002	6/-	5/-	8/6
W.200	.0001	5/-	4/-	7/6

(Brass 6d. extra)



WILKINS & WRIGHT LTD
 HOLYHEAD RD. *Utility* BIRMINGHAM

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V.3, 50 Volts, 11/6

V.4, 60 Volts, 13/6

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the introduction of an entirely new range of Full O'Power Radio Batteries, which includes models suitable for every type of battery operated radio set; and each battery will prove a revelation in

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The new Full O'Power Range will now include:—
 POPULAR TYPE, POWER TYPE, SUPER RADIO TYPE, SPECIAL TYPE (for Portable Sets), GRID BIAS BATTERIES.

VISIT SIEMENS
STAND No. 70
 NATIONAL RADIO
 EXHIBITION,
 OLYMPIA.

Ask for them to-day at your Dealers—these wonderful new batteries in the attractive new-style cartons. They are fully described in the Full O'Power Booklet just issued.

SIEMENS FULL O'POWER BATTERIES

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If you would know the new wonders that have been added to Radio, come straight to Radiolympia.

Radio-Gramophones are here that look and sound too marvellous to be true! Valve sets, Crystal Sets, Home Construction Sets, Components. All are here to meet every need and to suit every pocket. And whatever your ambitions you will find that the keynote of modern radio is simplicity. Today Radio is as much part of the home as Gas or Electric light and just as easy to operate.

Come to the NATIONAL RADIO EXHIBITION

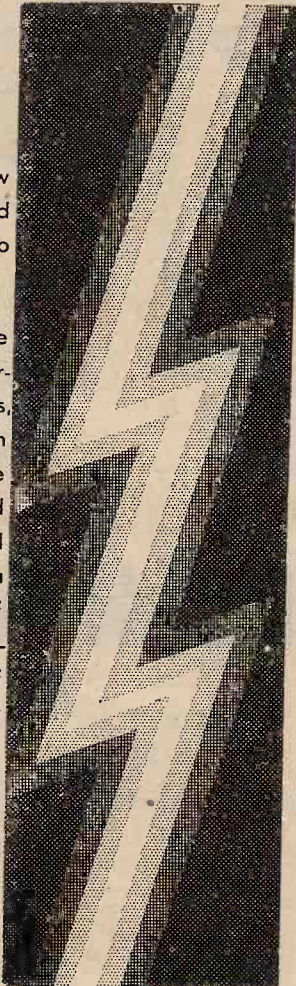
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CLARKE'S
"ATLAS"
SCORES AGAIN
THE
**BIGGEST HIT
OF ALL**

OLYMPIA 1930
STAND NO. 211

THIS COVER HIDES
A SECRET TO BE
REVEALED NEXT WEEK

LOOK OUT FOR THE
NEW WONDER

CLARKE'S
"ATLAS"
ALL MAINS UNIT

H. CLARKE & CO. (M/C) LTD., Old Trafford, MANCHESTER.

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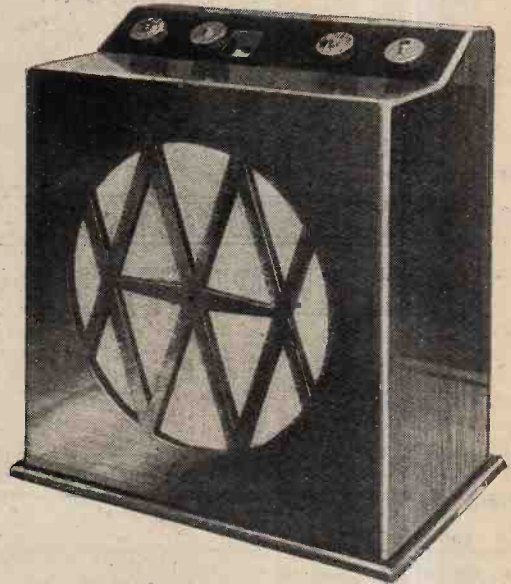
WHO'S MURPHY?

THE MURPHY RADIO PORTABLE.

"THE disposition of the controls, for instance, with a projecting ledge upon which to rest the hands when tuning is at once evidence of *careful attention to detail on the part of the designers.*"

"In the space of half an hour after dark, twenty-four stations at programme strength were tuned in on the 200-600 metre band. This is a conservative estimate as several strong carrier waves were passed over which did not happen to be modulated at the time." (Extract from "Wireless World" article, August 6th.)

**The above tells you something about
Murphy Radio.**



THE NEW MURPHY
RADIO PORTABLE.

Frank Murphy

You can see it on
STAND 252.

You can hear it at
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(opposite Olympia)

**MURPHY
RADIO LTD
WELWYN GARDEN CITY, HERTS**

B.Sc., A.M.I.E.E.,
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**MAKING
WIRELESS
SIMPLE**

M

4-VALVE SCREENED GRID RECEIVER

SINGLE TUNING CONTROL.—
Completely Ganged Circuits CALIBRATED IN WAVELENGTHS.
Fitted in beautiful Walnut Cabinet; weight 32 lbs.
No aerial or earth required.
B.R.V.M.A. Valves.
2-volt 23 A.H. unspillable Accumulator, mounted on acid-proof rack.
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Average H.T. consumption 8-9 m/a.
Gramophone Jack.
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External aerial and earth sockets.
Excellent loudspeaker reproduction, giving very enjoyable music and particularly clear speech.
Range and selectivity equal to, if not better than, any other portable set on the market.

PRICE 17 GUINEAS

including valves, batteries, turntable and Royalties.
M.C. 6.

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your guarantee

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Four of them are illustrated here. For performance and reliability, buy GECOPHONE. Convenient Hire Purchase Terms can be arranged on orders of £5 or over. Ask your dealer for particulars.

"STORK"
CABINET
LOUD
SPEAKER

£35.0

4 VALVE
ALL-ELECTRIC
RECEIVER for
A-C-Mains £30

PORTABLE
SCREEN-GRID
FOUR-VALVE
RECEIVER
(BATTERY TYPE)
20 GNS.

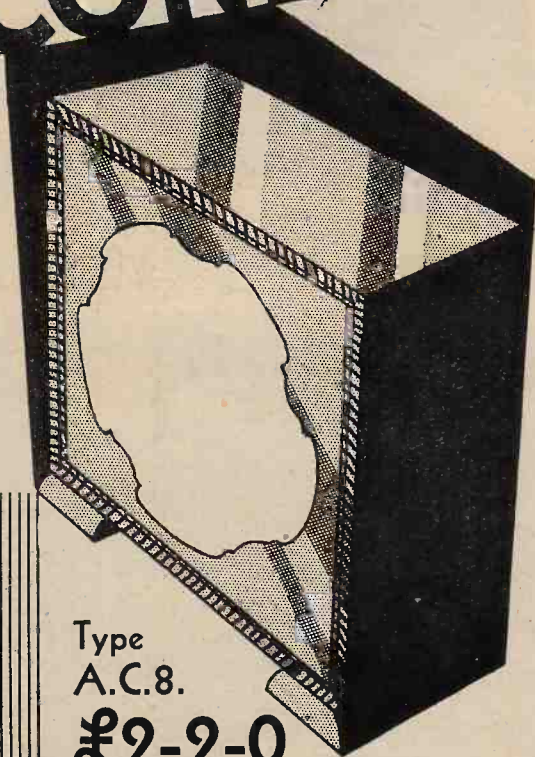
3 VALVE
ALL-ELECTRIC
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Mains £18

MADE IN ENGLAND
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AMPLION TWO-GUINEA CONE



Type
A.C.8.

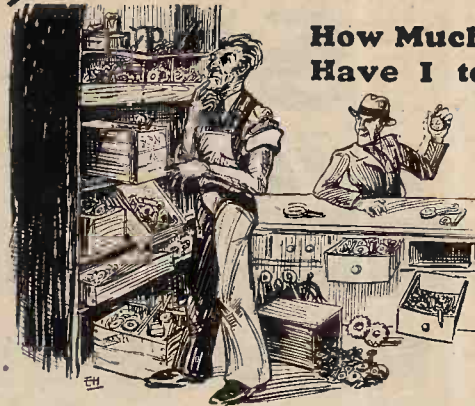
£2-2-0

One of Amplion's latest models at a really moderate price which brings it within the means of everyone. This sturdy little cone speaker is supplied in a neat cabinet of original design, with an attractive shaded finish. It is capable of giving really excellent reproduction, together with very considerable volume. Size of cabinet $12\frac{3}{4}$ " wide x $13\frac{1}{2}$ " high x $6\frac{5}{8}$ " deep.

Catalogues from Graham Amplion Ltd., 26 Savile Row, London, W.1.

AMPLION

"TILTRACK" Registered Trade Mark Patent STEEL STORES System



How Much Longer
Have I to Wait?

WHY
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'TILTRACKS'
LIKE
JONES & CO.
DO?

How much custom have you lost through those ramshackle old stores of yours? That conglomeration of broken boxes and crates wherein goods are lost for ever! Why not make your stores a credit to you? Why not make your speedy service talked about? In short—why not install "Tiltracks"?

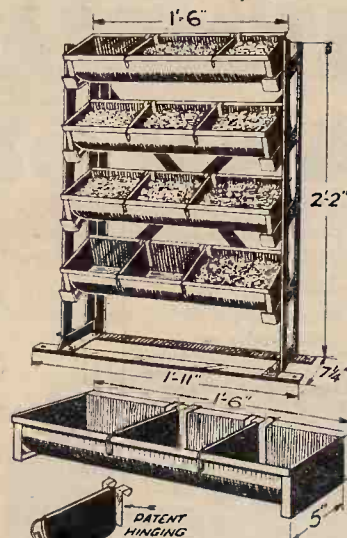
"Tiltracks" accommodate more goods in less space than any other system. By no other method can goods be so quickly seen and got at. All "Tiltracks" are fitted with compartments that can be quickly adjusted to suit the size of goods to be stored. At stocktaking time all stock can be seen and rapidly counted. Furthermore, the trays themselves can be easily removed from the racks. Why not investigate!—there's money in it!

"TILTRACKS" ARE MADE
IN MANY STYLES.
For the Experimenter, the Factor
and the Factory.
WRITE FOR LISTS.

THE "BENCHRACK" (Tiltrack Principle)

Stands on the work bench and is ideal for storing small parts. The trays tilt downwards with contents exposed to view, and the fronts of the trays are rounded to allow contents to be swept up the slope with one hand. Patent hinging partitions are provided also.

Price 30/- F.O.R.



"TILTRACK"
WHEELED TRUCK
It wheels to the job. A big timesaver.

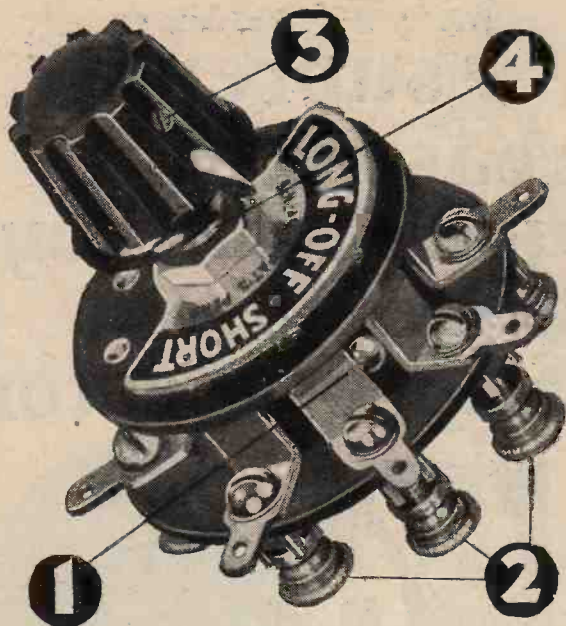
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BERTRAM THOMAS, MANCHESTER.**

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"TILTRACK" (Senior)
For storing all kinds of goods.
Approx. size of Trays, 2' 6" x 12" x 6".



AN ALL ROUND SWITCH

Are you a judge of a fine piece of engineering? If so, this new Benjamin Rotary Switch will make an irresistible appeal. Both electrically and mechanically it is a first-class job, and in appearance it is fit to take its place on the most luxurious panel. The spindle carries at one end a bakelite pointer knob and at the other a cross bar of bakelite into which is let two spring-loaded phosphor-bronze balls. As the knob is rotated the balls snick into the gaps between the heavy gauge contact strips and thus for any position of the switch, two pairs of strips are joined by a positive, low resistance, self-cleaning connection. The eight terminals, or tinned soldering lugs, can therefore be connected up to your radio circuit in a variety of ways for different purposes, and this switch will perform all the functions of a double pole change over switch neatly, efficiently and rapidly.

Diagrams of several typical connections for this switch, and its small brother the Single Pole switch, are given in our 1931 Radio Catalogue. A postcard will secure your free copy by return.

36

WITH TERMINALS

WITHOUT TERMINALS

3/-

- 1** One of the self-cleaning phosphor-bronze ball contacts is here seen making a firm connection between adjacent strips. On test it breaks 10 amps. at 20 volts fifty times and shows definite improvement with use.
- 2** A special feature of this switch is the novel terminal which screws down into a castellated base holding if necessary several wires simultaneously in a vice-like grip. Soldering tags and contact strips are in one piece.
- 3** The bakelite pointer knob is fixed to the spindle by a grub screw riding in a brass bush—no stripped female thread in the bakelite!
- 4** The switch is fixed by drilling a single 1/4" clearance hole in any metal or insulated panel up to 3/8" thickness. The indication dial reads LONG-OFF-SHORT on one side. The reverse is marked OFF only. (Your jeweller will engrave special lettering for a small fee.)

MAY WE HOPE TO SEE YOU AT STAND 115 WHERE ALL OUR PRODUCTS ARE SHOWN?

BENJAMIN



The Single Pole Rotary Switch is similar in construction to the Double Pole above. With terminals 1/3. Without terminals 1/6.



The Famous Benjamin Push Pull Switch one hole fixing sells at— With terminals 1/3. Without terminals 1/-.



All Benjamin Switches and Valve Holders are fully illustrated and described in our Catalogue No. 1142. Free on request.

THE BENJAMIN ELECTRIC LTD., Tariff Road, Tottenham, LONDON, N.17.
TOTTENHAM 1500.

**BURNDIPT IS
DOMINATING
THE SHOW with
the New A.C.
Receiver De Luxe**



All the wireless world is visiting the radio exhibition at Olympia—and inspecting Burndipt's latest wonder-set—the A.C. Receiver De Luxe (Model 1850). 20-30 stations can be received, and the set is calibrated for wavelengths of 210-560 and 900-2100 metres. Amazingly crisp and powerful reproduction is afforded. Price, 33 guineas, in handsome oak cabinet, or 34 guineas in mahogany.

Burndipt

is at Stand
Nº 56

Be sure to see also the Burndipt Needle Armature Pick-up which is used officially by the B.B.C., in its transmissions.

Burndipt Wireless (1928) Limited,
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Showrooms and Trade Counter:
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CVS.65

**4 supreme
reasons why
you should buy
a "Dario"
Super-Detector!**

6/6



- 1... PRICE
- 2... Slope 2 Ma/V
- 3... Mag. Factor 15
- 4... Fil. Current 0.15



Best way to all Stations

OTHER DARIO PRICES
Bivolt or Forvolt.

UNIVERSAL	} 5/6	SUPER POWER	7/6
RESISTRON		HYPER POWER	9/6
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DARIO TRANSFORMER Ratios 3-1 or 5-1			5/-
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Telephone: Wanstead 2722..

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202

Woburn
B20

IF YOU WANT TO HEAR ABSOLUTE REALITY

We invite visitors to
Olympia to hear the
**R.G.D. ALL ELECTRIC
RADIOGRAMPHONE**

STAND 126
(GALLERY)

AUDITION ROOM

"N" (directly opposite
Stand)



THE R.G.D. DE LUXE MODEL.

For those desiring the very best that both Radio and Gramophone can give, the "R.G.D." De Luxe Radio Gramophone is the ideal instrument. The Radio side of this instrument is so powerful that given favourable atmospheric conditions over 30 stations can be received with ample volume. The quality of reproduction from distant stations is equal to that of local stations.
In Oak £80 In Mahogany £85

**SOMETHING ENTIRELY
NEW THIS YEAR.**

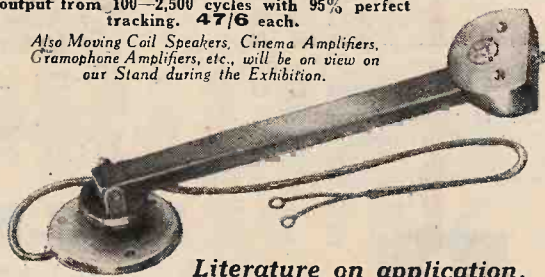
**THE R.G.D. DE LUXE RADIO
GRAMPHONE** has many new features!

2 Screened grid stages! Band Pass Filter!
Super Selective! Single knob Tuning!
Fader from Radio to Record!

All Mains operated with exclusive cabinet design.

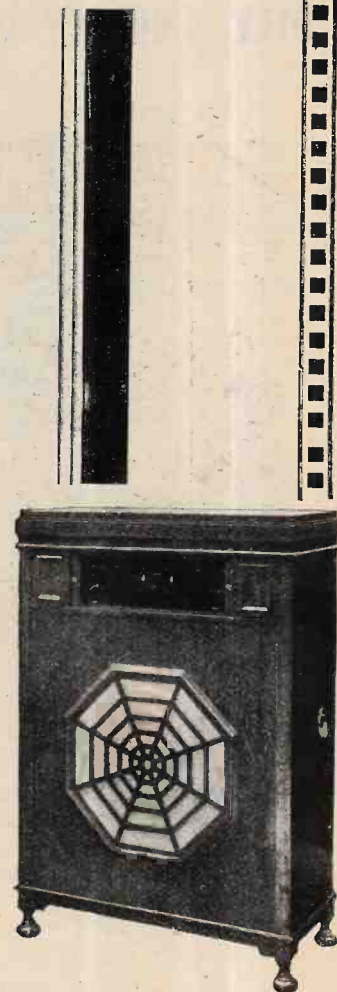
Why not book a demonstration now for Olympia, or visit our audition room at the Show? The new R.G.D. Gramophone Pick-Up has a straight line output from 100-2,500 cycles with 95% perfect tracking. 47/6 each.

Also Moving Coil Speakers, Cinema Amplifiers, Gramophone Amplifiers, etc., will be on view on our Stand during the Exhibition.



Literature on application.

**The RADIO GRAMPHONE
DEVELOPMENT Co.,
72, Moor Street, Birmingham.**



**THE R.G.D.
STANDARD MODEL.**

Owing to its undoubted popularity and our sales of this instrument during the last year we have decided to retain this model for the coming season.

In Oak - - £65
In Mahogany £70

**THE NEW
W.B.
PERMANENT MAGNET
MOVING COIL SPEAKER**



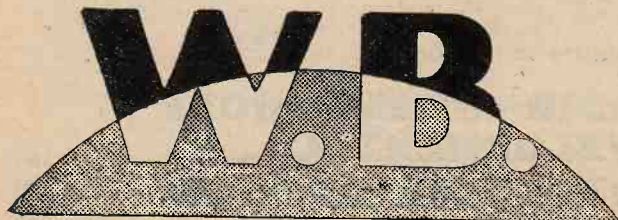
You have not heard your set at its best until you have listened to the new W.B. Permanent Coil Speaker. It is a moving Coil Speaker with a Sheffield made Cobalt Steel Magnet weighing 10½ lbs. and guaranteed for five years. The Permanent Magnet makes energising from the mains unnecessary. It is the most sensitive speaker you can buy.

It can be supplied completely assembled in chassis form or in an attractively designed and well-made Oak or Mahogany Cabinet.

Assembled in handsomely finished cabinet, size 17" x 15" x 19". Oak Cabinet Model **£8 8 0**
Mahogany Cabinet Model **£8 18 6**

Assembled in Chassis form and fitted with 14" baffle board Price **£6 6 0**

Made by W.B., manufacturers of the famous W.B. Valve-holders of every type. Prices from 1/- each. Write for particulars of the New W.B. Push-Pull switch fitted with patent nickel-silver conical contacts. Price 1/3.



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**Showing for
the First Time
at OLYMPIA
STAND 122**

The
**FAMOUS WEST OF ENGLAND
"H.S.P." PORTABLES**

**THE SETS
THAT GET THE
STATIONS IN
THE BADLY
SCREENED
HILLS AND
ROCKY DISTRICTS OF
THE WEST.**



From

15 GNS. TO 29 GNS.

to suit all requirements.

This season's designs and prices on application to

The H.S.P. Wireless Co.

LANGFORD WORKS

or

30, The Boulevard

WESTON-SUPER-MARE

PHILIPS BATTERY ELIMINATORS (H.T. UNITS)



Type 3002
£5-10-0

Type 3005
£3-17-6

Type 3009
£5-15-0

It is cheaper to use a Philips Battery eliminator and take your current straight from the mains than to buy rapidly wasting batteries at frequent intervals. Also it improves reception by the complete elimination of battery voltage drops and makes your set absolutely reliable.

One of the three types of Philips Battery Eliminators meets your needs. Types 3009 and 3002 work off A.C. Mains, Type 3009 giving G.B. as well as H.T. current. For D.C. mains there is Type 3005.

For 10/- down you can have any of these on Philips' Easy Payment System.



PHILIPS ALL-ELECTRIC RADIO

Made by the manufacturers of the famous Philips All Electric Radio Receivers, Argenta Lamps and Neon Signs.

PHILIPS RADIO, PHILIPS HOUSE, 145, CHARING CROSS ROAD, LONDON, W.C.2.

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H2!

Beating Nature — on her own ground !

The nose of a bloodhound, the ears of a deer, the whiskers of a cat—fascinating instances of the acute degree to which nature has carried sensitivity in many of her amazing creations. Yet the scientists of the Marconi Valve Factory have devised an appliance which for sensitivity beats any of these. This marvellous achievement is incorporated in the new Marconi Valve H.2, the introduction of which marks an entirely new era in the "detector" field of radio science.

The Marconi H.2 is a new high magnification valve with a mutual conductance of 1.0 ma/volt—the highest yet attained in this class—particularly suitable for detection in portable receivers. The amplification factor of 35, and impedance of only 35,000 Ohms, are obtained by special constructional methods which at the same time give exceptional freedom from microphonic feed-back. Marconi H.2 should be fitted as "detector" in portables—or, indeed, in any set where maximum sensitivity is essential. It will give greater range, fuller tone and perfect stability. It will bring in new stations with amazing consistency and improved reproduction.

Marconi H.2, the new **EFFICIENCY** detector, with the highest conductance, costs only 8/6. It is **ALL BRITISH!**

MARCONI

H.2.

8/6

**REDUCED
PRICES**
NOW IN OPERATION

Remember! Marconi Valves are used by the B.B.C., Imperial Airways, Croydon Control Tower, Metropolitan Police, Trinity House Beacon Stations and Lightships, Empire Wireless Communications, Large Passenger Liners, etc.—need more be said?

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B24

The Wireless World

AND
RADIO REVIEW
(18th Year of Publication)

No 577.

WEDNESDAY, SEPTEMBER 17TH, 1930. VOL. XXVII. No. 12.

Editor: HUGH S. POCOCK. Assistant Editor: F. H. HAYNES.
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 Telephone: City 2847 (13 lines). Telegrams: "Ethaworld, Fleet, London."
 COVENTRY: Hertford St. BIRMINGHAM: Guildhall Bldgs., Navigation St. MANCHESTER: 260, Deansgate. GLASGOW: 101, St. Vincent St., C.2
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 Subscription Rates: Home, £1 1s. 8d.; Canada, £1 1s. 8d.; other countries abroad, £1 3s. 10d. per annum.
 As many of the circuits and apparatus described in these pages are covered by patents, readers are advised, before making use of them, to satisfy themselves that they would not be infringing patents.

POINTS FROM OUR FORECAST

CHANGED tuning and direct wavelength calibration are features in a four-valve portable. (Page 279.)

Mains-driven sets have outstripped battery sets in point of numbers. (Page 280.)

A complete eliminator for portable sets at the low price of £5, with a current output up to 20 mA. (Page 285.)

The G.E.C. can fairly be called pioneers of the indirectly heated valve. (Page 288.)

A new battery S.G. valve, by Cossor, will attract much attention, in view of its negligible residual capacity. (Page 289.)

Chassis receivers of both battery and mains-operated types are available for fitting to existing cabinets. (Page 278.)

The Ediswan Company have a "Power Pentode Three" receiver employing a Mazda indirectly heated AC/Pen. (Page 278.)

A mains transportable is one of the leading exhibits of the Varley stand. (Page 278.)

Dubiliers are showing two-valve sets specially suitable for regional reception. (Page 279.)

In sets one of the most sweeping departures from conventional practice will be found in the new "Twintriple" self-contained sets on Stand 31. (Page 277.)

We are promised a number of sets at exceptionally low prices. (Page 279.)

A push-pull pentode output choke and a double push-pull input transformer will be found on Stand 105. (Page 281.)

A variable ratio push-pull output transformer, giving a choice of four ratios. (Page 281.)



An entirely new style of short-wave condenser. (Page 282.)

A new wire-wound, continuously variable resistance with a smooth movement, rated to dissipate 10 watts, and available in values up to 50,000 ohms. (Page 283.)

It would seem that the permanent magnet moving coil loud speaker is destined shortly to oust the rectifier type for use with A.C. receivers. (Page 286.)

An innovation on Stand 131 will be resilient sockets for use with solid prong plugs. (Page 285.)

The new "Inductor Dynamic" principle of construction in cone units is an interesting development. (Page 286.)

Among cabinet cones with balanced armature movements will be found an all-round reduction in prices. (Page 287.)

Considerable price reductions in electric gramophone motors have resulted from revisions of design. (Page 287.)

Giant electric motor models, about twenty times normal size, will be features of the display on Stand 256. (Page 287.)

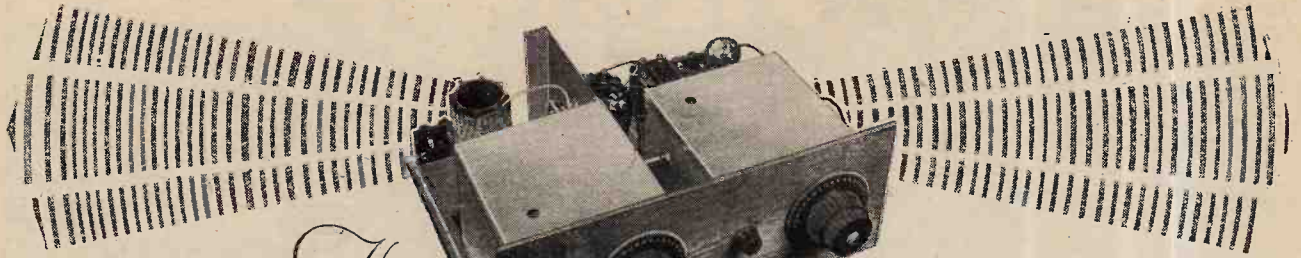
Radio gramophones fitted with the Novotone tone corrector can be seen on the stands of two exhibitors. (Page 280.)

A series of new A.C. power output valves with directly heated filaments consuming 1 amp. at 4 volts. (Page 288.)

The new McMichael "Mains Three" has ganged tuning, with a fixed horizontal scale directly calibrated in wavelengths, traversed by a moving indicating pointer. (Page 278.)

An unconventional feature in a three-valve A.C. mains set is the inclusion of a screen-grid valve as the detector. (Page 279.)

The Wireless World "Band Pass Four" is available in commercial form. (Page 278.)



The BAND PASS THREE

A General-purpose Receiver with an Up-to-date Tuning System.

EVEN if we ignore the real object of the band pass filter—which is to avoid loss of sidebands and consequent attenuation of the higher musical frequencies—it might well be argued that its practical advantages as a tuning device pure and simple would warrant its inclusion in a receiver. After all, a filter is

nothing but a rather specialised form of two-circuit tuner, with, almost as a matter of course, ganged control of its pair of variable condensers; this feature entirely overcomes the usual objection to loose-couplers with separately tuned aerials.

It is not hard to make out a good case for any type

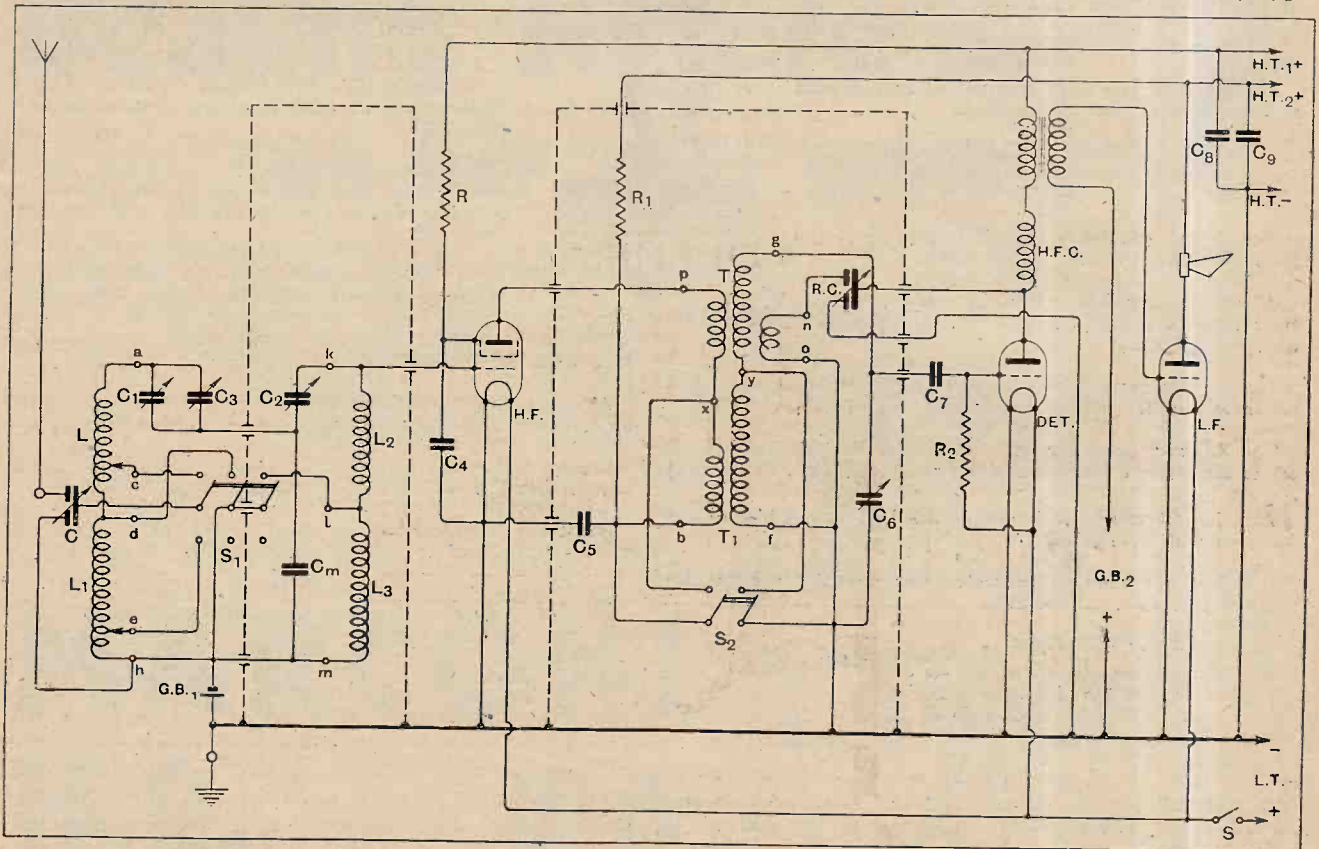


Fig. 1.—Complete circuit diagram. C, R.C., differential condensers, 0.0002 mfd.; C₁, C₂, C₃, 0.00035 mfd.; C₄, trimming condenser, 50 mmfds.; C₅, C₆, 0.5 mfd.; C₇, 0.0003 mfd.; C₈, C₉, 2 mfd.; R, R₁, 600 ohms; R₂, 2 megohms. Lettering of the coil terminal points corresponds to Figs. 4 and 5.

The Band Pass Three.—

of filter, but it is particularly easy to do so with regard to the capacity-coupled system, of which the possibilities and properties have been fully explored by other contributors to these pages. This device is so manageable that no amateur with the ability to handle wireless apparatus in a sympathetic manner need hesitate to adopt it.

The writer's aim has been to prepare a practical design for a receiver which, by virtue of its input filter, has an ample margin of selectivity even for the more difficult sort of present-day conditions, and, by avoiding the use of unusual components or methods of construction, to suggest a basis on which existing single-circuit sets that are deficient in selectivity may be rebuilt at small cost.

The general subject of filters has been discussed in this journal at such length that it is quite unnecessary to devote space to theoretical considerations, beyond drawing attention to the fact that conditions are not quite the same as in a simple detector set when the filter is to be succeeded, as in the present case, by a conventional tuned high-frequency coupling, isolated from it by an H.F. valve. In the first case, we must avoid the production of unduly high resonance peaks; otherwise although our object in retaining high notes will have

trary, it is an advantage, as the dip or depression between the peaks is filled up, and something approaching the ideal resonance curve is attained. Attenuation of the lower modulation frequencies in the filter is offset by emphasis of these same frequencies in the H.F. amplifier.

As shown in Fig. 1, the receiver comprises a high-frequency amplifying stage with transformer coupling, a regenerative grid detector, and a single transformer-coupled L.F. magnifier. Medium and long broadcast wavebands are covered. Except for the filter, and one or two other minor details, there are no points in design that call for special comment, but it is necessary to devote a few words to the input volume control, which takes the form of a differential condenser in the aerial circuit.

Without some means of limiting its input signal voltage, a filter may be more or less wasted: its main advantages disappear unless it is possible accurately to tune it (and any circuit in cascade with it) alike to a powerful local station and to the weak signals of a distant transmitter. Under the first-mentioned conditions the detector valve—or even perhaps the H.F. amplifier—may be hopelessly overloaded, unless suitable precautions are taken.

So far as the writer is aware, there is no entirely unobjectionable method of regulating H.F. input. In the present case, a differential aerial condenser is used; this component is arranged so that anti-clockwise rotation of its moving vanes will reduce volume both by loosening aerial coupling and by introducing a partial "short-circuit" across the aerial section of the input coil. At the same time, a reduction in transferred aerial capacity is to some extent compensated for by an increased meshing of the rotor with the earthed stator; compensation is not perfect enough entirely to avoid any

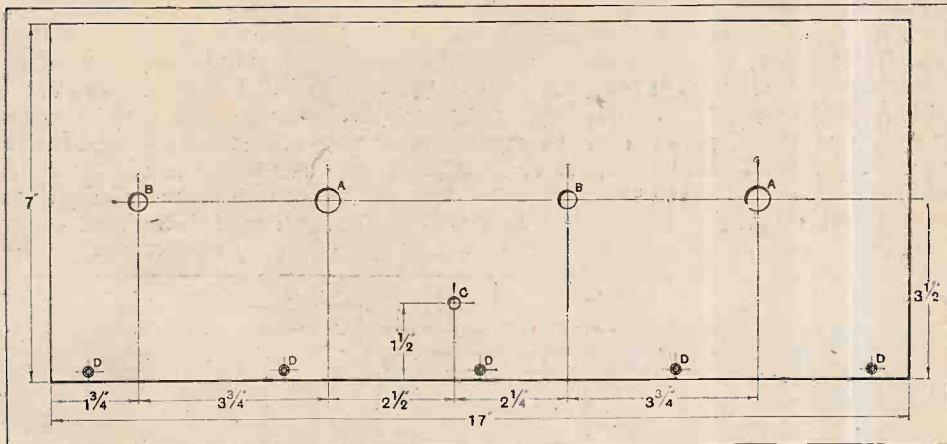
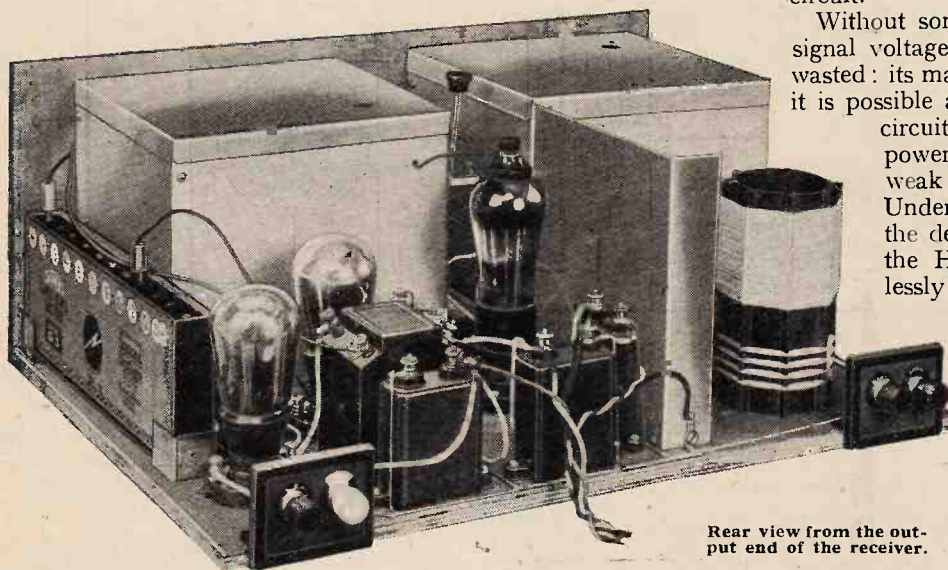


Fig. 2.—Drilling details of the front panel. A, 1/2in. dia.; B, 3/8in. dia.; C, 1/4in. dia.; D, 1/8in. dia., countersunk.



Rear view from the output end of the receiver.

been realised, low notes will be attenuated. In consequence, filter circuits of exceptionally "low loss" characteristics are definitely ruled out.

Where there is, in addition to the filter, another sharply-tuned single-peaked circuit, the presence of clearly defined humps is not a drawback; on the con-

The Band Pass Three—

change of tuning, but it can be made exact at two settings—for example, those corresponding to maximum volume and normal strength from the local station—by judicious adjustment of the shunting capacity value, either by removal of plates from the earthed rotor or by inserting a semi-variable condenser in its earthing lead.

It is hardly possible to dogmatise with regard to the

reception. Incidentally, no attempt is made to get true filter action except on the broadcast band.

Medium-wave coils of the maximum "goodness" consistent with the space available for them have been chosen, and each is wound as part of a unit assembly with its long-wave counterpart. Details of construction are shown in Fig. 4: Redfern 8-ribbed formers of $2\frac{3}{8}$ in. overall diameter, equal to an effective diameter of $2\frac{1}{2}$ in., are used throughout.

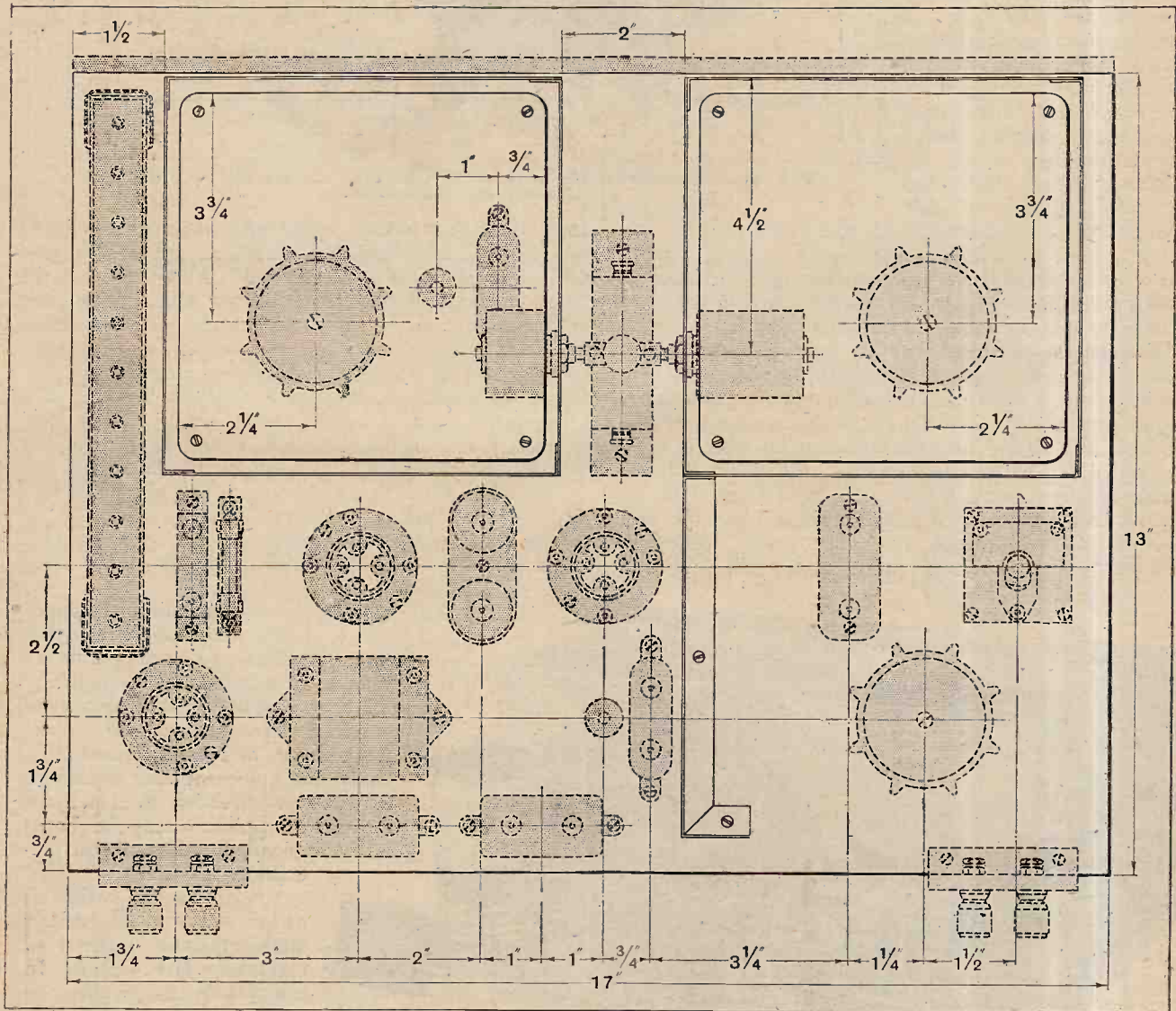


Fig. 3.—Layout of baseboard components.

best value for the filter coupling condenser C_m . A capacity that gives comfortable broadness of tuning at the middle of the broadcast band will tend to produce widely spaced humps at about 500 metres, which is inconvenient, to say the least, and a fairly sharp single peak at the lower extremity—which does not really matter. A capacity of 0.01 mfd. seems to be the best all-round compromise, and is effective for long-wave

The coils L and L_2 and the secondary of the transformer T are similar windings, each with 68 turns of No. 24 gauge wire. To comply with the ideal specification, their winding length should be 2 in., but this cannot normally be done unless a machine is available; double cotton-covered wire takes up too much space, and double silk too little, if wound with adjacent turns touching. To get over this difficulty, triple silk-covered wire was

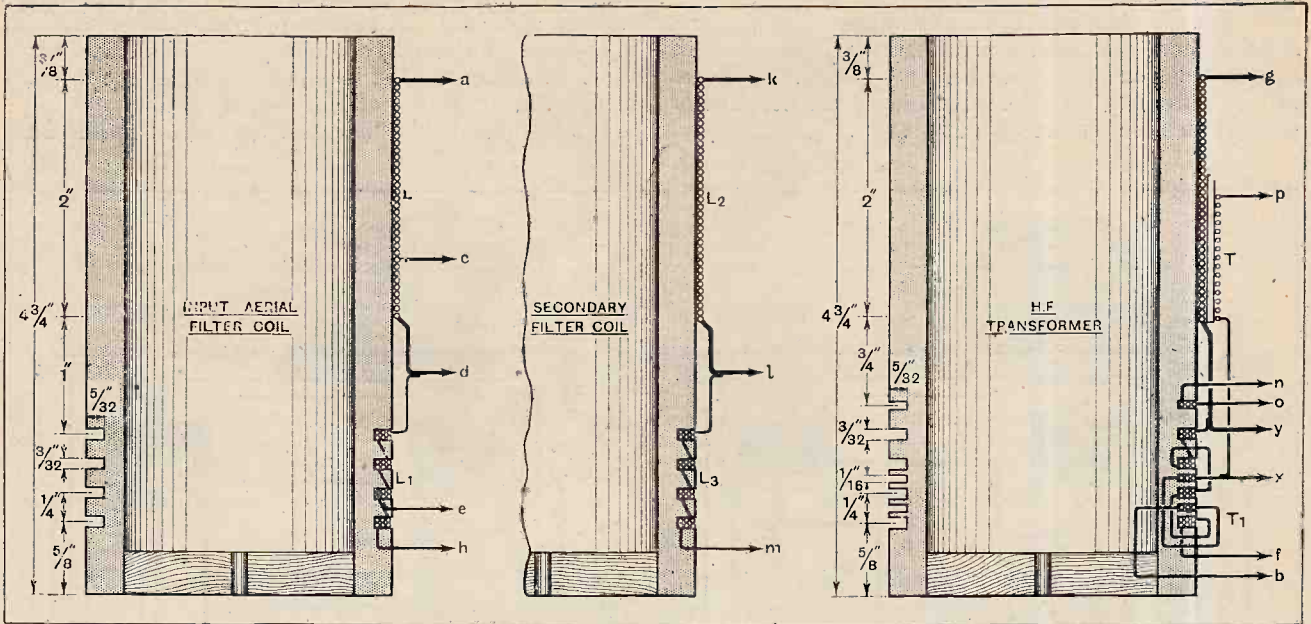


Fig. 4.—Preparation of the coil formers and details of windings. The two sets of filter coils are identical, except that the first is tapped.

obtained from Messrs. P. Ormiston and Sons; this wire winds almost exactly to the right length. There is little reason, however, why double silk-covered wire should not be used, and the resulting slight increase in inductance will be almost negligible, and will in any case only slightly raise the lower limit of the tuning scale. It is important that the filter coils L and L_2 should be wound carefully, with exactly the same number of turns. L is tapped at the 18th turn from its lower end.

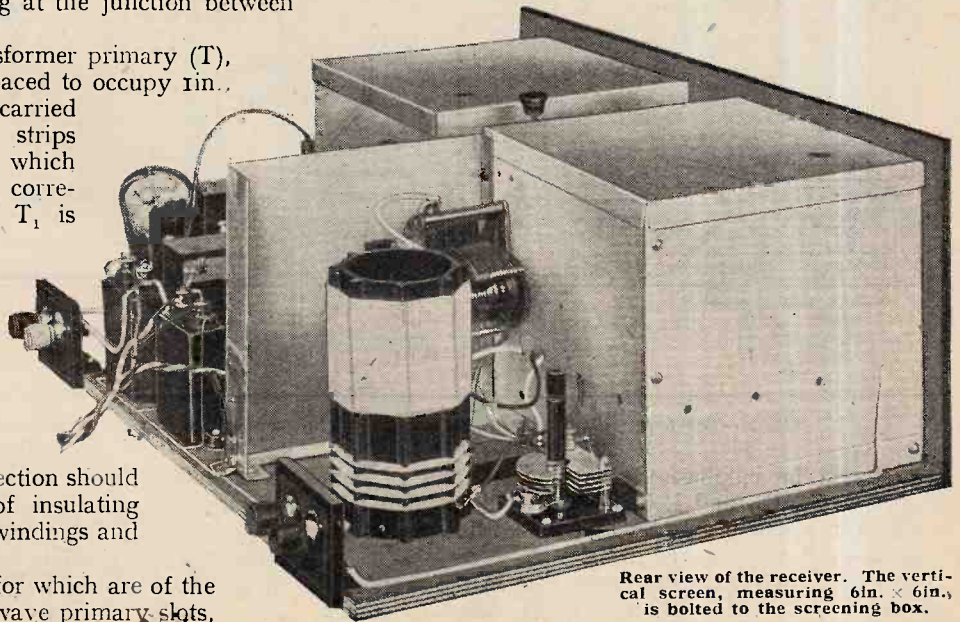
The three tuned long-wave windings, L_1 , L_3 , and the secondary of T_1 , each have a total of 224 turns of No. 34 D.S.C., divided into four sections of 56 turns. The first coil has an aerial tapping at the junction between the two lower sections.

For the medium-wave transformer primary (T), 30 turns of No. 38 D.S.C., spaced to occupy 1 in. are required; this winding is carried on eight grooved spacing strips having a thickness of $\frac{1}{16}$ in., which are laid over the ribs. The corresponding long-wave coil for T_1 is divided into two sections, sandwiched between the second and third, and third and fourth, secondary sections, and each having 50 turns of No. 38 D.S.C. Care must be taken to avoid possible short-circuits at the cross-overs between sections, and each secondary interconnection should be passed under a strip of insulating material slipped between the windings and the body of the former.

The reaction coil, the slots for which are of the same dimensions as the long-wave primary slots,

and are spaced $\frac{1}{4}$ in. from the long-wave secondary, has 40 turns of No. 38 D.S.C. All the coils of each assembly are wound in the same direction, and construction is somewhat simplified by omitting terminals; a sufficient length of wire is left at each of the ends for external connection. The coils are secured in position by screws passing through wooden plugs inserted in their lower ends.

The wave-changing switches are mounted through the sides of the screening boxes in such a way that their spindles may be connected together by a brass sleeve secured by nipping screws and fitted with an operating



Rear view of the receiver. The vertical screen, measuring 6 in. x 6 in., is bolted to the screening box.

The Band Pass Three.—

rod. The use of an elaborate link motion to control these switches from the panel has deliberately been avoided, as it is believed that a number of "ganged" switches will be introduced at Olympia, and so the constructor will have a wider choice than at present.

amplifiers will work satisfactorily with the H.F. transformers described. A general-purpose detector with an impedance of about 20,000 ohms is a safe choice, while the L.F. amplifier must be selected with an eye to one's facilities in the matter of H.T. supply.

It is suggested that the easiest way to set up the filter

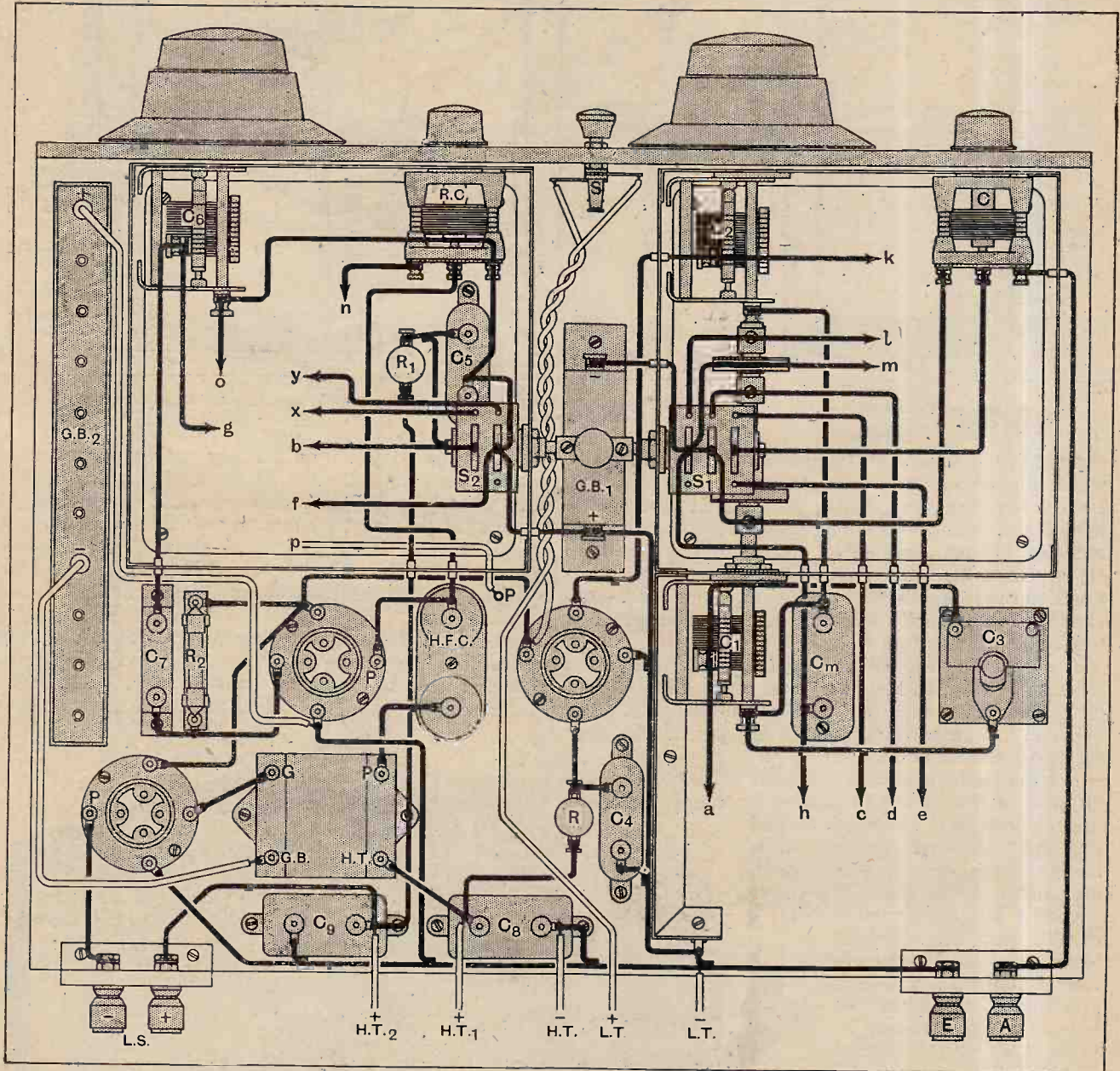


Fig. 5.—The wiring diagram coils are not shown, but connections to their terminal points are indicated.

It should be emphasised that the spindles of condensers C, C₁, C₂, and R.C. should all be insulated by bushes from the screening boxes, but that this precaution is unnecessary with regard to C₆.

This set is not particularly exacting in the matter of valves; any of the better-known S.G. high-frequency

is temporarily to loosen its inter-circuit coupling by connecting an extra condenser of 0.01 mfd. or even more in parallel with C_m, in order to avoid confusing double humps in tuning while adjustments are being made. A milliammeter connected in the detector anode circuit is a great help; indeed, it is almost essential, although

LIST OF PARTS.

- 3 Variable condensers, logarithmic, 0.00035 mfd. (Ormond: Small Log).
- 2 Couplers for ganging (Ormond).
- 2 Slow-motion dials (Ormond).
- 2 Differential condensers, 0.0002 mfd. (Ormond).
- 1 Trimming condenser, 50 mmfd. (Bulgin).
- 2 Fixed condensers, 2 mfd., 400 volt D.C. test (Dubilier).
- 2 Fixed condensers, 0.5 mfd., 400 volt D.C. test (Dubilier).
- 1 Fixed condenser, 0.01 mfd. (Dubilier 610).
- 1 Fixed condenser, 0.0003 mfd. (Dubilier 620).
- 3 Valve holders (Godwinex).
- 1 Grid leak, 2 megohms (Ediswan).
- 1 Grid leak holder (Wearite).
- 2 Decoupling resistances, 600 ohms (Wearite).

- 1 L.F. transformer (Varley Nicore T).
- 1 H.F. choke (Clinax).
- 2 Terminal mounts (Junit).
- 4 Indicating terminals A, E, L.S. + and L.S. - (Clax).
- 1 Grid bias battery, 16½ volts (Siemens).
- 1 Pair grid bias battery clips (Hunt).
- 1 Grid bias cell, 0.9 volts (Siemens).
- 2 Screening boxes, 6½ × 6½ × 6in. (Watnet).
- 1 Push-pull switch (Benjamin).
- 1 Switch, 3-pole double-throw (Wearite Rotary).
- 1 Switch, 2-pole double-throw (Wearite Rotary).
- Wood, sheet aluminium, wire, sleeving, wander plugs, etc.

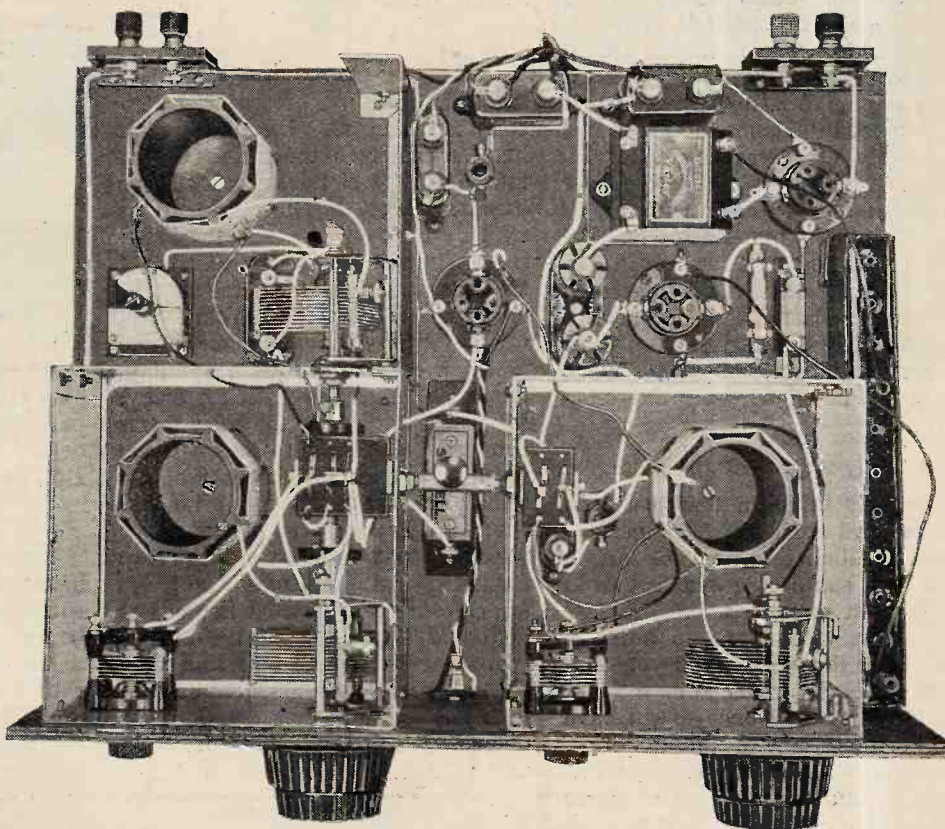
Approximate cost of above parts £7.

In the "List of Parts" included in the descriptions of *THE WIRELESS WORLD* receivers are detailed the components actually used by the designer and illustrated in the photographs of the instruments. Where the designer considers it necessary that particular components should be used in preference to others, these components are mentioned in the article itself. In all other cases the constructor can use his discretion as to the choice of components, provided they are of equal quality to those listed and that he takes into consideration in the dimensions and layout of the set any variations in the size of alternative components he may use.

with patience fair results can be achieved without visual indication of signal strength.

With the ganged condenser rotors in step, a signal on the medium band should be tuned in in the usual way; even though ganging may be imperfect, something should be heard. Then set the trimming condenser so that its vanes are meshed by about 20 degrees, and slack off one of the nipping screws of the flexible couplings so that C_1 may be rotated independently. With the help of a rod of wood or other insulating material, set the rotor of this condenser for maximum response, and then do the same with the secondary tuning condenser C_2 , which is, of course, controlled by its knob in the normal way. Having made sure that both these main condensers are adjusted as closely as possible (it is wise to go from one to the other several times), the flexible coupling between them may be locked by tightening its screw. While making initial adjustments, always choose a station whose wavelength corresponds as nearly as possible to the middle of the tuning scale, replace the screening box cover, and see that the H.F. tuning condenser is accurately set. Lastly, an adjustment should be made with the trimming condenser C_3 , of which the final setting should be marked.

Switching over to the long waves, it should be noted whether it becomes necessary to increase or to decrease trimming condenser capacity in order to get maximum response. If the first, the removal of a few turns of wire



Plan view, showing how the ganged variable condensers are linked by a short length of metal rod and flexible couplings.

from L_3 is indicated; if the second, the inductance of L_1 must be reduced in a similar way. It is best to take off turns from the upper ends of the windings.

This receiver will be available for inspection by readers on "The Wireless World" Stand (No. 4) at the forthcoming National Radio Exhibition, Olympia.

COMPETITION

IN this and the two following numbers of *The Wireless World* there will be found included amongst the advertisement pages an entry form for *The Wireless World* Olympia Show Competition.

This ballot, which is now being conducted for the third time, has established itself as an annual event of considerable interest to our readers, whilst it also provides a very useful guide to wireless manufacturers as to what products appeal most to the intelligent section of the wireless public. The first year that we launched the competition we had no means of forecasting what response we should get from our readers, nor how the idea would be received by the manufacturers. But our readers' interest was soon apparent, and when the competition was repeated last year the number of entries nearly doubled the first year, and so constituted a vote which might be taken as truly representative.

A Truly Representative Vote.

The only criticism that has been put forward against the competition is a suggestion that no vote run on these lines can decide what is best in the opinion of the readers, because the readers themselves—in order to qualify for the prizes—will vote, not for what they consider to be the best but for what they believe will have caught the fancy of the majority. This objection to a competition of this kind is undoubtedly valid where readers are not technical and have no intimate knowledge of the apparatus from which they are making their choice, but we believe that *The Wireless World* readers are in a position to judge apparatus for themselves on its merit, and were every reader to endeavour to fall in with the popular vote the result would still be the same as if the vote were cast entirely upon personal initiative.

The filling up of the entry form included in the advertisement pages

Wireless World OLYMPIA SHOW BALLOT

will not, we think, present any difficulty to the reader when once he has made his choice in the various classes into which we have divided the exhibits. Only one form should be used by each entrant, and the forms should not be sent to us until after the appearance of the issue of *The Wireless World* for Wednesday, October 1st, and should be forwarded to reach us not later than Monday, October 6th. The reason for delaying the forwarding of the entry forms is in order that those readers who are not able to visit the Exhibition personally can have the full benefit of the published reports of the Show which appear in this and the two further special numbers of *The Wireless World*, to be dated September 24th and October 1st. We believe that these issues will be found very helpful to readers in assisting them in their choice, since they deal in some detail with nearly all the representative exhibits on every stand.

Points to Remember.

The competition is exclusively an Olympia ballot, by which we mean that only apparatus on view at the Olympia Show may be included in the votes. We are anxious that competitors should take into account the question of general quality of the product first, but in relation to its cost; for value of the apparatus at the price asked for it should be an important consideration in making a choice.

The ballot is organised on the basis that every reader of *The Wireless World* is entitled to one vote for what he considers to be the outstanding single exhibit of the Show, whether a complete set, a component, or a valve. In order to reduce the possibility of ties, each competitor is required, in addition, to vote for one piece of apparatus in each of the classes into which we have divided the exhibits. Our classification of the exhibits is as follows:—

- (1) Receivers of all types, either mains or battery operated.
- (2) Radio gramophones.
- (3) Batteries of all kinds, including accumulators for both high tension and low tension.
- (4) Mains supply units, both D.C. and A.C.
- (5) Loud speakers of all types.
- (6) Valves.
- (7) Other apparatus not classified above, also amplifiers, component parts such as transformers, condensers, tuning coils, resistances, etc., etc.

The Prizes.

The details of the prizes which are being offered will be found on the entry form. A cash prize of £50 is to be awarded by *The Wireless World* to the competitor whose vote agrees with the opinion of the majority in the selection of the outstanding single exhibit, and also in the largest number of classes. In addition, there will be second, third, fourth and fifth prizes, to the total value of a further £50, in the form of vouchers for the purchase of apparatus.

We are most anxious that our readers should take a personal interest in this competition and make a point of filling in the ballot form and sending it to us. We desire that the result should be as representative as possible, as the importance of the competition to manufacturers as well as to the user must be proportional to the number of votes cast.

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The MAZDA AC/PEN
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Filament amps (max.)	1.0
Anode volts (max.)	250
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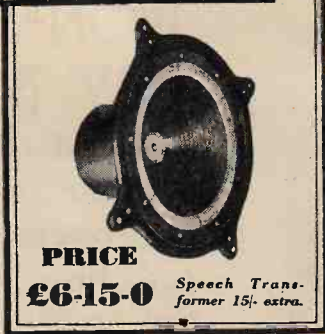
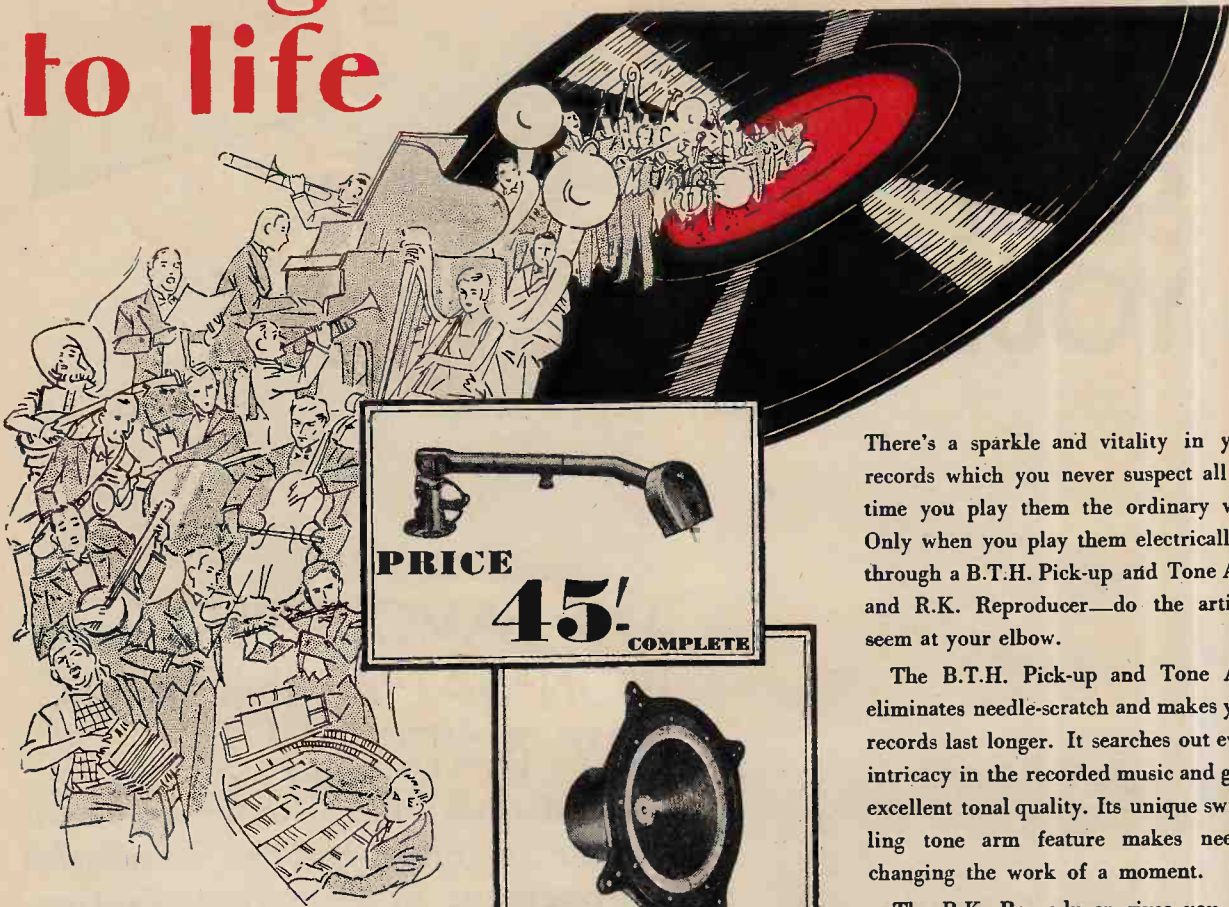
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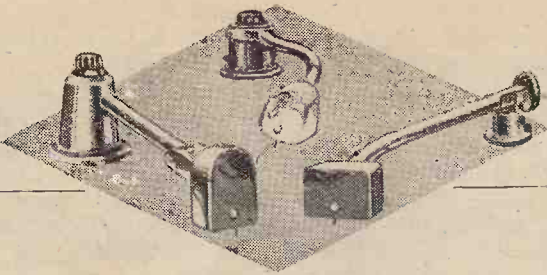
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PICK-UP



DESIGN

Points to Look for in Judging the Merit of Commercial Types.

THE majority of gramophone pick-up units in commercial production at the present time are of the balanced armature electromagnetic type. Needle vibrations are transmitted to a soft-iron or high permeability steel armature situated between the poles of a compact permanent magnet. The variations in magnetic flux caused by the movement of armature generate an alternating E.M.F. in a small pick-up coil or coils surrounding either the pole pieces or the armature itself. The output from this coil is then available for amplification up to any desired volume. In principle the function of the electrical pick-up is, in fact, the exact converse of the balanced armature cone loud speaker movement.

Mechanical Resonances.

The design of every pick-up centres round the mechanical resonances of the armature. Mechanical resonances are inseparable from any vibrating system possessing both mass and restoring force, and the aim of the designer should be to accept the inevitable and, if possible, to turn the resonance to useful purpose. The restoring force is generally rubber, which is introduced to maintain the armature in a central position between the poles and to prevent it from sticking over on either side. In many early designs the mass of the armature was too great in relation to the restoring force, and a nasty resonance appeared right in the middle of the

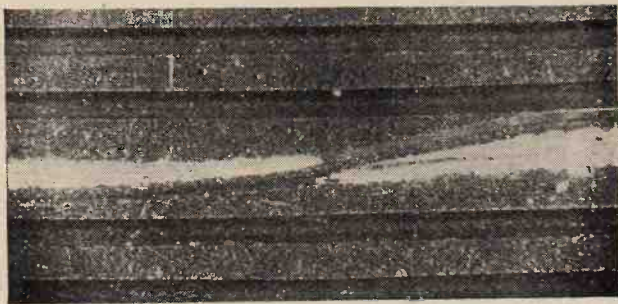


Fig. 1.—Microphotograph showing damage to record grooves due to excessive damping, inadequate needle pressure or incorrect alignment.

frequency range. In other cases the reed was too flexible and produced a whole series of resonances by taking up different modes of vibration at various well-defined frequencies. To overcome these difficulties increased damping was frequently employed. This resulted in undue

stiffness of movement in the reed, and the needle jumped the groove during loud passages.

Fig. 1 is a microphotograph of a "cross-over" from one groove into the next due to excessive stiffness in the reed and/or inadequate needle pressure. The effects of



Fig. 2.—Correct needle-track alignment for practical purpose is obtained by setting the pick-up at an angle to the tone arm. The angle A is determined by the distances a and c.

excessive damping could be overcome by increasing the weight of the pick-up and arm, but the limit to this method is set by the resistance to abrasion of the record; even with a well-designed pick-up the pressure at the needle point, assuming a weight of 5 oz. for the pick-up, is 20 tons per square inch when commencing to play.

While on the subject of record wear, the importance of good needle-track alignment should not be overlooked. Various designs with link motions arranged to keep the plane of the needle tangential to the groove have appeared from time to time, but sufficiently accurate alignment for practical purposes is obtained by the simple expedient of setting the pick-up at an angle to the tone arm as shown in Fig. 2. By maintaining the correct relationship between the tone arm angle A, the distance between needle and tone arm pivot (c), and the position of the tone arm pivot in relation to the centre of the record (a), it is possible to reduce tracking errors to within 2 deg. throughout the playing of a 12in. record.¹

¹ For a full discussion of the geometry of this method see *The Wireless World*, page 132, August 7th, 1929 and page 339, March 26th, 1930.

Pick-up Design.—

To return to the primary cause of record wear, viz., excessive damping and stiffness of the reed, if the damping is reduced the reed resonance at once resumes importance. One thing is certain, it must not be allowed to remain in the band of fundamental frequencies commonly used in music, i.e., 50 to 3,500-cycles. To reduce it to 50 cycles or less is impracticable, so the designer's aim should be to raise it above 3,500 cycles. This is quite practicable, and is brought about by reducing the dimensions and weight of the armature to very small proportions. In one or two notable examples the limit is reached by utilising the needle itself as the armature, but it is not absolutely necessary to go to this extreme in order to achieve the desired result; there are several instances of pick-ups with small armatures whose resonance lies above 3,500 cycles. Indeed, it is possible, by reducing the weight too far in relation to the restoring force supplied by the rubber packing, to produce too high a resonance. This would have the effect of enhancing record scratch which contains a large percentage of frequencies in the neighbourhood of 6,000-8,000 cycles.

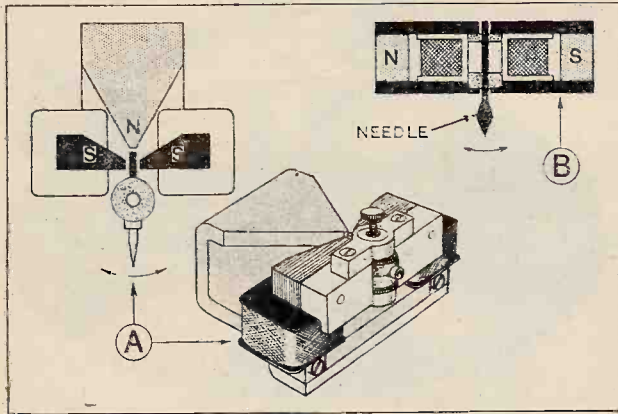


Fig. 3.—An armature of small dimensions is a characteristic of most successful pick-ups. The examples illustrated are (A) Marconiphone and (B) Lissen, in which the needle itself forms the armature.

In general, a resonance lying between 3,500 and 6,000 cycles should be aimed at with 4,500 cycles as an optimum value.

Amplitude Distortion.

Pick-ups with a high-frequency resonance generally behave well in the middle register, giving a sensibly straight characteristic. In most cases, however, from approximately 250 cycles downwards, the output rises considerably above the normal. This is due to the fact that the increased amplitude of the lower frequencies brings the armature nearer to the pole pieces in the course of its travel, producing a relatively greater change of flux, and, consequently, a greater voltage output. It is an axiom of acoustic science that for a given sound energy the amplitude varies inversely as the frequency, i.e., high notes have small amplitude and low notes large. To maintain this relationship on a record groove would require records of several feet in diameter on the basis of the amplitude at present allowed for frequencies above 250 cycles. Hence, to keep the vibrations within the

standard groove pitch the amplitudes below 200 cycles have to be deliberately curtailed. Thus the amplitude distortion exhibited by most pick-ups below 250 cycles is providential, as it tends to compensate for deficiencies in recording.

The degree of amplitude distortion is to some extent under the control of the designer, and can be varied by adjusting the air gaps in the magnet system. In some cases the rate of increase is inadequate, and it becomes necessary to use one of the tone-compensating units which have recently appeared on the market.

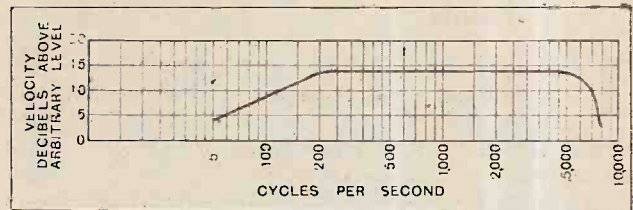


Fig. 4.—Curve showing the restriction in amplitude of frequencies below 200 cycles necessitated by limitations in the pitch of the record groove.

The efforts of the designer to obtain adequate high-note response can be easily brought to nought by unintelligent use of volume controls. A potentiometer arrangement should invariably be used, and the maker's recommendations as to the total resistance of the potentiometer strictly observed. The effect on the higher frequencies of using a shunt resistance of too low a value was discussed in detail in the issue of this journal for December 25th, 1929. Another factor tending to curtail high frequencies is the use of too flexible a needle. Here again the maker's recommendation is worth while following.

Finally, there is the question of sensitivity. Any modifications which the designer may wish to make with the object of improving the form of the characteristic must not be made at the expense of the general level of the voltage output. To allow for the inclusion of a volume control and to make it suitable for use with existing amplifiers and receiving sets, the average output should be about 1.0 volt R.M.S., but a pick-up may be regarded as satisfactory in this respect if this figure lies between 0.5 and 1.5 volts.

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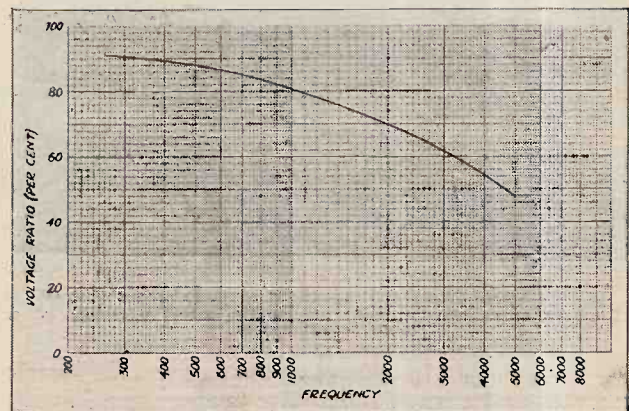



Fig. 5.—Experimental curve showing high-note loss due to a 10,000-ohm volume control used with a 0.6 henry pick-up. In general the resistance should be not less than 100,000 ohms; 0.25 megohm is a convenient value.

CURRENT TOPICS



Events of the Week in Brief Review.

RADIO FOR CITY OF LONDON POLICE.

The City of London Police will, we understand, possess their first wireless transmitting and receiving plant when the new headquarters in Old Jewry, E.C., are opened early in the New Year. The wireless section will work in close touch with the Metropolitan Police Headquarters at Scotland Yard.

BOOM IN GERMAN SCHOOL RADIO.

Four hundred schools in Russia will shortly be equipped with broadcast receiving apparatus, according to the plans of the German Union of School Radio. More than 8,000 teachers are members of the Union, which has already introduced wireless lessons to many schools in Westphalia and Silesia.

ECONOMY AT CORK.

Reasons of economy, according to the *Irish Radio News*, are responsible for some drastic reductions and alterations which will shortly take place in the internal organisation of the Cork broadcasting station. Although there is no fear that 6CK will have to close down, it will shortly abandon the majority of its local programmes and will relay the transmissions of Dublin.

THE ALGERIAN AMATEUR.

Wireless amateurs in flowing robes are now a common sight in Algeria, writes a correspondent, who reports that a radio boom has started in the country through the success of the new station, *Radio Algiers*. Unfortunately, this 13 kW. transmitter is not easily heard in England, as its wavelength (363 metres) is too near to that of London Regional.

CUTTING OUT THE "BLURB."

Dr. Lee de Forest's latest production is a photo-electrically-operated relay whereby the receiver can be switched off or on with a flashlight beam. The device comes at an appropriate moment, according to the *Christian Science Monitor*, which welcomes it as a means of cutting out the advertising "blurb" in the loud speaker immediately it starts. The time may come when "advertisement potting" will become a fashionable drawing-room pastime, especially if the flash lamp is shaped like a revolver.

What is now wanted is a device indicating when the "blurb" has ceased.

NAPLES IN TROUBLE.

Can you think of a snappy interval signal? If so, you may still be in time to win the competition organised by *Radio Napoli* in its quest for a better signal. Apparently listeners are weary of the present call: sixteen notes on a shepherd's flute.

BROADCASTING A BATTLE.

To commemorate the tenth anniversary of the invasion of Poland by the Bolshevik army, *Polskie-Radio* recently staged a representation of the battle of



THE WIRELESS LINK. A feature of the recent army manoeuvres in the Irish Free State was close co-operation between land forces and aircraft. The photograph shows an army signal van and wireless-equipped aeroplane.

Radzymin, 10 miles from Warsaw (writes a correspondent). Microphones were taken to the Rembertow manoeuvring ground, and, with the aid of artillery, rifles and bombs lent by the military authorities, listeners were regaled with all the thrills of the engagement.

SHORT-WAVE STATION FOR LEAGUE.

The terms of a contract for the construction near Geneva for the League of Nations of short-wave transmitting and receiving stations, including eventually a wireless telephone station, have been

agreed upon between Marconi's Wireless Telegraph Company and the subsidiary company, the International Standard Electric Corporation, the *Compagnie Générale de Télégraphie sans Fil* (France), the *Telefunken Company* (Germany), and *Messrs. Philips Lamps Company* (Holland), says *The Times*. The terms of the contract will now be submitted to the Secretary-General of the League.

RADIO IN BRITTANY.

Autumn holiday makers in Brittany will have an opportunity of studying French wireless apparatus at the Lorient Fair, to be held from September 27th to October 6th. The radio section will be an important feature.

FOR SICK SETS.

Within a week of the launching of their set maintenance scheme, the Radio Association received 10,000 enquiries from different parts of the country. The Association's head office is at 22 and 23, Laurence Pountney Lane, London, E.C.4.

ANTICIPATORY RECEPTION.

The reception of wireless echoes becomes insignificant when compared with the opposite kind of feat credited to an amateur of Marseilles, a town famed for its "tall stories." According to our Paris correspondent, the Marseilles enthusiast achieved anticipatory reception the other evening. He claims to have picked up Strasburg-Brumath, which will begin functioning in the near future.

RADIO ON ITALIAN TRAINS.

The successful introduction of broadcast receivers on German and French trains has attracted the attention of Italian railway officials, and experiments are shortly to be conducted on the Milan-Turin route. The receiver will be in the care of the guard, who will issue headphones to passengers on payment of a small fee.

A GRAMOPHONE PIONEER.

The Gramophone Company, Ltd., announces the election of Mr. Alfred Clark as chairman in succession to Mr. E. Trevor L. Williams.

Mr. Clark joined the Gramophone Company over thirty years ago. His early technical experience was gained through his association with the experimental work carried on by the late Dr. Emile Berliner, the inventor of the gramophone.

The 1930-31



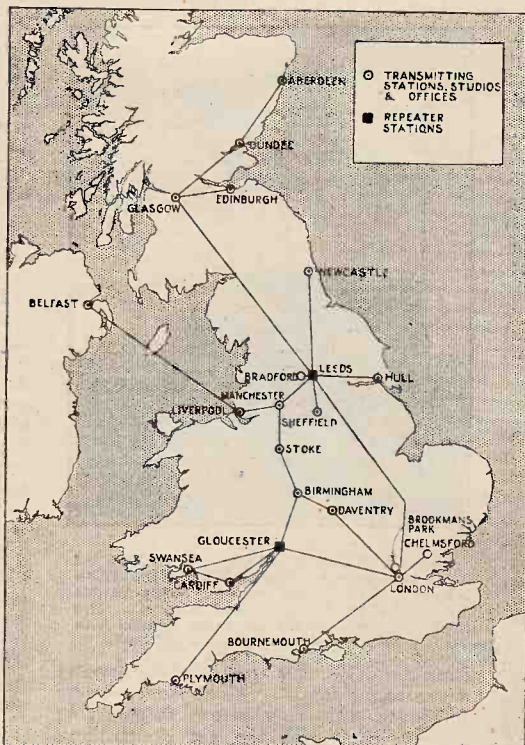
Model

SETS WE WANT TO SEE.

"ALL-ELECTRIC" is an alluring adjective, be it applied to a modern dwelling obtainable for £30 down or a modern wireless set for 30s. down. This is to be an "all-electric" season, regardless of the fact that less than 30 per cent. of the population have access to an electric supply. When we visit the exhibition we shall see the outcome of a mass effort in the making of mains sets in that almost every exhibitor has followed the same line of development. To this vogue they may have been led by recent improvements in indirectly heated valves, the successful performance of the few mains sets which appeared last season, recent tendencies in American designs, and a radio journal that has been responsible for coining such terms as "decoupling," "free grid bias," "residual S.G. valve capacity," "power output," and "band pass." There are those listeners who are not prepared to pay the price necessary to escape B.B.C. programmes, and local station reception with reasonably good quality is their aim. Assuming that the distance from the broadcasting station does not exceed fifty miles and that a good outdoor aerial is to be used, generally speaking the two-valve set will meet their needs. Single-dial tuning and reaction control will render the set easy to operate, and its circuit will be that of a leaky grid detector, followed by a transformer coupling and output stage. It should tune to both wave ranges so as to permit of the reception of the long-wave Daventry, and enquiry might be made as to the number of degrees interval on the tuning dial between the National and Regional London programmes when used at a distance

of, say, twelve miles from the station. Ability to receive 5XX satisfactorily at a distance of 100 miles without hearing the local broadcast band station is a good check on the overall performance of the set, and some assurance on this point should be expected. While some may turn their criticism to the merits of the intervalve transformer fitted, too much must not be expected if the price is low, particularly as considerable liberties can be taken

in the make-up of an intervalve transformer following a leaky grid detector valve. In battery sets there is always doubt as to whether to adopt 2-4- or 6-volt valves, and while the 6-volt detectors are little better than those with 2-volt filaments, the 6-volt L.F. valves usually give greater output. Quality of reception is largely a matter of output - valve performance, which is, in turn, related to both L.T. and H.T. consumption. Ask the power output in milliwatts, or note the type of valve used and seek the information from the valve manufacturers. This figure should not be less than 250, and indicates quality of reception rather than quantity. In really up-to-date two-valve sets of medium price, and arranged for all A.C. mains working, one may expect to find such features as power grid detection, a generous power output valve, and filter feed to the loud speaker terminals. This method of detection will handle powerful signals with a minimum of distortion, and is evidenced in the set by the fact that the grid leak bridges the grid condenser, the values of these components being of the order of 0.5 megohm and 0.001 mfd., while the suitability of the valve used might be endorsed by the valve maker. In such a set we may find



It is surprising how few listeners are acquainted with the distribution of broadcasting by the B.B.C. The map shows the present locations of the stations and the arrangement of the interconnecting lines.

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In addition to those visiting the exhibition intent on collecting a handbag of printed matter there may be a few who will courageously disclose that they are interested in buying a set, and to the small percentage of those who are perhaps less well informed on the technicalities of the sets shown than the manufacturers who offer them these brief guiding notes are humbly offered.

a resistance-fed intervalve transformer which brings about the desirable condition of avoiding the passing of heavy current through the transformer primary. The voltage on the anode of a power grid detector should not drop much below the rated 150. This demands an initially high output potential from the rectifier, and permits at the same time of the use of a really good output valve. One can be forgiven for observing here, perhaps, that the mains-operated wireless set entails less risks as regards fire or shock than any other mains-operated domestic appliance. The reason for this is that the voltages produced in the set are safe, while there is no direct contact with the mains once the transformer primary has been passed.

Sets of the popular type, and fitted with two L.F. stages, no longer exist, owing to the considerable improvement which has been made in valves. Of three-valve sets we seek all the features of the simple "twos," with the addition of an H.F. stage. In circuit there is no departure from the screen valve, with its associated tuned grid or tuned transformer-coupled H.F. stage. Performance varies considerably in various sets, but the invariable inclusion of reaction, when properly applied, goes a long way to bring them all up to a common level. As these sets are not used so much for foreign station listening as "fours," their application is that of compensating for bad aerial conditions, excessive distance from a broadcasting station, as well as an aid to better selectivity. We therefore seek definite data on range and selectivity in addition to details of the method of detection and power output already mentioned. The merits of the H.F. valve fitted, the efficiency of the coils—and some makers are able to give figures in this respect—and the completeness of the screening afford good clues on the merits of the design. Tuning may be by one or two dials, although in the former case an aerial trimmer helps to get the last ounce out of the set.

Four-valve sets are for long-range reception, and we now enter the declining class of portables. In the days before all-electric sets the portable almost reigned supreme among the non-technical listeners. They were not prepared to place improved performance, particularly

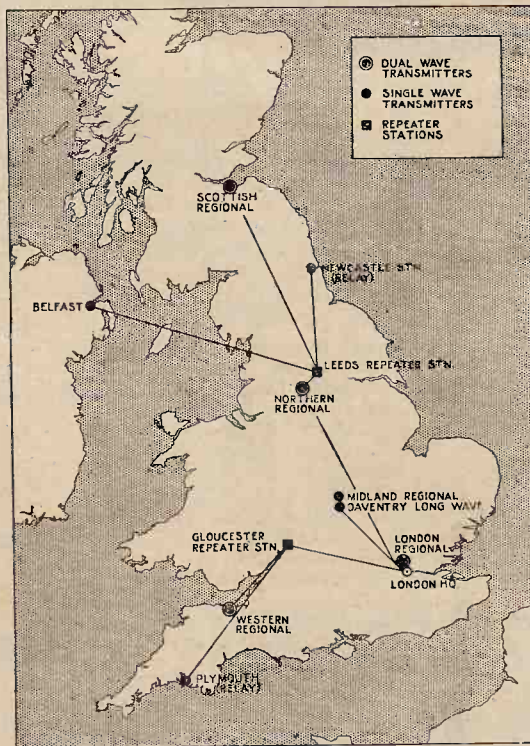
in the matter of quality, against what, to them, was the eyesore of batteries, trailing leads, and inability to move the set. Assuming that a portable is only for indoor use, we can now turn our attention to greatly improved models which are mains-operated. By this means the available voltages are no longer restricted, and the cost of running is reduced a hundredfold. There is, however, little demarcation now between the modern type of all-mains set and the portables and transportables, the only distinction being that the latter are usually fitted with loud speaker.

Good continental reception necessitates a four-valve set fitted with two screen-grid H.F. valves and arranged, preferably, for connection to a small outdoor aerial. It is in sets of this class that the majority of the interesting new designs are to be found. Single-dial control with aerial trimmer seems to have been followed by most designers, while we note also the adoption of coils and valves under cylindrical containers in order to render screening as effective as possible. A good set of this kind, where the H.F. amplification is high, does not need the fitting of a reaction condenser, although the means adopted for volume control, if associated, as it should be, with the H.F. stages, does, incidentally, regulate the inherent reaction, thus rendering the set exceedingly sensitive. Ability to receive no fewer than twenty stations may be expected, and information as to the amount of tuning scale occupied by the nearby broadcasting station might be sought.

If more technically interested the components might be more carefully scrutinised, and, apart from general beauty of finish, the majority of the sets will bear the closest investigation in the matter of circuit principle. Apart from screening, see that the feed circuits, both H.T. and grid bias, are adequately separated by decoupling feed resistances and condensers. By this means only is considerable H.F. amplification possible before oscillation sets in.

Note the maximum anode voltage, if obtained from an eliminator, and from enquiry as

to the value of the feed resistances, and knowing the average anode current of the valves, you can see that, in any case, you may reasonably expect to be given details of the circuit which, to the expert, is the only clue to performance and the value given.



Station distribution is being slowly modified to the Regional scheme, which includes four dual wave transmitters serving the London, Western, North and Scottish areas.

Exhibitors at Olympia

- A**DEY Radio, Ltd., (261)
99, Mortimer St., Regent St., W.1.
- Amalgamated Press, Ltd., (5)
The Fleetway House, Farringdon St., E.C.4.
- Arding & Hobbs, Ltd., (262)
Clapham Junction, S.W.11.
- Atalanta, (232)
1-3, Brixton Rd., S.W.9.
- Automatic Coil Winder & Elec. Equipment Co., Ltd. (107)
Winder House, Douglas St., S.W.1.
- B**AIRD Television, Ltd., (216)
133, Long Acre, W.C.2.
- Bakelite, Ltd. (255)
68, Victoria St., S.W.1.
- Baker's Selhurst Radio, (137)
89, Selhurst Rd., S. Norwood, S.E.25.
- Beaver Electrical Supply Co., (206)
5, Great Chapel St., W.1.
- Bel-Canto Radio, Ltd., (264)
Warple Way, The Vale, Acton, W.3.
- Belling & Lee, Ltd., (134)
Queensway Works, Ponders End, Middlesex.
- Benjamin Electric, Ltd., (115)
Brantwood Works, Tariff Rd., Tottenham, N.17.
- Bernard Jones Publications, Ltd., (1)
58, Fetter Lane, E.C.4.
- Bird, Sydney S., & Sons, Ltd., (73)
Sarnesfield Rd., Enfield Town, Middx.
- Birkbys, Ltd., (245)
Liversedge, Yorks.
- British Broadcasting Corporation, (220)
Savoy Hill, W.C.2.
- British Ebonite Co., Ltd., (253)
Nightingale Rd., Hanwell, W.7.
- British General Mfg. Co., Ltd., (59)
Brockley Works, Brockley, S.E.4.
- British Radiophone, Ltd., (223)
Aldwych House, Aldwych, W.C.2.
- Brown Bros., Ltd., (17)
Great Eastern St., E.C.2.
- Brown, Ltd., S. G., (78)
Western Av., North Acton, W.3.
- Brownie Wireless Co. of Gt. Britain, Ltd., (102)
Nelson Street Works, Mornington Crescent, N.W.1.
- Bulgin & Co., A. F., (103)
9-11, Cursitor St., Chancery Lane, E.C.4.
- Bullphone, Ltd., (33)
38, Holywell Lane, E.C.2.
- Burndep Wireless (1928), Ltd., (155)
Eastnor House, Blackheath, S.E.3.
- Burne-Jones & Co., Ltd., (121)
288, Borough High St., S.E.1.
- Burton, C. F. & H., (44)
Progress Works, Bernard St., Walsall.
- British Blue Spot Co., Ltd., (217)
94-96, Rosoman St., Rosebery Ave., E.C.1.
- C**ADISCH, R., & Sons, (259)
5 & 6, Red Lion Sq., W.C.1.
- Carrington Mfg. Co., Ltd., (140)
24, Hatton Garden, E.C.1.
- Catesbys, Ltd., (260)
Tottenham Court Rd., W.1.
- Celestion, Ltd., (53)
London Rd., Kingston-on-Thames.
- Chloride Electrical Storage Co., Ltd., (54)
217-229, Shaftesbury Av., W.C.1.
- Clark & Moir, Ltd., (205)
147-149, Newington Causeway, S.E.1.
- Clarke, H., & Co. (Manchester), Ltd., (211)
Atlas Works, Eastnor St., Old Trafford, Manchester.
- Classic Radio & Gramophone Co., Ltd., (113)
25, Eccleston St., S.W.1.
- Climax Radio Electric, Ltd., (27)
Haverstock Works, Parkhill Rd., Hampstead, N.W.3.
- Cole, E. K., Ltd., (48)
Ekco Works, Southend-on-Sea.
- Columbia Graphophone Co., Ltd., (71)
92, Clerkenwell Rd., E.C.1.
- Colvern, Ltd., (45)
Mawneys Rd., Romford, Essex.
- Concordia Elec. Wire Co., Ltd., (209)
New Sawley, nr. Nottingham.
- Cossor, A. C., Ltd., (52)
Cossor House, Highbury Grove, N.5.
- D**.X. Coils, Ltd., (237)
542, Kingsland Rd., E.8.
- Danipad Rubber Co., Ltd., (208)
5-7, Market St., Finsbury, E.C.2.
- Darwins, Ltd., (254)
Fitzwilliam Works, Sheffield.
- Dayzite, Ltd., (25)
19, Lisle St., W.C.2.
- De la Rue & Co., Ltd., Thos., (128)
90, Shernhall St., Walthamstow, E.17.
- Dew, A. J., & Co., (15)
33-34, Rathbone Pl., Oxford St., W.1.
- Dibben, Wm., & Sons, Ltd., (11)
Antelope Bldgs., St. Mary's Rd., Southampton.
- Donotone (Regd.) Loud Speaker, (139)
40, Furnival St., E.C.4.
- Downing, John S., & Sons, Ltd., (210)
Crown Works, Commercial St., Birmingham.
- Dubilier Condenser Co. (1925), Ltd., (50)
Ducon Works, Victoria Rd., N. Acton, W.3.
- Dulcetto-Polyphon, Ltd., (24)
2-3, Newman St., W.1.
- Dunhams, Ltd., (2)
Bellerophon Works, New Wharf Rd., N.1.
- Dyson & Co., Ltd., J., (104)
5, Godwin St., Bradford.
- E**AGLE Engineering Co., Ltd., (43)
Eagle Works, Warwick.
- Eastick, J. J., & Sons, (256)
118, Bunhill Row, E.C.1.
- East London Rubber Co., (20)
Great Eastern St., E.C.2.
- Econasign Co., Ltd., (250)
137, Victoria St., S.W.1.
- Edison Bell, Ltd., (23)
Glengall Rd., S.E.15.
- Edison Swan Electric Co., Ltd., (67)
1a, Newman St., W.1.
- Electrical & Radio Products, Ltd., (37)
Aeonic Works, Horley, Surrey.
- Ensign, Ltd., (10)
88, High Holborn, W.C.1.
- Epoch Radio Manufacturing Co., Ltd., (203)
3, Farringdon Av., E.C.4.
- Ever Ready Co. (G.B.), Ltd., (49)
Hercules Place, Holloway, N.7.
- F**ALK Stadelmann & Co., Ltd., (119)
83-93, Farringdon Rd., E.C.1.
- Ferranti, Ltd., (47)
Hollinwood, Lanes.
- Flinders (Wholesale), Ltd., (22)
East Stockwell St., Colchester.
- Formo Co., (72)
23, Golden Sq., Piccadilly Circus, W.1.
- Fuller Accumulator Co. (221 & 265)
(1926), Ltd., Woodland Works, Chadwell Heath.
- G**AMAGE, Ltd., A. W., (244)
Holborn, E.C.1.
- Gambrell Radio, Ltd., (105)
Buckingham House, Buckingham St., W.C.2.
- Garnett, Whiteley & Co., Ltd., (30)
Mill Lane, Old Swan, Liverpool.
- Garrard Engineering & Mfg. Co., (256)
17, Grafton St., W.1.
- General Electric Co., Ltd., (46 & 68)
Magnet House, Kingsway, W.C.2.
- Graham Amplion, Ltd., (62)
25-26, Savile Row, Regent St., W.1.
- Graham Farish, Ltd., (76 & 108)
Masons Hill, Bromley, Kent.
- Gripso Co., The, (202)
32, Victoria St., S.W.1.
- Grosvenor Electric Batteries, Ltd., (263)
2-3, White St., Moorgate, E.C.2.
- H**.S.P. Wireless Co., (122)
Langford Works, Weston-super-Mare.
- Halcyon Wireless Co., Ltd., (144)
27a, Pembridge Villas, Notting Hill Gate, W.11.
- Harlie Bros. (Edmonton), Ltd., (147)
Ballham Rd., Lower Edmonton, N.9.
- Henderson Wireless & Electrical Service, (231)
54, Queen's Rd., Brighton.
- Hobday Bros., Ltd., (13)
21, Great Eastern St., E.C.2.
- Hunt, A. H., Ltd., (155)
H.A.H. Works, Tunstall Rd., Croydon.
- Hustler, Simpson & Webb, (247)
55-7, Tanner St., Bermondsey, S.E.1.
- Hillman Bros., (18)
123, Albion St., Leeds.
- I**GRANIC Electric Co., Ltd., (240)
147, Queen Victoria St., E.C.4.
- Iliffe & Sons Ltd. ("The Wireless World"), (4)
Dorset House, Tudor St., E.C.4.
- Itonia Gramophones, Ltd., (21)
53, City Rd., London, E.C.1.

- Exhibitors at Olympia.—**
- JACKSON Bros.**, (63)
72, St. Thomas St., S.E.1.
- Jewel-Pen Co., Ltd.**, (138)
21-22, Great Sutton St., E.C.1.
- Johnson & Bolson, Ltd.**, (142)
Carlisle Works, Carlisle St., S.E.1.
- Junit Mfg. Co., Ltd.**, (65)
2, Ravenscourt Sq., W.6.
- KALISKY (Aldgate), Ltd., S.**, (23)
75, Aldgate High St., E.1.
- Kolster-Brandes, Ltd.**, (55)
Cray Works, Sidcup, Kent.
- L.E.S. Distributors, Ltd.**, (16)
9, St. Martin's St., Leicester Sq., W.C.2.
- Lamplugh, S. A., Ltd.**, (124)
King's Rd., Tysley, Birmingham.
- Lectro-Linx, Ltd.**, (131)
254, Vauxhall Bridge Rd., S.W.1.
- Lever (Trix), Ltd., E. J.**, (249)
8-9, Clerkenwell Green, E.C.1.
- Lissen, Ltd.**, (40)
Worpole Rd., Isleworth, Middlesex.
- Lithanode Co., Ltd.**, (135)
190, Queen's Rd., Battersea, S.W.8.
- Lock, W. & T., Ltd.**, (132)
St. Peter's Works, Bath.
- Loewe Radio Co., Ltd.**, (207)
4, Fountayne Rd., Tottenham, N.15.
- London Electric Wire Co. & Smiths, Ltd.**, (41)
7, Playhouse Yard, Golden Lane, E.C.1.
- "Loud Speaker" Co., Ltd.**, (214)
Palmer Works, 2, Palmer St., S.W.1.
- MAINTEN Mfg. Co., Ltd.**, (219)
22, Gray's Inn Rd., W.C.1.
- M.P.A. Wireless (1930) Ltd.**, (213)
62, Conduit St., W.1.
- M-L Magneto Syndicate, Ltd.**, (222)
Victoria Works, Coventry.
- McMichael, Ltd., L.**, (57)
Wexham Rd., Slough, Bucks.
- Manufacturers Accessories Co. (1928), Ltd.**, (201)
85, Great Eastern St., E.C.2.
- Marconiphone Co., Ltd.**, (38 & 120)
210, Tottenham Court Rd., W.1.
- Matchless Radio Mfg. Co.**, (246)
105, Great Eastern St., E.C.2.
- Mayfair Enterprises, Ltd.**, (212)
5-6, Cork St., Bond St., W.1.
- Montague Radio Inventions & Development Co., Ltd.**, (145)
Beethoven Works, Great College St., Camden Town, N.W.1.
- Mullard Wireless Service Co., Ltd.**, (36 & 101)
Mullard House, Charing Cross Rd., W.C.2.
- Murphy Radio, Ltd.**, (252)
Broadwater Rd., Welwyn Garden City, Herts.
- NATIONAL Accumulator Co., Ltd.**, (39)
50, Grosvenor Gardens, S.W.1.
- New London Electron Works, Ltd.**, (34)
East Ham, E.6.
- OLDHAM & Son, Ltd.**, (64)
Denton, Manchester.
- Ormond Engineering Co., Ltd.**, (75)
Ormond House, Rosebery Av., E.C.2.
- Osborn, Chas. A.**, (25E)
Regent Works, Arlington St., New North Road, N.1.
- P.R. Products**, (224)
P.R. House, Newgate St., E.C.1.
- Pandona, Ltd.**, (218)
184, Aston Rd., Birmingham.
- Paroussi, E.**, (227)
10, Featherstone Bldgs, W.C.1.
- Partridge & Mee, Ltd.**, (248)
74, New Oxford St., W.C.1.
- Partridge, Wilson & Co.**, (251)
217a, Loughborough Rd., Leicester.
- Perfectavox, Ltd.**, (241)
Alexandra Works, High St., Yeadon, nr. Leeds.
- Pertris, Ltd.**, (243)
233, Shaftsbury Av., W.C.2.
- Peto-Scott Co., Ltd.**, (110)
77, City Rd., E.C.1.
- Pioneer Manufacturing Co.**, (226)
Cromwell House, Fulwood Place, W.C.1.
- Pye Radio, Ltd.**, (31 & 32)
Faris House, Oxford Circus, W.1.
- QUEST Radio Mfg. Co.**, (238)
41, Newcomen St., S.E.1.
- RADIO Gramophone Development Co.**, (126)
72, Moor St., Birmingham.
- Radio Instruments, Ltd.**, (61)
Purley Way, Croydon.
- Radio Loud Speakers, Ltd.**, (228A)
Cranmer Works, Cranmer Court, High St., Clapham, S.W.4.
- Radio Service (London), Ltd.**, (235)
105, Torriono Av., Camden Town, N.W.5.
- Radio Society of Gt. Britain**, (229)
53, Victoria St., S.W.1.
- Redfern's Rubber Works, Ltd.**, (204)
Dawson St., Hyde, Cheshire.
- Red Star Radio, Ltd.**, (109)
Aston Rd., Birmingham.
- Rees Mace Mfg. Co., Ltd.**, (117)
39a, Welbeck St., W.1.
- Regent Radio Supply Co.**, (51)
21, Bartlett's Bldgs., E.C.4.
- Ridged Cone Co., Ltd.**, (112)
York House, Southampton Row, W.C.1.
- Rolls Caydon Sales**, (237A)
77, Rochester Row, S.W.1.
- Rolls Radio, Ltd.**, (35)
138, St. John St., Clerkenwell, E.C.1.
- SELECTORS, Ltd.**, (114)
206, Bedford Av., Trading Estate, Slough, Bucks.
- Sel-Ezi Wireless Supply Co., Ltd.**, (14)
6, Greek St., W.1.
- Selfridge & Co., Ltd.**, (242)
Oxford St., W.1.
- Sheffield Magnet Co.**, (125)
116, Broad Lane, Sheffield.
- Sherwood, A. M. E.**, (130)
66, Hatton Garden, E.C.1.
- Siemens Bros. & Co., Ltd.**, (70)
Caxton House, Westminster, S.W.1.
- Six-Sixty Radio Co., Ltd.**, (58)
17-18, Rathbone Place, W.1.
- Smurthwaite, F. W.**, (116)
15a, Onslow Gardens, Wallington, Surrey.
- Sovereign Products, Ltd.**, (156)
52, Rosebery Av., E.C.1.
- Standard Battery Co.**, (42)
184, Shaftesbury Av., W.C.2.
- Stratton & Co., Ltd.**, (28)
Bromsgrove St., Birmingham.
- Sun Electrical Co., Ltd.**, (19)
118, Charing Cross Rd., W.C.2.
- Swift Levick & Sons, Ltd.**, (129)
Clarence Steel Works, Sheffield.
- Sylvex, Ltd.**, (127)
144, Theobalds Rd., W.C.1.
- "TANNOY" Products**, (111)
1-7, Dalton St., W. Norwood, S.E.27.
- Telegraph Condenser Co., Ltd.**, (145)
Wales Farm Rd., North Acton, W.3.
- Telsen Electric Co., Ltd.**, (69)
Miller St., Birmingham.
- Tonex Co.**, (233)
Walker St., Blackpool, Lancs.
- Trader Publishing Co., Ltd.**, (3)
St. Bride's House, Salisbury Sq., E.C.4.
- Trelleborg Ebonite Works, Ltd.**, (228)
Union Place, Wells St., W.1.
- Turner & Co.**, (9)
54, Station Rd., New Southgate, N.11.
- ULTRA Electric, Ltd.**, (77)
661, Harrow Rd., N.W.10.
- Umello, Ltd.**, (234)
12, Doughty St., W.C.1.
- Universal Gramophone & Radio Co., Ltd.**, (123)
Ryland Rd., Kentish Town, N.W.5.
- VANDERVELL & Co., Ltd.**, (7)
C. A., Warple Way, Acton, W.3.
- Varley (Oliver Pell Control)**, (105)
103, Kingsway, W.C.2.
- Voltron Electric, Ltd.**, (215)
3, Queensway, Ponders End, Middx.
- WATMEL Wireless Co., Ltd.**, (12)
Imperial Works, High St., Edgware.
- Westinghouse Brake & Saxby Signal Co., Ltd.**, (239)
82, York Rd., King's Cross, N.1.
- Whiteley, Boneham & Co., Ltd.**, (66)
Nottingham Rd., Mansfield, Notts.
- Whittingham, Smith & Co.**, (74)
Portadyne Works, Chase Estate, Park Royal, N.W.10.
- Whiteley, Wm., Ltd.**, (257)
Westbourne Grove, W.2.
- Wilkins & Wright, Ltd.**, (60)
Utility Works, Holyhead Rd., Birmingham.
- Wingrove & Rogers, Ltd.**, (118)
188, Strand, W.C.2.
- "Wireless World"**, (4)
Dorset House, Tudor St., E.C.4.
- Wright & Weaire, Ltd.**, (250)
740, High Rd., Tottenham, N.17.
- YOUNG Accumulator Co. (1929), Ltd.**, (225)
Burlington Works, Arterial Rd., New Malden, Surrey.
- ZEITLIN, V., & Sons, Ltd.**, (26)
54, Lambs Conduit St., W.C.1.



OLYMPIA, 1930.

THE outstanding characteristic of the Olympia Show of 1930 can, we believe, be expressed in the one word, "consolidation." In previous years changes in circuits and essential apparatus, particularly in types of valves, have been so frequent that the manufacturer has had little opportunity to consolidate his own position and standardise on types of receivers. This state of affairs was particularly marked last year, when one might almost say that the majority of the up-to-date sets shown at Olympia verged upon being experimental models, because of the shortness of time available for the manufacturer to incorporate new ideas and include new valves which were available to him only a comparatively short time before the date of the Show.

This year it will be found that valves have improved in characteristics and have attained a high standard of reliability and consistency. Receiver circuits have been improved in detail, and sets generally have reached a higher standard of perfection and dependability than has been possible in the past.

A noticeable feature in set design this season is the tendency to increase the number of valves instead of, as in the past, endeavouring to strain the utmost out of every stage. British manufacturers in the past have undoubtedly been "valveshy," and one of the principal reasons for this attitude has been the high royalty of 12s. 6d. per stage, which was calculated proportionately to the number of valves. This net royalty at such a figure tended to induce the manufacturer to cut down the number of valves in his design to the minimum. The royalty on receivers has now been reduced to a much lower figure, so that it is no longer a factor to be considered seriously in deciding upon the number of stages to be

used. With the increasing need for selectivity in the modern set and a growing interest in reception of distant programmes, the tendency everywhere amongst manufacturers is towards an increase in the number of valves, except for sets which are intentionally designed only for local reception.

Olympia, 1930, is to be more essentially a British Radio Show than any previous year. The British manufacturers intend to make a bold bid to show the public that there is no need to go beyond the shores of our own country to satisfy requirements in every variety of broadcast receiving sets at reasonable prices. Just as the Berlin Exhibition, which we recently referred to in these columns, excluded all but German firms, so the Olympia Show is wholly British.

Below we mention some of the interesting sets, accessories, and components of the Show forecasting the general trend of progress.

The New Receivers

EVEN those whose personal activities are mainly confined to local station reception will probably spend a good deal of their time at Olympia in examining the more ambitious long-range receivers. A preliminary survey of the new season's models shows that sets with two tuned stages of high-frequency amplification will be well to the fore, and the methods adopted by manufacturers in

overcoming the undoubted difficulties inherent in the realisation of practical designs are likely to be full of interest.

One of the more sweeping departures from conventional practice will be found in the new Pye "Twintriple" self-contained sets, with two S.G. high-frequency amplifying valves and ganged control of their three tuned circuits. An overall H.F. magnification of 1,000 to 1,500 times—a good figure even for the laboratory receiver of a year or two ago—is claimed for these sets, which are available in models arranged for battery, D.C. and A.C. supplies. The battery set has anode bend rectification, while power grid detectors are fitted to the mains-driven models. Input volume control is provided.

There is to be a new Marconiphone "console" model for A.C. mains operation, with two H.F. stages, detector, and pentode output. This set is completely self-contained, as for normal operation sufficient signal energy is picked up from the mains; for long-distance work, an external aerial can be added. A new type of moving-coil loud speaker is mounted in the walnut cabinet in which this promising set is housed.

Among the new Gecophone sets is a four-valve radio-gramophone, which includes two H.F. stages, power detector, and a ten-watt output valve. This is an A.C. mains-driven set, operating without an external aerial for medium-distance reception, although one can be added for long-range work. A similar set, without gramophone attachment, is also available.

As far as complete sets—as opposed to mains apparatus—for this season are concerned, the activities of the Regent Radio Co. are concentrated in the production of

Show Forecast.—

a clean-looking 2-H.F.-det.-L.F. model for A.C. mains. This set has ganged control of all its tuned circuits and no reaction.

Readers will be interested to see a commercial version of *The Wireless World*



New Marconiphone Console receiver with built-in moving coil loud speaker.

"Band Pass Four," a receiver with two sets of filter circuits and two high-frequency stages, which, it is understood, is to be exhibited on the Magnum stand.

Another up-to-date set in the long-range class is the new R.I. "Madrigal Four," which includes a very carefully designed system of ganged control.

Intermediate between this class of receiver and the general-purpose outfit, we have the four-valve H.F.-det.-2-L.F. type of set. This particular circuit arrangement seems to be mainly confined to portables this year, but one or two "outside-aerial" sets will be seen.

The widest choice of sets will be found in the H.F.-det.-L.F. three-valve class, as



Gecophone A.C. set with two H.F. stages.

almost every manufacturer has produced at least one example of this deservedly popular type, which seems best capable of meeting the needs of the average listener. Pentode output valves, either definitely specified or optional, will be found in the majority of sets of this category, which, thanks largely to con-

tinual improvement in valve characteristics, are capable of giving a better performance than ever before.

The new McMichael "Mains Three" is a good example of the progress that has been made in the design of this type of set; it includes ganged tuning with a fixed horizontal scale directly calibrated in wavelengths, which is traversed by a moving indicating pointer. The output valve is a power pentode. The modern tendency towards simplicity and cleanness of external design is well exemplified in this set, which is for A.C. mains feed; a somewhat similar receiver for battery operation is also produced.

Another set of neat and attractive external appearance is the Ferranti Model 32, supplementary to the Model 31, which is retained. A metal container, covered in Rexine, houses this new receiver, which has a modified form of ganged control; both sets of condenser rotors may be turned together when they are locked by operation of a second knob. The tuning scales for medium- and long-wave reception are directly calibrated in wavelengths; the particular scale that is out of use is covered automatically by a shutter controlled by the waveband switch. The Type 31 receiver is now supplied in a "console" cabinet, with built-in Magnodynamic loud speaker.



Regentone receiver, with two H.F. stages and ganged control.

Messrs. Garnett, Whiteley are adding to their range of sets a three-valve "transportable" all-mains model, and a similar receiver with an H.F.-det.-pentode circuit which is completely self-contained except for external aerial and earth connections.

The General Electric Company has produced an up-to-date "All-Electric-Three" for this season. It is an H.F.-det.-pentode combination, with pre-detector volume control.

The new three-valve Ultra A.C. Mains set has several unconventional features, including a screen-grid valve as a detector. The tuning condensers are ganged, and a valve is used for rectifying the power supply.

The H.F.-det.-L.F. circuit with which we are now dealing is quite adequate for inclusion in radio-gramophones, and it will be found in a number of these instruments, including the Bel Canto; this is self-contained except for the loud speaker, which is supplied as a separate unit so that it can be mounted in the most advantageous position from the acoustic point of view.

Chassis for 1-v-1 receivers of the battery- and mains-operated type are to

be shown by the Dibben Company; these chassis are to be fitted into various styles of containing cabinet.

Among Columbia sets will be seen a new mains-driven three-valve receiver, arranged for A.C. or D.C. This is to be available either as a table model or mounted in a pedestal cabinet with built-in loud speaker. The same firm are pro-



The new McMichael three-valve mains set.

ducing an H.F.-det.-L.F. radio-gramophone with direct wavelength calibration.

The Ediswan Company are using a Mazda indirectly heated AC/PEN output valve in their new "Power Pentode Three."

A "mains transportable" is to be one of the leading Varley exhibits; this set is intended for operation with or without an external aerial. A similar circuit arrangement, but with parallel output valves, is used in the "All-Electric" console radio-gramophone produced by this firm. A built-in moving-coil loud speaker, with its pot magnet winding energised through a Westinghouse metal rectifier, is included in the latter instrument.

The Lamplugh range of receivers is to include a three-valve set in a console cabinet with built-in Inductor Dynamic loud speaker, and also a table model without loud speaker, but with a similar circuit arrangement.



The new Ferranti set.

Various improvements have been effected in the R.I. three-valve receiver, which is available for D.C. or A.C. mains feed.

Show Forecast.—

Probably for the first time there is to be a distinct effort to cater for the listener who requires good quality reproduction from one or two stations—or, if he is favourably situated, from perhaps three or four stations—but who does not insist on long-distance reception. An interesting example of this type of receiver will be found in the Ferranti Model 22, which, like the larger set already referred to, is mounted in a metal case covered in Rexine. It includes what may be described as “switch tuning,” and is sent out from the works with its circuits adjusted to the two wavelengths of a twin regional transmitter, such as Brookmans Park. Either wavelength can then be selected by the simple manipulation of a two-way switch.

A simple, robust, and inexpensive Marconiphone set, with a detector-L.F. two-valve circuit, has been produced. It is available in battery or A.C. models, and a pentode may be used in the output position. Incidentally, as most of our readers are aware, this firm takes particular trouble to ensure that their apparatus shall be properly “serviced” after it passes into the hands of the user, and it is interesting to note that a new system of colour wiring, intended to facilitate testing and fault-finding, is included in sets for the present season.



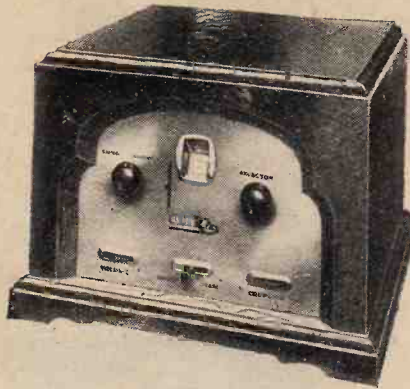
Self-contained Lotus mains receiver.

The old-established firm of S. G. Brown and Co., known to wireless men long before the days of broadcasting, or even of radio-telephony, have now entered the field as set constructors; one of their models is to be a “Regional Two” detector-L.F. combination.

Before leaving the local-station or medium-range type of receiver, mention should be made of the new Magnum det.-L.F. set for D.C. supply, and of the Lissen “Baby Radio-Gram,” with the same basic circuit arrangement. The latter outfit is available for battery or A.C. mains drive. The Ediswan “Power Pentode Two” should be capable of giving an exceptionally high power output for this class of set.

We are also to have a new Dubilier all-mains two-valve set specially suitable for “regional” reception, and the Chako-

phone Senior II, a table model, is to be available for battery, A.C., or D.C. feed. Another set, intended primarily for local reception, is the Climax All-Electric Two.



Ultra A.C. receiver: an S.G. detector valve is used.

Portable sets appear to be as popular as ever, although, with one or two notable exceptions, it seems likely that no very startling advances in design will be seen. Apart from the sets in this classification already mentioned, a new Amplion four-valve portable, with two H.F. stages, is to be shown. Incidentally, this firm is also producing an A.C. detector-L.F. set of the simple medium-range type, and their five-valve all-mains receiver is now supplied in a large upright cabinet.

Detailed information regarding the new four-valve portable to be shown by S. G. Brown and Company will be awaited with interest. This set has tuned high-frequency amplification, and provision is made for using a gramophone pick-up.

A wide range of Dunham portable and transportable models have been produced, including an H.F.-det.-pentode self-contained mains-driven set with internal frame aerial. There are also a 1-v-2 suitcase portable and five-valve portables and transportables.

One of the most ambitious portables will be the H.S.P. four-valve model, with two S.G. high-frequency valves, detector, and pentode output. This set has three separate tuning controls. Its makers are to show a complete range of self-contained receivers.

The Classic Radio and Gramophone Company are exhibiting the “Ariel Pigmy” suitcase model, as well as several other types.



The Monarch Minor: an inexpensive receiver.

One of the smallest practical sets of last year's exhibition was the Rees Mace Gnome; the 1931 version of this set, of which the weight (20 lb.) has not been increased, has been considerably improved in detail, and is now fitted with Hypermite L.F. transformers. A transportable model of the same little receiver, with provision for connection of an H.T. battery eliminator, has also been produced.

The Welbeck Major, a four-valve suitcase portable, is a new Rees Mace product, and has a single stage of tuned H.F. amplification.

Halcyon sets for this season include models with tuned and aperiodic H.F. amplification, and also a radio-gramophone.

We are promised a number of sets at exceptionally low prices; in particular those to be shown by Messrs. Johnson and Bolson, Ltd., who have produced a three-valve transportable to sell at £5 12s. 6d., and a five-valve portable at £7 19s. 6d.



A Dubilier radio-gramophone.

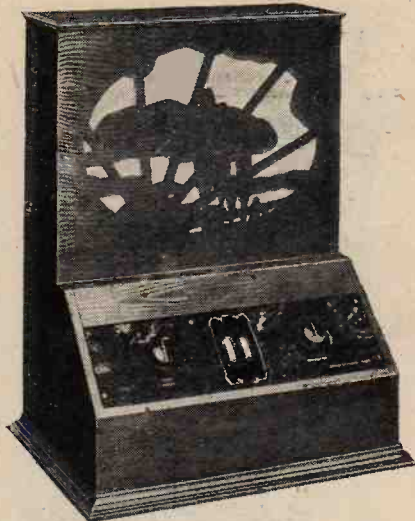
Several improvements have been made in the design of the “Beethoven” portable, which includes quasi-constant reaction. The makers of this set are showing several other types, including one in which programmes are selected by operation of switches.

Such features as ganged tuning and direct wavelength calibration are included in the Murphy four-valve portable, which was reviewed in a recent issue of *The Wireless World* and of which a slightly modified version is to be shown. Other prominent exhibitors of self-contained sets will be the Pandora and Portadyne firms; the latter concern is to specialise in a long-range four-valve model with an S.G. high-frequency valve.

Many radio-gramophones are to be shown; probably the most complete range of these instruments is that of Edison

Show Forecast.

Bell, who are producing types with from two valves upwards. Their most ambitious model is the "Senior All-Mains,"



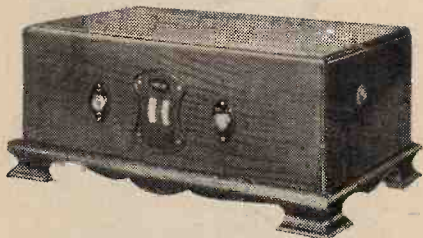
Dunham A.C. set with built-in loud speaker.

with a 1-v-2 circuit, built-in loud speaker, and a scratch filter; the simplest, a detector-pentode combination for mains operation, is fitted with an electric motor and also with a scratch filter to eliminate surface noises.

The Gambrell radio-gramophones are to be fitted with the Novotone tone corrector: this device is also to be found in the gramophone amplifiers produced by Dulcetto Polyphon, Ltd.

Apart from radio gramophones, it seems certain that an overwhelming majority of the sets to be exhibited will be fitted with a connection for a pick-up.

In spite of the recent decision of the B.B.C. to extend their short-wave transmitting service, there are few signs of



An Amplion two-valve mains set.

greatly increased activity on the part of makers of short-wave receivers. The Eddystone "All-Wave Four" set, with a wavelength range of from 12.5 metres upwards, is one of the few receivers intended to cater for the Overseas exile. This set is specially designed to withstand tropical conditions, and is housed in a container cast in aluminium alloy with integral partitions. It includes provision for connection of a gramophone pick-up.

When a census can be taken, it will probably be shown that mains-driven sets have definitely outstripped battery re-

ceivers in point of numbers; even listeners with D.C. supplies are to be much better catered for than in former years. Practically every manufacturer is exhibiting mains sets: among newcomers in this branch of the industry is the Tulsemere Electric Company, well known as makers of eliminators, with a range of sets and radio-gramophones. The firm of E. K. Cole and Co., Ltd., who have always been specialists in mains apparatus, are producing several new sets. One model, in particular, is likely to be of especial interest to those with D.C. mains; it includes several unusual refinements and has provision for adjustment to compensate for the peculiarities of various supply systems.



H.S.P. portable, with three separately tuned circuits.

Advance information has just been received regarding the Burndept programme. This firm has produced what promises to be a most effective A.C. receiver, which is also to be sold in radio-gramophone form. This set embodies a single H.F. stage, and, as it is fitted with the new Mazda super-power pentode in the output position, is capable of giving over 1,000 milliwatts of undistorted energy. It includes a new patented control of volume and selectivity, which operates on the aerial coupling. There is



New Pandona portable.

a new system of gauged tuning, with provision for individual adjustment of the main tuning condensers when receiving weak transmissions.

The deservedly popular Burndept Universal Five, with minor detail improvements, is to be retained, and will be available in battery, A.C., and A.C. console models.

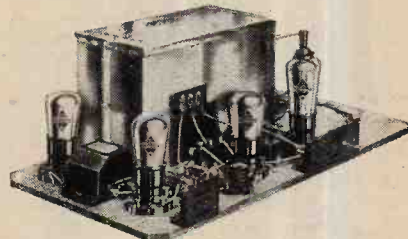


Eddystone All-wave Four: 12.5 metres upwards.

The new kit sets are particularly interesting. One of the most ambitious is the Osram Music Magnet Four, which, as our readers are aware, has two H.F. stages, with fully gauged tuning.

Two Cossor kit sets have been produced. The first is a comparatively simple 1-v-1 combination of very easy construction, while the second is a four-valve receiver with one high-frequency stage. This set has gauged tuning and is supplied with an assembled H.F. amplifier.

The Mullard Company are sponsoring several kit sets, but details concerning these are not yet available.



New Cossor Kit set.

Ferranti kit sets for home construction are now produced in greater variety than last year. Probably the most interesting and generally popular model will be an H.F.-det.-L.F. three-valve combination with completely screened H.F. couplings. Magnetic reaction, controlled by a Bowden wire cable, is fitted. A similar receiver is also designed for mains operation.

There is also to be a four-valve set with one H.F. stage, anode bend detection, and push-pull output, employing the new Ferranti low-ratio L.F. transformers. An A.C. version of this set will be available.

It is also hoped to have ready a 2-H.F. model, both for battery and mains, and a simple detector-L.F. set is promised.

Voltron Electric, Ltd., are to exhibit a new three-valve kit set of attractive appearance, and, apparently, efficient design. An A.C. unit for operating this receiver from the mains is also to be shown. A trickle charger for the L.T. accumulator is included in this device.



Components and Accessories

THE time when the annual Wireless Show was the occasion to reveal a glittering array of new components has long since passed, which is a healthy sign, since it shows that more attention is given to-day to improvement in quality rather than to quantity. At first sight these improvements may not appear to be very marked, but a closer study will show



T.C.C. 2 mfd. non-inductive by-pass condenser of low H.F. resistance.

a definite advance towards a higher standard than attained at any time hitherto. In some cases the characteristics and not the physical form of the component must be examined, and the products of the Telegraph Condenser Co., Ltd., are a case in point.

On their stand (No. 145) will be seen some condensers which closely resemble other of their products outwardly, but the quality of the actual condenser is vastly improved. The special feature of these new type non-inductive by-pass condensers is that the peak frequency has been raised from 500 kc. to 1,000 kc., and the impedance materially lowered. This is an important feature, since when used as H.F. by-pass condensers in screen grid valve circuits, a path of much lower H.F. resistance to earth is provided. These new type condensers are to be shown in

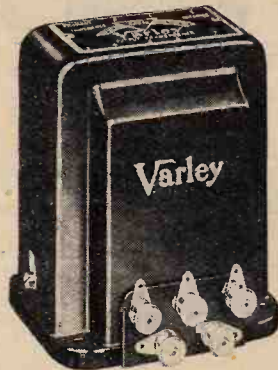


Ferranti condenser pack for use in mains sets and battery eliminators.

B 45

capacities ranging from 0.005 mfd. to 2 mfd.

Messrs. Ferranti, Ltd., will be exhibiting on Stand No. 47 a full range of large-capacity fixed condensers also, among which will be some condenser packs. These are mainly intended for use in mains sets and battery eliminators, a section which is dealt with separately elsewhere in this issue. So far as components are concerned, the visitor should not fail to examine their wide range of low frequency and output transformers, some of which are entirely new. A super-audio frequency intervalve transformer, styled the A.F.7, has been developed to follow anode bend rectifiers, and affords a step-up ratio of 1 : 1.75. The inductance of the primary is 280 henrys with no D.C. flowing, and 150 henrys when passing 2 mA. A com-



Varley impedance matching output transformer providing six alternative ratios.

panion model, the A.F.7C., designed to precede a push-pull amplifier, will also be shown.

"Varley" promise an interesting array of L.F. transformers on Stand No. 105, and among the newer types is an impedance matching output transformer. This has been designed to afford a range of different ratios to enable a better balance of impedance between the loud speaker and the output valves to be obtained than hitherto. The choice of six ratios is available, in the order of 8 : 1, 10 : 1, 12 : 1, 15 : 1, 20 : 1, and 25 : 1. The D.C. resistance of the primary is 162 ohms, and its inductance, when passing 25 mA. of D.C., is 6.5 henrys. A push-pull pentode output choke and a double push-pull

input transformer are two other interesting exhibits that will be found on this stand.

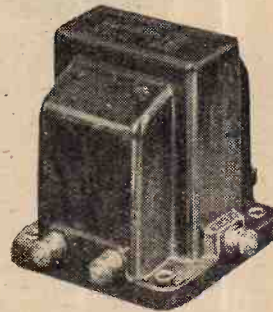
Something out of the ordinary in L.F. transformers and L.F. chokes will be shown by Radio Instruments, Ltd., and a visit to Stand No. 61 should be included in the itinerary. Those interested in push-pull amplification will be well rewarded,



R.I. new variable ratio push-pull output transformer.

as some interesting new designs are to be on view. These include a variable ratio push-pull output transformer giving the choice of the following ratios: 2 : 1, 1.5 : 1, 1 : 1, 1 : 1.5. For feeding into the output stage there is a heavy-duty push-pull input transformer to carry 20 mA. of D.C. through the primary and providing a step-up ratio of 1 : 1.5 to each grid of the last stage. In addition there will be an interesting exhibit consisting of L.F. transformers and chokes employing a nickel-iron alloy for the core.

The Telsen Electric Co., Ltd.—Stand 69—will be making a special display of improved versions of their Ace and Radio-grand transformers. This year the windings have been modified, and the new models are shrouded and enclosed in



Telsen L.F. transformers are now enclosed in a neat bakelite case. The windings are screened.

Show Forecast.—moulded bakelite cases with an extra terminal for earthing the metal parts. This firm have considerably augmented their range of components and will be showing some new pattern valve holders, an H.F. choke with an effective range of from 18 to 4,000 metres, and a range of fixed condensers in capacities up to 0.001 mfd.

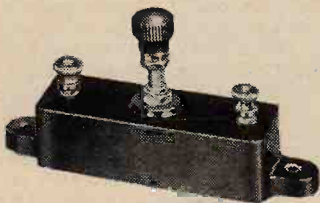
Simplification of control by gauging the tuning condensers will figure prominently in a large percentage of receivers, and we find many component manufacturers featuring gauged condensers this year. A fine example will be the Chassimount



J.B. "Chassimount" 4-gang condenser assembly.

range of gauged condensers to be found on Messrs. Jackson Bros.' stand, No. 63. Each unit of the gang is carefully matched over the whole tuning range and not merely at maximum and minimum positions. Messrs. Wingrove and Rogers, Ltd. (Polar), promise something a little out of the ordinary in gang condensers, and they are showing, also, a range of the compression-type pre-set semi-variable condensers in capacities of 0.0003 mfd. and 0.001 mfd. maximum. These will be seen on Stand No. 118.

An entirely new style of short-wave condenser will be shown by Messrs. Sydney S. Bird and Sons, Ltd., on Stand No. 73. It is designated the "Series Gap" type, the design being such that no H.F. currents traverse the bearing supporting the moving vanes. The ubiquitous pig-tail

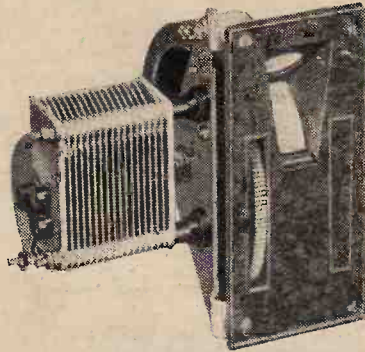


Pioneer compression-type pre-set condenser.

is, therefore, unnecessary, the special feature being that it is noiseless in action. In addition, there will be a wide range of variable and gauged condensers of every conceivable kind.

The Graham Farish Manufacturing Co. have considerably augmented their range of Microficient, Miloficient, and Aeroficient variable condensers, and many types will be available for inspection with insulated spindles. A range of miniature fixed condensers styled the "Parvor" series, in capacities of from 0.0001 mfd. to 0.01 mfd., are to be shown, also, on

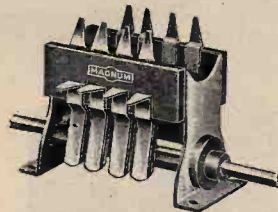
their stands, Nos. 76 and 108. A new compression type semi-variable condenser is added to the range of components made



New drum dial for Utility "Mite" condensers with 2:1 reduction drive. The dial can be illuminated.

by the Pioneer Manufacturing Co., and will be shown on Stand No. 226. This is available in three types, C, J and F, the maximum capacities being 0.001 mfd., 0.0003 mfd. and 0.0001 mfd. respectively.

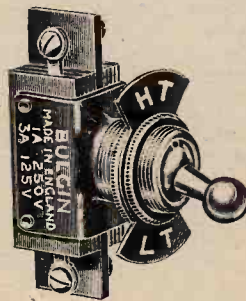
A novel drum dial for the popular Utility "Mite" condensers made by Messrs. Wilkins and Wright, Ltd., will be found on Stand No. 60. This has a reduction ratio of 2:1, the drum describing a complete revolution while the condenser vanes move through 180° only.



"Magnum" wave change switch designed for gauging. A loose spindle is fitted.

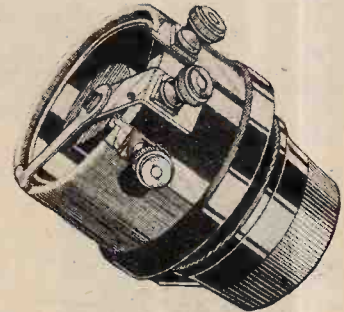
The 0-180 scale is, therefore, much more open than usual with dials of this type. The drum is 3in. in diameter, but by virtue of the 360° movement it is equivalent to one of approximately double the size, so far as the engraving is concerned. Provision is made for illuminating the dial.

Where more than one tuning circuit is operated by a single dial, it is desirable that the associated wave-changing



Toggle action mains switch rated to handle 250 watts. A new Bulgin product.

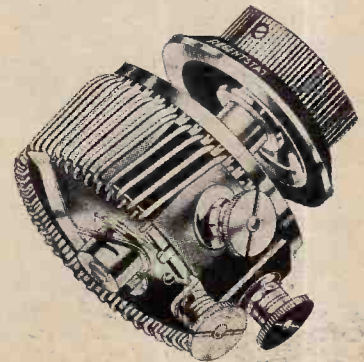
switches should be gauged also, and to facilitate this many manufacturers have developed special switches. Some typical examples will be shown by Messrs. Burne-Jones and Co., Ltd. (Magnum), on Stand 121. These switches are intended to be mounted on the baseboard or sub-base. They are of the rotary type, the control knob moving through an arc of 90°. The contact springs are flexible, but quite certain in their action, and the two contact positions, as well as the



Continuously variable wire-wound "Col-verstat," designed to dissipate 10 watts. It is smooth in action and durable.

neutral position, are well defined. Among other interesting Magnum products will be a new wire-wound potentiometer and a range of decoupling resistances in values of 600 and 1,000 ohms.

Messrs. A. F. Bulgin and Co., Ltd., will be displaying a wide and varied range of components, many of which will be familiar, but some new and improved models are promised. There will be a new toggle-action switch in various forms which can be used for changing over con-



Regentone variable high resistance. The moving arm rides over a series of contacts which protect the resistance element.

nections carrying a relatively heavy current. These are rated at 250 watts. Single-hole fixing bushes are fitted, and indicating plates, appropriately engraved, are included. Even a brief description of the full range of components to be shown on their stand, No. 103, would be too lengthy to include here, so the visitor should include this stand when he visits the exhibition.

Wave-change switches suitable for gauging are to be a feature of the exhibits of Colvern, Ltd., this year, and

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some fine examples of dual-range coil units, including switches and enclosed in screening boxes will be seen on Stand No. 45. A new component is a wire-wound variable Colverstat, with a evenly graded track, rated to dissipate 10 watts, and available in values up to 50,000 ohms. Fixed resistances, wound on glass tubes, suitable for anode resistances, voltage-dropping resistances, and numerous like purposes, will be shown in a wide range of values.

In addition to the special mains equipment for which the Regent Radio Supply Co. (Regentone) are well known, and which is dealt with elsewhere in this issue, there will be shown on Stand 51 a new Regentstat, a wire-wound variable resistance of high ohmic value and capable of handling considerable power. The moving arm rides over ni-chrome wire contacts, thus relieving the fine wire, on the resistance element of the wear that would otherwise take place, and totally eliminat-



Siemens new series "Full-o'-Power" dry-cell H.T. battery.

ing the risk of breakdown due to mechanical causes. There will be two types shown: Type A ranging from 500 to 120,000 ohms, and rated to carry 40 to 8 mA., according to value; and Type B in values from 500 to 180,000 ohms. This latter range carries from 100 to 8 mA., according to size. All models are fitted with single-hole fixing bushes.

The dry-cell battery manufacturers have been busy during the past months, and the fruits of their labours will be



Young Dri-Power portable pattern L.T. accumulator with jelly electrolyte.

seen this year at Olympia. Messrs. Siemens Bros. and Co., Ltd., are showing a complete new range of the Full-o'-

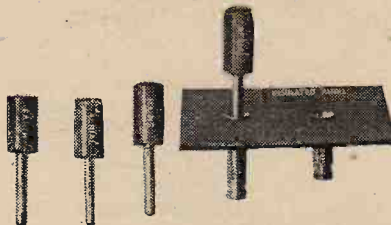
Power batteries, which completely supersede the old pattern. The 100-volt model, No. 1,206, has been discontinued, and the new units to replace this are in



Exide new series Gel-Cel unspillable accumulator. Jelly electrolyte is employed.

50-volt sizes only. This is regarded as being far more convenient in many respects. There will be shown, also, on Stand No. 70, a comprehensive range of portable type batteries, and, for that matter, a battery for every conceivable purpose in the radio sphere.

Another firm that will be showing a wide range of improved and new style batteries is the Grosvenor Electric Batteries, Ltd. Their stand, No. 263, will carry a wide range of standard, double, and triple capacity H.T. batteries and portable set units in a variety of shapes and voltages, designed to meet practically all requirements.



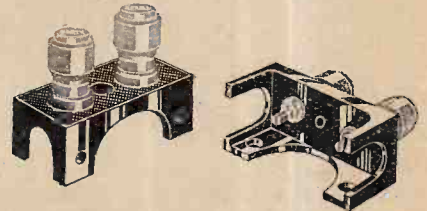
Clix new pattern plug and socket. A resilient socket and solid plug are used.

For the low-tension supply the Young Accumulator Co. (1929), Ltd., are making a special display on Stand No. 225. Unspillable types, known as the "Dri-Power" range, are to be shown in portable set form and in voltages and capacities suitable for all other purposes. These cells are filled with a jelly electrolyte, but, in addition, there is a wide range of cells with liquid electrolyte for those who prefer this form.

A new feature of Exide batteries this year is the adoption of jelled acid dielectric in a new range known as Exide Gel-Cel cells, which will be seen on Stand No. 54 of the Chloride Electrical Storage Co., Ltd. The new range is intended for portable set use, and is exceptionally comprehensive, practically duplicating throughout the corresponding

types of free acid non-spillable cells, so that in every case a choice is available between liquid and jelly electrolyte. The non-spillable type with liquid electrolyte is retained, with sundry improvements in the acid traps and general design of the container.

An innovation introduced by Lectro-Linx, Ltd., and to be shown on Stand 131, is the Clix resilient sockets, with which are used solid prong plugs. It is claimed that the policy of transferring the resilience to the socket confers such advantages as greater tensile strength and immunity from damage, since the socket is well protected by being located behind the terminal strip, and that the socket retains its resilience far better than the easily damaged split, or resilient, plug. The internal diameter of the socket is standardised with that of an average valve pin to facilitate the use of these in mounting valves on a strip sub-panel.



Multiple purpose terminal block with two positions for mounting. A new Belling-Lee product.

A solid prong plug is, of course, used with these new sockets, which are to be shown in three forms—long, short, and insulated—the latter being recommended for mounting on metal work.

Messrs. Belling-Lee, Ltd., will be showing, on Stand No. 134, in addition to their wide range of engraved terminals, wander plugs, fuse adaptors and other accessories for which they are noted, a multiple-purpose terminal block arranged for horizontal or vertical mounting. It is made from bakelite, and will accommodate terminals of any make, but is especially designed to take the Belling-Lee non-reversible terminals. In one position a single screw serves to fix the block, but when arranged with the terminals horizontal two small screws are required.

A new ball-bearing turntable for attachment to portable set containers, to facilitate orientation of the frame aerial,



British Radiophone ball-bearing turntable for portable sets.

is to be shown on Stand No. 223 by the British Radiophone, Ltd. The standard finish is in gilt, and fixing is by means of four wood screws, or small screws and nuts may be used if preferred.



Mains Equipment

COMPARATIVELY few eliminators, and an absence of radically new models and new ideas, summarises the position. This may seem unexpected following the advent of the indirectly heated valve and the sudden increase in mains-operated sets. The reason for the decline is that where A.C. is available the all-mains set will be preferred to the use of the auxiliary H.T. mains unit which could hold its own only when the filament current supply was derived from an accumulator. Eliminators will only be supplied where an existing set is being modified or to replace the H.T. batteries when the supply is D.C. Grid biasing potentials, critical screen voltages and all the complications necessary for effective decoupling cannot be introduced when the eliminator is designed as a separate unit. Decoupling, screening and voltage regulation must be so carefully taken into account or the performance of the eliminator operated receiver will be impaired. There is a marked tendency, therefore, to replace the eliminator by the all-mains-operated set.



A popular Regentone model giving an output of 20 milliamps at 120 volts. Two variable voltage outputs are provided in addition to the maximum voltage terminal, one of these being particularly suited for providing a screen grid potential.

Apart from mains-operated sets we find that there are some six exhibitors specialising in the production of eliminators. They are Atlas (Stand No. 211), Ekco (Stand No. 48), Parmeko (Stand No. 248), Regentone (Stand No. 51), Mainten (Stand No. 219), and Tannoy (Stand No. 111). Manufacturers of the complete range of radio apparatus are also showing eliminator equipment, such as Marconiphone (Stands Nos. 38 and 120), Pye (Stands Nos. 31 and 32), and Ferranti (Stand No. 47).

Over twelve different models are available in the new Ekco range. They are rated according to output, and the arrangement of the tappings and models are available for either A.C. or D.C.

supply. An example of a typical mains unit is the Ekco type A.C. CP.1. Retailing at £6, this unit gives a current output of 20 mA. and is designed to fit into the space normally occupied by the H.T. battery in a portable. A screen voltage of 60 to 80 is available, as well as a tapping variable from zero to 120 volts.



A new Regentone eliminator, model W.5, by the use of which a portable receiver may be readily modified for all mains working.

The maximum voltage output is 150, and by means of tappings this can be reduced to 100. This eliminator, in spite of its compact construction, provides grid biasing potentials and an L.T. supply in addition to the H.T. potentials. As is the case with all Ekco A.C. mains units, a Westinghouse rectifier is used. There are comparatively few complete D.C. eliminators available in which provision is made to feed the filament heating current to the valves without drastic alteration to the set. In the Ekco range, however, there are a number of complete D.C. eliminators, supplying, in addition to H.T. and grid biasing potentials, L.T. current up to 0.4 amp.

Another extensive range of mains equipment is to be exhibited by Regent Radio (Stand No. 51). Some twelve models are available, including units for the conversion of portable receivers. All



Mainten portable set H.T. eliminator for use with A.C. supply.

A.C. models retain the Westinghouse rectifier as formerly, and where a variable voltage output is required either by series resistance or potentiometer, a wire-wound variable resistance is fitted. Although not producing an absolutely continuous change in potential, this new component gives a large number of steps—a necessary condition when the regulation of screen voltage controls regeneration. Variable voltages are produced where necessary in Regentone eliminators by the use of a potentiometer, a feature that has long been sought after, yet has rarely been found. Good appearance is obtained by the use of well-finished all-metal containers. A novel feature is that units are modified by means of their flexible wire connector, so that they may be used on any supply voltage from 200 to 250 without any internal change being made to the eliminator itself. Regentone D.C. all-mains eliminators employ the floating battery method of L.T. supply, this being a reliable means of holding the L.T. voltage constant.

Both Westinghouse and valve rectifiers are to be found in the various Atlas models to be exhibited by H. Clarke and Co. (Manchester), Ltd. (Stand No. 211). The metal rectifiers are used in the



Tannoy mains unit type C.P.2. It is of compact design and intended essentially for the conversion of portable receivers for mains working.

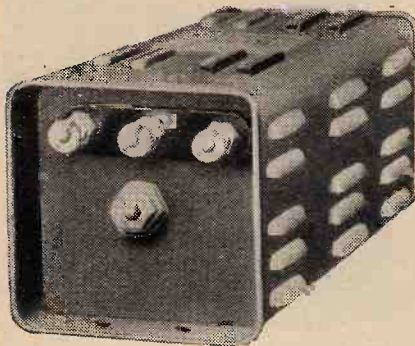
smaller popular-priced models, while valve rectification is found in those types giving more generous outputs. Among new types is a compact A.C. eliminator of overall dimensions corresponding with those of a small H.T. battery. In addition to H.T. supply, it includes a trickle charger, so that it can be used to replace the H.T. battery of a portable, and will maintain the L.T. battery in a charged condition.

Combined H.T. and trickle chargers are, in fact, to be a feature among the eliminator exhibits at this year's Show. The Mainten Manufacturing Co., Ltd. (Stand No. 219), produce an eliminator of this class again designed particularly for portable receiver operation. It has

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an H.T. output up to 20 mA., two fixed voltages of 60 and 120, as well as an L.T. trickle charger giving 0.25 amp. and suitable for use with 2-, 4-, or 6-volt batteries. The Mainten range is complete and will include eliminators giving various outputs for use with A.C. or D.C. supply, as well as a trickle charger.

A complete range of battery eliminators will also be found on the stand of J. Dyson and Co., Ltd. (Stand No. 104). The range is extensive and covers all the various requirements for use with A.C. and D.C. supply for providing H.T. grid bias, L.T. and trickle charging. Westinghouse rectifiers are employed throughout in the A.C. models. Here, again, will be found a complete unit for portable set conversion from battery to mains working. The unit includes a potentiometer control for screen grid voltage, as well as trickle charging for the L.T. supply. This portable set eliminator is

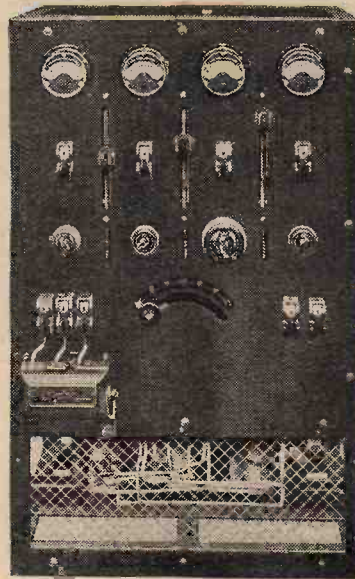


Westinghouse rectifier unit type H.T.7. It measures 3ins. x 3ins. x 5½ins. and gives an output of 28 mA. at 200 volts. The container is of new and lighter design than formerly.

particularly low in price and sells at under £5, while, like other eliminators of its class, a current output up to 20 mA. may be taken. In the Dyson range is a useful eliminator consisting of an inexpensive rectifying unit designed for adding to a D.C. eliminator and meeting the circumstances encountered when a change-over is made from D.C. to A.C. supply.

Another exhibitor of mains equipment is "Tannoy" Products (Stand No. 111). Again there is no departure from what one must consider the standard design incorporating Westinghouse rectifier. The most popular demand to-day in eliminators as compared with the all-mains-operated set is a unit that will convert an existing battery-operated receiver to all-mains working without modification to the set itself. Tannoy produce a single unit for this purpose designed to give various H.T. outputs and incorporating a trickle charger with indicating meter. Grid bias, being already provided in the set, is omitted from this unit, thus removing a complication that is best avoided. In this unit the trickle charging is by metal rectifier, but a modification is made as regards the H.T. supply in that an electrolytic form of rectifier is adopted requiring, it is claimed, no

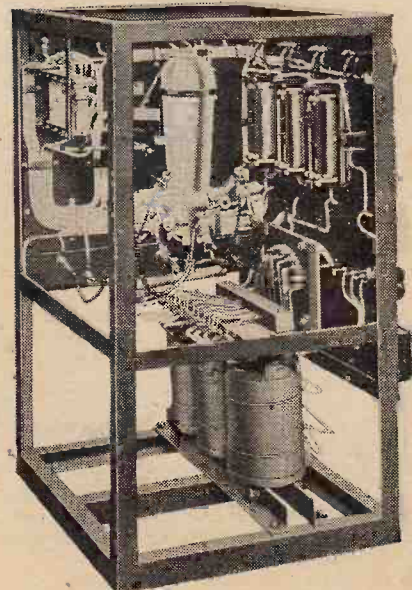
attention. A Westinghouse H.T. rectifier can be fitted in place of the electrolytic if desired. For portable receiver conversion Tannoy supply a pair of compact units, the one arranged to trickle charge the battery by means of a metal



The Hewitt heavy duty battery charger for use with A.C. supply, to be shown by Brown Bros. Ltd.

rectifier at 0.5 ampere, and the other giving a maximum output of 120 volts at 20 mA.

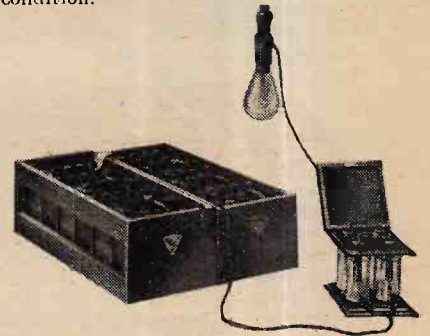
It is worth while noting that Ferranti (Stand No. 47), in pursuing their policy of catering for all amateur needs, are issuing a series of new constructional charts. The ground covered by these



Rear view of the Hewitt rectifier showing the three-phase transformer and mercury rectifier.

charts is extensive, and under the heading of mains equipment includes constructional details of an H.T. supply unit. Incorporating a metal rectifier, it is arranged to give an output of 200 volts at 100 milliamps. Another chart shows the construction of a similar unit, but employing the alternative arrangement of valve rectification. Two smaller supply units are also dealt with constructionally, as well as a combined H.T. and L.T. supply unit. Specimen apparatus built to the designs is to be exhibited at the stand.

An entirely different form of eliminator applicable to either L.T. or H.T. supply is the form of auto-power unit which will be found on the stand of Oldham and Son, Ltd. (Stand No. 64). This unit consists essentially of an accumulator and combined battery charger, and in the case of H.T. supply provides a source having practically zero internal resistance, constant voltage output irrespective of load and variable to precise values in steps of 2 volts. On this as well as the L.T. supply unit, battery charging is provided by means of a changeover switch so that the A.C. supply is entirely disconnected from the set when in use and the possibilities of hum obviated, while when the set is idle the battery is brought up to a fully charged condition.



The Chromal battery charger, a small and inexpensive electrolytic bridge connected rectifier to be exhibited by the Young Accumulator Company.

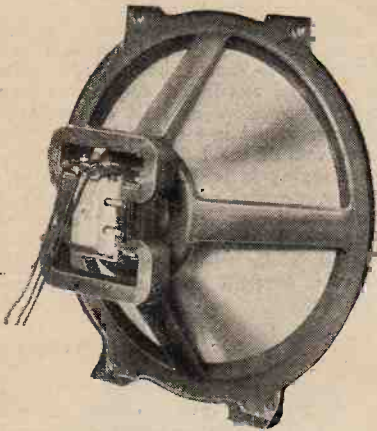
To those interested in heavy-duty battery chargers, attention is directed to the Hewitt mercury arc rectifier which is to be exhibited by Brown Bros., Ltd. (Stand No. 17). It provides an alternative to the use of rotary machines when a generous D.C. output is required from A.C. supply. The efficiency of this method of rectification is stated to be over 60 per cent. on either light or heavy load, and the standard equipment to be shown is arranged for use on three-phase supply.

Prices of mains units have been reduced this season, and as an average it can be taken that the most modest D.C. unit costs about 30s., the price varying with the completeness of the smoothing equipment. The corresponding A.C. model with three voltage outputs, one possibly continuously variable, costs a little over £4. Conversion eliminators for the mains operation of portable sets vary in price with an average of about £5.



Loud Speakers and Pick-ups

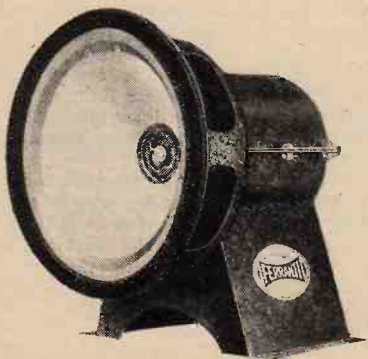
AT least two interesting developments in loud speaker design are promised for Olympia this year, viz., permanent magnet moving coils and the new "inductor dynamic" principle of construction in cone units. More than one example of the latter will be shown, as several firms are now making these units under licence. The performance of this



Gecophone "Dynamic Inductor" loud speaker chassis.

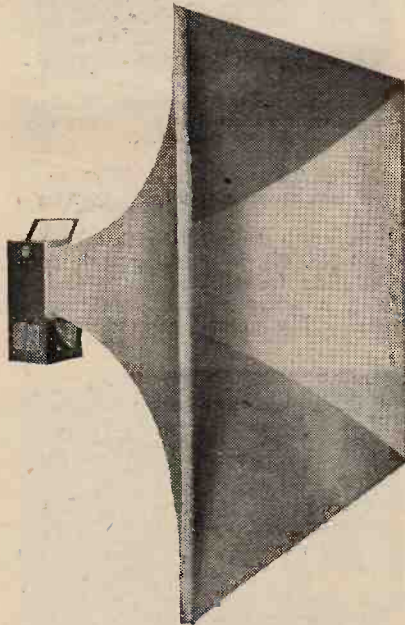
new type is well worth the closest attention on account of the "moving coil" amplitudes developed in the lower register and complete freedom from chattering. S. A. Lamplugh, Ltd. (Stand No. 124) are showing three models, a chassis and two in cabinet form; while the G.E.C. (Stand No. 68) will have chassis and oak cabinet models on view.

It would seem that the permanent magnet moving coil loud speaker is destined shortly to oust the rectifier type for use with A.C. receivers, while the D.C. mains models are also threatened. Research has been going forward in several quarters throughout the past year, with the result that the permanent magnet models



Ferranti "Magno Dynamic" loud speaker with permanent magnet field.

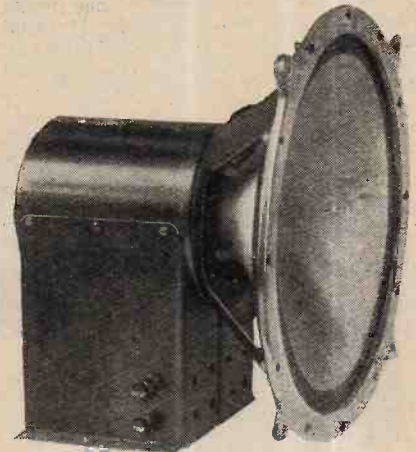
to be placed on the stands this year are quite equal in sensitivity and power handling capacity to their mains-driven prototypes. The Ferranti "Magno-Dynamic" (Stand No. 47) and B.T.H. permanent Magnet R.K. (Stand No. 67), which have already been announced in the Press, both have cobalt steel pot magnets giving flux densities of the order of 8,000 lines per square centimetre. L. McMichael, Ltd. (Stand No. 57), are exhibiting a permanent magnet model of



Baker Selhurst moving coil cinema loud speaker with exponential horn.

entirely new design with adjustable tapings for matching the speaker impedance to a wide range of output valves. Permanent magnet models are also included in the moving coil programmes of S. G. Brown, Ltd. (Stand No. 78), and the Epoch Radio Manufacturing Co., Ltd. (Stand No. 203), are also making a feature of their new mains energised "Domino" model 101. Baker Selhurst Radio (Stand No. 137), who specialise in moving coil loud speakers, have a comprehensive range for 1931. First, there is a permanent magnet model, with cobalt steel pot magnet. Then there are two ranges de-

signed for A.C. and D.C. mains or battery excitation, the "Standard" series for average inputs and a "Super Power" series for higher powers. The magnet windings are the same for both A.C. and D.C. mains models and a standard Westinghouse rectifier is supplied for converting the D.C. model to A.C., a distinct advantage now that supply systems are



Baker Selhurst "Super Power" moving coil loud speaker with electro-magnet field.

changing in many parts of the country. The A.C. equipment is also suitable for charging H.T. accumulators, the output being 100 mA. at 200 volts. All the above models are supplied with a range of speech coil windings, including a special winding for pentodes. Two types of cabinet suitable for the above range have been standardised at reasonable prices. Both the sides and back are panelled with fabric to eliminate box resonance. It is interesting to note that a linen diaphragm is fitted to the pentode model. A cinema model designed for A.C. or D.C. mains will also be shown. This model has a moving coil movement with 40 watt electro-magnet



Edison Bell "Volume Control" pick-up with variable magnet system.

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and 6in. cone diaphragm, and is used in conjunction with an exponential horn with 4ft. flare built of 1½in. solid wood.

An all-round reduction in prices will be found among cabinet cones with balanced armature movements. Notable examples are the new Celestion models D.10

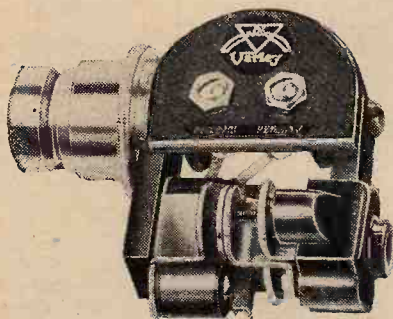


The Ultra pick-up; a new model.

and D.12 at £3 and £5, which replace the well known C.10 and C.12 (Stand No. 53), the Amplion "Two Guinea" cone (Stand No. 62), the Brown "Austral" loud speaker at £2 10s. (Stand No. 78), which has already enjoyed considerable success in Australia, and two new models, E.B.85 and E.B.71, attractively finished in Caucasian walnut and mahogany respectively on the Loewe stand (No. 207).

The British Blue Spot Co., Ltd. (Stand 217), in addition to a wide range of cabinet cone loud speakers, are showing two interesting new balanced armature units of improved design. Type 66P. is a development of the well-known 66K. unit, and is designed for average input with a permissible D.C. current through the windings of 30 mA. Type 66R. is specially constructed to deal with heavy inputs and will withstand, in addition, a D.C. current of 50 mA. Both types are adjustable, and metal cone chassis have been developed to work in conjunction with each model.

Graham Amplion, Ltd., in addition to the "Two Guinea" cone already men-



Redesigned Varley pick-up which incorporates an ingenious needle clutch.

tioned, are producing three new cabinet models with balanced armature movements. The A.B.6 incorporates the standard Amplion B.A.2 balanced armature unit, but a new power type unit has been developed for models A.B.41 and A.B.45, which are housed in the type of cabinet used in the "Lion" series of loud speakers.

In view of the increase in permanent magnet moving coil loud speakers, the stands of Messrs. Swift, Levick and Sons, Ltd. (Stand No. 129), and Darwins, Ltd. (Stand No. 254), should prove of unusual

interest. These firms are specialists in magnet steels, and will show a wide range of permanent magnets for moving coils, cone units, pick-ups, telephone ear-pieces, etc.

As far as pick-ups are concerned, the show will probably indicate a year of consolidation and detail improvements rather than the evolution of novel principles in design. An exception to this generalisation will be found in the Edison-Bell (Stand No. 29), where a novel form of "volume control" pick-up is to be shown. In this instrument the voltage output is adjusted by varying the magnetic flux, an indicator scale being fitted to the pick-up itself. S. G. Brown, Ltd. (Stand No. 78) are showing a new type of pick-up, styled Model No. 4, which is entirely free from rubber damping and so may be expected to hold its characteristic indefinitely. This model supersedes the No. 3 model, but the low-priced No. 2 model is continued. Ultra Electric, Ltd. (Stand No. 77), of "Air Chrome" loud speaker fame, are producing a pick-up for 1931. This component has a high-permeability armature,



Celestion "Tiltatone," a combined volume and tone control for gramophone pick-ups.

four-pole balanced armature movement, 5oz. needle pressure, and a rising bass and high-note characteristic. A tone arm, for which 99 per cent. track alignment is claimed, is included. The "Electro-efficient" pick-up of Graham Farish, Ltd. (Stand Nos. 76 and 108), has been considerably improved, and is now fitted with stronger magnets, with the result that the average output is as high as 2 volts R.M.S. The Celestion-Woodroffe pick-up (Stand No. 53), one of the earliest pick-ups to be marketed in this country, is to be fitted with a tone arm designed to give correct tracking, and the Varley "compound mass suspension" pick-up (Stand No. 105) has been redesigned for 1931 with an automatic needle clutch in place of the clamping screw. The damping in the latter component has been reduced and the characteristic adjusted to cut off at 4,000 cycles to obviate needle scratch.

Tone correction devices for compensation of deficiencies in recording show an increase in numbers this year. The Gambrell "Novotone" (Stand No. 106) is now available in two types, model "S" for standard pick-ups and model "H" for high-impedance pick-ups. Amongst other

examples of accessories of this type will be found the Celestion "Tiltatone" (Stand No. 53) and the Igranic Response Corrector (Stand No. 240), while Edison Bell (Stand No. 29) are showing a combined volume control and scratch filter.

Electric gramophone motors are still



Redesigned B.T.H. universal gramophone motor.

further to the fore this year, and in many cases considerable price reductions have resulted from revisions of design. The new B.T.H. motor (Stand No. 67) is of the universal type, a three-position switch being incorporated for adjusting the series resistance to the voltage and nature of the supply. The power taken is less than 20 watts, i.e., it will play 900 twelve-inch records per unit. In place of the belt drive in older models a worm gear drive is fitted on the same shaft as the governor. A slipping clutch is incorporated to prevent damage through misuse. In addition to their usual range of clockwork motors the Garrard Engineering and Manufacturing Co., Ltd. (Stand No. 256) will show electric motors of the universal and induction types. Giant models, about twenty times normal size, of both electric models will be features of the display on this stand. The problem of electrical noise has been solved by the Henderson Wireless and Electrical Service (Stand No. 231) in their new A.E.D. Electric-Clockwork motor. During the playing of the record the clockwork motor supplies the driving power, the



Garrard induction type gramophone motor.

supply current being cut off, so that no interference is experienced. An automatic switch worked by a stop on the tone arm brings into operation the electric motor at the end of each playing, which rewinds the clockwork ready for the next record and automatically switches off when the spring is fully wound.

In conclusion, the gramophone enthusiast will find an interesting little gadget on the stand of A. F. Bulgin and Co. (Stand No. 103). This is a dual-purpose pilot light which not only indicates when the amplifier is switched on, but also directs a shaft of light on to the record to facilitate engagement of the needle to the outer groove.



Valve Improvements

It will be remembered that the last two Exhibitions were each made conspicuous by the general release of valves entirely new in principle. Reference is made to the screen-grid valve, the pentode, and valves with indirectly heated cathodes. While the Exhibition which is about to open will not be characterised by any fundamentally new principles in valve design, we shall see the healthy consolidation of principles already well tried and consequent stabilisation of receiver design. In view of the premier position which they hold in the world's valve industry our manufacturers can

valve for A.C. or D.C. all-mains sets. The A.C. resistance has been reduced to 1,050 ohms and the slope is increased to 3.3. With the maximum anode voltage of 200 an undistorted output of some 1,000 milliwatts is available—enough for a moving-coil speaker and nearly all domestic purposes.

On the Mullard stand we shall see a series of new A.C. power output valves with *directly heated* filaments consuming 1 ampere at 4 volts. Not only does the indirect cathode type of construction not lend itself particularly well to large output valves, but also the absence of a separate heater helps in making the provision of automatic bias a much simpler problem. These considerations have led the Mullard Company to market the AC.104, AC.064, and AC.044, whose A.C. resistances range from 1,150 to 2,850 ohms. The maximum anode voltage is 200, and a glance at the characteristics suggests undistorted outputs in the order of 1 watt. Hum will not be introduced, first due to the thick filament and secondly, owing to the absence of subsequent amplification. The new high voltage pentode—the PM24B—also has a heavy one-ampere filament of the directly heated type, and is capable of enormous output when working into a load of suitable value. Anode and screen voltages up to 400 and 300 respectively may be

applied. The D.O.25 is a newcomer in the large power output category demanding 1.8 amps. at 6 volts. The maximum anode voltage is 400 and the A.C. resistance 1,150 ohms. The A.C. screened valve—the S4V—now becomes one of a family of three; the two new additions being the S4VA and the S4VB. These two valves have A.C. resistances respectively of 430,000 and 250,000 ohms, so that the set designer who may have in mind the use of some special tuning coil now has a wide choice of S.G. valves. In our review of the S4VA a short time ago it will be remembered that very



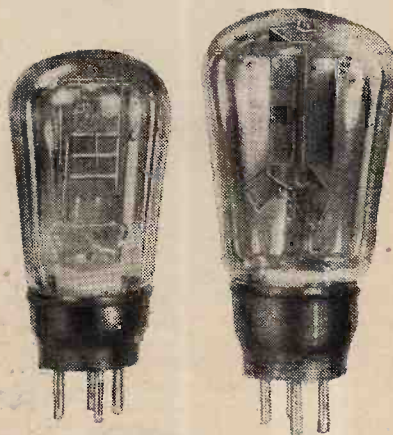
New Osram PX4 valve.



Marconi MHL4 with high mutual conductance.

afford to rest on their laurels awhile, and give attention to such details as consistency of characteristic and general improvement of performance.

It is befitting that we should first describe the latest indirectly heated valves of the General Electric Company, for in producing the KLI in 1926 they can fairly be called pioneers of this class of valve. The Osram MS4, MH4, MHL4, and ML4 have all undergone improvement. The first of these—the screen-grid member—has a mutual conductance of 1.1, and this, together with the remarkably low interelectrode capacity of 0.0025 μF ., ensures high stage gain with stability. The MHL4 has greatly improved constants; the amplification factor of 20 and A.C. resistance of 8,000 ohms are particularly suited to power-grid detection where high anode voltages are used with the grid at zero. The MH4 has a modified slope of 2.2, a well-defined bend in the grid current curve, and should be useful for any of the three forms of detection. The new directly heated PX4 is a very suitable output

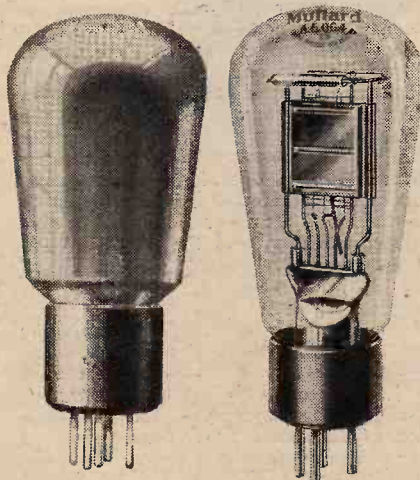


(Left) Mazda P.220A—a two volt power output valve. (Right) The AC/HL valve with improved characteristics.

favourable comment was made concerning the interelectrode capacity of about 0.0015 μF .

The Marconiphone Company will be showing a new valve—the H.2—having an amplification factor of 35 and an A.C. resistance of 35,000 ohms. Its grid current characteristics are specially suitable for leaky grid detection, and the method of support of the filament renders the valve quite non-microphonic; these are ideal properties for use in a portable set. Besides the MH4, MHL4, and ML4 series which have greatly improved characteristics this season, there is an inexpensive mains rectifier added to the U5, U8, U9 range. It is styled the U10 and will give 60 m.A. at 265 volts across a 4-mfd. condenser when the R.M.S. input is 250.0-250 volts. The three pentodes—the PT.240, PT.425, and the PT.625—are retained, and there is a slight improvement in characteristic.

On the Ediswan stand will be seen the well-known range of Mazda valves, to which one or two additions have lately been made. There is the P.220A with a

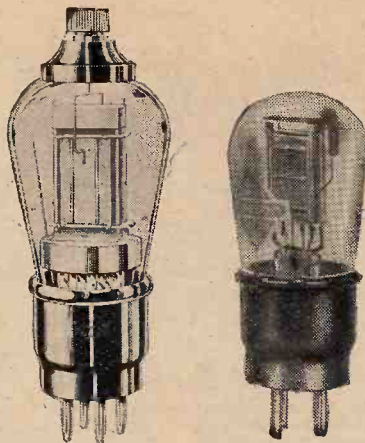


Two new Mullard valves. (Left) The PM24B a high-voltage pentode. (Right) The AC.044—a 4 volt 1 amp. power valve

Show Forecast.—

2-volt filament, an A.C. resistance of 1,850 ohms, and the remarkable slope of 3.5. With quite a modest grid swing sufficient power output is obtained to load adequately most moving-iron loud speakers. The AC/PEN—the first indirectly heated pentode—will be examined with interest, for not only will it provide a “humfree” output of some 1,400 milliwatts when used in the output stage, but also as a power-grid detector it can perform the dual function of power output valve and detector, and be arranged to feed the loud speaker direct without any intermediate L.F. stage. The AC/HL valve, well recognised as a highly efficient detector, has been given an even better mutual conductance.

The new Cossor battery S.G. valves will attract much attention in view of their negligible residual capacity. Besides the stable high-stage gain available there is the excellent feature of low-valve base



(Left) The new Cossor screen-grid valve—the 215 SG. (Right) A non-microphonic detector—the Cossor 210 Det.

loss and satisfactory grid-current curve, the effect of which has lately been discussed in these pages. A new non-microphonic detector—the 210 Det.—will also be shown. Its filament is supported at five points and the grid current characteristics shows a cut-off at zero grid volts. The objectionable microphonic howl so often set up by the loud speaker in a portable set should now vanish. The 4XP is a new power output valve in the Cossor series with a heavy 0.6 amp. filament for raw A.C. heating. As its A.C. resistance is but little more than 1,000 ohms, there should be available a large watts-dissipation—always a criterion of generous loud speaker output. Great improvements will be seen in the valves with independently heated cathodes. The mutual conductance—which, after all, is a measure of the “goodness” of a valve—has increased substantially in each case; the 41MP, for instance, having a slope of 3.5, while that of the 41MHF is 2.3.

A CONTRAST IN TRANSMITTERS.

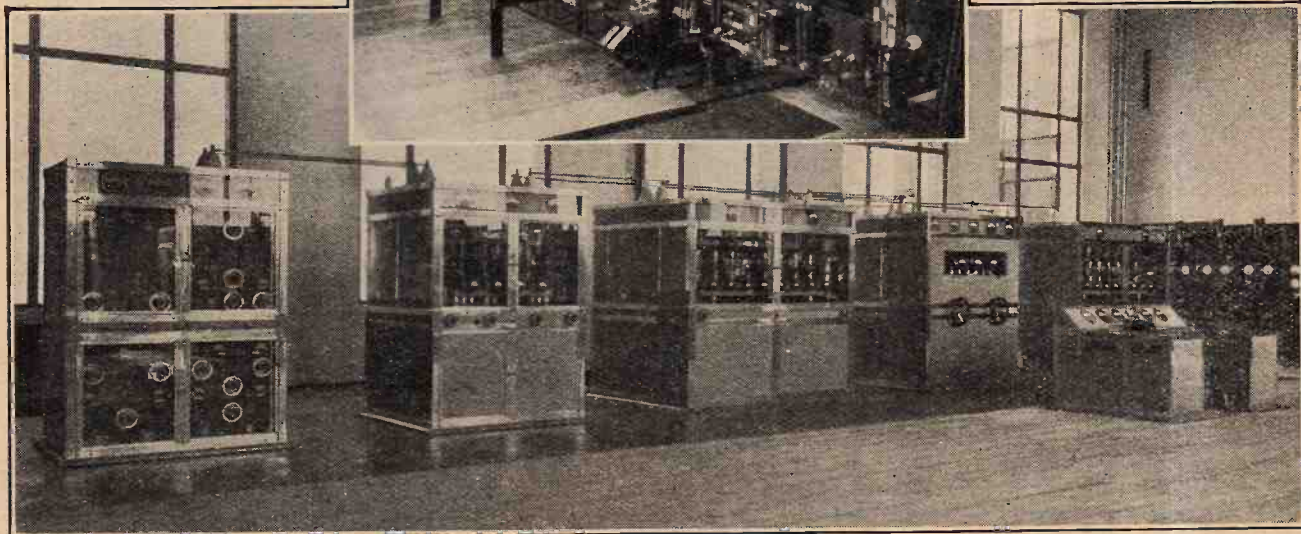
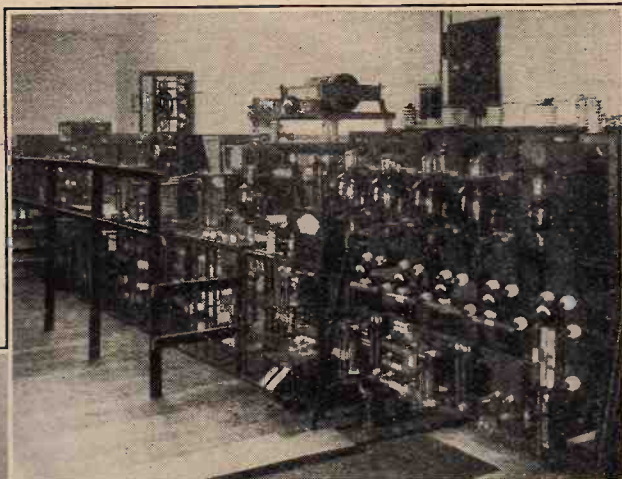
NOT the least impressive exhibit at Olympia will be the original 2LO transmitter used at Marconi House in 1923, in the days of the British Broadcasting Company. This historic collection of apparatus will be completely re-erected on the stand of the B.B.C., together with other interesting gear.

The average listener, concentrating his attention on the advances in receiver design in the past few years, may sometimes overlook the steady progress made at the transmitting end. A glance at the photographs on this page reveals the revolutionary changes in transmitter design during the last seven years. The Marconi transmitter seen in the upper photograph represented the peak of efficiency at the time it was

brought into use, and served its purpose admirably. Indeed, it can be said that the receiver of those days required nothing better; if the modern transmitter at Brookmans Park could have existed in 1923, half its fragrance would have been wasted on the desert air, particularly on the lower frequencies!

Probably the greatest development is seen in the construction of the valves. Those in the Marconi House transmitter were subject to overheating, and led short lives. At Brookmans Park water-cooled valves are used.

The unit system of construction, already evident in the earlier transmitter, has been fully developed at Brookmans Park, simplifying the task of maintenance, the location of faults, and valve replacement.



ANCIENT AND MODERN. The upper photograph shows the original 2LO transmitter which the B.B.C. will exhibit at Olympia. In strange contrast appears the latest B.B.C. regional transmitter at Brookmans Park, seen in the lower photograph.



Talking Along a Beam of Light

By M. LEEUWIN.

THE PHOTOTONE.

MONSIEUR VICTOR (*Villa de la Falaise, Boulogne*):
"Oh, Charmante Mees!
At last I 'ave adjusted ze
Vinder of your Chambare!
Oh! mon Angelina!!"

MISS ANGELINA (*The Lees, Folkestone*):
"Hush,
Monsieur Victor! Not so
loud! Remember that
Anna Maria sleeps in the
next room!!"

(Reproduced by permission of the Proprietors of
"Punch.")



A New Field of Experiment for the Amateur.

FOLLOWING on the imposition by Post Office regulations of quartz crystal control to experimental transmitting gear, a rapid decline has gone on in amateur transmitting activities in consequence of the complication and expense involved. Attention is now turning to a new field of experiment brought about by the enormous improvement in the working of the photoelectric cell. Already several amateurs are successfully pursuing the fascinating field of experiment offered by establishing communication along a beam of light. To further this interest practical details are given in this article of simple apparatus used for establishing successful two-way working. Experimental work possesses great attractions, and here again the amateur is afforded the opportunity of contributing his share to the progress of radio.

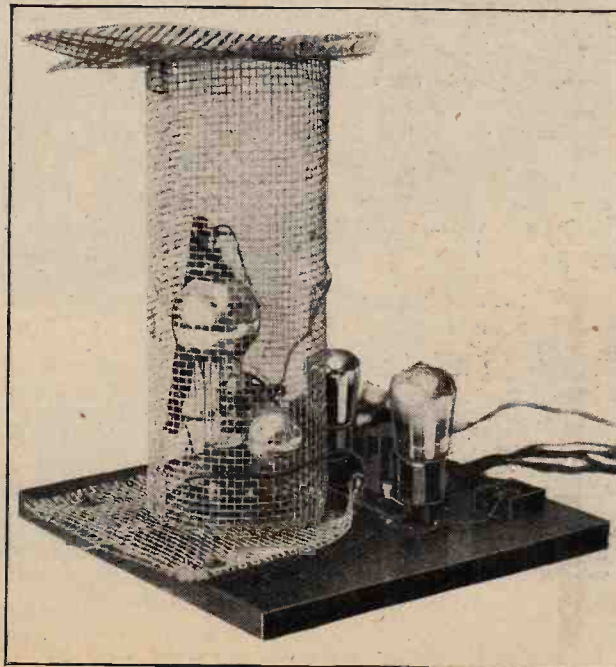
THE history of communication by means of light-waves is as old as the history of communication itself. Even in the grey past light-signals seem to have been in use for the transmission of urgent or important messages. It seems, therefore, quite natural that even in more recent times much attention has been paid to this means of communication not only in the form of the heliograph apparatus, but also the various types of apparatus developed towards the end of the past century and the beginning of the present one. In this connection mention might be made of the experiments of Bell and Tainter, who in 1880 succeeded in establishing telephonic communication over a beam of light. In their early experiments they used sunlight, but later on they turned their attention to the possibilities of using an arc lamp. (Shortly after these remarkable experiments there appeared in "Punch" (1880) the cartoon which is reproduced in the heading of this article.)

During 1897 Professor Simon, of Göttingen, noticed

that when an alternating current was superimposed upon the continuous current feeding arc lamp the arc emitted sound, thus turning attention to the possibilities of the singing arc lamp. This discovery enabled Ernst Ruhmer in the year 1902 to establish telephonic communication by means of a talking arc lamp and a selenium cell, and in the course of the year he succeeded in covering quite reasonable distances. At first successful communication over nearly four kilometres was obtained, and later on this distance was extended to seventeen kilometres. Eventually, Ruhmer succeeded in establishing two-way communication over the considerable distance of thirty-five kilometres.

The Experiment Modernised.

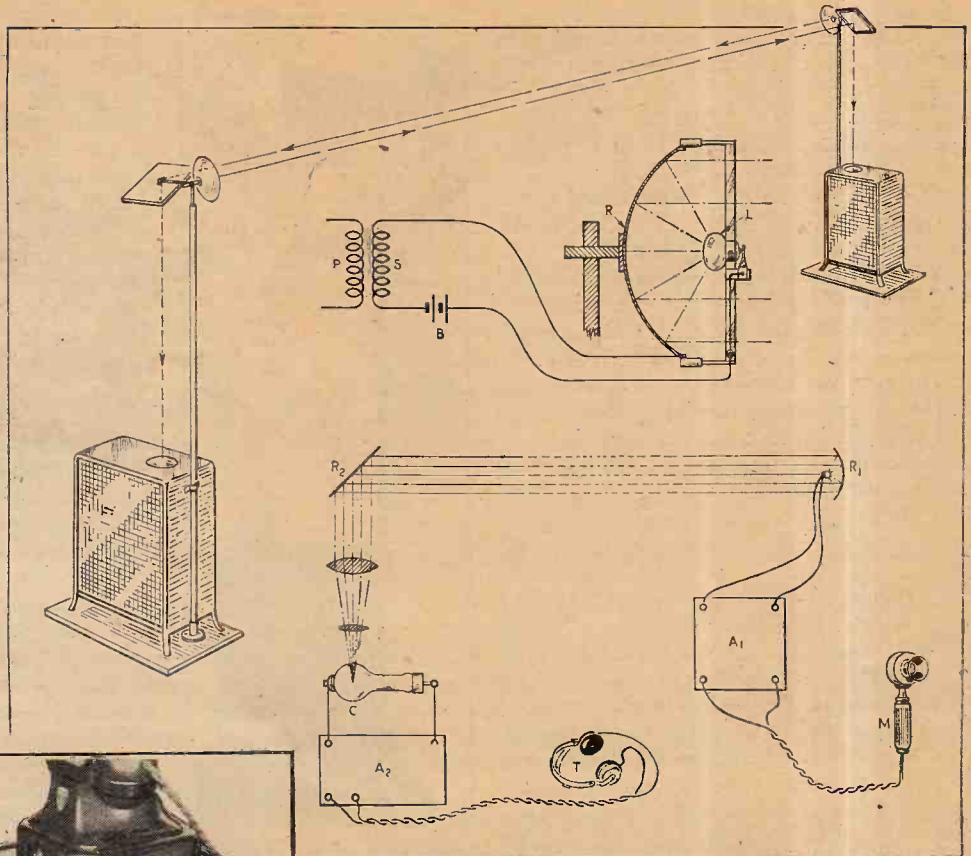
Photo-electric cells, extensively used at present for talking films and similar purposes, are far better suited for the receiving end of such a telephone system than is a selenium cell. The apparatus here described, chiefly being designed for demonstration purposes, was



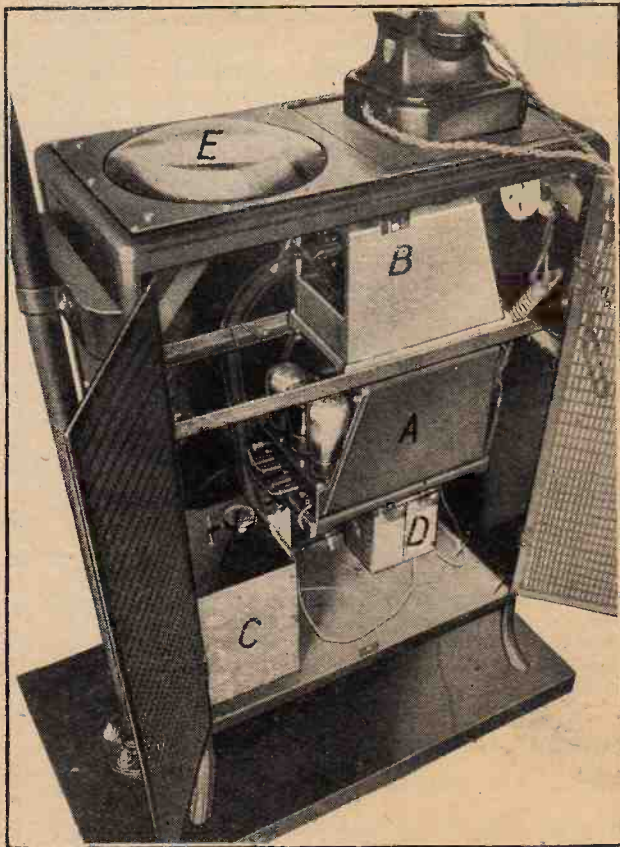
The photocell unit with its electrostatically screened cell and three-stage amplifier.

Talking Along a Beam
of Light.—

constructed to be as simple and reliable as possible. It was considered that the use of an arc lamp at the transmitting end would involve the setting up of complicated and costly apparatus, and as a result an alternative system was developed. At first the possibility of using a glow discharge lamp, such as a specially constructed neon lamp, was investigated, and experiments showed that extremely good results could be obtained. Unfortunately, communication could only be established over comparatively short distances, owing to the small intrinsic brilliancy of the glow discharge, making it difficult to obtain a sufficiently powerful beam of light.



Schematic diagram, showing the setting up of apparatus for two-way working.



The well-finished receiving unit in which the light is concentrated through the lenses E and F on to the photocell contained in the compartment C, the output being passed on to the L.F. amplifying equipment A, B and D.

Further tests were then made in order to determine what results a normal flashlight bulb would give if properly "modulated." Contrary to expectations, it was found that a splendid reproduction of speech and music could be obtained, but the need to provide an initial biasing current to the filament was quickly revealed. One would expect the inertia of the glowing filament to be so great as to prevent the temperature following the rapid current variations caused by the higher note-frequencies. Measurements, however, demonstrated the rather astonishing fact that even frequencies as high as 7,000 cycles were very well reproduced. The explanation of this effect is not quite clear at the present moment, but undoubtedly the cooling of the filament at the suspension points plays an important part.

Practical Details.

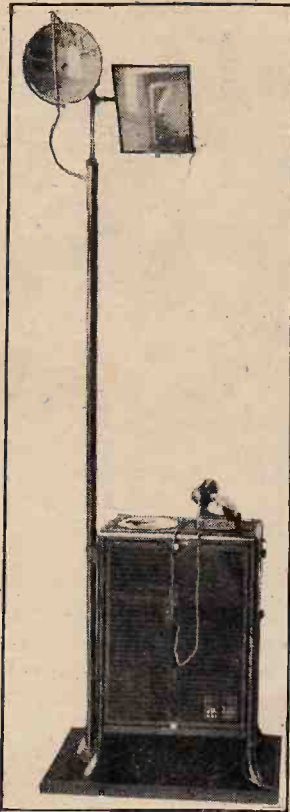
As will be easily understood, a biasing current is necessary, as otherwise the current impulses would have to "warm up" the filament every time and distortion on a disastrous scale would result. By applying a biasing current the filament is brought to a convenient degree of incandescence, and the alternating currents superimposed on the circuit are faithfully translated into light-intensity changes.

The very simple circuit in which the flash-lamp bulb is used is shown, P being the primary of the output transformer of the amplifier and S the secondary, the

Talking Along a Beam of Light.—

impedance of the latter being adapted to the resistance of the filament. Preliminary experiments were carried out with quite simple apparatus, amplified speech signals originating from a Philips type 25II receiver, having a low-impedance output exceedingly well suited to the purpose. The reflector of an ordinary cycle lamp served as the projector. Later and in the more final arrangement, the bulb was mounted at the focus of a parabolic mirror in order to obtain a very narrow beam.

The receiver used in the first tests consisted of a well-screened photo-electric cell coupled by means of a very high resistance to a three-stage transformer-coupled amplifier. In order to keep stray capacities, which with the high coupling resistances used would have a detrimental effect on the reproduction of the high-note frequencies, as small as possible, the first amplifying valve was "decapped" and placed inside the screening very close to the coupling resistance. During the tests it was found that if the beam was properly concentrated and a suitable optical system was used at the receiving end in order to focus all the light received on the photo-cell, one stage of amplification after the photo-cell was sufficient for good telephone strength. It was also found that the output of a normal power pentode, such as the PM24, was sufficient to "modulate" the transmitting lamp deeply. From this it will be clear that the installation can be extremely simple to construct.



The light beam telephone, providing call-up signal and two-way conversation.

In order to demonstrate two-way conversation by this system two exactly similar sets were built. Each has a mast supporting the receiving and transmitting mirrors. The received modulated beam is cast by a flat mirror tilted at an angle of 45 degrees on to a large condenser lens, which focuses the beam with the aid of a smaller correcting lens, so that it just passes through a half-inch hole in the screening box containing the photo-cell and amplifying stage. This box can be seen in an accompanying illustration at C.

"Calling-up" Signal.

To make the communication as complete as possible, provision was also made for "ringing up." To this end the selector mechanism of the automatic desk telephones was connected so as to interrupt rapidly the feed current of the bulb applied for initial biasing. The selector was so adjusted that when turning from zero the light was interrupted twenty times. In this way it proved quite possible to ring up the opposite station over the light beam. By means of a switch and an additional amplifier provision was made for reproducing by loud speaker music transmitted by the other station. The quality of this reproduction was very good, as was the telephonic two-way communication. (This interesting apparatus was demonstrated by Philips exhibition at Enschede (Holland), and is now being exhibited at the World Exhibition at Antwerp.)

PRINCIPAL TIME SIGNALS OF THE WORLD.

(Particulars of signals from other important stations will be included in subsequent issues.)

RUGBY, GBR.

Wavelength : 16.01 kilocycles (18740 metres).

Times of Transmission : 09.55-10.00 and 17.55-18.00 G.M.T.

System : Rhythmic (or Vernier) signals, consisting of 306 signals in 300 seconds (61 signals in 60 seconds), those at the even minutes being dashes of 0.4 seconds duration and the remainder dots. Each dash begins at the exact minute and the final dash denotes the even hour. These signals are preceded by a series of dots sent for 15 seconds for tuning purposes only.

NAUEN, DFY (Germany).

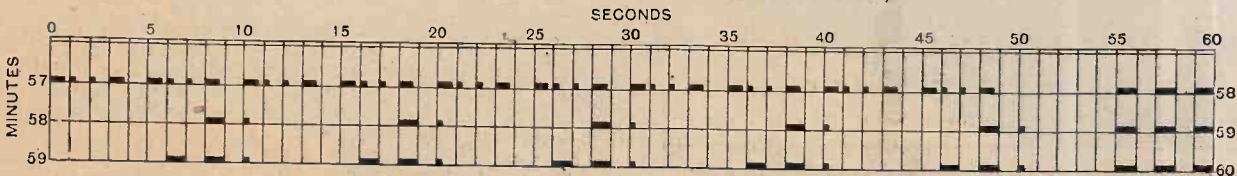
Wavelength : 183.5 kilocycles (1635 metres).

Times of Transmission : 11.55-12.06 and 23.55-00.06 G.M.T.

Preliminary Signals : A series of Vs (---) followed by attention call, CT ---, Call sign, DFY --- and MGZ (G.M.T.) ---

International (Onogo) System (from Deutschen Seewarte, Hamburg). Followed by Rhythmic Signals at 12.01-12.06 and 00.01-00.06 G.M.T. (see Rugby GBR).

Relayed from Norddeich DAN and Königswusterhausen on 183.5 kc. (1635 metres).



Old International (Onogo) System adopted at the Conference Internationale de l'Heure, 1912-1913.

Unbiased.

By
FREE GRID.

Pity the Poor Service Man.

MUCH acid has flowed over our carpets since the birth of broadcasting gave us all something fresh to grouse about, and although commercial receiver design has made steady progress since that date, with one or two notable exceptions, no reliable service system has been organised by the big manufacturers. Furthermore, they have done little to make trouble tracing as straightforward as possible for the radio doctor by the obvious method of supplying with the instrument a diagram of the circuit employed. Nobody who has not tried it can fully appreciate the length of time taken up in working out the diagram of, say, an all-mains set by the painful process of tracking each individual wire to its lair. A straightforward theory diagram minus all switching and other frills and also a detailed diagram would be all that would be needed, and these could well be mounted in some easily accessible position, such as inside the lid of the cabinet.

The old argument that the circuit employed is secret and "unique" will no longer hold water to-day. No good manufacturer has anything to lose by disclosing the circuit he uses. This old cry of "unique circuit" was originally raised by certain manufacturers of the baser sort in order to conceal the poverty of the land in the matter of sound design. The home constructor who makes a foolproof set for the benefit of his maiden aunt, and then very wisely departs into a far country, might also take heed and have pity on the unfortunate man who sooner or later will be called upon to effect some repair to the horror he has perpetrated. Fortunately, really knowledgeable wireless service men are becoming less scarce, at any rate in the larger centres of civilisation, although in small county towns the set owner still finds himself between Scylla and Charybdis, or, in other words, between the local plumber and a member of some foreign radio-engineering institute.

The Set of the Future.

At the moment it is a little difficult to see upon what lines the set of the future is going to develop. Just at present the completely self-contained transportable receiver seems to be yielding to the competing claims of the radio-gramophone, more especially in the case

of those listeners whose homes are equipped with A.C. mains. The transportable possesses the advantage that it can be taken from room to room as desired, but one cannot very well build into it a turntable and gramophone motor. Probably the outcome will eventually be the use of a massive radio-gramophone with separate moving coil loud speakers in other rooms for those with plenty of spare cash, whilst the transportable with a jack for the gramophone pick-up will hold sway amongst those of us who cannot afford the more ambitious apparatus.



—and then very wisely departs into
a far country—

Staging a Come-back.

Judging from certain rumours that have reached me, the superheterodyne receiver which enjoyed such a great vogue five years ago, threatens once more to become popular, especially amongst those who are in a position to supply its rather large power requirements from a handy wall plug. During the past two or three years, this method of reception has been rather overshadowed by the "straight" type of set. One of its greatest drawbacks which led to its downfall, of course, was the large number of valves which had to be employed, which resulted in a rather big bill for upkeep. Another shortcoming was the rather lamentable quality with which its name became associated, chiefly owing to bad design. Great strides have been made, however, in all directions since 1925, and it would not surprise me to see this old favourite take its place again as the set par excellence.

When Broadcasting is Eclipsed.

Anybody who heard the remarkably clear telephony from Australia on the occasion of the inauguration of the new £2 per minute service between this country and the Antipodes some months ago must have piously wished that it was always possible to receive Australian short-wave broadcasting programmes with such clarity and strength. Indeed, somebody cynically remarked in my hearing that it was a pity that the ordinary local telephone service was not equally as clear. Seriously, though, it is surprising how many people do not realise that constancy of the signal strength compared with that from 3LO is due not so much to the power employed as to the use of the beam or directional system instead of the power wasting broadcasting system.



But not at £2 per minute.

The Big Push at Olympia.

A kilowatt and a half will be handled by the last stage of the big amplifier which the B.B.C. are displaying to visitors at Olympia. This power will be required to operate the 250 loud speakers distributed throughout the Exhibition buildings.

Guaranteed Music.

It would be a big surprise if the B.B.C. ran short of music. No risks are being run; the National and Regional programme will both be "on tap," and a line is also being taken from the B.B.C. stand to a microphone in the dance-band enclosure. There will also be a gramophone on the stand itself, and a local microphone into which, in an emergency, the engineers can sing.

Remote Possibility.

The last will only occur if "Nat." and "Reg." are both giving talks, the dance band is missing, and all records are smashed.

"Our Own Make."

Caution is also revealed in the decision to manufacture the necessary power on the B.B.C. stand itself. The motor generator set feeding the power amplifier will comprise a motor driving two generators, one supplying 3,000 volts H.T., and the other providing 18 volts for the valve filaments.

B.B.C. Grows Bolder.

The few who favoured the controversial ban of two years ago, when B.B.C. talkers were mentally muzzled before reaching the microphone, will shudder more than once during the coming winter.

The boldest move in the B.B.C. talks policy is the inclusion of a series of addresses on "Science and Religion." Without exception, the speakers are noted for their outspokenness; they number twelve, and I doubt whether any two will display close agreement.

Righter Sundays.

Among the speakers are Professor Julian Huxley, Dr. J. S. Haldane, the Bishop of Birmingham, the Very Rev. H. R. L. Sheppard, the Rev. C. W. O'Hara, S.J., and Dean Inge. The talks are to be given between 5.45 and 6.15 p.m. on Sundays, beginning on September 28th.

Talks on the Birth-rate.

"Standing Room Only" is the title of another important series of talks which will deal with the highly topical question of population. Eugenics and the fall of the birth-rate will also receive attention in talks entitled "A1 or C3?"

Enough Said.

Mr. George Lansbury's name is now coupled with that time-worn suggestion that the B.B.C. should broadcast physical training instructions before breakfast. As in other matters, the B.B.C. is guided on this question by the attitude of public opinion.

A B.B.C. official tells me that the Corporation has not received half a dozen letters on the subject in the last four years.

Broadcast Brevities

By Our Special Correspondent.

Relays from America.

The checking of European wavelengths is a routine job which calls for a good deal of patience and absorbs most of the time of the engineers at the Tatsfield receiving station. Sometimes, however, they find opportunities to tune in the American short-wave stations, and with the approach of winter it is likely that listeners will occasionally be regaled with snatches of the American programmes.

No regular schedules are to be attempted.

The Two Bostons.

Provided atmospheric conditions are satisfactory, listeners will hear a relay from Boston (U.S.A.) this evening (Wednesday), when Mr. Reuben Salter, Mayor of Boston (England), will give a talk about the Boston (Massachusetts) Tercentenary celebrations.

FUTURE FEATURES.

National (261 and 1,554 metres).
 SEPTEMBER 22ND.—"R.U.R.," a play by Karel Capek.
 SEPTEMBER 23RD.—Vaudeville programme.
 SEPTEMBER 24TH.—Russian folk music, orchestral programme.
 SEPTEMBER 25TH.—Talk on the League of Nations Assembly, from Geneva.
 SEPTEMBER 27TH.—Promenade concert.

London Regional.

SEPTEMBER 21ST.—Chamber music concert.
 SEPTEMBER 22ND.—Popular Band programme.
 SEPTEMBER 23RD.—Promenade concert.
 SEPTEMBER 24TH.—Orchestral concert.
 SEPTEMBER 25TH.—"R.U.R."
 SEPTEMBER 26TH.—Promenade concert.
 SEPTEMBER 27TH.—"The Ridgeway Parade."

Midland Regional.

SEPTEMBER 25TH.—"That Reminds Me..." feature programme.
 SEPTEMBER 27TH.—Commentary on Rugby Football Match, Coventry v. Bristol, relayed from the Coventry R.F.C. Ground, Coventry.

West Regional (Cardiff).

SEPTEMBER 23RD.—Band concert, from Bristol's Annual Exhibition, Colston Hall, Bristol.
 SEPTEMBER 26TH.—A Welsh Programme by some of the Victors at the National Eisteddfod, Llanelli, 1930.
 SEPTEMBER 27TH.—Eric Coates orchestral programme.

North Regional (Manchester).

SEPTEMBER 23RD.—Orchestral programme of Spanish Dances.
 SEPTEMBER 26TH.—Scandinavian music.

Glasgow.

SEPTEMBER 21ST.—Evening Service, relayed from Paisley Abbey.
 SEPTEMBER 26TH.—A "Very Young" instrumental concert.

Belfast.

SEPTEMBER 27TH.—"Snippets," a Selection of Odds and Ends.

A Papal Relay in Britain?

From Rome comes an authoritative report that the Pope will give a personal address to the world from the new Vatican short-wave station during October. Although no definite plans have been made, I understand that the B.B.C. sees no obstacle in the way of a relay *via* Tatsfield. The speech of His Holiness would probably go out from Daventry (long wave), and one or more of the Regional transmitters.

The Language Question.

Before a decision is arrived at it will be necessary to know in what language the Pope will speak and whether interpreters will be employed. There would be few listeners to a Pontifical talk in Latin.

Wanted: Music for Broadcasting.

The influence of Mr. Adrian Boult's musical regime at Savoy Hill is reflected in the appeal to composers to submit their new work to the B.B.C. Already a tremendous amount of original material is offered, so that it has become necessary to warn composers that works must be submitted before the end of February in each year to stand a chance of inclusion in programmes of the following autumn and winter.

This explains why the B.B.C. encourages the *young* composer; he has reasonable expectations of hearing his works performed.

Composing in the Bath.

The modern composer enjoys facilities which might have changed musical history if they had been available to Bach, Beethoven and Company.

When Philip Ridgeway gets ideas for songs for his broadcast shows, he stops whatever he happens to be doing at the time, and sings the new tune into a dictaphone. Sometimes ideas come to him in the middle of the night; sometimes he is in his bath.

Further editions of "The Ridgeway Parade" will be heard by listeners on September 26th and 27th, October 6th, 8th, 17th and 18th.

A Baronet's Dance Band.

Sir Robert Peel's Dance Band, which is now heard regularly in the Midland Regional programme, is said to have had a philanthropic origin. Sir Robert, who is a descendant of the man who formed the modern police force, was touched by the conditions in the mining districts of Staffordshire, so he organised a club for unemployed miners. From among the members he formed a small band which grew and improved until it was skilled enough to appear professionally.

Sir Walford Davies.

That genial "Master of the Microphone," Sir Walford Davies, will need no introduction on Tuesday, September 30th, when "Music and the Ordinary Listener" takes on a new lease of life. Sir Walford will deal with pure and applied music, a distinction corresponding to that between pure and applied science.

READERS' PROBLEMS

The Service is subject to the rules of the Department, which are printed below; these must be strictly enforced in the interest of readers themselves.

Information on Free Bias.

Can you refer me to a text book in which full information is given on the subject of automatic grid bias in A.C. and D.C. mains-driven receivers?

D. B. H.

As far as we know, this essentially modern subject is not treated exhaustively in any text book, at any rate from a practical and up-to-date point of view. A good deal of space has been devoted in the pages of *The Wireless World* to problems of this sort, and we would especially refer you to an article entitled "Mains Sets and Grid Bias" in our issue of December 4th, 1929.

o o o o

High-loss Switches.

Is it possible for a switch of poor quality to cause an appreciable falling-off in signal strength when it is used for short-circuiting the long-wave section of the "tuned grid" intervalve coupling coil assembly?

The receiver in which the switch is included functions very satisfactorily on the medium band, but it is not nearly so good on the long-wave side unless the switch is completely disconnected, when volume is audibly increased, but only after retuning. Does this prove conclusively that the switch is definitely at fault?

R. d'A. C.

It seems that your switch is really intended for "D.C." work; it is probably of the jack type, with an exceptionally

RULES.

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(2.) Only one question (which must deal with a single specific point) can be answered. Letters must be concisely worded and headed "Information Department."

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(4.) Designs or circuit diagrams for complete receivers or eliminators cannot ordinarily be given; under present-day conditions justice cannot be done to questions of this kind in the course of a letter.

(5.) Practical wiring plans cannot be supplied or considered.

(6.) Designs for components such as L.F. chokes, power transformers, complex coil assemblies, etc., cannot be supplied.

(7.) Queries arising from the construction or operation of receivers must be confined to constructional sets described in "The Wireless World"; to standard manufactured receivers or to "Kit" sets that have been reviewed used in their original form and not embodying modifications.



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high capacity between the blades, and is constructed with very poor dielectric material. An effect such as you describe has been brought to our notice on more than one occasion, and we have little hesitation in saying that your switch is to blame.

o o o o

Insulated Condenser Spindles.

I notice that plain condenser dials are specified for the "All-D.C. Three"; as far as I can see, there would be no objection in using slow-motion controls for the tuning condensers, provided that the spindles were properly insulated.

Will you please confirm this point?

J. D. S.

This is not quite correct. Matters are so arranged that the low-potential sets of vanes of the variable condensers used in this set are insulated from the mains, always provided that an accidental short-circuit does not take place. There is no basic reason why any type of slow-motion dial should not be used.

o o o o

Stabilising a "Tuned Grid" Set.

My H.F.-det.-L.F. set is stable over the whole of the medium waveband, but self-oscillation is produced at the extreme lower end of the long-wave tuning scale. It is realised that this could be overcome by joining the anode of the H.F. valve (through the existing feed condenser) to a suitably chosen tapping point on the long-wave coil (the medium-wave inductance is already tapped), but this would involve the use of an extra pole on my wave-change switch. Is there any simpler way out of the difficulty?

W. S.

As self-oscillation is apparently confined to a very narrow band of wavelengths at the bottom of the long-wave tuning scale, we think it should be possible to put matters right by making a reduction in the capacity of the stopping condenser always used in arrangements of this sort to prevent short-circuiting of the H.T.

A selection of queries of general interest is dealt with below, in some cases at greater length than would be possible in a letter.

battery. We suggest that you should try a condenser with half the capacity of that at present in use; this alteration will probably prevent long-wave self-oscillation and should not impair performance on the medium waveband to any noticeable extent.

o o o o

Reaction Control of the "Regional One."

In the description of the band pass unit in your issue of August 27th it is stated that reaction control by means of an ordinary two-electrode condenser (as included in the unit) may be incorporated in the "Regional One" (August 6th), which employs a similar form of filter circuit.

As I have a spare variable condenser of 0.0003 mfd. which I should like to use, will you please tell me how this may be connected in place of the differential condenser as originally specified?

B.M.B.

This alteration is of an extremely simple nature, and, for ordinary requirements,

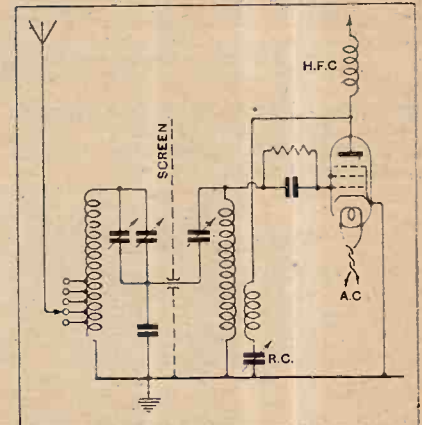


Fig. 1.—Modified reaction circuit for the "Regional One." The reaction condenser (R.C.) should have a capacity of not less than 0.0003 mfd.

all you will have to do is to connect the two-electrode condenser as shown in Fig. 1 of the article in which the "Band Pass Unit" was described.

A simple detector set of this kind is seldom used for long-distance reception, and so it follows that there will ordinarily be little need for critical adjustment of reaction. But in cases where it is desired to avoid all traces of hand-capacity effects the reaction condenser could be joined between the low-potential end of the reaction coil and "earth," as shown in the accompanying circuit diagram, Fig. 1.

Push-pull Detection.

I propose to do some experiments with push-pull detection; the rectifiers will be preceded by an H.F. stage, coupled by a transformer with a centre-tapped secondary. Will it be satisfactory to use an ordinary component—with, of course, the addition of a tapping—for this purpose?

W. M. J.

Strictly speaking, the ordinary type of H.F. transformer, as described from time to time in this journal, would not be entirely suitable. The normal low-potential end of the secondary, which is in close inductive relationship with the primary,

serve as "aperiodic" aerial-grid couplings.

By fitting separate aerial windings to the coils the necessary change may be made with the help of single-pole switches by connecting them as in Fig. 2 (b). This is probably comparable with your own method of "shorting out" the long-wave H.F. transformer windings.

Unless there is a particular reason for providing metallic isolation between aerial and closed circuits, matters may be further simplified by adopting the scheme of connections given in Fig 2 (c). In this case a separate primary winding

A Logical Conclusion.

My A.C. receiver works quite well when its anode circuits are fed (as a temporary measure, and for testing) from a borrowed accumulator H.T. battery, but is completely lacking in stability when the built-in eliminator is connected. This means, I suppose, that the eliminator smoothing circuits are responsible for the introduction of an excessive amount of impedance common to all anode circuits of the receiver itself. What should be my next move?

R. M. L.

It is only logical to assume that your eliminator is introducing inter-circuit

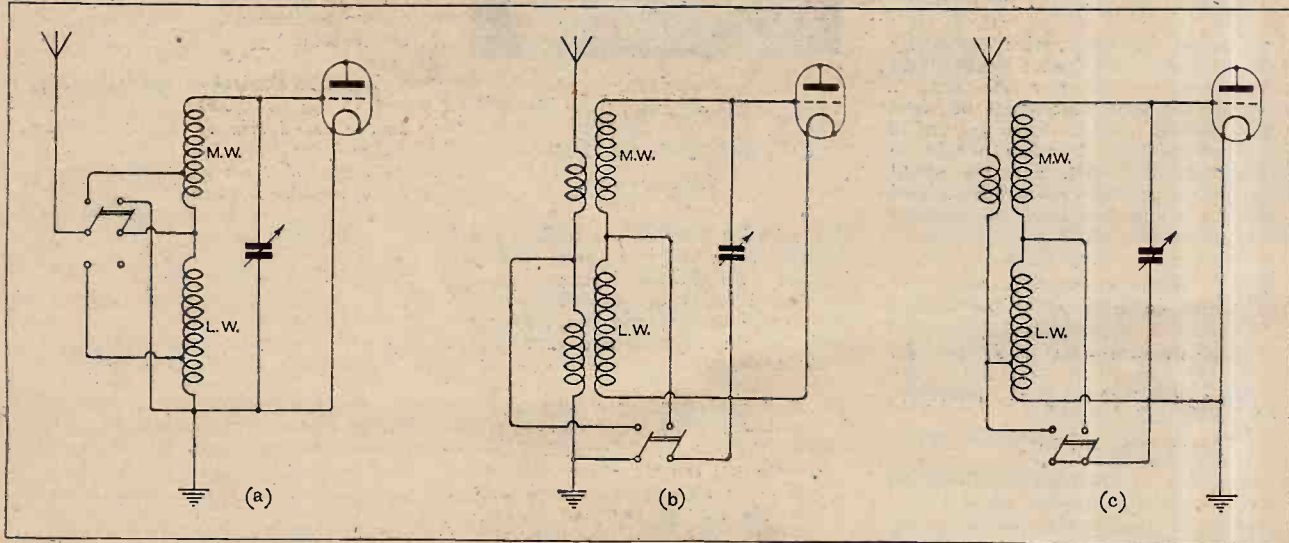


Fig. 2.—Switching connections for "aperiodic" aerial-grid couplings, with single- or double-throw switches. M.W., medium-wave coils; L.W., long-wave coils.

would be at high potential in a push-pull circuit. To preserve symmetry, it would be best to wind the primary coil over the centre part of the secondary.

o o o o

Input Circuit Switch.

For changing over from medium to long waves in my new 1-v-2 receiver (at present in course of construction), I have obtained two double-pole single-throw switches. It is quite clear to me how one of these is to be connected in the H.F. transformer circuit, but I cannot see how the appropriate aerial alterations can be made without using a double-pole (or change-over) switch.

Will it be necessary for me to obtain a new component? Any suggestions as to suitable methods of connection will be appreciated.

B. McF.

It is generally rather more convenient to use a double-pole switch for changing inductances and aerial connections in an input circuit, but it is by no means essential to do so.

The conventional form of connection is shown in Fig. 2 (a) any complication due to the use of a double-pole switch is offset by the fact that extremely simple auto-transformer tapped coils may

is required for the medium-wave coupling, but a tapped connection will suffice for the long-wave coil.

o o o o

The Detector Milliammeter.

Since adding a milliammeter in series with the detector anode of my receiver I have noticed that instability is evident over a part of the medium-wave tuning scale. Before this addition was made it was impossible to provoke self-oscillation.

Will you please tell me how the meter should be connected in order to avoid this trouble? C. L. D.

Your meter should be inserted in the lead from the low-potential end of the L.F. coupling component (transformer, resistance, or choke, as the case may be) and the H.T. positive terminal. A large by-pass condenser should be joined between the "live" meter terminal and earth, and the leads joined to the instrument should be twisted together. Further, it may be necessary to insert a decoupling resistance of, say, 1,000 ohms; this will be joined between the L.F. coupling component and the milliammeter.

We would add that the effect you describe would indicate that H.F. and L.F. components in the anode circuit of your detector are not thoroughly separated.

coupling, and, rather than attempt to generalise on this subject, we think our best course is to ask you to send us a complete circuit diagram, with values.

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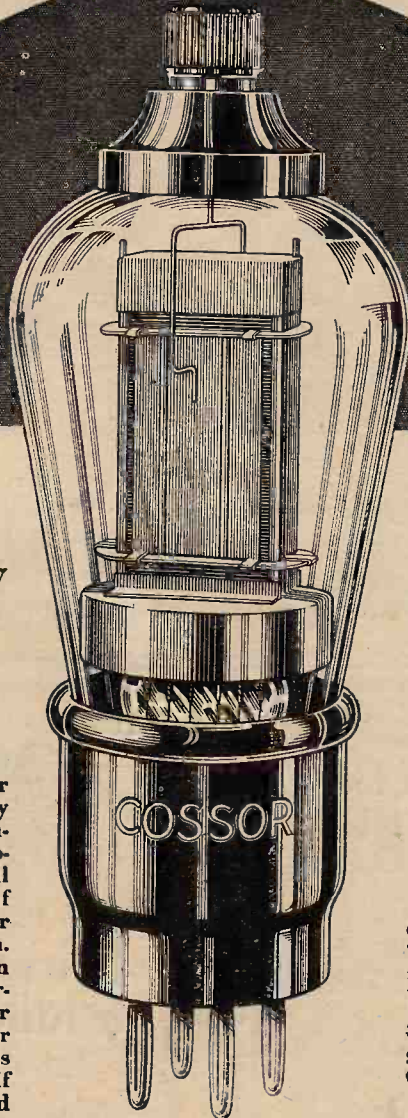
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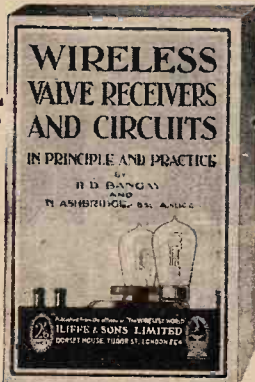
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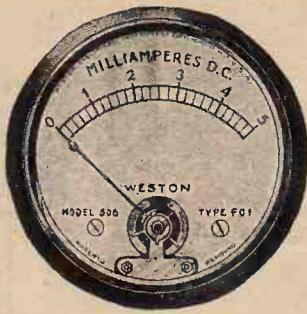
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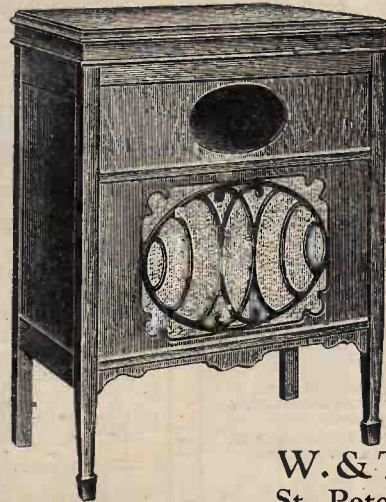
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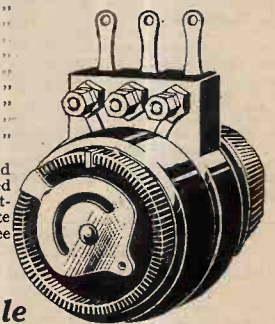
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Receivers for Sale.—Contd.

APPLEBY'S.
WHERE Radio Part Exchange Began ; a service under the patronage of notabilities and men of consequence all over the world which has accurately handled the requisitions of over 25,000 people, 84% of whom have repeated their first transaction.

THE Service is as follows : We can supply practically all the leading lines of radio apparatus on the market at current list prices ; if so desired we can accept in part exchange the reputable makes of the following apparatus : Receivers (domestic and portable), radio-gramophones, loud-speakers (cone and moving coil), cone units and chassis, battery eliminators and mains equipment components, battery chargers, remote control equipment, pick-ups and carrier arms, electric gramophone motors, H.F., L.F., and power chokes, condensers (variable, reaction, by-pass and smoothing), measuring instruments (high grade), L.F. transformers, slow motion dials (high grade), modern miscellaneous components ; valves and tuning coils cannot be accepted in part exchange except by special arrangement.

IN View of the Difficulty of Making Fair and Definite Offers for Material that we have not inspected, it is requested that apparatus tendered for part exchange be kindly forwarded to us for valuation ; no business can be proceeded with in connection with part exchange until material tendered has been examined ; in this connection there need be no fear, material is sent to us from all over the world, not a single item of customers' property has ever been lost or mislaid ; rejected offers from Xmas last amount to only 3.

IN Order to Furnish a Guide, the part exchange allowance may be gauged as approximately 50% of the list price of the article or articles tendered ; for some articles the allowance will be more, and for others somewhat less ; the allowance is entirely determined by the demand for individual articles, considering also their condition and production age ; amateur constructed receivers cannot be accepted in part exchange as receivers, their value lying wholly in the components contained in them ; only modern apparatus in good condition is accepted in part exchange ; material cannot be purchased by us for cash.

TERMS of Part Exchange Business : A minimum of 50% of the value of an order, plus carriage charge where due, is payable in cash, unless the value is below £1, when a minimum of 10/- is payable ; should the part exchange allowance exceed 50% of the total value of new requirements, the difference will be credited against future orders ; material may be deposited against a credit note, which may be utilised at a later date ; the maximum amount allowed to stand to the credit of any one individual is £200.

THESE Terms Have Been Made to the Lowest Economic Minimum, to give the customer the best value possible, while enabling us to maintain the standard required of this business.

SPECIAL Notice is drawn to the fact that by stipulating a minimum of 50% cash payable on part exchange orders, which is the same as stating that the part exchange allowance is credited to an order for not less than twice the allowance, you are ensured always of the best offer, as obviously the more we allow you the more you ultimately spend with us, to utilise your credit, if for no other reason ; note also the facility of depositing material against a credit note, it can be drawn upon as required, whenever you may be ; credit notes worth many thousands of pounds have been duly honoured upon presentation ; a credit note on Appleyb's is saleable, should the necessity arise, providing notice of transference is lodged with us at the time of sale.

AS Soon as Apparatus is Discarded from Use, dispose of it, don't keep it ; it is not only wasteful, but expensive ; the longer you keep it the older it is, and the older it is the less value it is ; exchange it for a part exchange credit note, the value of which is constant, and can be disposed of if necessary by the holder with greater ease and facility than an article or collection of articles can ever be.

YOU Will Do Well to Deal with Appleyb's ; there is more in part exchange than the mere allowance ; there is that something which begets confidence, that care that makes for efficiency ; in the recent words of an old customer : "Quite an embarrassing aloofness of purpose and an almost monotonous accuracy ; you will know that it is all British—British capital and British behaviour ; you will know also by dealing there that you are helping to employ British people."

SINCE the Day This Service Started it has Steadily Grown, not on rash advertising or subscribed capital, but on the volume of attainment only ; and in these days businesses do not grow by that means for nothing, therefore we are privileged to invite you to utilise this service, wherever you may live ; if you send your material by a carrier, pack it well, carriers are only human, and it is better to be safe than sorry ; if you live in London, call to see us, you will like the atmosphere, it savours more of sport and art than the searing curriculum of commerce.

APPLEBY'S, Chapel St., St. Marylebone, London (opposite Edgware Rd. Metropolitan Station, or 4 minutes from Marble Arch, Oxford St.) Tel. : Paddington 8828 (5 lines). [0340]

Receivers for Sale.—Contd.

A.C. Kilo Mag. Four, complete with valves, but less eliminator parts, aluminium cabinet, Wearite coils, £9; without valves, £6.—Thompson, 54, Ecclesall Rd. South, Sheffield. [1412]

PORTABLE Five, leather case, perfect; cheap; owner going abroad.—Newman, 4, Parade, Bath. [1427]

ATWATER KENT Five, on baseboard, without valves or batteries.—Russell, 103, Broomknowles Rd., Glasgow, N. [1423]

MULLARD S.G.P. 3-valve, with accumulator, nearly new; £6.—Wright, 155, Erskine Rd., Carshalton, Surrey. [1431]

ROTAX 3-valve Portable, new valves, batteries, good condition; £4/10.—Davis, 6, Warwick Court, W.C.1. [1430]

HIGH Power 4-valve Radio-gram, all mains, 240-250v. A.C. 5 w. output (LS5A), with Webson M.C. speaker, 3ft. x 3ft. baffle, B.T.H. electric motor, Westinghouse rectification throughout, enclosed polished Jacobean cabinet, size 4ft. 6in. x 3ft. x 2ft. 6in., suitable for hotel, club, or dance hall; price £75, cost over £130, with records; view 11 a.m.-10 p.m.—The Mitre Hotel, High Barnet, Herts. [1432]

YOUR Old Receiver or Components Taken in Part Exchange for New; write to us before purchasing elsewhere, and obtain expert advice from wireless engineer of 25 years' professional wireless experience; send a list of components or the components themselves, and we will quote you by return post; thousands of satisfied clients.—Scientific Development Co., 57, Guildhall St., Preston. [0226]

FERRANTI 3-valve Mains Receiver, 200-250v. A.C., absolutely new, must sell; £12, offer.—Box 7469, c/o The Wireless World. [1469]

UNWANTED Gift.—G.E.C. 4-valve kit, unopened carton, take £8/10; Undy moving coil, 6v. field. £2.—Box No. 7468, c/o The Wireless World. [1468]

BROWN'S 6v. Microphone Type Amplifier, cost £6/10, Pultograph, unused; cost £24, what offers?—Harding, Oaklands, Longton Avenue, Svdendam. [1459]

READ and MORRIS, Ltd., the mains pioneers, who in 1925 equipped the hospital with mains sets, still supreme in all-mains receivers and units.

LOW Tension A.C. Eliminators, permanently replacing batteries, now only £5/15; electrolyte condensers, 2,000 m.f., as used in above, 13/-; including postage.

CONSULT Us Before Buying Elsewhere.—Read and Morris, Ltd., 31, Eastcastle St. (facing back of Waring's), Oxford St., W. [1450]

DUNHAM S.G.3 Mahogany Cabinet, £4; Ecco A.C. eliminator, £4; Ecco charger and accumulator, £2; the lot £8/10; new condition, valves new; also 5-valve pedestal set, built to Marconi specification, £5.—Dolphin, 25, Oaklands Rd., Bromley. [1448]

McMICAL 7-valve Supersonic, mahogany, perfect, frame aerial, also 2 S.G. dect. R.C.C. set, mahogany, perfect; offers.—Upton, 62, Mortlake Rd., Kew Gardens. [1444]

3-VALVE Modern Receiver; £3 (royalties extra); splendid performance, equalling any set at double the price; particulars.—Minkow, 143, Amhurst Rd., E.8. [1440]

ROLLS-CAYDON 5-valve Portable, Osram valves, Celestion speaker; cost 18 guineas November, 11 guineas.—Ray, 23, Stratford Rd., Barnet, Herts. [1437]

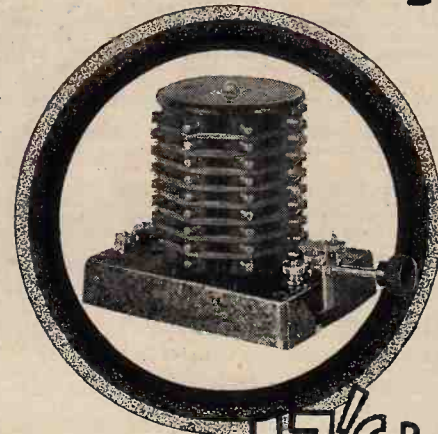
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PHILIPSON'S Safety H.T. Supply Units are Famous for Reliability and Silent Working.

OUR New Prices Again Make Them Famous for Value: for D.C. mains model D.C.4 gives 120v. at 15 m.a., 27/6; D.C.5, 150v. at 25 m.a., 1 fixed, 2 var. tappings, 35/-; for A.C. mains model A.C.7, 120v. at 20 m.a., £3; A.C.5, 150v. at 30 m.a., 1 fixed, 2 var. tappings, £3/17/6; A.C.6, for 25 cycle mains, £5.

PHILIPSON'S Safety H.T. Supply Units are Guaranteed for 12 months; write for our booklet, "Radio Power."

PHILIPSON and Co., Ltd., Radio Engineers, Astley Bridge, Bolton. Phone: 2038. Grams: Safety, Bolton. Est. over 50 years. [0318]

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CHESTER BROS.—Type W.10, for H.T., 3 or 4, output 135v. 50 m.a. and 4v. 4a., C.T.; 23/6.

CHESTER BROS.—Smoothing chokes, constant inductance, type O.B.2, 45 henrys, 25 m.a.; 15/-.

CHESTER BROS.—Write for lists of standard models. Please note change of address. [9793]

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SAVAGE'S Mains Transformers and Power Choke are carefully constructed from first class materials with an exceptionally generous margin of safety; they are fully guaranteed and may be purchased with confidence.

SAVAGE'S, 146, Bishopsgate, London, E.C.2. Phone: Bishopsgate 6998. [1283]

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BRYCE'S—Mains transformers easily made at home, including "Wireless World" transformers; write for instruction sheets.—Bryce's, 54, Dawson St., Bury, Lancs. [1460]

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CABINETS to Your Own Requirements; quotations by return.—Hammonds, 1, Stratford St. N. n. Eaton. [1234]

- H. & B. - KITS, SCREENS, COILS

We can supply any of the above for circuits described in this journal. Prompt deliveries guaranteed.

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Kit of components, exactly as used by the designer, together with material to make the necessary resistances; aluminium base plate, wire and screws; cash price

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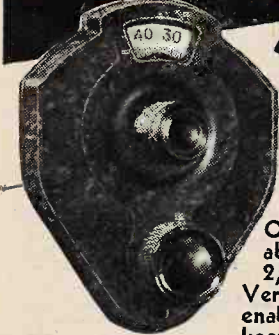
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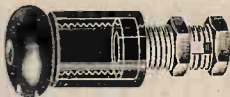
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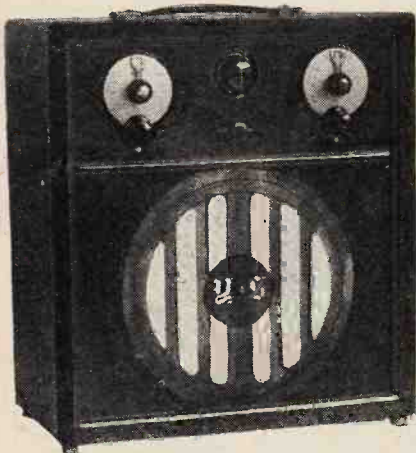
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For use with normal aerial, or as a portable with about 6 ft. of wire, no earth required in either case.

Dual-wave range. Variable selectivity for all conditions of service. Universal Mains Transformer for 200-220-240 A.C. 50 Cycles. Mazda Mains Valves S.G., D, and Super Power. Parmeko Mains Equipment. Height 15 1/2". Width 14 1/2". Depth 7 1/2". Weight 25 lbs.

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PICTURE RECEIVER APPARATUS.

BARGAIN.—Amateur has for disposal complete televisor, assembled from latest Baird standard components, including motor, neon lamp, etc., etc., all in running order, also R.C. amplifier to suit same; whole outfit, £17, or nearest offer.—Box 7461, c/o *The Wireless World*. [1457]

TRANSMITTERS.

QUARTZ Control Without Reaction: 84-metre band crystals; 17/-.—Smith, Bryn Rodyn, Colwyn Bay. [1442]

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AMPLIFIER Valve.—If you require power you cannot do better than one of these (or matched in pairs if required).

FILAMENT Volts 6, plate volts 400 (maximum), grid bias 84 volts (approx.), impedance 800 ohms, amplification factor 3.8, mutual conductance 4.35 m.a./volts; price £5/10; see article "The Wireless World," 24th July, 1929, then send to North London Valve Co., Ltd., 22 1/2, Cazenove Rd., Stoke Newington, London, N.16. [0341]

MULLARD Valves for Orgola Senior 6v.; £2/10; sell separate, slightly used.—Hawkins, Station Lane, Wombwell, Barnsley. [1426]

POWER Pentode P.T.625 (unused), 20/-; P.650, 10/-; S.P.18B, P.M.E.D., D.E.L.610, D.E.H.610. 4/- each; full emission guaranteed.—Dean, 352, Gilbart Rd., Birmingham. [1418]

TRANSMITTING Valves, new, 2 T50, 2 T15. Marconi, 2 0-500 milliamperes. Weston; what offers.—McLean, 31, Elm Park Gardens, S.W.10. [1407]

WIRE.

132, St. John's St., E.C.—New, enlarged premises of M. A. Frost, Wire Specialist. Any gauge, any covering! [1465]

COMPONENTS, ETC., FOR SALE.

BELLING-LEE Panel Fittings are designed to give an expert finish to any home-constructed set; catalogue post free.—Belling and Lee, Ltd., Queensway Works, Ponders End, Middlesex. [0018]

COMPONENTS Lent on Hire.—Details from Alexander Black, Wireless Doctor, 55, Ebury St., S.W.1. Sioane 1655. [0329]

MAINS Transformers and Chokes for Radio and Sound Systems, totally enclosed in cast aluminium plates, guaranteed; write for lists; manufacturers and traders enquiries invited.—Eric Cookson and Co., 14, Cambridge Rd., Blackpool. [1425]

ALL Slightly Used, but guaranteed in perfect order, 1 Heaybeard transformer, 200-240v input, 400 and 7.5v. output, £2; 1 Heaybeard transformer, 200-240v. input, 12v. output, 15/-, Westinghouse metal rectifier for same, 17/6; 3 8 mfd. 1,000v. D.C. test hydro condensers, 15/- each; 1 Webson M.C. speaker, 6 volt field, 1 200v. field coil and spare cone, coil and frame for same, £4, or separate; 2 L.S.6 As., 15/- each; 2 Mazda A.C. H.L. old type base, 5/- each; 2 A.C. X old type base, 5/- each; 3 S625 Osram old type horizontal fittings, 2/6 each; 1 Osram U5. 7/6; 1 Kolster Brandes All-mains Three, £15; 1 Philips All-mains Three, £16.—349, Hasland Rd., Hasland, Chesterfield. [1424]

EXIDE W.H., 140 volts, in fine condition; half price; Brown Vee, ditto.—Bowles, 1, Prospect Rd., Surbiton. [1422]

AMATEUR'S Surplus.—50 watt power amplifier, in metal box, complete with 2 L.S.5B's and 2 L.S.6A's, 6v. 6 amp. accumulator, H.T. unit, £8; R.K. 10in. moving coil 200v. D.C., in large baffle, £5; rectifier for above, for 200-250v. A.C., with valve, £2/10; G.E.C. Universal A.C. D.C. gramophone motor, in mottled aluminium stand, complete with B.T.H. pickup, a beautiful job, £5.—H. H. S. Harris, 80, Wardour St., London, W.1. [1421]

AMATEUR'S Surplus Includes: 4 G.R. superhet transformers, with 2 oscillator couplers and base, £1; 1 Benjamin eliminator transformer and rectifier tube, £1; 1 Lissen super L.F. transformer, 7/6; 2-valve short wave set, £2; stamped envelope for list.—Killingbeck Hospital, Leeds. [1413]

S625 (unused), 10/-; Cossor H.F.610, R.C.610; 2 L525s, 3/- each, perfect; Triotron unit, 8/6; exchange anything wireless; wanted, P.M.24.—Butcher 4, Stanley Place, Bridport. [1404]

R.I. Straight Line Super Transformer, practically new; 10/-.—Minkow, 143, Amhurst Rd., E.8. [1411]

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MAINS TRANSFORMERS
MODEL 34
 Designed for the
"BAND PASS FOUR"
 as specified in the June 25th, issue.
PRICE £2.5.0
MODEL "27"
 Designed for the
"REGIONAL ONE"
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 Please state Mains Voltage & Frequency.
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EXACT TUNERS
 250 to 2,000 metres.
 No further coils are required, tuning is as simple as A.B.C., see "Wireless World," January 23rd: "We can strongly recommend these tuners." Send postcard for particulars and Circuits FREE to
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SWITCHES Push Pull and Rotary Type. Very compact and efficient. Full particulars in our Catalogue No 1142.
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THIS HIGH-TENSION ELIMINATOR
 for your PORTABLE at a remarkably LOW PRICE

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 Designed for use with Portables, or Sets with outside aerials. Variable Detector Tapping adjustable to any set. Full wave rectification with Philips type 1801 valve, giving output of 25 M.A. at 120 volts. This output is greater than that of most eliminators on the market. Saving at least £5 per year in high tension batteries—Coates' Eliminator is a sound investment and ensures consistently good reproduction with wider range and greater volume. Specially made and very neatly finished in blue.
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MICROPHONES**

The Ideal Instruments for addressing a large Audience out-of-doors or indoors through Loudspeaker (via Valve Amplifier or L.F. Stages of Wireless Set), and for relaying Speech and Musical Entertainment to any distance.

Powerful Loudspeaker Reproduction with perfect Purity.



Hand Type.
Highly distance-sensitive, yet guaranteed entirely free from distortion or microphonic noises, absolutely silent background; far superior to ordinary Microphone Transmitters; for use with Valve Amplifier or Wireless Set at Open-air Meetings, Sports Grounds, Garden Fêtes; in Cinema, Theatre, or Dance Hall. Operates from 2-volt tapping of L.T. Accumulator, through Microphone Transformer.
Current consumption one-tenth Ampere. Provided with detachable sound collector and a 9ft. silk connecting cord; every metal part nickel-plated, black polished. **16/6**
Illustration



Pedestal Type.
Highly Sensitive Microphone, as above described, provided with detachable sound collector and a 9ft. silk connecting cord, and fixed by silk-brided rubber suspension in nickel-plated frame on pedestal 11in. high; for mounting on Speaker's Platform, in Pulpit, on top of Camera Stand, or for suspension from ceiling, as **25/-**
Illustration

Microphone without Stand: 18/-

The above Microphones are rendered **Directional** by attaching the Sound Collector.



Microphone Transformer, special design to obtain best possible results from sensitive Microphones when connected to high-resistance phones, Loudspeaker, Wireless Set, or Valve Amplifier: best Transformer made for clear speech with volume, modulation, speech and music transmission, Public Address Microphones, etc. Prim. and Sec. terminals fitted. **6/-**
Full directions for use of Microphones and diagrams of connections free. Goods by return post.

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(INEXPENSIVE)
Highest Efficiency Guaranteed.



£1-2-6 as illustrated, including a light headband for the earpiece.

£1-10-0 fitted with MIDGETPHONE (fits into ear) instead of earpiece with headband.

THIS Aid comprises a highly sensitive SUPER-MICROPHONE for taking up Sound (to be attached to Coat or Dress, conveniently concealed), a SMALL BATTERY (for the pocket), and a SMALL EARPIECE which can be held to the deaf ear by hand or by a light headband supplied with the Aid. All speech and sound reaching the Super-Microphone is loudly heard in the earpiece. The battery can be switched off when the Aid is not in use.

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Full particulars of the Super-Microphone and Parts post free.

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VARLEY Pentode Output Choke (unused), 15/-; D.C. eliminator (10 tappings, best components), 30/-; Igranic dual impedance coupling unit, 15/-; variable and fixed condensers (all capacities), H.F. chokes, potentiometers, R.C.C. units, valve holders, etc.; c.o.d. if required.—Dean, 352, Gillott Rd., Birmingham. [1420]

RADIO HOUSE, HUDDERSFIELD, issues the Reliability Wireless Guide, which will be sent post free upon request by Messrs. J. H. Taylor and Co., 15, Macaulay St., Huddersfield. [7823]

PART Exchange.—See our advertisement under Receivers for Sale.—Scientific Development Co., 57, Guildhall St., Preston. [0228]

M.C. Speakers, pick-ups, cone speakers, microphones, transformers, etc.; send for list.—G2VM, 27a, Bridget St., Rugby. [1435]

AIR Force 2-valve Transmitters, Mark II, contain transformer, choke, high voltage condensers, ammeter, multi cables, and many other useful parts, made by G.E.C. new and unused, complete in carrying case, 10/-; weight 25 lb.; Fullograph picture receivers, complete, 32/6, only few left; G.E.C. power amplifier and moving coil speaker, both 200-260 A.C., £23, list price £39.—Modern Radio Supplies, 37, Lisle St., W.C.2. [1458]

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SECOND-HAND and New Components and Speaker Units for Sale.—Please send for list to C. Baker, 20, Wrotham Rd., Camden Town, N.W.1. [1438]

EXPERIMENTER'S Surplus, mostly used; cost over £6, accept 15/-; postcard for list.—Tetley, 9, Prince Wales Terrace, W.8. [1399]

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SCOTT SESSIONS and Co., Great Britain's Radio doctors, officially approved as wireless repairers by Radio Society of Great Britain and Wireless League; old sets of every type repaired, rebuilt, modernised; send set for immediate quotation.

SCOTT SESSIONS and Co.—New sets constructed with your or our components, guaranteed finest workmanship; we specialise in "The Wireless World" circuits; remember, we have satisfied customers throughout the British Isles and in three Continents; if you so desire, we will design and construct high grade apparatus to suit your special circumstances for quality, range and selectivity.—Tel.: Tudor 5325. Muswell Hill, London, N.10. [0262]

ALEXANDER BLACK.

THE Original Wireless Doctor, will call (London and Home Counties) and cure your set.

CONSULTATIONS by Appointment without Obligation; sets installed, maintained and brought up to date; components and McMichael portable sets on hire; purity reproduction specialists.

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LEADS IN QUALITY**



THE PILOT VOLUMGRAD

"A Potentiometer device full of good points."

Technical Editor, "Popular Wireless," Aug. 23rd, 1930.

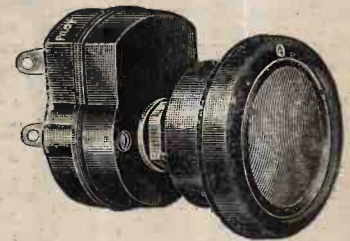
Volume adjusted from zero to maximum with one turn of the knob.

IN SIX RESISTANCES:

50,000 Ohms	500,000 Ohms
100,000 "	1 Megohm
200,000 "	2 Megohms

6/6

SNAP!!



THE PILOT SWITCH

"That most excellent Snap action that represents my ideal in Switches."

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HANDLES 3 amps. at 220 volts

RETAIL PRICE **2/6**

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Sole Agents for Great Britain and Ireland for all lines manufactured by The Pilot Radio and Tube Corporation of Lawrence, U.S.A.



This well-known H.T. Battery recharges itself overnight; and provides unfluctuating trouble-free service for 12 months or more.

STANDARD CARTRIDGE

Four hours a day, thirty hours a week, and more! Smooth power, steady and strong, feeding H.T. to your set, making it give its very best, month after month. Absolutely reliable, the compact Standard Battery is the ideal power supply. For twelve months and even longer the cells do not need recharging, and when they DO, it is quite a simple and inexpensive matter to replenish with the cartridge refills.

GREAT HOME TEST OFFER For 2- or 3-valve Sets.

2 trays (as illustrated) of No. 2 cells, 96 volts, 7/6 down and 5 equal monthly payments of 7/6. Cash £2 2s. 11d. Spare No. 2 cells (complete except chemical), 1½ volts each, 5/6 per dozen. Any voltage supplied.

Write for full particulars of the complete battery range.

THE STANDARD BATTERY CO.
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ONE FOR YEARS

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KING'S PATENT AGENCY, Ltd., 146a, Queen Victoria St., E.C.4.—Free advice and handbook on patenting inventions and registering trade marks by registered agents with 43 years' experience. [0002]

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THE Owner of a Provisional Patent relating to an Improved Earth Tube would like to get in touch with a manufacturer of wireless components, etc., with a view to marketing same.—BM/MHTV, London, W.C.1. [1453]

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SCOTT SESSIONS and Co., Great Britain's radio doctors; read advertisement under Miscellaneous column. [0263]

LOUD-SPEAKERS, headphones, cone units, pick-ups, rewind, remagnetised and adjusted, transformers rewound; all 4/-, post free.—Electrical Products (Chingford), Willow St., Station Rd., Chingford, Essex. [1409]

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WANTED.

SECOND-HAND Barndept Portable, new 1930 89 model.—Box 7414, c/o The Wireless World. [1405]

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GOOD 3v. Battery Set, Lotus remote control, A.F.3 or A.F.5 transformer, P.M.14, cone L.S.—A. Watson, Sunnyside, Cockermouth. [1461]

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BELL WIRELESS, Ltd.

205, Uxbridge Rd., W.13.

PIONEERS of Radio Part Exchange; tip-top allowance, every deal on its merits.

WE Want Speakers, gramophones, radiograms, complete sets, etc.; don't confuse other part exchange offers with ours, we are unique; economise and save money. [1387]

PART Exchange.—Let us know what you have and your requirements, and we will make you an amazing quotation.—Radio Co., 24, Vestry St., N.1. [1434]

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SITUATIONS WANTED.

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Any Screen to order.

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Aluminium screening boxes, all sizes, to order. Standard size from stock,

6x6x6½, price 4/- each.

W. H. PARKER, Sheetmetal Workers, Back Autumn Terrace, Leeds. Tel. 52859.

“Could have been sold over a dozen times!”

A recent advertiser in “THE WIRELESS WORLD” writes as follows:

“You may be pleased to know that the coils I advertised in ‘THE WIRELESS WORLD’ could have been sold over a dozen times.

“They were sold first post here on Thursday morning, and I had applications for them for a fortnight after.”

W. A. Pelly, Pierhead, Eastbourne.

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Price **7/6** THE **JOLLEX** Price **7/6**
Postage and Packing Free. UNIVERSAL Postage and Packing Free.

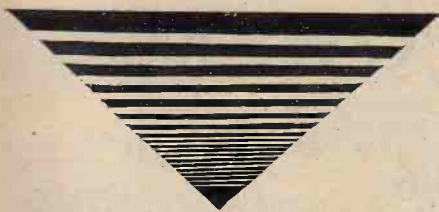
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SUITABLE FOR **BLUE SPOT 66R, 66K, ORMOND, etc.**

Steel Chassis Finished Antique Copper COMPLETE WITH STAND.

TRADE ENQUIRIES INVITED. Supplied by **F. W. JOLLY,** ASTON LANE, WITTON, BIRMINGHAM.

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SELHURST RADIO
STAND
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and examine the finest range of Moving Coil Loud Speakers in the Exhibition at OLYMPIA! These speakers are the achievement of SIX YEARS specialisation by the Pioneer Manufacturers of Moving Coil Speakers.



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'Phone: CROYDON 2563.

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FREE: Inventor's Guide on Patents—T. A. A., 253, (W), Gray's Inn Rd., London, W.C.1. [6373]

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SALE BY AUCTION
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WIRELESS EQUIPMENT,
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THOMAS DUNHAM, F.A.I.
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Burdopt and Philips Receivers, Magnavox and other Loud-speakers, Valves, Condensers, Transformers, Batteries, etc., and all wireless sundries. Ecko and other eliminators, 20 amp. D.C. Charging Board Transmitters, Microphone, Rotary transformer, and all items. Lathes and office furniture, etc. Also 1926 MORRIS-COWLEY Tourer, recently overhauled at a cost of £30.

Sale at 12 noon. View previous day, 10 a.m. to 6 p.m. Particulars from Auctioneer, Falstaff Sale-rooms, Market Place, Manchester. Tel.: 3777 City.

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The Leeds Wireless Repair Service,
5, Boston Place, Green Road,
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Expectations!

Man's Skill Can Do Marvels



**MAN'S SKILL
Produces the World's
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Using similar materials to other makers, but with greater care and knowledge, Stradivarius produced a violin of outstanding beauty and tone.

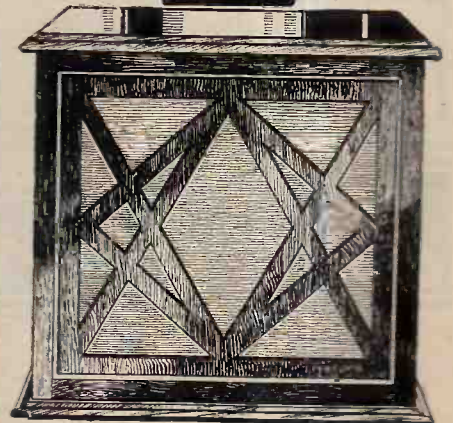
And now its the same with Speakers! Using similar materials to "the others," but striving after perfection, Bel-Canto experts have produced a Loud Speaker that gives a living interpretation of pure music and speech.

That's the difference between ordinary speakers and the finished product of the craftsman.

If you want the best from your set, you cannot do better than reproduce through Bel-Canto. Go to your dealer to-day and ask him to demonstrate.

**Bel-Canto
"REALISM IN RADIO"**

FROM
£5:10



Director of Sales,
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Artistic finishes in WALNUT, ROSEWOOD, JACOBAN, etc., effects.

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I might add that 'The Wireless World' is the best journal I have read."

W. F. Macbeth, "Bramar," Ballymena, Ulster.

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POWER CHOKES

guaranteed twelve months substantially built, for smoothing circuits in eliminators dealing with currents too to 300 milliamperes, inductance 30 henries, post free

8/6

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TRANSFORMER REPAIR Co.

Dept. W., 953, GARRATT LANE, TOOTING, LONDON, S.W.17.

MICROPHONES

You will get the best and cheapest selection of Microphones for all purposes at 218 Upper Thames Street, E.C. Electradix Mikes are used everywhere. Broadcast Mikes, £12, £6 and £2, for public address. Announcers' Hand or Stand Mikes, 15/- Wrist Speech Microphones, 10/6. Solo Hand Mikes 107B in brass case, 3/6. Microphone Units for making multiple mikes, 4/6. Skinderviken Buttons, 3/6. W.E. Service Speech Buttons, 10d. Booklet "Wonders of the Microphone," 6d. Add postage on above.

New September Sale List just issued. Free for stamped addressed envelope.

Microphone Specialists, ELECTRADIX RADIOS, 218 Upper Thames Street, E.C.4

WIRE for all purposes

AT STAND 209 OLYMPIA

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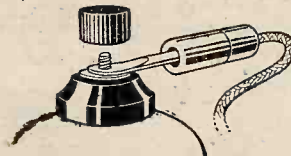


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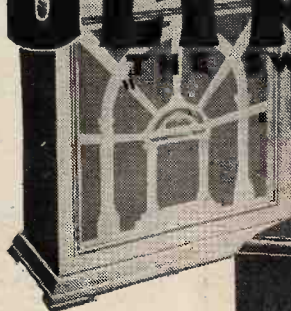
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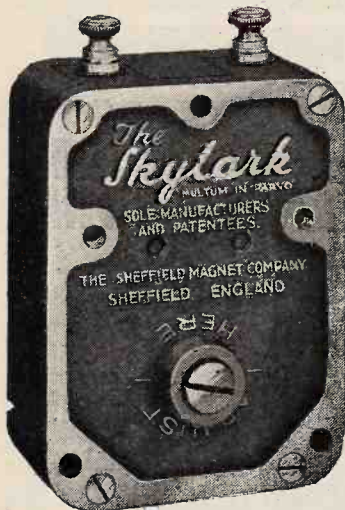
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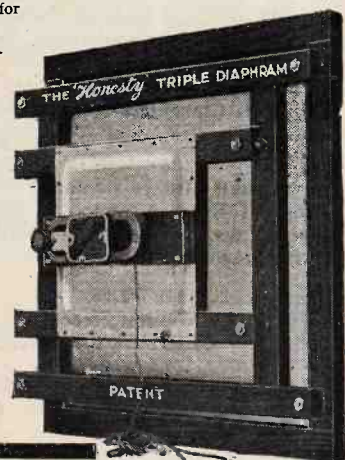
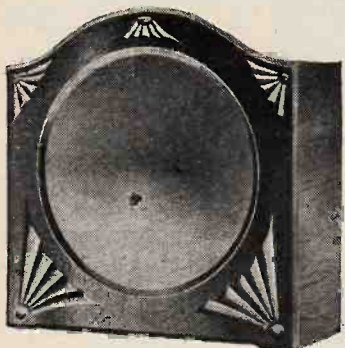
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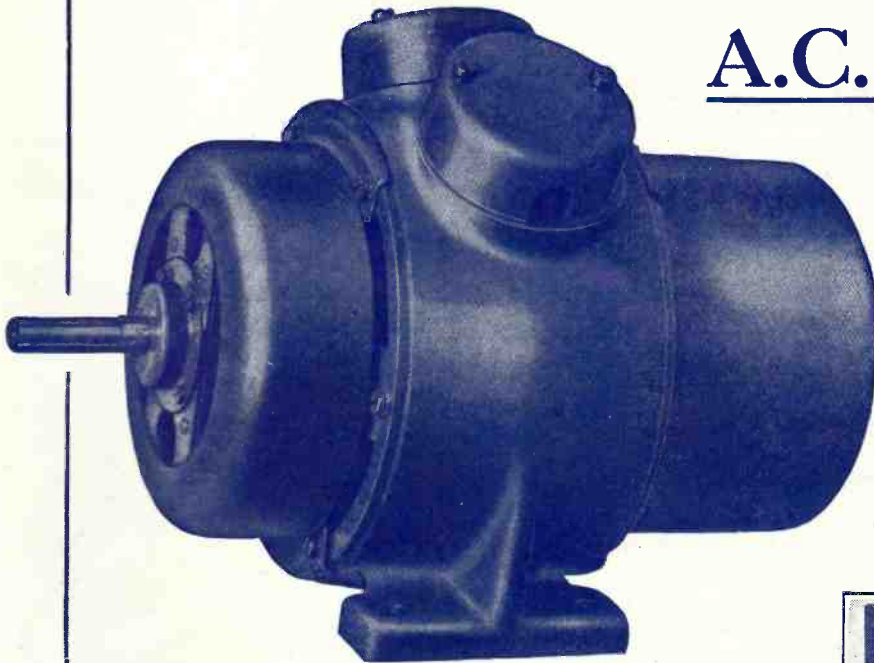


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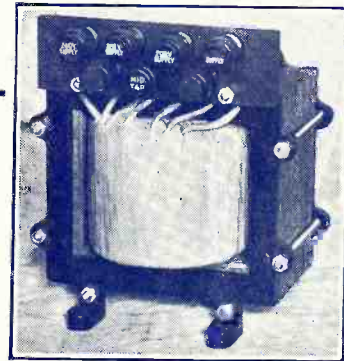
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MULLARD

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The Wireless World

4^D

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The Paper for Every Wireless Amateur


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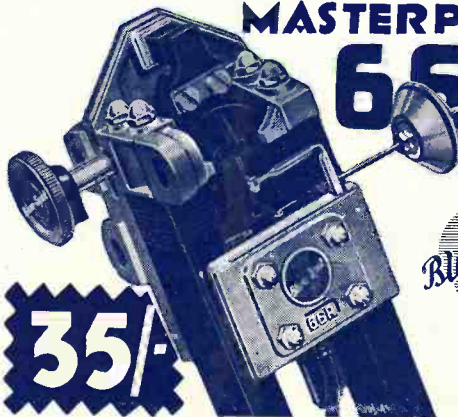
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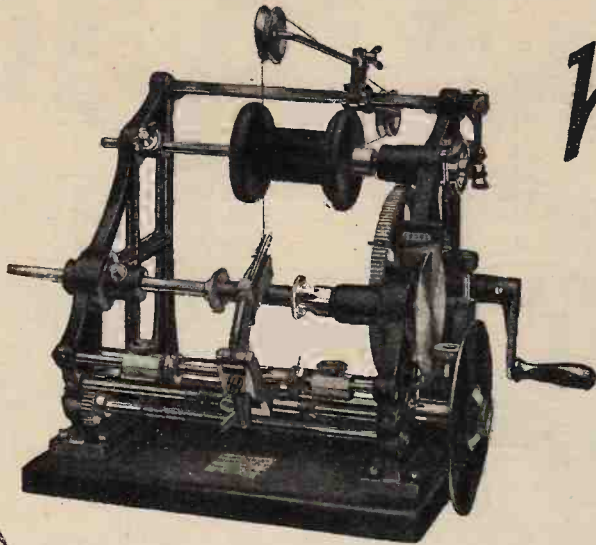
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LOTUS

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 without worry
here it is!



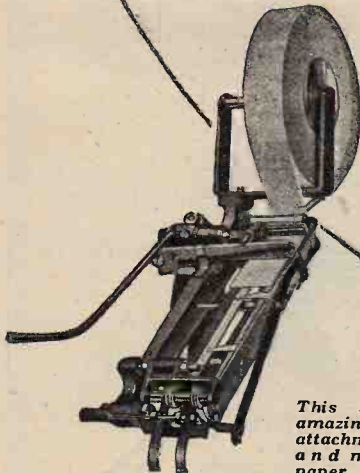
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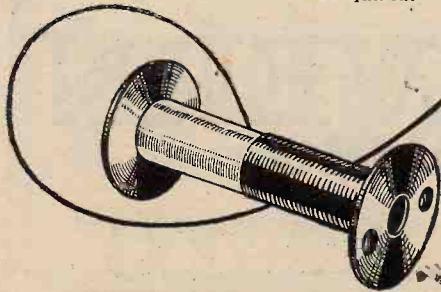


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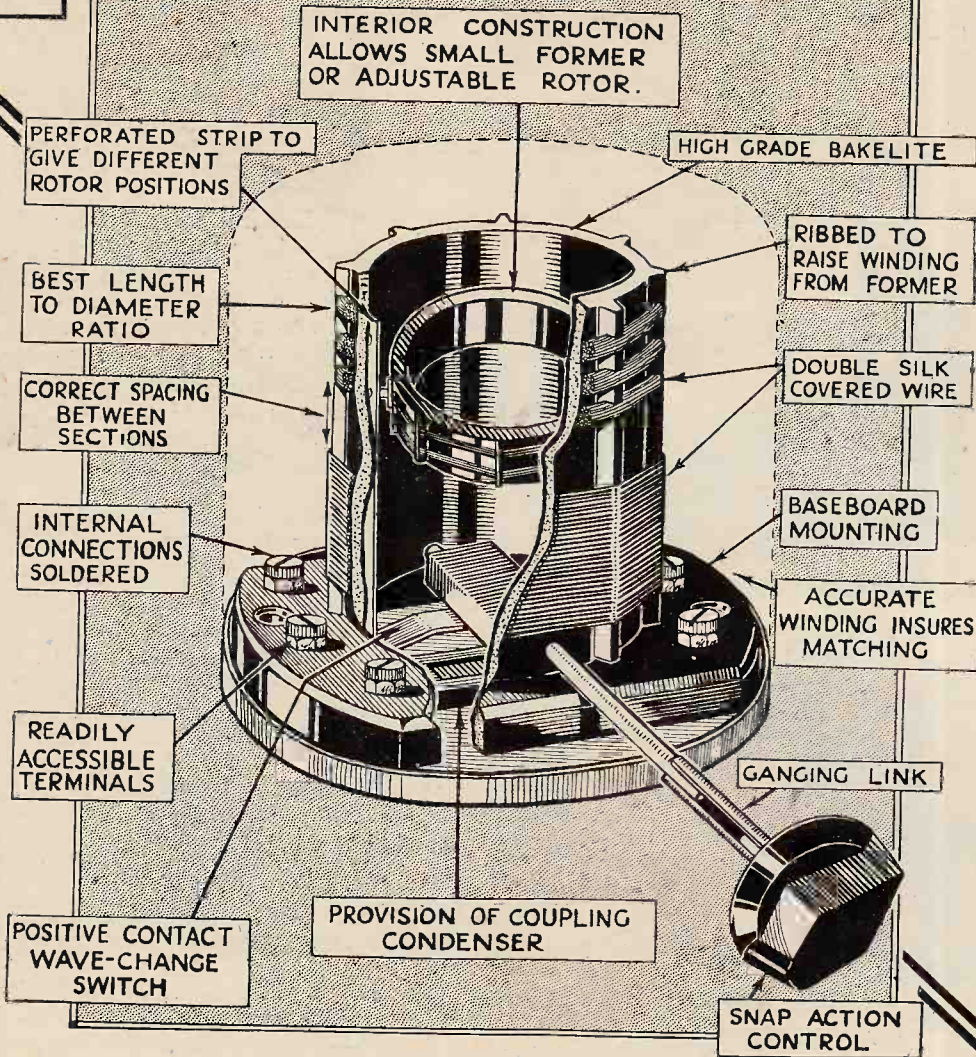
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THE MULLARD 'ORGOLA'
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THE COSSOR
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NEW 3-VALVE SET OBTAINS OVER 50 STATIONS ON LOUD SPEAKER WITH DAVENTRY 5 GB WORKING

This is the new Northampton Plating Co. Super Selective 3-Valve Loud Speaker set, which is now offered to the public. After months of careful research a circuit has been designed superior in selectivity to a screen grid set, and yet remarkably simple. It can be used, not only for cutting out the local station, but for other disturbances such as Morse. It is the simplest, cheapest, and most selective in the world. No soldering required or coil changing. Experts have declared it absolutely unique. Over fifty stations have been obtained on loud speaker with aerial 20 feet high, using cheap valves, including Cardiff, Paris, Madrid, Manchester, Stuttgart, Toulouse, Hamburg, Glasgow, Frankfurt, Rome, Langenberg, Berlin, Brussels, Hilversum, Kalundborg, Königswusterhausen, Radio Paris. These were obtained 3 miles from Daventry while 5 GB was working. Thousands of novices with no knowledge of wireless have built the old Northampton Plating Co. Super 2 and 3 in all parts of the world, and have been astounded by the results even with cheap components, but the new Super Selective 3 makes other sets old-fashioned, and marks the greatest improvement in valve sets for years. Orders have poured in from all parts of the world, including America, Turkey, Gold Coast, and Nigeria. In order to give everyone the opportunity of testing out the new circuit, two 6d. Blue Prints, one for new Super Selective 2 and one for Super Selective 3 Valve, will be supplied for 3d. each.

NEW SUPER 4-VALVE PORTABLE SEPARATES TWO BROOKMANS PARK STATIONS UNDER THE AERIALS

This is the latest model circuit by the Northampton Plating Co. offered to the public for the first time. It has been specially designed to satisfy the requirements of the new regional stations. Owing to its wonderful selectivity, it requires no wave trap and obtains under favourable conditions a large number of Continental Stations at loud speaker strength, including Toulouse, Hilversum, Eiffel Tower, Königswusterhausen, and Radio Paris. At less than half the price of a high-class portable set, it is acknowledged under severe technical tests to be far superior. In order to show what marvellous results can be obtained the set was placed between two aerials at the entrance to Brookmans Park, and the two programmes were easily separated. The set was also taken on 1,000-mile motor-tour over England and Wales. On the South coast and East coast many stations were easily obtained on loud speaker at good strength. Even in Wales, where reception is difficult, excellent results were also obtained. In order that everyone may be able to construct this unique portable set, a full size shilling Blue Print, with full details and instructions, can be obtained from Northampton Plating Co. for 6d. Letters must be fully stamped. NAME AND ADDRESS IN BLOCK LETTERS.

TRADE SERVICE AGENTS WANTED.

ARE YOU TROUBLED

with Brookmans Park? Test Report on New Brookmans Park Station from Palmer's Green, about four miles from Station, by our own radio engineers. Using the Northampton Plating Co. Super Selective Set, with the addition of a Type F Formodensator (Price 1/6) in earth lead, it was found that by careful adjustment of set the local station was absolutely cut out. Many British and foreign stations were easily obtained at loud speaker strength, including 5 GB, Radio Toulouse, Radio Paris, 5 XX, Königswusterhausen. This is a marvellous achievement since the set used is the cheapest in the world.

READ THE LATEST REPORTS BY THE LEADING RADIO EXPERTS OF THE DAY:—

I refer to the receiver marketed by the Northampton Plating Co. as a kit set at a price that is more than reasonable. I had a pleasant surprise when I first operated it. I found there were 12 or 13 Stations easily brought in at loud speaker strength on the medium wave in addition to 5 GB. The set has remarkable qualities of selectivity and sensitivity, two characteristics rarely coupled in any one receiver. It must be set down as a definite advance.
 ("NOTTINGHAM JOURNAL," December 21st, 1929.)

Those who are too far from a station to use a crystal and are deterred from wireless by the present high cost of valves, will find it best to make a set from the Northampton Co.'s blue prints for two or three valves, price 3d. each. If they cannot afford a Mullard, the same company supply excellent valves at 4s. 11d., which give admirable reception, though so cheap. A thoroughly good two valve set ought not to cost more than £2 10s., including everything, and a three valve about 11s. more.
 ("REYNOLDS' NEWS," January 12th, 1930.)

READ THESE TESTIMONIALS.

I have had your Super 3 since Sept. 1929, and have had wonderful results, about 50 stations at full loud-speaker strength, and can get most of these any night of the week, chief among them being: Paris, Eiffel Tower, Budapest, Prague, Belgrade, Stockholm, Madrid, Toulouse, Stuttgart, Barcelona, Turin, Maravstra-Ostrava, Rome, Algiers, Langenberg, Oslo, Lahti and Kaunasa. Wishing you every success.—W. T., Emsworth, Hants, 17/1/30.

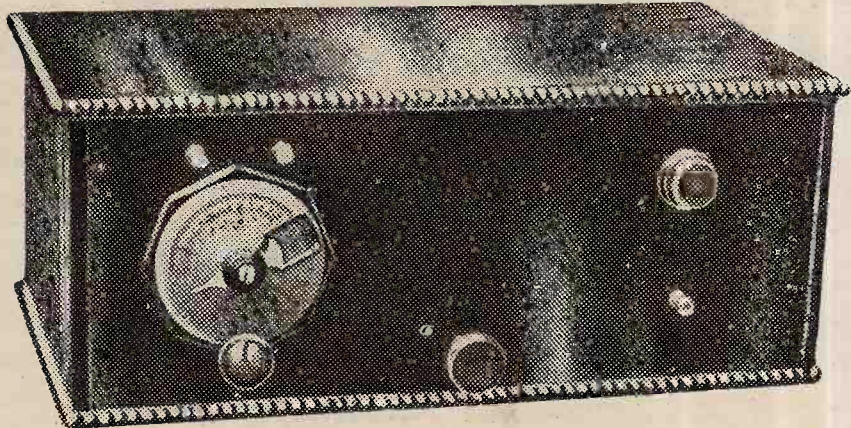
I must write and tell you I am more than pleased with your three valve set I have just made. It is the most wonderful bargain I have ever known in wireless, and it is all that you claim of it. I wish to recommend it to my friend who is a keen wireless enthusiast.
 W. F. T., Derby, 16/1/30.

I have now built up your Super Three Valve set, and, independent of price, I have never heard or seen a set to beat it. We are still getting fresh stations, and up to the present have logged 20 at full loud speaker strength. As I am writing we are hearing an Aria from Rome. My last set cost me about £25. Your Super Three has cost me less than £5, including accumulators.
 W. A. P., Norwich, 3/2/30.

Referring to the 3-valve set recently supplied, I have pleasure in informing you how satisfied I am with it. I recently put up an expensive 4-valver, and had such bad results. I may say I have had many circuits in use up to 5 valves with very good results—that means quality of reception, volume and distance. I purchased your Super 3 really for local use. As you will see, I am on top of the Brookmans Park Transmitter. The results I am getting are equal to my best with 4 and 5 Valves. I can still have my Continentals on the loud speaker, and with perfect quality. Wishing you every success.—Yours faithfully, V. M., Cheshunt, Herts.

I feel I must write and congratulate you on a wonderful circuit. I have now had your "Northampton 3" only two nights, but in those two nights it has fully justified itself. I have the poorest of poor indoor aerials, and I have in 10 minutes logged 16 stations on the Loud Speaker. I have had to insert a volume control because of the power of the local station (Bournemouth, 70 miles away) and 5 GB. I have just received Oslo, Paris (2), Hamburg, Berlin, Budapest, and many others. Your "3" gives 90 per cent. better results than you specify. Wishing your sets the best of luck in the future.—Yours very satisfied, C. D. N.

I have examined the above testimonials, and am satisfied that these are genuine communications.—Advertisement Manager, "Daily News."



SPECIAL WIRELESS AND CYCLE BARGAINS.

Usual Price.	Sale Price.	Usual Price.	Sale Price.	Usual Price.	Sale Price.	Usual Price.	Sale Price.
10/- Latest Type Cabinet 12x8	4/11	17/6 New Cossor Type Long	9/6	12/6 Mullard Type Cabinet, 18x7	6/11	12/6 100 Volt H.T. Battery	8/11
5/- Ebonite for same, 12x8	3/-	7/6 Volume Coils, pair	3/11	7/6 Aluminium Panel, 18x7	3/11	5/6 2 Volt Accumulator	3/6
5/11 Transformer	3/6	7/6 H.F. Choke	3/11	17/3 Dual Coil for M.M3	12/6	2/- Accumulator Carr.	11d.
4/6 .0005 Variable Condenser	2/11	2/6 Daventry 5 GB Coil	1/3	Tritron Dull Emitter Valve	4/11	4/6 Neutralising Condenser	2/11
2/- .002 Condenser	1/3	10/6 6 Volt Amplion Valve	3/11	5/- Cycle Tyre	2/6	4/- Reaction Condenser	2/6
1/6 .0003	10d.	12/6 Cone Unit	6/11	2/6 Cycle Tube	1/3	5/- Diff. Reaction	2/11
1/- Grid leak 2 meg.	10d.	12/6 Cone Speaker Cabinets	7/11	6d. Panel Transfer	3d.	2/- Loud Speaker Cord	11d.
1/- Anti-Mic. Valve Holder	9d.	2/- 12in. Cone Speaker Frets	11d.	6/- Double Reading Voltmeter	3/11	2/- 'Phone Cord	11d.
2/3 Rheostat	9d.	3/- 15in. Cone Speaker Frets	1/11	Tritron Super Power Valve	6/6	£2 S.L.F. Condenser	3/11
2/- Indoor Aerial	9d.	7/6 Old Cossor Type Coils	3/11	15/- Titan Coil	9/11	£2 Loud Speaker	15/-
5/- Earth Tube	1/6	15/- Old Cossor Type Cabinets, 21x7	7/11	9/- 60 Volt H.T. Battery	4/11	£3 Super Telefunken Type Loud Speaker	29/11
10/- Guaranteed Phones	4/11	Ebonite for same	3/11			30/- Cone Speaker	9/11
3/6 S.M. Dial	1/11					'Phones Repaired	2/6

Parts supplied for all sets at Reduced Prices. Send now to avoid disappointment. Cash with order or C.O.D. Special terms to those making sets. All goods guaranteed and exchanged if not satisfactory. Enquire for anything you want. Trade supplied. Send for our wonderful Bargain Price List W.W.

Trade Service Agents Wanted all over the World.

Owing to the enormous number of enquiries and orders, write clearly Name and address in Block Letters to the firm that made Radio Popular. Letters must be fully stamped.

NORTHAMPTON PLATING CO. (RADIO and Cycle Manufacturers), NORTHAMPTON

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



An Entirely

NEW

Detector Valve



**OSRAM
H.2**

For 2 volt sets

*Extraordinary
High efficiency*

A mutual conductance of 1.0 m.a. volt combined with the high Amplification Factor of 35.

This means more overall amplification and increased sensitivity of your set to distant stations.

The moderate Impedance of only 35,000 ohms. means that the quality of reproduction is maintained in spite of the high amplification.

The new OSRAM H.2 is the ideal Detector Valve for portable sets or for any set working from a 2-volt accumulator. It is also excellent as a R.C. or L.F. amplifier.

Characteristics:

Filament Volts	...	...	2.0 max.
Filament Current	...	...	0.1 amp.
Anode Volts	...	...	150 max.
Amplification Factor	...	...	35
Impedance	...	...	35,000 ohms.
<small>Measured at Anode volts 100; Grid volts 0.</small>			
Mutual conductance	...	...	1.0

**Osram
Valves**

MADE IN ENGLAND

Sold by all Wireless Dealers.

PRICE 8/6

WRITE for "OSRAM WIRELESS GUIDE" (1930 Edition) Sent Post Free.

Advt. of The General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.

NATIONAL RADIO EXHIBITION, Olympia, Stand 46, Ground Floor, New Hall

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Hear all there is to hear - and hear it better with,

a Dubilier all-electric set:

and the long winter evenings become a real delight. If you are not satisfied with your local programmes you can reach out to where you



DUBILIER CONDENSER CO. (1925) LTD.,
Ducon Works, Victoria Road, N. Acton, London, W.3.

will — Rome, Paris, Berlin, Toulouse, Brussels, Vienna. All and more can be received at real alternative programme strength and quality. The Dubilier all-electric set is extremely economical to run, costing as it does but a few pence a month for mains current.

PRICES :

2 Valve Set, £15. 3 Valve Set, £25.

We are exhibiting at Stand 50,
THE NATIONAL RADIO EXHIBITION,
Olympia (New Hall), Sept. 19th-27th, 1930.

DUBILIER

ALL-ELECTRIC RADIO

THIS CABINET has Remarkable Acoustic Properties



YOU will obtain better results if you mount your Moving Coil—dynamic speaker or chassis and unit—into this handsome cabinet of mahogany with quarter veneer panels. A removable baffle board is supplied. Height 40 ins. Inside dimensions: 20 x 13 ins. For better results use the



MAYFAIR CABINET
Price £5 10s.

Write for 24-page
Catalogue describing many
other Cabinets
to:

CAMCO MANUFACTURING Co., Ltd.,
24, Hatton Garden, E.C.1.

Phone: Holborn 8202.

(Factory: Camco Works, S. Croydon).

TRELLEBORGS

GUARANTEED

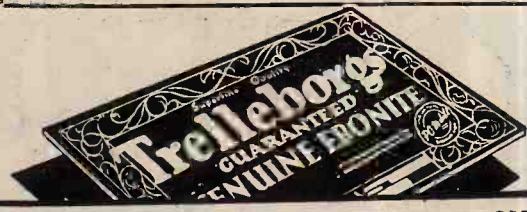
GENUINE EBONITE

Highest dielectric insulation
120,000 v. per mm.
Lowest power factor.
No current absorption.
Unconditionally guaranteed
perfect.

No surface leakage.
Easy machining.
Best polished surface.
Superfine consistent
quality.

PANEL PRICES PER SQUARE INCH, POLISHED

9/16 ^{D.}	3/16" THICK	3/4 ^{D.}
BLACK		MAHOG.
1/4" - 3/8d.		1/4" - 1d.



THE SUPERFINE QUALITY RADIO EBONITE

TRELLEBORGS EBONITE WORKS, Ltd.,
UNION PLACE, WELLS ST., LONDON, W.1.

Telephone: Museum 6200.

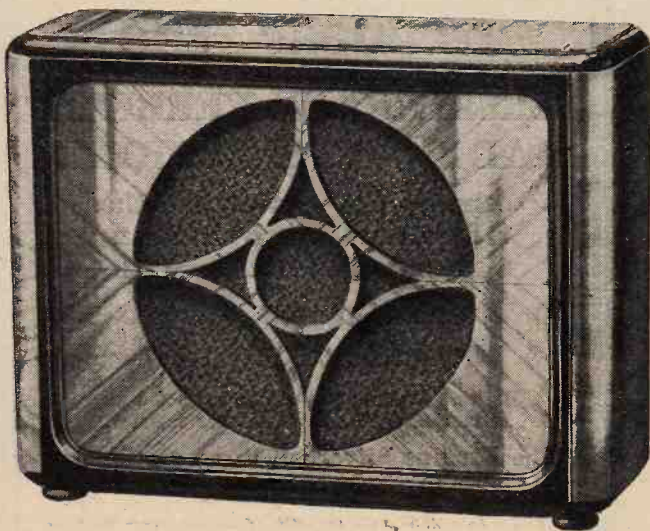
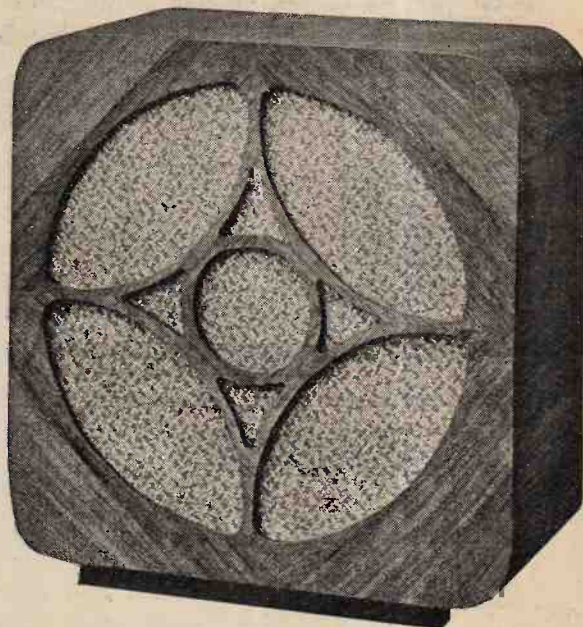
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Two wonderful Speakers!



41K This speaker's arrival on the market is a great event in wireless history—accurate reproduction at a popular price. Almost every home in England can now have its Blue Spot Speaker. Housed in a beautiful walnut case, this fine speaker costs fifty shillings.

50/-



71R This new and splendid speaker represents all that is highest in loudspeaker reproduction. The walnut case is a perfect piece of the cabinet maker's art and the driving unit is 66R, the finest unit in the world.

Price 95/-

Meet us at :

OLYMPIA, SEPT. 19-27—STAND No. 217. MANCHESTER RADIO SHOW, OCT. 8-18—STAND No 26 MAIN HALL.

• THE BRITISH BLUE SPOT COMPANY LTD. •

BLUE SPOT HOUSE, 94/96, ROSOMAN STREET, ROSEBERY AVENUE, LONDON, E.C.1

Phone: Clerkenwell 3570.

Distributors for Northern England, Scotland, and North Wales: H. C. RAWSON (Sheffield and London) LTD.,
100, London Road, Sheffield; 22, St. Mary's Parsonage, Manchester; 183, George Street, Glasgow

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LOG THOSE ELUSIVE STATIONS



The vanes are carefully shaped to ensure that the capacity change will be the same for both halves and constant throughout the full range. Satisfactory operation of differential reaction depends upon accurate balance in the condenser.

That elusive station . . . hold it . . . log it . . . bring it up to full strength without having to readjust the tuning. There is nothing more annoying than to hear a station faintly and lose it again at each movement of the reaction condenser. The new J.B. Differential Reaction Condenser will put an end to this trouble, for differential reaction does not upset the tuning. It will make station-finding easier and enable you to get stronger, clearer reception of distant programmes. It will give you smooth reaction that is constant over the range of your tuning coils.



Bakelite dielectric between vanes makes short circuit impossible at normal voltages.
Prices '0001 4/- '00015 4/-
'0002 4/3 '00025 4/3
'0003 4/6



The Centre Spindle is insulated. Pig-tail connection to rotor.



PRECISION INSTRUMENTS.

The NEW J.B. DIFFERENTIAL CONDENSER

Advertisement of Jackson Bros., 72, St. Thomas' Street, London, S.E.1. Telephone: Hop 1837.

EAGLE "ALL-IN TWO"

A Self-contained Detector - Pentode Two Valve Receiver



Why use a five valve set for the reception of your local station? An appreciable amount of money is expended on the maintenance of valves which are rarely, if ever, called upon to do any useful work.

The Eagle "All-in Two" operating on the frame aerial has a range of twenty-five miles, and to cater for those who require occasional long-distance reception, provision is made for an external aerial and earth system, which takes the place of several expensive valves which would normally be unprofitable passengers.

"The Wireless World" gives full details of this remarkable set in its review page of July 30th, 1930.

See the full range of our exhibits at

STAND No. 43 OLYMPIA

or write for full particulars and illustrated lists of Chakophone Receivers and Components to:—

Eagle Engineering Co., Ltd., Eagle Works, Warwick.



2 Valve Set, complete with all valves, batteries, and Royalty paid,

9 GNS.

3 Valve Set, 11 Gns.

You are invited to hear the

ERSKINE SILVERBELL RADIO GRAMOPHONE

during the period of the Olympia Exhibition, September 19th to 27th, in comfort in our Showrooms, 13, MACLISE Rd. (behind Olympia)

In the Exhibition it can be inspected on Messrs. A. W. Gamage's Stand, No. 244.

The Erskine Silverbell is revolutionary both in performance and price.

*To hear it is an education—
to possess it a lasting pleasure.*

Write for new illustrated catalogue.

THE ERSKINE SILVERBELL CO.,
189, Southfield Rd., Chiswick, London, W.4
'Phone: Chiswick 5514.

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



A low impedance valve specially developed for use where the valve in the output stage should have a fairly high amplification factor, as, for instance, in receivers having only one low frequency stage, type P.M. 256 is essentially the output valve for such sets as the Wireless World "Kilomag Four" or the "Foreign Listener's Four." By virtue of its recently improved characteristics and the increased anode voltage at which this valve can now be operated, the P.M. 256 will give a large undistorted output amply sufficient for operating a powerful domestic speaker or radio gramophone.

L.T. Supply.

The filament is rated to consume 0.25 amp. at 6.0 volts which may be obtained, if desired, by a step-down transformer operating on the A.C. electric light mains.

Mullard

THE · MASTER · VALVE

Advt. The Mullard Wireless Service Co. Ltd., Mullard House, Charing Cross Road, London, W.C.2.

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All Hits and No Misses

Complete Reception
on all
Broadcast
Wavelengths



DUAL ASTATIC H.F. CHOKE

will make your speaker reproduce all the stations broadcast which your set is capable of receiving.

There will be no more unaccountable missing of parts of the programme, or of complete loss of distant stations on certain wavelengths.

Every programme will be a big hit without misses or "blind spots," and the Dual Astatic will ensure this more than any other H.F. Choke can.



The Dual Astatic H.F. Choke that entirely eliminates resonant peaks and "blind spots" in modern radio circuits.

7/6

See the Dual Astatic leaflet for technical proof—ask your dealer or us for a copy.



Be Sure You Visit
STAND 61
at the
RADIO EXHIBITION



"MADRIGAL" WORKS, PURLEY WAY, CROYDON.

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

STAND NO.
104,
NATIONAL RADIO
EXHIBITION.

GODWINEX

MAINS UNITS

MAKE RADIO
"ALL ELECTRIC"

Ask for
Complete
List.

for
A.C. or D.C. MAINS.

AVAILABLE
FOR ALL VOLTAGES
NO HUM
NO ATTENTION.

Illustration
shows Model
A.S.H.

Incorporate
Westinghouse
Metal Rectifier.



Rich Brown Crystal-line Finish Metal Cases. Complete with Flex and adaptor, and fully guaranteed for twelve months' perfect service.

POPULAR A.C. MODELS.

Model.	Output Milliamps	Positive Tappings	1. Volts	2. Volts	3. Volts	£	s.	d.
A.	20	2	75	120	—	3	7	6
A.S.	25	2	75	120	—	3	12	6
A.S.H.	25	3	75	90	120	3	17	6
A.S.V.	25	3	75	var.	120	4	7	6

J. DYSON & CO. 2, Coleman Street, London, E.C.2
LTD., & 5, Godwin Street, Bradford.

Send for Particulars of our Special Agency Scheme.

12 Guinea WIRELESS CABINET for £3

JUST ASSEMBLE IT YOURSELF
THE OSBORN-WAY THATS ALL



MODEL
N° 219

No. 219. A Radio or Radio Gramophone Cabinet, 3' 9" high, 2' 2" wide, and 1' 6" deep. The battery and loud speaker compartments are at the bottom and are partitioned off. Size of the baffle behind the fret is 24" x 24". Metallic fabric for the fret front is included. Opening at the top and back. This cabinet will take a panel 2' x 9" or smaller.

READY TO ASSEMBLE: OAK 65/-,
MAHOGANY 70/-, WALNUT 80/-.
ASSEMBLED READY TO POLISH:
OAK 85/-, MAHOGANY 90/-,
WALNUT 100/- ASSEMBLED & POLISHED:
OAK 105/-, MAHOGANY 120/-,
WALNUT 135/-. ALL MODELS
CARRIAGE PAID.

Send for 56-page illustrated catalogue. Enclose 3d. in stamps.

CHAS. A. OSBORN (Dept. W.W.)
THE REGENT WORKS, ARLINGTON ST., LONDON, N.1.
Telephone: Clerkenwell 5095.
And at 21, ESSEX ROAD, ISLINGTON, N.1. Phone: Clerkenwell 5634.

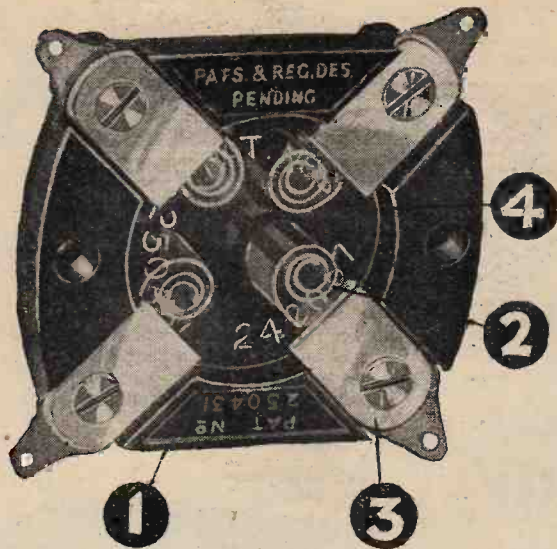
COUPON

Please send me your 56-page illustrated catalogue for which I enclose 3d. in stamps.

Name

Address

DEPT W.W.



A FAMOUS VALVE HOLDER

The illustration depicts the well-known and ever-popular Benjamin Vibrolder as seen from underneath. Ever since its introduction the Vibrolder has met with an enthusiastic reception and it is to-day easily the most popular valveholder on the market. The most important feature of this holder is the socket construction. As will be seen, this is in the form of a spiral and this confers three important advantages.

Firstly, a spring-grip contact is provided assuring excellent connection either for split or the increasingly popular solid pin valves.

Secondly, the sockets will align themselves to the valve pins should these be inaccurately spaced or bent.

Finally, the four sockets together hold the valve in a sprung suspension which damps out vibration, thereby protecting the valve filament from shock and eliminating the microphonic "ring" or howl which would otherwise mar reception.

All the different Benjamin valveholders are made on this famous anti-microphonic principle and a full description of them is given in our new 1931 Catalogue, which we shall be glad to forward on request.



1 The base of the valve is of polished bakelite, into which the metal sockets are recessed, eliminating damage to the valve by wrong insertion. Distance between fixing holes $1\frac{1}{2}$ inches.

2 The spiral spring-grip sockets are in one piece with the tinned soldering lugs, making excellent connection possible between the valve and its circuit.

3 Stiff limiting lugs prevent the spring sockets being strained by rough handling. The four screw heads shown carry through to plated terminals indexed in the bakelite moulding.

4 A transparent dust-proof cover keeps the interior of the holder clean and makes it impossible for the valve legs to come into contact with the base-board.

MAY WE HOPE TO SEE YOU AT STAND 115, WHERE ALL OUR PRODUCTS ARE SHOWN

BENJAMIN



The Clearer Tone anti-Microphonic Holder with terminals and tinned soldering lugs. Cat. No. 8650. Price 2/-



The 5-Pin Holder suitable for split or solid, four- or five-pin valves. Cat. No. 8659. Price 1/8.



All Benjamin Valve Holders and Switches are fully illustrated and described in our Catalogue No. 1142. Free on request.

THE BENJAMIN ELECTRIC LTD., Tariff Road, Tottenham, LONDON, N.17.
TOTTENHAM 1500.

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Showing for the First Time at OLYMPIA STAND 122

The
FAMOUS WEST OF ENGLAND
"H.S.P." PORTABLES

THE SETS
THAT GET THE
STATIONS IN
THE BADLY
SCREENED
HILLS AND
ROCKY DISTRICTS OF
THE WEST.



From

15 GNS. TO 29 GNS.

to suit all requirements.

This season's designs and prices on application to

The H.S.P. Wireless Co.

LANGFORD WORKS

or

30, The Boulevard
WESTON-SUPER-MARE

TONEX UNIBOX

SCREENED GRID UNIT

STAND
233
OLYMPIA

PRICE

30/-

FROM ALL
RADIO
DEALERS.

Make your Det. L.F. Set up-to-date —to-day— with S.G. Get a "TONEX UNIBOX"—the complete S.G. Unit. Enclosed in the crystalline enamelled metal case are coils to cover long and short waves controlled by a switch. The Valve is placed in the most correct position for efficient shielding. Plainly-marked terminals are provided for easy hooking up. *The very thing you have been waiting for.*

Send for details and diagrams.



THE TONEX CO., WALKER ST.,
BLACKPOOL.

PARMEKO

on Apparatus means
O. K.



IF you buy a piece of PARMEKO apparatus, you will be satisfied. The finest materials have been built into it to excellent designs. There is a PARMEKO Transformer and Choke for every circuit featured in the technical Press, besides other Mains Apparatus. And if you need anything in this type of apparatus which you cannot buy from stock, PARMEKO will make it for you. Simply send particulars and we will quote by return.

VISIT STAND
No. 248
(New Hall)
OLYMPIA.

Write for Price List of
Wireless Mains Apparatus.
Stocks held in London.

PARTRIDGE & MEE Ltd.,

74, New Oxford Street,
LONDON, W.1.
Museum 5070.

26, DOVER STREET,
LEICESTER.
Cent. 22276.

EVERYTHING **The G.E.C.** ELECTRICAL
your guarantee

GECOPHONE

REGISTERED TRADE MARK

THIS ALL-ELECTRIC

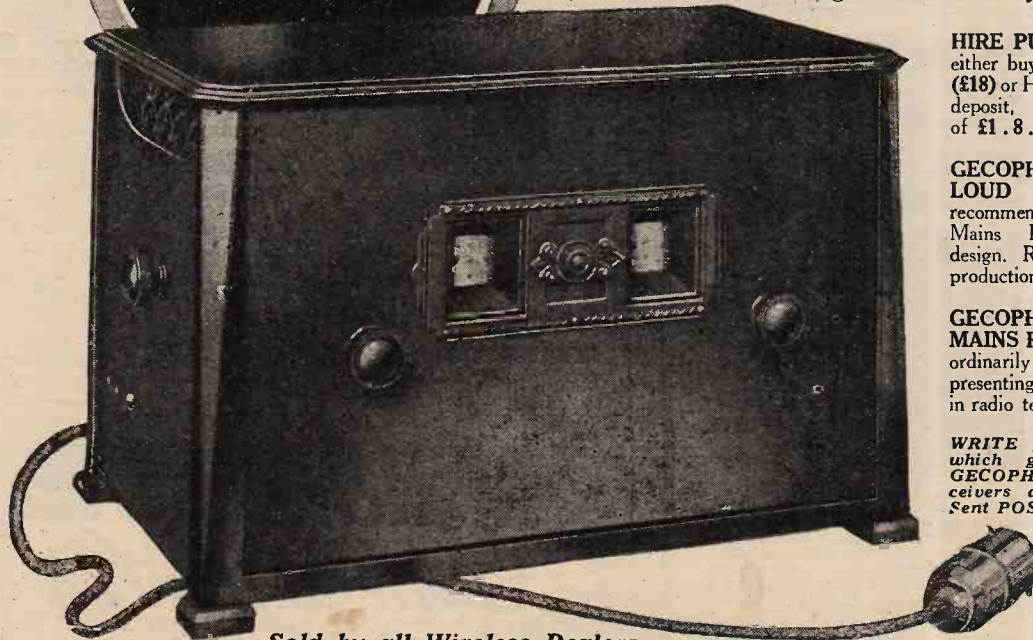
**THREE-VALVE RECEIVER
FOR A.C. MAINS**

**THE PICK OF THE
EXHIBITION**

A real treat is in store for listeners with A.C. Electricity supply in their homes with the new GECOPHONE 3-Valve A.C. Mains receiver. It is electrically perfect, made in accordance with the Institute of Electrical Engineers' recommendations by the largest electrical manufacturing organization in the British Empire—the G.E.C.—your guarantee of reliability. In price it represents unapproachable value. In performance it is the last word in purity, full-power volume, and a range that will get you almost anywhere. The handsome design of the cabinet is enhanced by the ebony black front panel relieved with old gold . . . A truly remarkable set.

for
£18

WITH OSRAM VALVES
AND ROYALTY



HIRE PURCHASE. You can either buy this receiver for Cash (£18) or Hire Purchase—£1.16.0 deposit, 12 monthly payments of £1.8.4.

GECOPHONE "STORK" LOUD SPEAKER, specially recommended for the 3-valve A.C. Mains Receiver. Handsome design. Realistic reproduction. Price **£3.5.0**

GECOPHONE 4-VALVE A.C. MAINS RECEIVER. An extraordinarily powerful receiver, representing the superlative in radio technique. Price **£30**

WRITE for leaflet B.C.5603, which gives particulars of GECOPHONE A.C. Mains Receivers and Loud Speakers. Sent POST FREE.

**MADE
IN
ENGLAND**

Sold by all Wireless Dealers.

Advt. of The General Electric Co. Ltd., Magnet House, Kingsway, London, W.C.2.

National Radio Exhibition, G.E.C. STAND 68, Ground Floor, New Hall.

A13

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LISENIN

POSITIVE GRIP TERMINALS

(Patented)

Scientifically constructed, both electrically and mechanically, they hold the wire, but grip the flex covering. All stresses and strains are removed from the conductors, and once a connection is made it stays put, and without any unsightly frayed ends of leads, the bane of all fans.

Write for **FREE** copy of our latest descriptive leaflet "W.W." Post free, of course.

POSITIVE GRIP Banana Type PLUG & SOCKET.
A great advance on all other types of plug. A silky, dead smooth contact is NOW obtainable. Price 4d. complete.

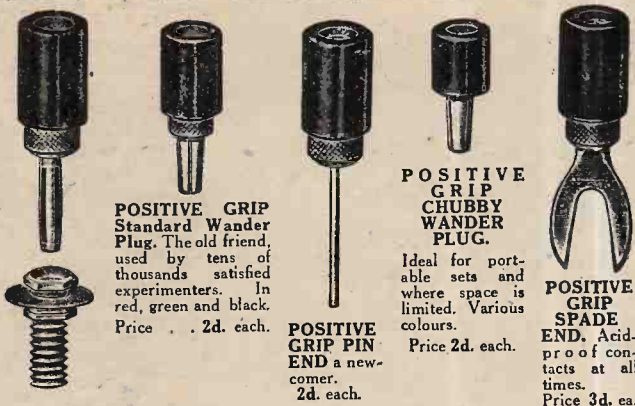
POSITIVE GRIP SAFETY PLUG AND SOCKET
(Registered Design)



LISENIN POSITIVE GRIP ALL MAINS PLUG AND SOCKET (Registered Design).
The Lisenin Mains Plug and Socket is totally insulated and is equally as valuable on sets working off batteries as those from the electric supply. The leads may be dropped with impunity and there is no chance of a short circuit. Instantly assembled with the aid of a screwdriver. **NOTE THE PRICE, 6d. each, complete as illustrated.**

WRITE to-day for our new descriptive folder, mentioning this paper.

We have moved to larger premises. Note new address: —
THE LISEININ WIRELESS CO.,
5, Central Buildings, HIGH ST., SLOUGH, Bucks.
'Phone : Slough 652. T. Address : POSGRIP SLOUGH.



POSITIVE GRIP Standard Wander Plug. The old friend, used by tens of thousands satisfied experimenters. In red, green and black. Price . . . 2d. each.

POSITIVE GRIP CHUBBY WANDER PLUG.

Ideal for portable sets and where space is limited. Various colours. Price 2d. each.

POSITIVE GRIP PIN END a new-comer. 2d. each.

POSITIVE GRIP SPADE END. Acid-proof of contacts at all times. Price 3d. ea.

"DAVEX" PORTABLE



Tuning Range
220
to
550,
and
1,000
to
2,000
Metres.

VOLUME AND PURITY.

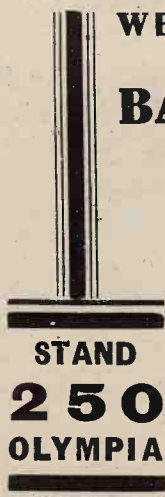
Complete £12-12-0 and royalties

Solid Oak Cabinet throughout, 5 valves, Mullard Loudspeaker, Ediswan Unspillable Accumulator, weight complete 28 lbs. Gives a good selection of stations both on the high and low Broadcast Bands, including Continental Stations.

Send for further particulars to:

ST. MARY'S MOTOR Co. (Wireless Dept.)
MARKET HARBOROUGH.

WEARITE COMPONENTS FOR THE BAND PASS THREE



- Screening Boxes . . . 6/6 ea.
6½ × 6½ × 6
- 600 ohms De-coupling Resistances 1/6 ea.
- Grid Leak Holder 6d.
- 3 pole Double Throw Rotary Switch 4/-
- 2 pole Double Throw Rotary Switch 3/6
- Set of 5 coils for the Band Pass Four . . . 25/-

WEARITE COMPONENTS

Send for our new Illustrated Lists.

WRIGHT & WEAIRE LTD.
740, HIGH ROAD, TOTTENHAM, N.7.
'Phone : Tottenham 3847/8.

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

Varley

FAMOUS SINCE BROADCASTING BEGAN



Impedance Matching
Output Transformer.

Six Ratios—
8 : 1, 10 : 1, 12 : 1,
15 : 1, 20 : 1, 25 : 1.

Price
each

£1 : 2 : 6

Long before Broadcasting became what it is to-day, Varley had won fame for their coil winding.

On this experience is founded Varley's latest achievement in radio. Varley Impedance Matching Output Transformer—a new component of advanced design—gives six different ratios. Accurately and without difficulty you can match loudspeaker and output valves.

Remember that Varley Components are descendants of a long line. Since radio came Varley ideal has been quality. The Varley Impedance Matching Output Transformer is the only answer to a modern radio problem.



STAND No. 105
OLYMPIA
Sept. 19—27, 1930

Adv. of Oliver Bell Control & Co., Kingsway House, 103, Kingsway, London, W.C.2. Telephone: Holborn 5303.

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INSPIRED LEADERSHIP!

FORMO


FOR ALL CONDENSERS

PRESCIENCE
EPITOMISED INGENUITY
PERFECT BALANCE
EXQUISITE CRAFTSMANSHIP

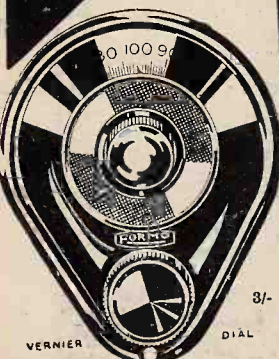
PRECISION
METICULOUS ACCURACY
EXCEPTIONAL MERIT
THE QUINTESSENCE OF EFFICIENCY

The highest, lowest loss and most efficient Condenser exact.


Capacities:
·0005
·00035
·00025
·00015




MID LOG LINE CONDENSER 4/6




VERNIER DIAL 3/-
Easy reading. Smooth action.



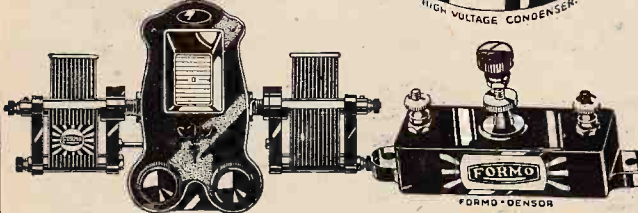
Metallic continuity. No crackle. Cap. ·00015 3/9



Higher test, lower loss, great longevity. Caps. 2, 1, ·5, ·25, ·1. Eakelite cased 600 volt test mains Condenser. Prices: 3/2, 2/2, 2/-, 1/9, 1/6



HIGH VOLTAGE CONDENSER



Aerial Tuning Unit

A truly phenomenal drum dial (illustrated type) with trimmer control. Drum dial 8/6. With one condenser, 13/-. With two, 17/6.

A great little variable compression type condenser.

F ·0001	1/6
J ·0003	1/6
G ·001	1/6
H ·002	2/3

BRITISH LEADERSHIP

SUPPLIERS TO THE LEADING SET MAKERS OF THE COUNTRY

CATALOGUE FREE. GERRARD 1863. Golden Sq., Piccadilly Circus, London

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2. Write your name and address clearly and in ink on the entry form in the space provided, and send the completed entry form after Wednesday, October 1st, and not later than Monday, October 8th, to: The Competition Editor, The Wireless World, Dorset House, Tudor Street, E.C.4.
3. The prizes will be awarded to the competitors who correctly forecast the outstanding single exhibit (No. 8 below), as decided by the majority of votes, and have also the largest number of correct forecasts in the other classes of apparatus.
4. No correspondence can be entered into in connection with the Competition, and the Editor will not be responsible for any entries lost in the post or otherwise.
Only one entry form to be sent in by each competitor.
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ENTRY FORM**

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5 Loud speakers of all types.		
6 Valves.		
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I agree to accept the rules and declare that this is the only entry form that I have completed.

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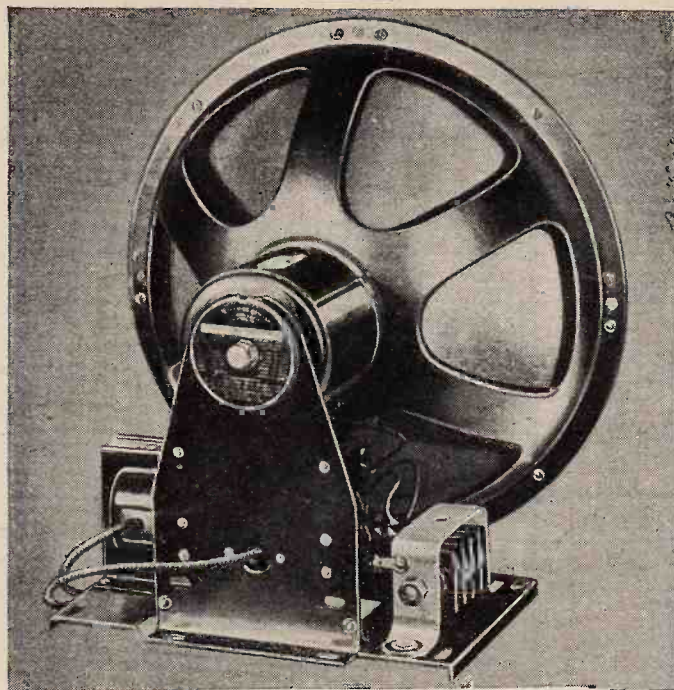
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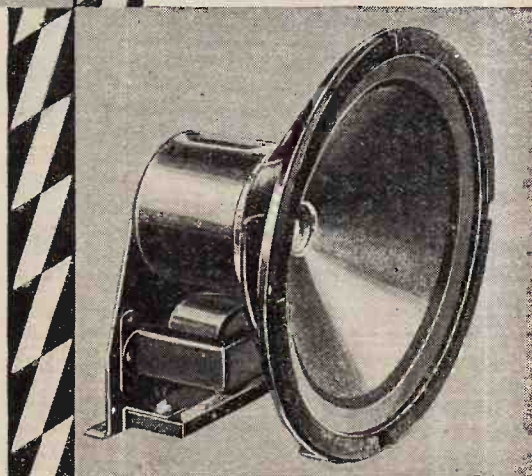
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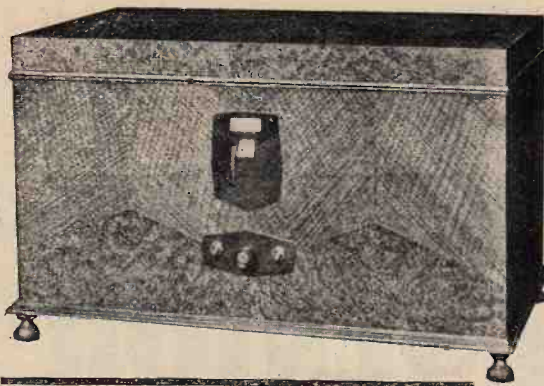
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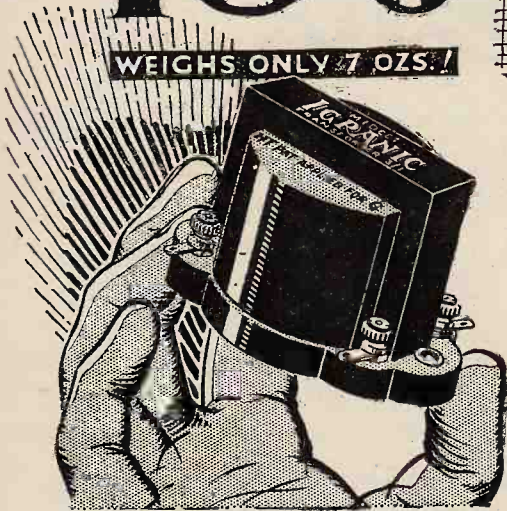
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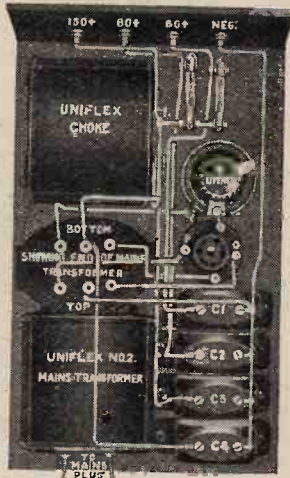
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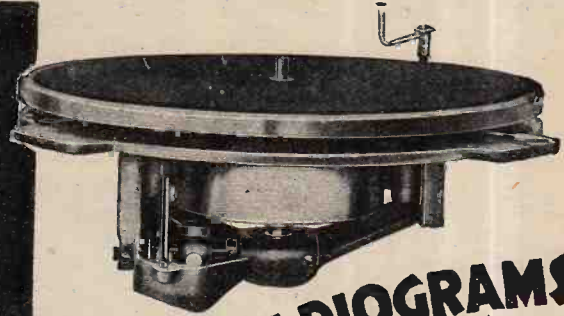
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ONE QUALITY ONLY
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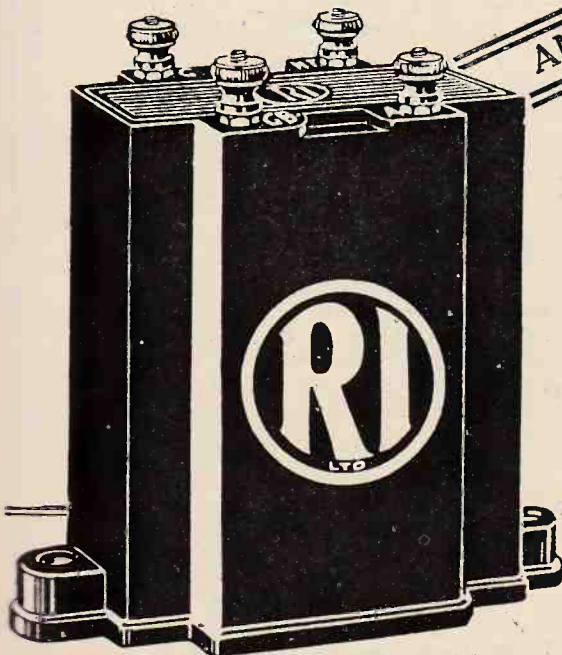
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L.F. INTERVALVE TRANSFORMER with the NIKALLOY CORE



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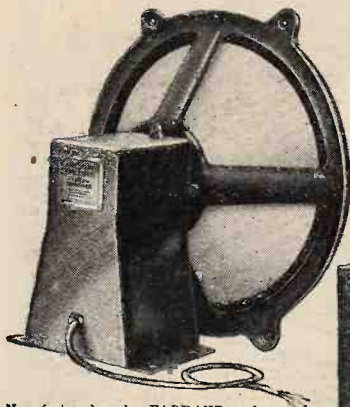
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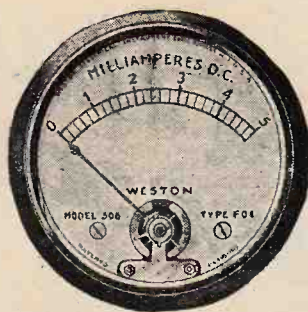
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Naturally
the Best



TO TRACE DISTORTION

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(1927)

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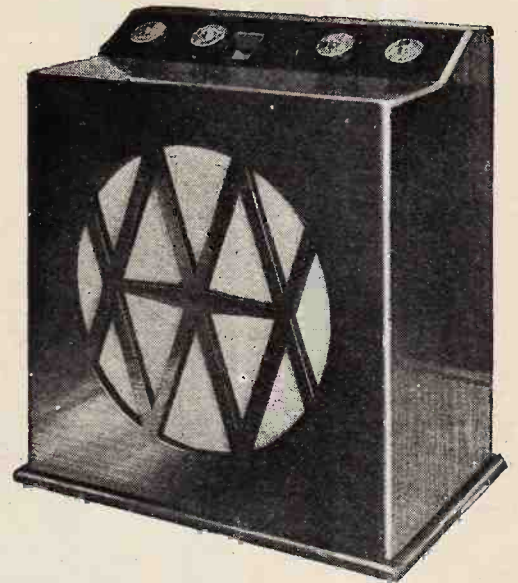
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You can see it on
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You can hear it at
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WELWYN GARDEN CITY, HERTS

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SIMPLE** **M**

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SINGLE TUNING CONTROL.—
Completely Ganged Circuits CALIBRATED IN WAVELENGTHS.
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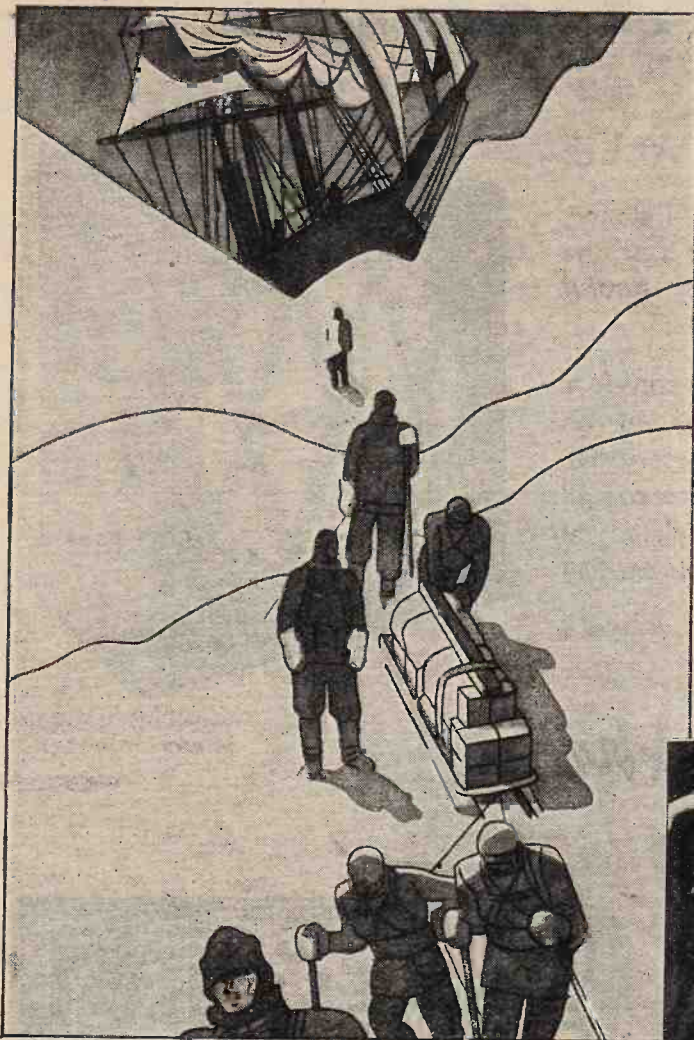
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AND
RADIO REVIEW
(18th Year of Publication)

No. 578.

WEDNESDAY, SEPTEMBER 24TH, 1930.

VOL. XXVII. No. 13.

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 As many of the circuits and apparatus described in these pages are covered by patents, readers are advised, before making use of them, to satisfy themselves that they would not be infringing patents.

Man's Debt to Broadcasting

HUMAN nature is peculiarly quick to adapt itself to new conditions, and this characteristic is responsible for the ease with which we can become accustomed to and take for granted innovations which are the product of scientific development.

As time goes on there is an inclination to forget that we were ever without broadcasting and to look upon it as one of the common amenities of life, meriting no more special consideration than electric light or the telephone, but in the comparatively short space of eight years which it has taken to build up broadcasting organisations throughout the civilised world, broadcasting has undoubtedly contributed very effectively towards general progress. Broadcasting has found its greatest sphere of usefulness in providing recreation and both musical and general education amongst very large sections of the public who, either because of their geographical location or for financial reasons, would otherwise be denied these amenities. The distribution of general knowledge for which broadcasting can be held directly responsible is a most important part of its service to mankind.

An aspect of broadcasting activity, the influence of which has only begun to be widely felt during the past two or three years, is the happier relations and closer sympathy which are steadily growing up between the peoples of different nations as a direct result of mutual participation in broadcasting programmes. The evening with the family listening to a musical entertainment emanating from a Con-

tinental station can do more to break down artificial barriers of nationality than many years of diplomatic tact and political manoeuvring.

Interest in international broadcasting and reciprocating programmes is growing, whilst we look forward, in addition, to Empire Broadcasting as a very important service of the future.

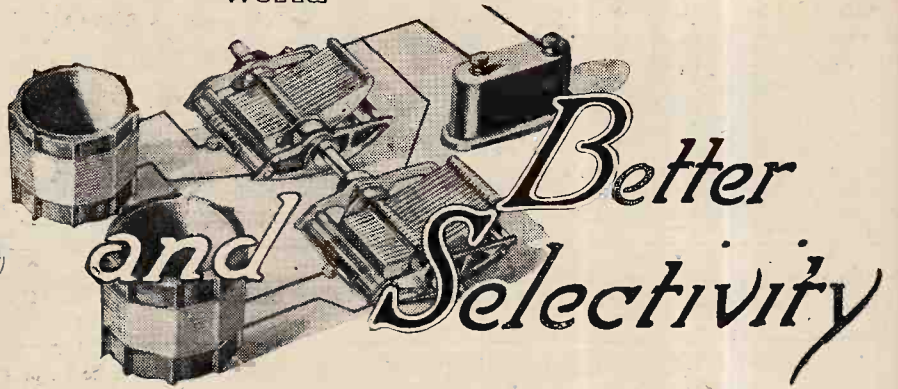
To the credit of broadcasting must be placed the very wide general knowledge which the public has acquired of the subject of electricity and wireless, as a direct result of the fascination of amateur construction and experimenting as a hobby. Until broadcasting arrived members of the public, with the exception of those who had actually studied electricity, might consider themselves accomplished if they knew enough about the subject to connect up an electric bell, yet to-day there are few households where there is not at least one member capable of building a wireless set, with a fair knowledge

of the theory of operation of every part of it. Last, but by no means least, we have to thank broadcasting for giving us an entirely new industry which, although it may have gone through difficult times in the past in the effort to establish itself firmly, has now secured for itself a definite position amongst the most promising industries in this country, and the stand to stand review of the Annual Olympia Show included in the pages of this issue is, in itself, very positive evidence of the stable position of the industry now and of its progressive spirit.

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- BAND PASS AND BETTER SELECTIVITY.
- WIRELESS WORLD SHOW COMPETITION.
- RADIO SHOW IN RETROSPECT.
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BAND PASS



Better Selectivity

Advantages of the Double-humped Resonance Curve.

By W. I. G. PAGE, B.Sc.

PROBABLY one of the greatest problems of to-day in radio is the design of a simple aerial tuning device operated with a single dial which will offer excellent selectivity to cope with local station interference, will not cut sidebands and thus destroy quality, and, last but not least, will not sacrifice signal strength as compared with the obsolete single circuit.

The band pass filter, which was first developed in this country by *The Wireless World*, very nearly fulfils all these conditions. Whether a band pass filter is worth while is no longer a matter of personal opinion. Investigation of its theory provides sufficient evidence that it is the most satisfactory form of tuning yet devised. In the writer's opinion any views to the contrary should be received with caution.

To those who are turning their attention for the first time to these circuits, the mechanism of double-humped tuning, which is the essential feature of the band pass system, may seem a little bewildering, and it is the purpose of these notes briefly to summarise the various articles on the subject which have appeared during the last year in these pages.

a maximum voltage is developed from the currents trying to pass through the circuit. In Fig. 1 (a) is illustrated a typical resonance curve of a single tuned circuit with no filter. The vertical scale shown as "response" represents the relative volts developed around resonance. The

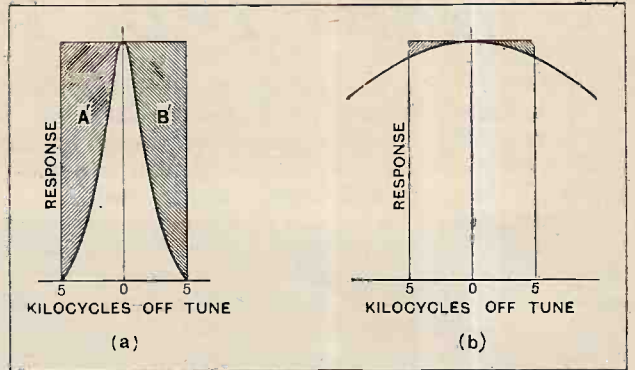


Fig. 2.—By increasing the number of single tuned circuits in cascade, the skirts of the resonance curve (a) can be confined to 10 kilocycles, but the high-note loss area A' B' is excessive. In (b), where a curve for a single circuit with high L/C ratio is shown, the high-note loss area is negligible but the selectivity is appalling.

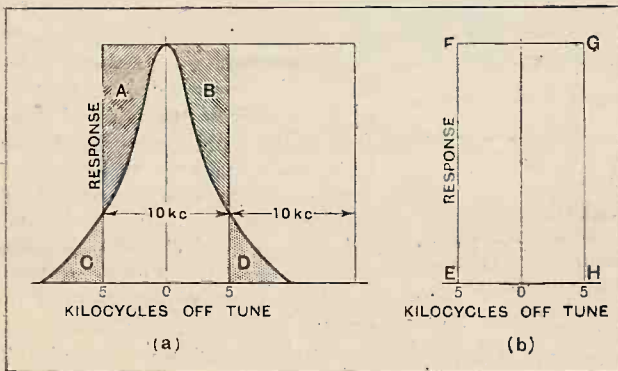


Fig. 1.—Typical resonance curve for an efficient single tuned circuit (a). The area A B represents loss of high notes and C D interference by encroachment into the next 10 kilocycle rectangle. The ideal response curve is given in (b), where there is neither high-note loss nor interference.

When a circuit containing an inductance in parallel with a condenser is tuned to resonance, the whole behaves as a pure resistance of high value across which

peak of the curve is somewhat pronounced, and the skirts spread to about 10 kilocycles either side of resonance. When telephony is transmitted the band of frequencies occupied is about 10 kilocycles, or 5 kilocycles each side of the carrier wave. The frequencies which spread beyond the allotted wavelength are known as sidebands, and convey the high notes which must be retained in our receiving system if music is not to be denuded of its overtones and harmonics. Thus the top of the resonance curve should embrace 10 kilocycles if high notes are to be reproduced, and as stations are only separated by this same frequency the skirts should extend the least possible amount into the adjacent rectangles representing the next 10 kilocycles.

The ideal curve would have vertical sides to give perfect selectivity, and a flat top to ensure a full quota of high notes. Such a response curve is shown in Fig. 1 (b) as EFGH. It is not possible in practice to attain such perfection, but it will be later shown that an approxima-

Band Pass and Better Selectivity.—

tion to it is possible. To return to Fig. 1 (a) where the typical single circuit curve is shown, we see that the deviation from a "square-top" is rather serious, the areas A and B representing considerable high-note loss, while C and D are encroachments upon the two adjacent 10-kilocycle rectangles and represent interference if there happen to be stations with this minimum frequency separation.

By increasing the number of single tuned circuits in cascade—that is, by employing a number of tuned high-frequency stages—the selectivity can be progressively enhanced until the skirts of the resonance curve are confined to 10 kilocycles and interference with adjacent stations is impossible. An overall response curve for such a system is given in Fig. 2 (a), but unfortunately it will be seen that the high-note loss areas A' and B' are excessive, and reproduction generally would be "woolly," and speech would be difficult to understand. On the other hand, it is not hard to arrange a well-damped tuned circuit with a large ratio of inductance to capacity and obtain a curve such as that of Fig. 2 (b). Here the high-note loss is negligible, but the selectivity would be appalling; it might be difficult to separate the two Brookmans Park stations, so far away from resonance would the sides of the curves meet the base line. In brief, with single uncoupled circuits in cascade, either the requisite selectivity or the full quota of sidebands can be retained, but not both.

Selectivity without Loss of Sidebands.

When two tuned circuits not separated by a valve are allowed to react the one with the other either by being magnetically coupled or by the use of a separate common condenser or inductance, the tuning system, taken as a whole, tends to respond to two different frequencies at once, and the resonance curve is typified by that of Fig. 3 (a). If the double hump is so shaped that the two peaks are 10 kilocycles apart, then the sidebands

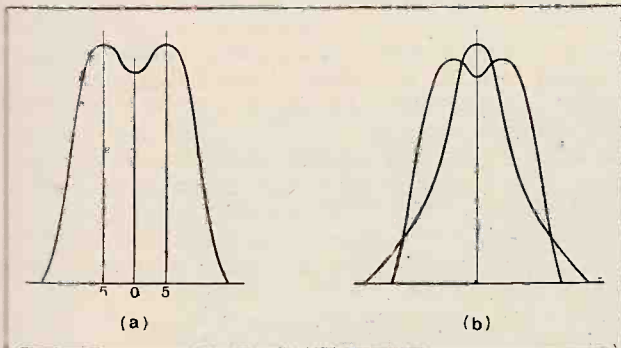
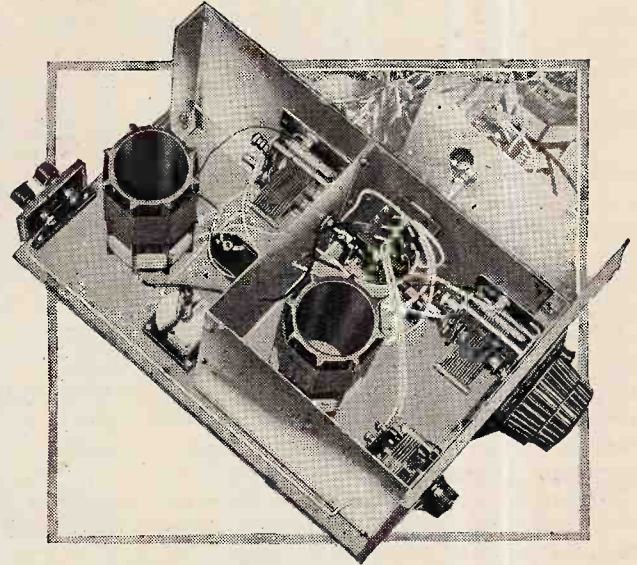


Fig. 3.—(a) Double-humped curve of a capacity or inductance-coupled filter. (b) When employing a single tuned circuit separated by a valve from a band pass filter an approximation to the ideal case of Fig. 1 (b) is realised.

will not only be present in their fullness, but they will be slightly over-pronounced at the expense of the fundamental. There is generally little harm in allowing the high notes to be slightly over-represented in the input of a receiver, for in nearly all the subsequent stages, due to valve and wiring capacities, etc., the upper audio-frequencies are shunted away.

It is fortunately an inherent property of the capacity-coupled filter that not only are the sidebands not mutilated, but the sides of the response curve are steep, so that the desirable combination of selectivity and good quality can be realised. If a single tuned circuit of the type in Fig. 1 (a) be used as an inter-valve high-frequency coupling, and a band pass filter [see Fig. 3 (a)] be employed as the aerial input, the overall response



Showing the ganged band pass filter in the "Band Pass Three" receiver described in last week's issue.

curve will be sensibly square-topped—the peak of the single circuit filling in the depression between the two peaks of the filter. The overall curve, which is not shown, can easily be estimated by combining the two curves of Fig. 3 (b). A highly selective set, called the "Band Pass Three," giving excellent quality, has just been described in this journal in which the tuning arrangements are similar to those just described.

New Type of Capacity Filter.

An example of a band pass filter for the aerial circuit is shown in Fig. 4. The two tuning coils are prevented from direct magnetic and electrostatic coupling by an earthed screen, the only common path being the condenser C_m . If the capacity of the latter is very large it will act as a short-circuit to high-frequency currents, no voltage will be developed across it, and no energy will be transferred to the second circuit; alternatively, if the capacity is very small the condenser will form a fairly high resistance, and a voltage common to both circuits will be set up across it. The higher the common voltage the tighter the coupling becomes and the greater the tendency to produce a double-humped curve. As the circuit is tuned to lower wavelengths (higher frequencies), the reactance of the fixed coupling condenser becomes lower, and therefore less volts are developed across it, the coupling gets looser, and the two peaks tend to coalesce.

It might seem at first sight that a pure resistance could be used as the separate coupling component, as a voltage common to both members of the filter would be developed across it. Careful investigation shows, however, that to

Band Pass and Better Selectivity.—

obtain the true filter effect consisting of a double resonant circuit the common coupler must have capacitive or inductive reactance, otherwise the necessary phase shift will be absent and only a simple loose-coupled tuned circuit will result.

A capacity filter, when forming the only tuning device in a receiver, as for instance, in detector-L.F. sets, has the disadvantage that the coupling at the lowest wavelengths is a little too loose for the optimum transference of energy from the primary to the secondary of the filter, whilst at the higher wavelengths the peaks, by virtue of the tight coupling, are separated by rather more than 10 kilocycles. These shortcomings disappear in a multi-stage set where a compensating effect can be arranged by the mixing of single and coupled circuits. In spite of the varying peak separation across the tuning range with detector-L.F. sets, the band pass filter is an important advance over other forms of tuning, and gives remarkable selectivity and quality. The ideal condition is produced by arranging a change in coupling capacity with change in wavelength. The writer has been experimenting with a large-capacity variable condenser of the type now available, the rotor of which is attached to the common spindle of the ganged tuning condensers. By

making C_m continuously variable there are two important advantages—the coupling and peak separation remain constant, and signal strength does not suffer at the lower wavelengths.

The condenser C_m can be replaced by a small coil with an inductance of about 3 microhenrys (10 turns No. 22 D.C.C. on a one-inch former) or a variometer to be controlled by the ganged condenser spindle. As the reactance of a coil increases with increase of frequency, a filter with separate fixed common inductance has a response curve the two peaks of which get farther

apart as the wavelength decreases—just the opposite to the capacity filter—but although the signal strength is rather better with an inductively coupled filter, the selectivity is considerably worse, especially at the lower end of the wave-band. The two tuning coils in either type of filter should be matched, the ganged condensers should be of the log-law type, and as the fraction of the aerial capacity thrown into the circuit, when a tapped aerial input is arranged, is smaller than the input capacity of the valve, a trimming condenser to compensate for disparity of incidental capacities must be included in the input side. Practical details of an aerial filter were given in the August 27th issue in the description of the "Band Pass Unit."

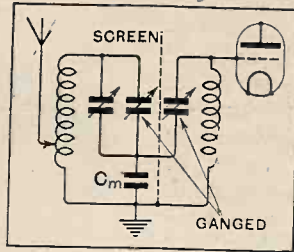


Fig. 4.—Circuit of a capacity band pass filter. The coils must be matched, the log-law tuning condensers ganged and a small trimming condenser arranged across the aerial coil. The coupling condenser C_m can be variable and controlled by the spindle of the ganged condensers. This gives constant peak separation and constant signal strength.

We Want Your Vote.

"The Wireless World" Olympia Show Competition.

WE have already announced in previous issues the details of the Olympia Show Competition which *The Wireless World* is again arranging this year, on similar lines to previous years, in connection with the annual Radio Show. We are particularly anxious that every reader should record his vote, because the greater the number of votes the more interesting does the result of the competition become and the more accurate is it as an indication of the collective opinion and choice of our readers.

Simplicity of the Competition.

We believe that we have reduced the competition to the simplest possible form, so that there should be no difficulty in completing the entry form when once the reader has decided upon his choice in the various sections into which we have divided the Olympia exhibits for the purpose of the vote. Our classification has been arranged for convenience as follows:—

- (1) Receivers of all types, either mains or battery operated. (2) Radio-gramophones.
- (3) Batteries of all kinds, including accumulators for both high tension and low tension.
- (4) Mains supply units, both D.C. and A.C.
- (5) Loud speakers of all types. (6) Valves.
- (7) Other apparatus, not classified above. Also am-

plifiers, component parts, such as transformers, condensers, tuning coils, resistances, etc.

To enter for the competition, readers are asked to complete an entry form taken from the advertisement pages of this or next week's issue. Competitors are required to enter the name of what they consider to be the best in each class above and also to record their vote for what they consider to be the outstanding single feature of the Show, irrespective of classification. The forms should not be sent to us earlier than October 1st, but should reach us on or before Monday, October 6th. The reason for this request is to enable full use to be made of the information contained in our three Show Numbers.

Prizes of Cash and Apparatus.

The prizes which we are offering in connection with the Competition are to a total of £100; a first prize of £50 to be awarded to the competitor whose vote agrees with the opinion of the majority in the selection of the outstanding single exhibit and also in the largest number of classes; and, in addition, second, third, fourth, and fifth prizes to a total value of a further £50 in the form of vouchers for the purchase of apparatus from firms exhibiting at Olympia. Full details of the prizes will be found on the entry form.

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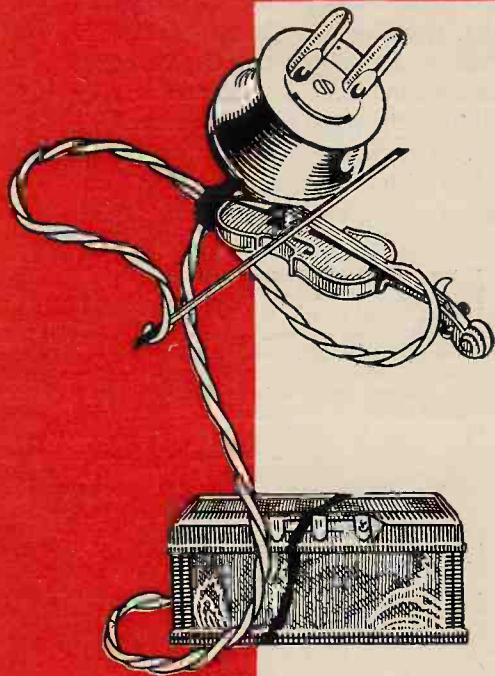
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PHILIPS ALL-ELECTRIC RADIO



Whether your mains are A.C. or D.C., or even if you have no electric light, there is a Philips Receiver that will exactly meet your needs. In the Philips range of receivers, the biggest range of any one radio manufacturer, you will find a set for every purpose and to fit every purse.

Philips 3-Valve All-Electric Receiver Type 2514 works entirely from A.C. Electric Mains (40/100 cycles). Complete with valves and leads.

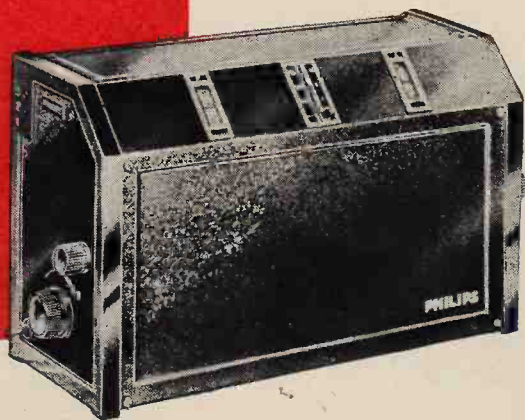
Price £21 0 0

Philips 3-Valve All-Electric Receiver Type 2524, as Type 2514, but works completely from D.C. Electric Mains. Complete with valves and leads.

Price £21 0 0

Type 2502, similar to Type 2514, but operates from batteries or a supply unit. Price £12 10 0

Philips 4-Valve All-Electric Receiver Type 2511 is a deluxe receiver, all current being taken from A.C. mains. Complete with valves and leads. Price £35 0 0



Philips Lamps Ltd., Philips House, 145, Charing Cross Road, London, W.C.2.

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PHILIPS ALL-ELECTRIC RECEIVERS COVERS EVERY NEED OTHER



Philips Portable Receiver Type 2522 incorporates single knob tuning with two tuned circuits, ensuring the utmost selectivity. The cabinet of polished walnut is fitted with a turntable, and when closed automatically switches off the receiver which cannot be used again until the cabinet is unlocked. Complete with valves, accumulator, batteries and waterproof cover. Price £25 0 0



Philips 2-Valve All-Electric Receiver Type 2515 works entirely from A.C. Electric Mains (40/100 cycles). The ideal local station receiver. Single dial tuning with a reaction and variable selectivity device. Loudspeakers Types 2016, 2026 and 315 have been specially designed for use with this receiver. Complete with valves and leads.

Price £12 10 0

Philips 3-Valve All-Electric Receiver Type 2531 works completely from A.C. Electric Mains (40/110 cycles). It is fitted with a tapped mains transformer for operation on mains of 100-110 and 190-250 volts, two tuning controls together with reaction and selectivity regulators. Philips Loudspeakers Types 2007, 2019, 2024 and 2109 (Moving Coil) have been specially designed to work from this receiver. Complete with valves and leads.

Price £23 0 0

Philips Console Receiver Type 2601 is a 4-Valve A.C. All-Electric Receiver mounted with a new permanent magnet moving-coil speaker in a console cabinet of walnut finished phillite. A volume and tone brilliancy selector is fitted, enabling the listener to vary the relative strengths of bass and treble notes. Connections provided for a gramophone pick-up. The speaker is of improved design, giving strikingly rich tone with realistic distribution of sound.

Complete with valves and leads.

Price £45 0 0



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ALL-ELECTRIC RANGE FOR THE A.C. OR D.C. USER

Philips Loudspeaker Type 2024. This new model is contained in an exceptionally well-constructed dark oak cabinet of attractive appearance, with an organ-pipe fret.

Price £4 10 0



Philips Loudspeaker Type 315 is a new model which is a superb example of the cabinet maker's art. It is of unique design and gives wonderfully mellow reproduction. In mahogany or walnut.

Price £3 15 0



Philips Radiogramophone Type 2811 operates entirely from A.C. Electric Mains and combines a 4-Valve All-Electric Receiver and an electric gramophone. The latter incorporates a newly designed pick-up and an electric turntable with combined automatic brake and mains switch. Tone brilliancy selector. Valve amplifier incorporates 10 watt super pentode. The speaker is of new design with separately excited field. The cabinet is of polished walnut, in a striking modern design. Fittings are of oxidised silver and two record albums are supplied. Complete with valves and leads. Price £80 0 0

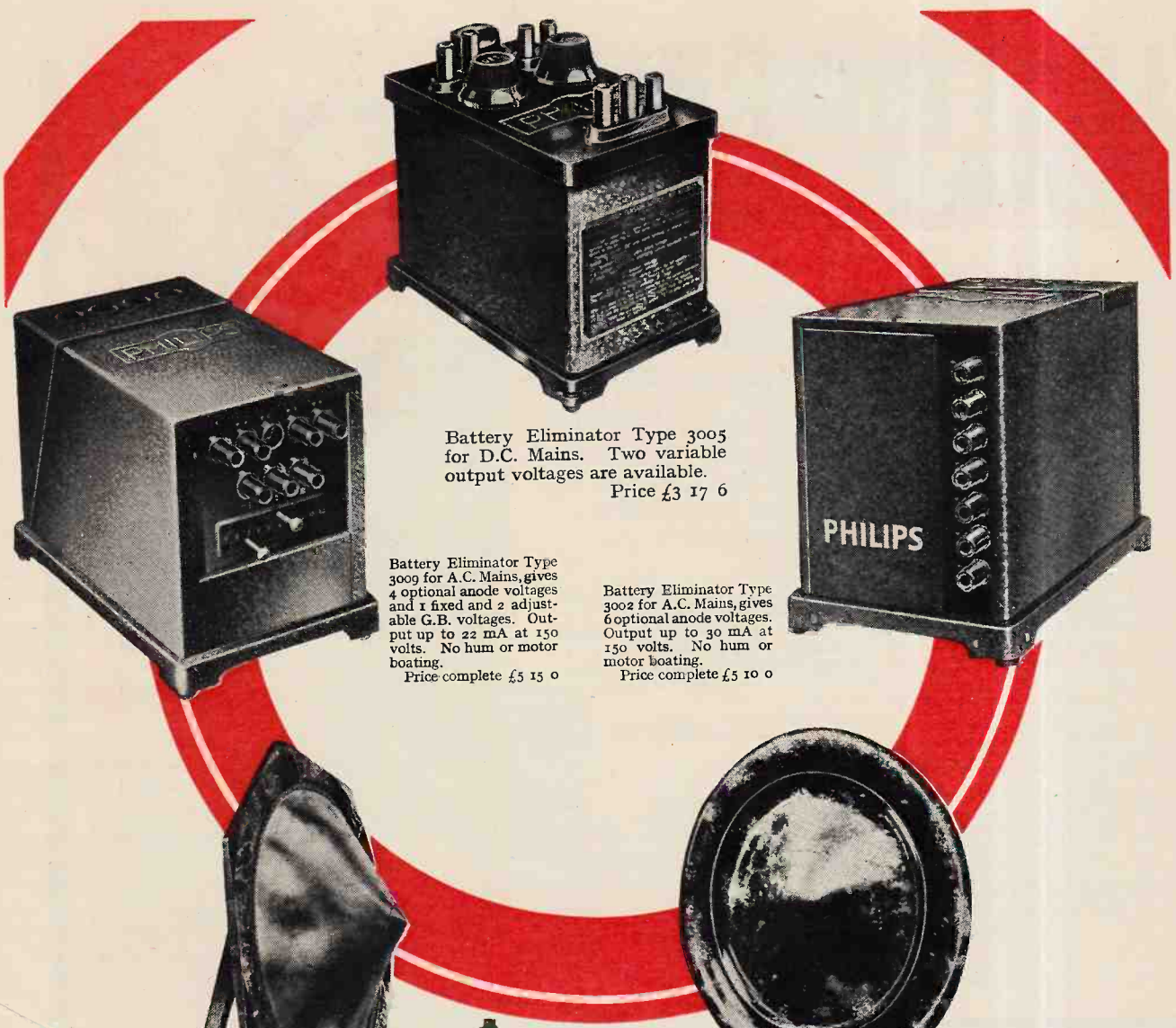
Philips 2-Valve All-Electric Receiver Type 2523 works completely from D.C. Electric Mains of 200-240 volts. It incorporates single dial tuning with a reaction and variable selectivity device. Special detector and pentode valves are fitted. Supplied in mottled philite case. Philips Loudspeakers Types 2016, 2026 and 315 have been specially designed for use with this receiver. Complete with valves and leads. Price £12 10 0

Console Receiver is a 4-Valve A.C. Receiver mounted on a new permanent moving-coil speaker cabinet of polished philite. A tone brilliancy selector fitted, enabling the user to vary the strengths of bass notes. Connected for a gramophone. The speaker is of a rich tone distribution of

with valves and leads. Price £45 0 0



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Battery Eliminator Type 3005 for D.C. Mains. Two variable output voltages are available. Price £3 17 6



Battery Eliminator Type 3009 for A.C. Mains, gives 4 optional anode voltages and 1 fixed and 2 adjustable G.B. voltages. Output up to 22 mA at 150 volts. No hum or motor boating. Price complete £5 15 0



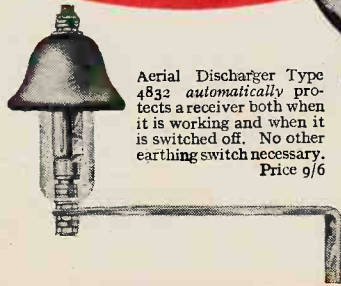
Battery Eliminator Type 3002 for A.C. Mains, gives 6 optional anode voltages. Output up to 30 mA at 150 volts. No hum or motor boating. Price complete £5 10 0



Loudspeaker Type 2016. In mottled red finish fitted with dual tone switch. Also Type 2026, finished in dark oak and ebony, without dual tone switch. Price £2 10 0



Loudspeaker Type 2007. In mottled philite in three colour schemes to harmonise with all surroundings. Price £5 5 0



Aerial Discharger Type 4832 automatically protects a receiver both when it is working and when it is switched off. No other earthing switch necessary. Price 9/6

PHILIPS

All-Electric Radio

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RADIO SHOWS IN RETROSPECT

Milestones of Technical Development in Broadcast Receiver Design.

EVERY industry of national importance, from baking to shipbuilding, holds an annual exhibition. After every exhibition the cynics and pessimists get to work with pencil and paper and "prove" that exhibitions do not pay. "Next year we will spend the money in newspaper advertising," they say; but next year finds them there just the same. The fact is, that exhibitions have a "goodwill" value—call it what you like—that cannot be estimated with pencil and paper. The opportunities for personal contact between producer and consumer serve to stimulate interest and renew enthusiasm, while the necessity of formulating a programme for the coming season forces the manufacturer to marshal the results of his research activity during the past twelve months and to present these results in concrete form.

To the student of design, therefore, the show is a summary of the year's progress. It is from this point of view that a study of the radio exhibitions in chronological order is instructive. One might almost construct a graph, with time as a basis and each show as a point, showing not only the rise and fall in popularity of individual components and principles, such as the horn loud speaker, the crystal set and the neutrodyne, but also fluctuations in the productivity of ideas in general. The latter curve, for instance, would be practically flat between 1922 and 1923 with a prominent peak at 1926.

There are still some people who persist in asserting that "wireless is still in its infancy." A comparison of the apparatus shown this year at Olympia, and described elsewhere in this issue, with the equivalent types

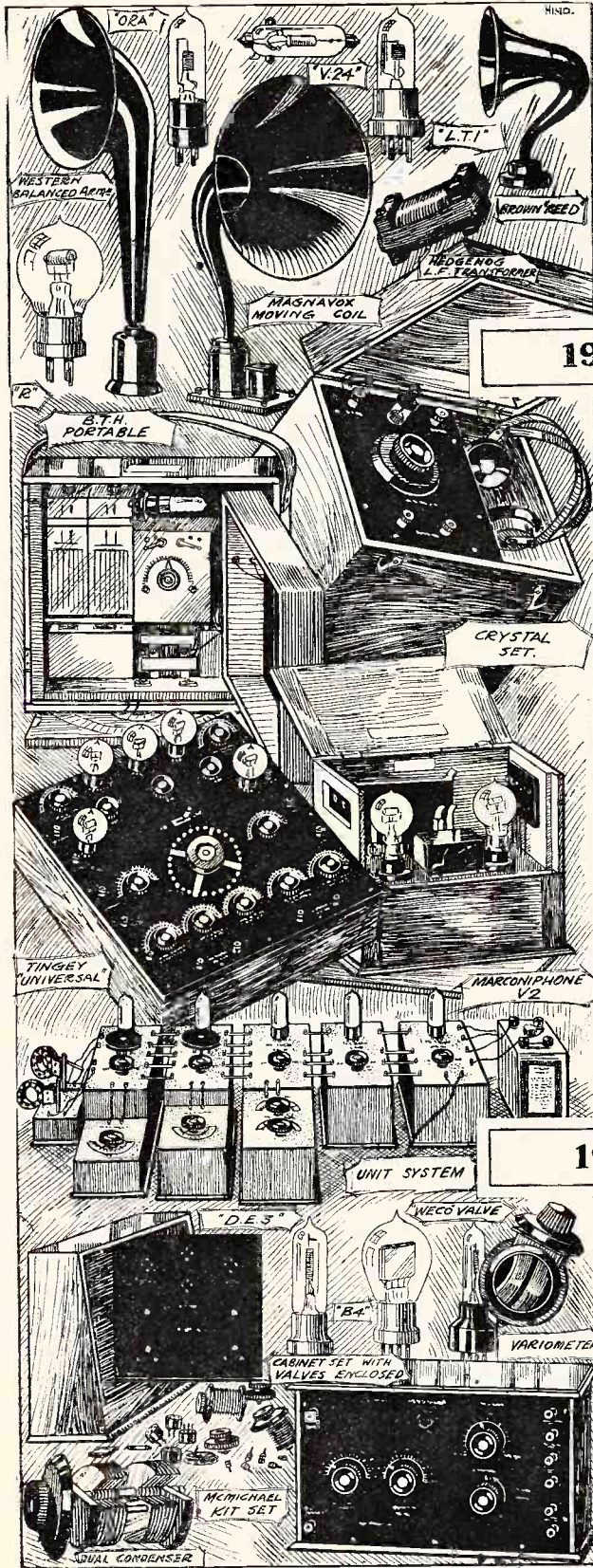
exhibited at the Horticultural Hall in 1922 should finally dispose of this time-worn platitude. Compare also the standard of technical knowledge displayed by visitors to Olympia with that in evidence at the first All-British Wireless Exhibition. Apart from the few scientific amateurs already in possession of experimental licences, the skill of the average broadcast listener in 1922 was severely taxed by the simple operation of adjusting a crystal. Indeed, the crowds who flocked to the 1922 exhibition did so out of curiosity to witness the new phenomenon of broadcasting rather than to make a critical examination of the apparatus shown. Contrasting this with the well-informed quest for information displayed by visitors at Olympia this year, one can no longer deny that wireless has long since passed through adolescence to years of discretion.

It would be interesting to trace the influence of the technical Press in educating the listening public to an appreciation of the merits of modern receivers—the superheterodyne, the neutrodyne, and the moving-coil loud speaker were popular with the home constructor as much as twelve months in advance of their general adoption by the trade—but we will content ourselves with a simple presentation of the outstanding features of each show and leave it to the reader to study the facts from his own particular viewpoint.

In conclusion we would point out that, although the rate of production of new ideas has at times been slow, the curve of progress has so far always taken an unexpected upward tendency at periods when it has shown signs of reaching saturation.



The principal feature of interest at the Horticultural Hall in 1922 was not so much the apparatus displayed as the phenomenon of broadcasting itself.



THE All-British Wireless Exhibition and Convention held at the Horticultural Hall from September 30th to October 7th, 1922, although not the first large-scale radio show to be held in this country, was the first exhibition to receive the support of the entire trade, and may be said to have definitely raised the manufacture of broadcast apparatus in this country to the status of an industry.

Bearing in mind the fearsome appearance of valve receivers at this time, it is not to be wondered that the simple crystal set received the greatest support. The majority of valve sets were of the "all-wave" variety with switches for cutting in or out L.F. stages and capable of receiving Morse as well as telephony on all wavelengths from 200 to 20,000 metres. The only outstanding receiver designed exclusively for broadcasting was the Marconiphone V₂. Another type of receiver popular with the scientific amateur at this time was the unit system in which any number of stages could be linked by standardised terminal connections. There was also a portable—the B.T.H.—forerunner of a type destined in later years to become one of the staple products of the industry.

With one or two notable exceptions, loud speakers were in general bad, and could not compete with the crystal set and headphones for quality of reproduction. All were of the horn type and, while most movements made use of an attracted iron diaphragm, there were isolated examples of principles which have become established practice to-day, e.g., the Magnavox moving coil, Brown reed, and Western balanced armature movements.

Loud speakers, however, were not entirely to blame for the mediocrity of reproduction; the responsibility was shared by the valves then obtainable.

The market was dominated by the "R" valve, a bright emitter with an excellent war record but a microscopic undistorted power output. The Marconi-Osram factory had already produced two dull emitters, the L.T.1 and L.T.3, but at the time they were regarded in the nature of an interesting technical experiment. Incidentally, the price of the "R" valve was 26s. 6d., whereas the dull emitters cost £2 10s. each.

HELD at the White City, the exhibition this year was organised by the newly formed N.A.R.M.A.T. With broadcasting firmly established there was an increase both in the number of sets and the variety of components. Enclosed cabinet receivers were displacing those with exposed valves, but tuning controls were just as complicated and quality of reproduction little better. Credit for any improvement in the latter must be given to the B.4 valve—forerunner of the D.E.5, and of similar characteristics. The introduction of this valve was probably the most important advance of 1923, though the D.E.3, with 0.06 amp. filament, and the "Weco valve" with oxide-coated strip filament, secured far more publicity. Variometer tuning was also popular this year, and several ganged condensers made their appearance. It is also interesting to note at least one example of a kit set for home construction.

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NOW thoroughly established as an annual event, the Show this year was held at the Royal Albert Hall. One of its most memorable features was the B.B.C. demonstration of reception, which came as a revelation to most people and helped to establish a demand for better quality of reproduction. Receiving sets in general had undergone a process of structural simplification without any outstanding change in circuit principle. The D.E.5 and B.4, with a power output of 75 milliwatts, were still the standard output valves for quality reception, while a special high-magnification valve for resistance amplification—the D.E.5B—was enthusiastically acclaimed by experimenters. Four-electrode valves of the space-charge-grid variety also enjoyed a considerable vogue about this time. They were used for reception with low H.T. voltages and also for dual amplification and experiments in reflexing.

For the three most important developments of the 1924 show we have to look among the components and accessories. Foremost must be put the Marconiphone "Ideal" transformer. Produced at a time when manufacturers were advertising such qualities as the ability of their instruments to withstand immersion in water, this transformer, with its guaranteed frequency characteristic, did much to clear the air of current superstitions in relation to L.F. amplification. Next there was the Sterling "Primax," the first commercial hornless loud speaker; a little insensitive by comparison with existing horn loud speakers, but capable of a far better response in the lower register. Finally, there was the "square law" condenser, introduced to overcome the crowding of stations at the lower end of the tuning dial of which the users of semi-circular vane condensers complained.

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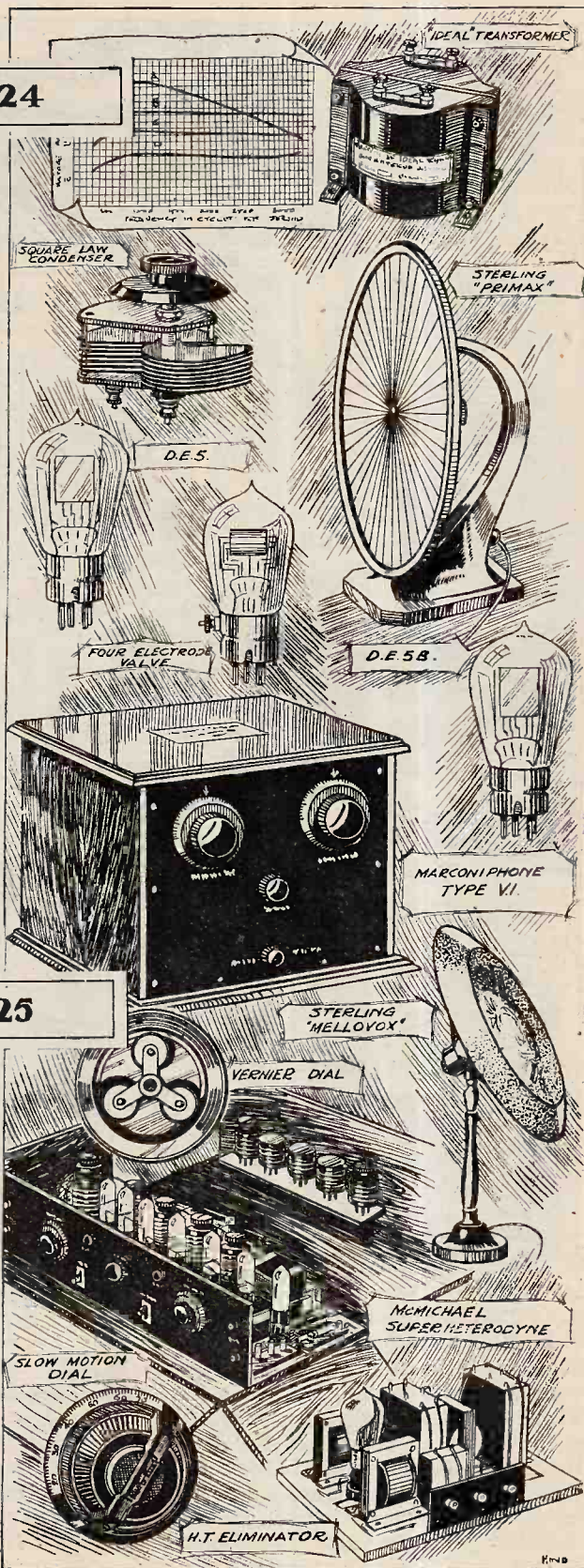
A GAIN held at the Royal Albert Hall, the exhibition this year was dominated by the superheterodyne receiver. All the principal manufacturers were showing examples of this type, which was discussed by everyone and purchased by the affluent few. Crystal sets were still in demand, and the majority of valve sets sold were of the reacting detector-and-one-L.F. type for local station reception with a small loud speaker.

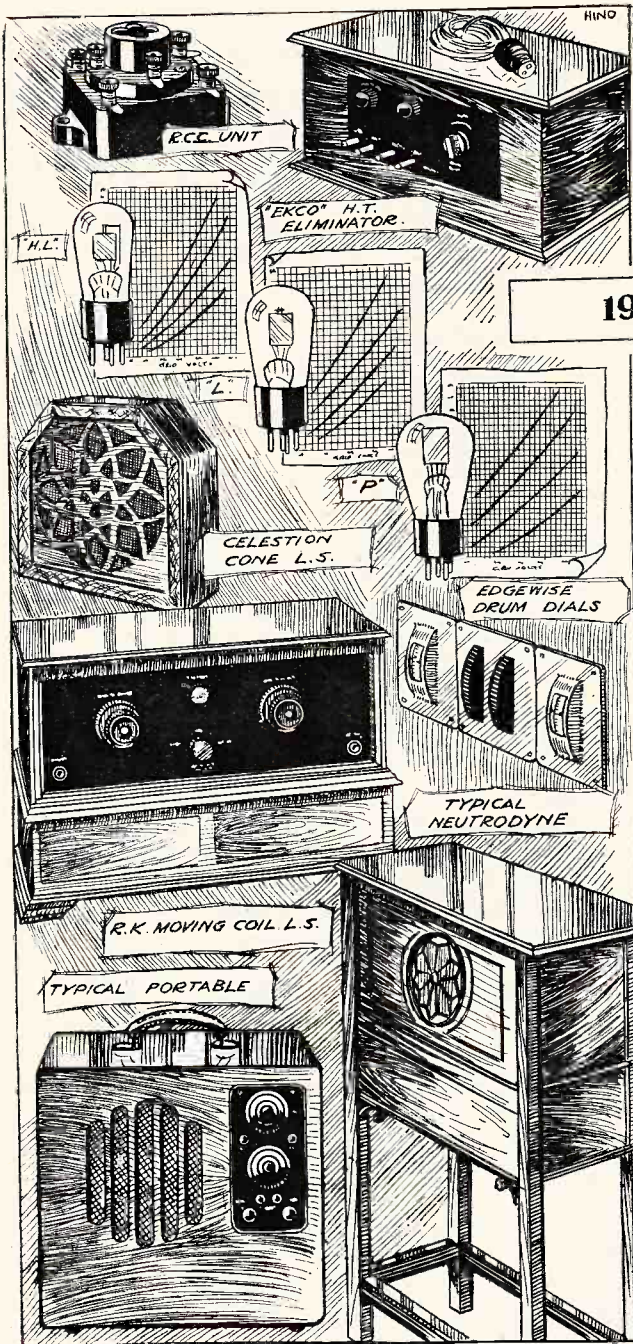
The hornless loud speaker made little progress during the previous year, and the Sterling "Mellovox" was the only new example to come to support the "Primax."

While valves specifically designed for H.F., L.F., and power amplification were being offered to the public in ever increasing profusion, the technical information supplied by the makers was still meagre. The 0.1 amp. non-microphonic filament had virtually displaced the 0.06, and "mass"-type 2-volt cells were the source of L.T. current in place of the dry batteries for which the 0.06 filament was designed.

Attention was being directed to the possibility of deriving H.T. current from electric supply mains, and at least one battery eliminator was in commercial production.

Vernier condenser dials, originally imported from America, were now in production in this country, and 1/4 in. spindles were being fitted to variable condensers instead of the usual 2B.A. threaded spindles.





1926

THE entry of the Radio Show into the historic exhibition building at Olympia coincided with a period of unprecedented activity and originality in the design of broadcast apparatus. The following were a few of the more important developments of 1926: (1) Neutralised H.F. amplification. (2) Portables. (3) Coil-drive loud speakers. (4) Super-power valves. (5) Mains equipment.

The neutrodyne principle of H.F. amplification entirely revolutionised the design of long-distance receivers. The tuned anode circuit with plug-in coils and the semi-tuned H.F. transformer were swept from its path, and the only serious challenge to its supremacy came from the firmly entrenched superheterodyne. Indeed, the "neutrodyne versus superhet." controversy was one of the brightest features of the Show. But for the intervention of the screen-grid valve in the following year the struggle might still be in progress. Then there was the portable. In the absence of developments in other directions, 1926 would undoubtedly have been known as the "portable year." The demand for sets of this type was unprecedented, and examples were to be seen on nearly every stand.

The moving-coil loud speaker also made its debut as a commercially produced component, the B.T.H. model R.K. being the pioneer example. This was the sole representative of the type, however, and not until 1928 did it become really popular with manufacturers. Battery eliminators and trickle chargers for the L.T. battery, by this time well beyond the novelty stage, were common. The majority were housed in wooden cabinets.

All valve makers of repute now supplied full data and curves, and the system of nomenclature first introduced by Burndep, Limited, was gaining ground. With minor modifications the same system is still in vogue to-day. Other interesting valve developments were the introduction of super-power valves and the Met-Vick "Short-path" principle of construction.

The "low-loss" fashion in component design reached its zenith about this time. This quality was claimed for practically every item, with the possible exception of resistances. The edgewise drum dial—now so popular—was shown for the first time, and there were a few examples of screening boxes. The component most in evidence, however, was the R.C.C. unit—resuscitated by the introduction of special high-magnification valves. With these valves the amplification per stage with resistance coupling was comparable with that obtainable with transformer coupling and existing L.F. valves.

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**THE PRESENT
AND
THE FUTURE**

WITH the opening of the Olympia series of shows in 1926 we enter upon what may be regarded as the contemporary period in the history of broadcast receiver design. None of the developments which have been introduced since that date can yet be regarded as solely of historical interest. The screen-grid valve, indirectly heated valves, electrical pick-ups, radio gramophones—all are in a healthy state of development and general improvement.

The year 1926 is, then, a convenient point at which to pause, for it marks a period of transition between developments which are of current interest and of those which are now merely of historical interest. The Olympia Show has never failed to fill the New Hall, in which it started, and this year has overflowed into Empire Hall. Will the commencement of the third era be marked by the first exhibition to be held in the Main Hall?

UNBIASED.

By

FREE GRID.

Bedlam in the Home.

THERE are still a large number of people who, in their search for perfect quality, have got the false idea firmly fixed in their heads that in order to attain this desirable end it is necessary for the loud speaker to reproduce the programme at the same strength as it is in the concert hall from which it is being broadcast, and consequently they go to enormous expense in providing hyper-super power valves which have a voracious appetite for watts. In order to realise the absurdity of this you have only to think of what would happen if it were physically possible to cram the whole of an orchestra of Queen's Hall magnitude into the corner of the room usually occupied by the loud speaker. The result would be sheer pandemonium and complaints from the neighbours.

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Why People Don't Like Wireless.

In spite of the truly remarkable progress which has been made in the past twelve months in the improvement of the moving coil loud speaker, the demonstration instrument stuck outside their shops by many dealers in order to attract custom still sounds more like a lion roaring after its prey than anything else. It seems a great pity that this state of affairs should persist, as it must put many people off buying a set, and it brings broadcasting into general disrepute. It is noticeable that this travesty of music usually issues from the establishments of those who have been accustomed in the past to dealing in the more loathsome type of cheap gramophone. Probably the proprietors of such establishments have become hardened to it through much usage.

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A Striking Contrast.

The wireless trade, more than any other which I know of, seems cursed with a spirit of utter indifference to any out-of-the-ordinary requirements of its customers. The idea of earning goodwill never seems to enter the minds of those responsible for carrying on the business, be they proprietors or assistants, and this spirit seems to prevail among the largest as well as the smallest wireless concerns. An instance of this was strikingly brought home to me only the other day. It so happened that I was in need of a rather out-of-the-way type of component and sallied

forth in an attempt to obtain it. I first tried a well-known establishment whose name is a household word in almost every country of the world, although more for ordinary electrical than for wireless goods. After being received with the codfish eye of suspicion by the Admiral of the Fleet stationed in the doorway, I was admitted to the establishment. After a relatively brief wait of ten minutes or so I was able to find somebody to listen to my pleas, but alas! I was at the wrong counter.

I came out empty handed after half an hour or so, disgusted at the complete indifference shown as to whether my wants were fulfilled or not, and made my way slowly westward to a well-known radio shopping district situated not much more than a wavelength (London Regional) away. Entering the first shop I again stated my wants, but the youth in attendance barely broke off his conversation with the fairy presiding at the wander plug counter in order to intimate to me curtly that he had never heard of the article I asked for. I received similar treatment in several shops, and in some the rather unusual nature of my request earned for me such a searching look of suspicion that I began to wonder if all was well with my personal attire. But no, autumn was in the air, and Mrs. Free Grid had only recently consigned my old suit to the dustbin, and I was newly clad in "gent's new autumn suiting."

At length I gave up my quest in despair, and almost immediately a striking instance of the much better spirit prevailing in other trades was brought home to me. I had the misfortune to break the glass of my watch, and so I called at the nearest watchmaker's establishment for the necessary repair. After a few moments I was civilly informed that my watch glass was of rather an odd size and was not in stock. In order to prevent damage to the hands of the watch would I permit them to put in temporarily a glass which was very slightly on the small size until a proper one could be obtained? I would. As I fished in my pocket for the necessary small change I was informed that no charge whatever was made for an incomplete job, but if I would call in next time I " . . . the Codfish eye of suspicion . . . "

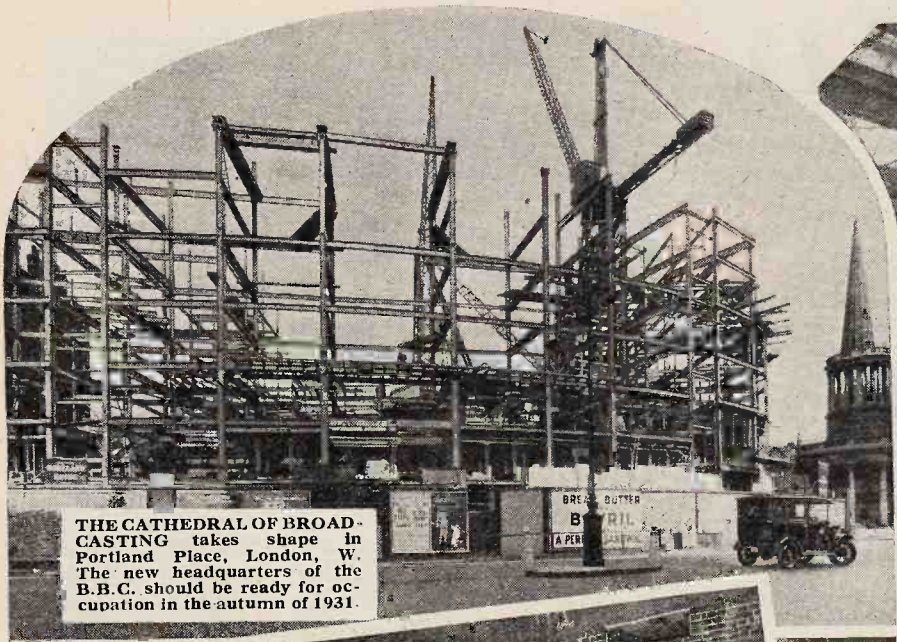
was passing a proper glass would be fitted. It only remains to be said that I visited this establishment a couple of days later, when the job was satisfactorily completed; nor was the price ruinous although the glass had been specially ordered for me. What a contrast!



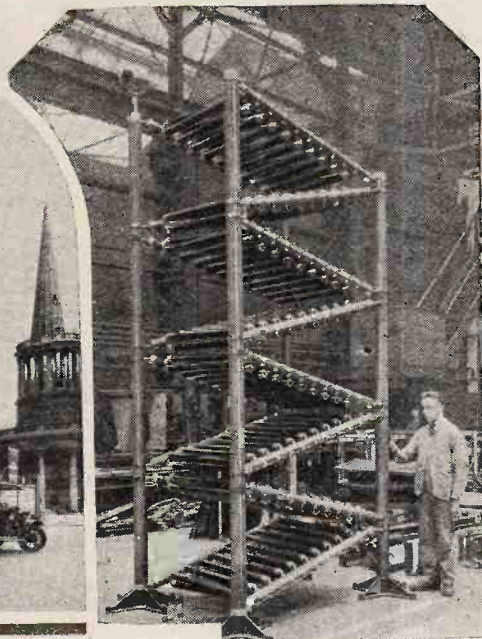
" . . . sheer pandemonium and complaints from the neighbours . . . "



" . . . the Codfish eye of suspicion . . . "



THE CATHEDRAL OF BROADCASTING takes shape in Portland Place, London, W. The new headquarters of the B.B.C. should be ready for occupation in the autumn of 1931.

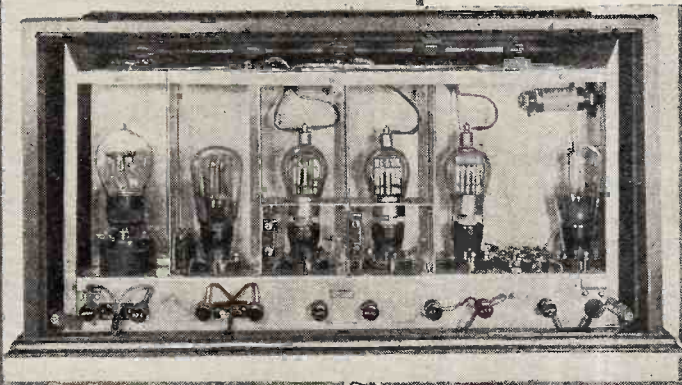


A BANK OF CONDENSERS recently built by Messrs. Ferranti, Ltd., for use on 800,000 volts

THE STENODE RADIOSTAT. The chassis of a finished demonstration set, seen from the back.



"IN THE RAW." A gallery studio on the sub-basement floor of Broadcasting House. When completed it will be almost a replica of the large studio at Manchester.



PRO KOPF U. JAHR

COMPARISONS. A pictorial representation at the Berlin show of the relative importance of luxuries in the life of the average German. At present beer precedes broadcasting.



BIER
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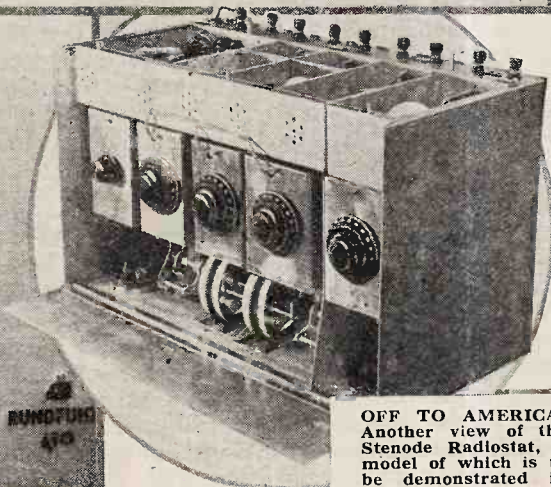
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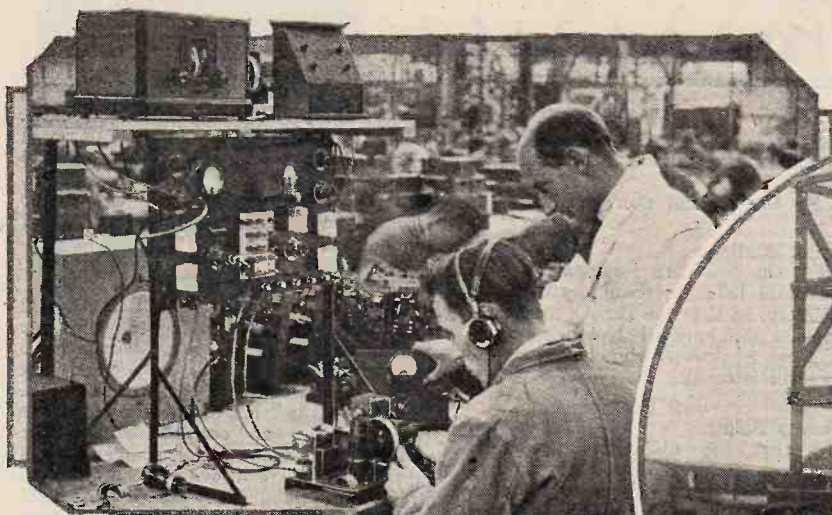
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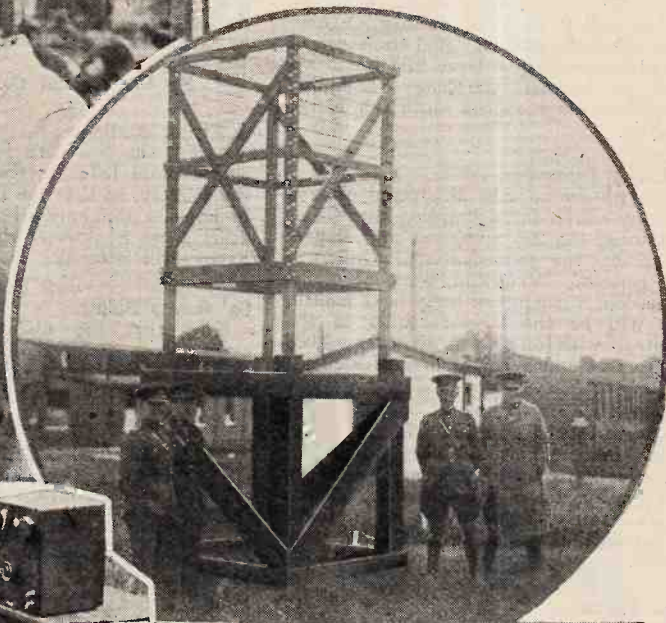
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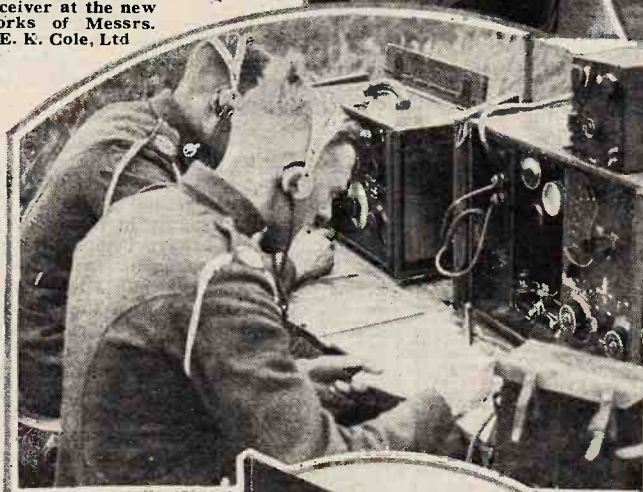
OFF TO AMERICA. Another view of the Stenode Radiostat, a model of which is to be demonstrated in the U.S.



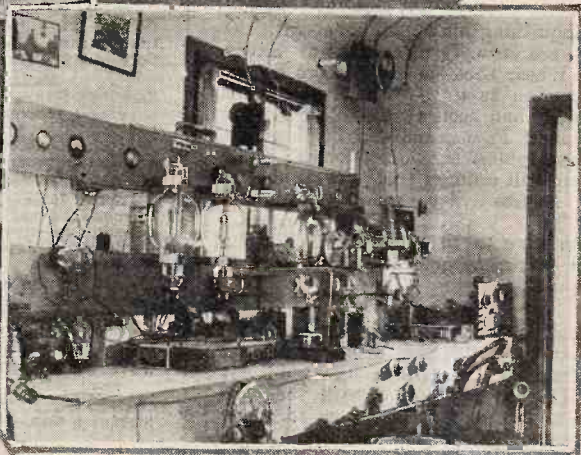
ALL CORRECT? Conducting an overall test of a completed receiver at the new works of Messrs. E. K. Cole, Ltd



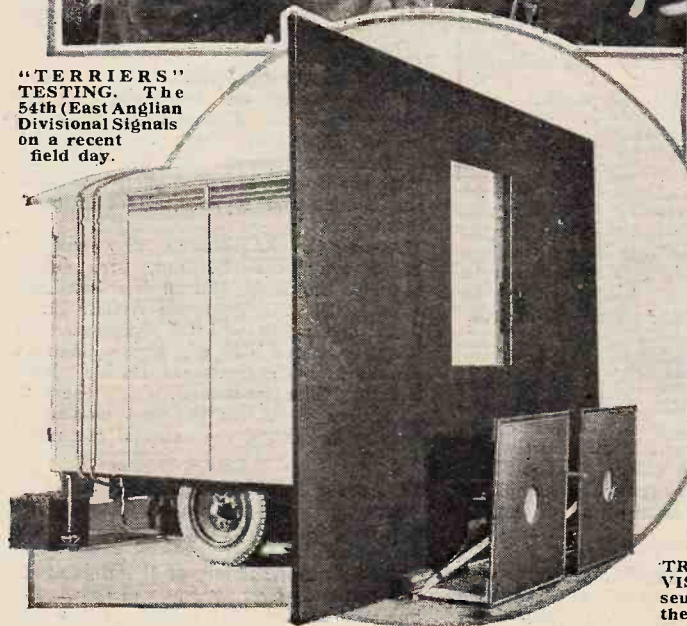
TRAFFIC CONTROL IN THE AIR will be one of the main functions of the new directional wireless station at Baldonnell Aerodrome, near Dublin, I.F.S. Our photograph shows the receiving aerial.



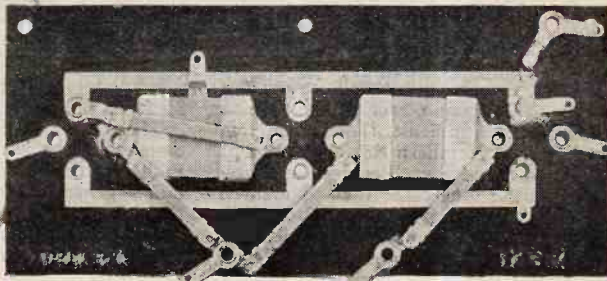
"TERRIERS" TESTING. The 54th (East Anglian Divisional Signals on a recent field day.



CALLING THE WORLD. The 1930 edition of 2 NM, Sonning-on-Thames, owned and operated by Mr. Gerald Marcuse, of the Radio Society of Great Britain.



TRANSPORTABLE TELEVISION arrived on the Coliseum Music Hall stage in the form shown-in the left-hand photograph.



VALVES NOT INCLUDED! A three-valve receiver for 1s. 2d. beats the world's record for cheapness. The set, shown above, was exhibited at the Berlin show.

Broadcast Brevelias

By Our Special Correspondent.

At long last the B.B.C. appears to have found another studio equalling the acoustic brilliance of the Grand Hotel at Eastbourne. Listeners will be able to judge on Sunday, October 12th, when the new National Orchestra of 114 players will give their first broadcast from a disused warehouse adjoining Waterloo Bridge on the south side of the Thames.

A Lucky Discovery.

The warehouse was discovered after a feverish search for a building capable of containing the 225 musicians and singers composing the new National Orchestra and Chorus. When the work of transformation is completed early next month, this will be the largest studio in the country, with an area of over 4,000 square feet and a height of 30 feet.

"Ideal."

Acoustically the building is said to be ideal. Private lines are being run from Savoy Hill to the warehouse, which is barely a quarter of a mile away. It will be used fairly frequently as an auxiliary studio until the opening of Broadcasting House.

Jack Payne.

Rumours that Jack Payne is thinking of relinquishing his appointment with the B.B.C. are strongly discounted at Savoy Hill. I hear that the story arose out of a discussion as to whether dance bands grow stale and need a rest. Be this as it may, Jack Payne and his band evince not the slightest sign of staleness; many listeners will contend that "every day in every respect they grow better and better."

From time to time the band enjoys a change of atmosphere by touring the music-halls.

"Educating" the Northern Listener.

A rather frightening task faces that department of the B.B.C. whose duty it is to provide the public with the bare technical information necessary for good reception. The job immediately ahead is the "education" of the Northern listener, who will shortly be blessed or cursed, according to his capabilities, with alternative transmissions on high power.

Bristling with Difficulties.

Whereas only one major problem was offered by the change-over to Brookmans Park, viz., the huge power increase which made separation difficult, the change from Manchester to Northern Regional offers at least three problems. Besides the question of power increase (and Northern Regional promises greater radiation than Brookmans Park), the unfortunate listener in the North will have to consider a violent change in wavelength. At present he enjoys his Manchester programme on 376.4 metres. For his Regional programme he must step up to 479.2 metres, and a switch-over to the National means a drop to 301.5 metres.

A Bigger Audience.

Again, the Northern Regional area includes more listeners than any other in the country, so that the B.B.C. may have to appease ten enraged Northerners for every seven Southrons who choked up the Savoy Hill letter-box last year.

Ca' Canny Policy.

Now that the difficulties are fully appreciated, it is likely that a very cautious policy will be observed in introducing the tests. It is felt that the

From correspondence received it becomes increasingly apparent that many listeners in cities are taking the local transmissions on crystal sets using only an indoor aerial. With the extension of the Regional scheme, however, most of these people are doomed to disappointment and annoyance, as the Regional stations are all to be situated at a distance from centres of population.

Converting the Crystal User.

Anticipating trouble, the B.B.C. will shortly launch a campaign to encourage the manufacture of cheap single-valve sets which should not be beyond the pocket of the ordinary crystal user. The "single-valver" has often been abused as the producer of oscillation, but the ordinary tyro who merely changes from a crystal to a valve in order to obtain local programmes is unlikely to display sufficient technical interest to misuse his set.

The Prime Minister.

Mr. Ramsay MacDonald will come to the microphone on Tuesday next, September 30th, when he will broadcast a talk on "The Imperial Conference."

Plea for Earlier Epilogue.

Commenting on the B.B.C.'s debatable practice of cutting out items of the Sunday evening concert in favour of the Epilogue, which always begins promptly at 10.30, a correspondent writes:—"It seems to me that the only alternative is to ask the B.B.C. to give the Epilogue after the news at 9.5 p.m. I am sure the pious listener after being at church in the morning and evening and listening to the broadcast service would not object, and by that time ought to be very tired and ready for bed. In my youth secular songs on Sundays at home were never permitted."

Talks with the Foreigner.

"The World and Ourselves" is the title of a series of broadcasts beginning on October 2nd, which may prove of considerable interest. The talks will take the form of discussions between Englishmen and representatives of other countries.

Among the Englishmen who will be heard are Lord Lothian, Mr. Oliver Stanley, the Hon. Harold Nicolson, Mr. John Loder, and Professor Arthur Taynbee. Germany will be represented by Count Gottfried Bismark; Russia, Maurice Hindus; and Turkey, Halide Edib Hanum. The last-named, who is the wife of Adnan Bey, was the first woman in Turkey to discard the national costume.

Tit-bits for American Listeners.

Extract from programme notes, U.S. National Broadcasting Company, for September 15th:—"C. A. Burmoester, of the Bureau of Agricultural Economics, will give the bureau's semi-annual report on the hog outlook."

FUTURE FEATURES.

- National (261 and 1,554 metres).**
 SEPTEMBER 28TH.—Religious Service, relayed from All Saints' Church, Southbourne, Bournemouth.
 OCTOBER 2ND.—"Red Tabs," a radio play.
 OCTOBER 4TH.—Students' Songs.
- London Regional.**
 SEPTEMBER 28TH.—Orchestral programme.
 SEPTEMBER 30TH.—Brass Band concert (from Newcastle).
 OCTOBER 1ST.—"Red Tabs."
 OCTOBER 3RD.—Military Band programme.
 OCTOBER 4TH.—Vaudeville programme.
- Midland Regional.**
 SEPTEMBER 30TH.—"Come, Pipe a Song," choral programme.
 OCTOBER 4TH.—Popular Vocal and Orchestral concert, relayed from the Central Hall, Birmingham.
- West Regional (Cardiff).**
 SEPTEMBER 30TH.—"Across the Water," a one-act play, by W. J. Gruffydd.
 OCTOBER 2ND.—Symphony concert, relayed from the Assembly Room, City Hall, Cardiff.
- North Regional (Manchester).**
 SEPTEMBER 30TH.—Bradford Triennial Festival of Chamber Music, relayed from Queen's Hall, Bradford (from Leeds).
- Glasgow.**
 SEPTEMBER 30TH.—"The Incubator," a rural comedy in one act.
- Belfast.**
 SEPTEMBER 30TH.—An Irish Programme.

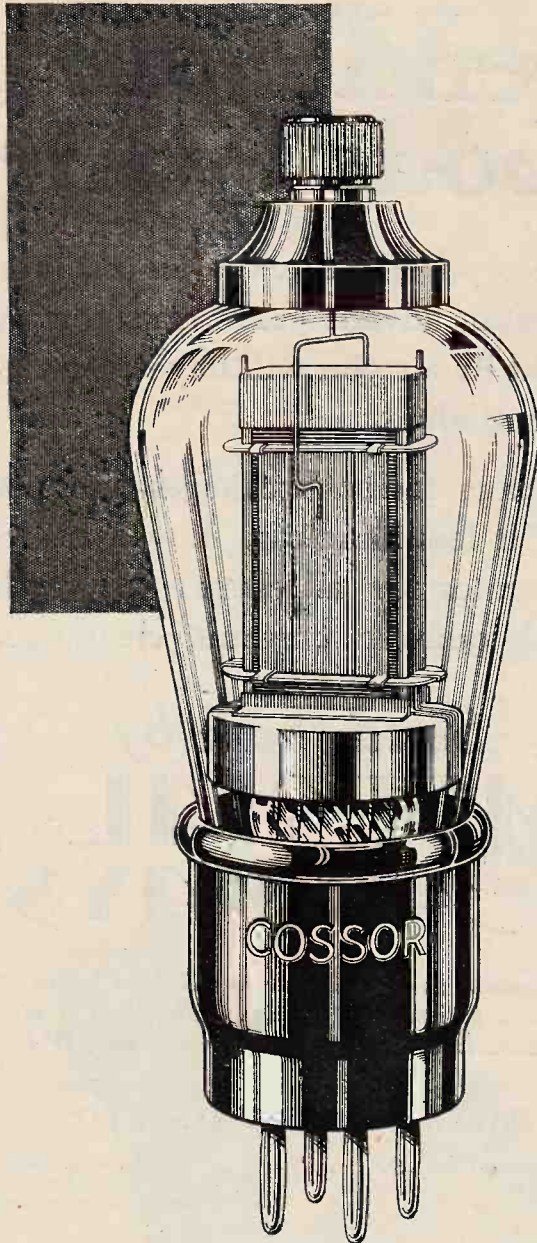
Manchester transmissions should cease immediately Northern Regional begins functioning, and for this reason the first signals from the new station may not be heard until January. These will be on the Regional wavelength of 479.2 metres.

Signs of Life.

The Diesel engines have already been erected in the station buildings and the Slaithwaite moors are now bedecked with motor generators, which will shortly find their proper resting place. As the 500ft. masts are now more than half completed the place begins to wear an air of importance.

A Word for the "One-Valver."

That most neglected of receiving arrangements—the single-valve set—is to be championed this winter by the B.B.C.



Highest effective amplification

The effective amplification available with any Screened Grid Valve is largely controlled by its inter-electrode capacity. The lower this self-capacity the greater the effective amplification available. In the new Cossor 215 S.G. residual capacity has been reduced to the low order of .001 micro-microfarads. This is lower than any other Screened Grid Valve on the market. Due to this—and also to the absence of grid current—the new Cossor 215 S.G. permits a degree of effective amplification which, a year ago, would have been considered utterly impossible. Illustrated folder giving full technical details sent free on request.

Cossor 215 S.G. 2 volts,
15 amp. Impedance 300,000.
Amplification Factor 330.
Mutual Conductance
1.1 m.a/v. Normal working
Anode Volts 120. Positive
Voltage on
Screen 60-80. Price **20/-**

THE NEW
COSSOR
215 S.G.

HIGHEST ACTUAL AMPLIFICATION

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

5999

SAFETY FOR SIXPENCE



SUPPOSE you "blew" your Screen-grid Valve to-night . . . Sixpence would have saved it. The Belling-Lee S.G. Anode Connector is entirely insulated. Even if it touches exposed metal parts at earth potential your valves are safe and your H.T. supply too.

Just push it over the Screen-grid Anode Terminal in place of the usual nut. Then forget it. Strong spring grip—compact—side entry for flex—a special loading device grips the braid as well as the wire.

S.G. Anode Connector
6d. each.

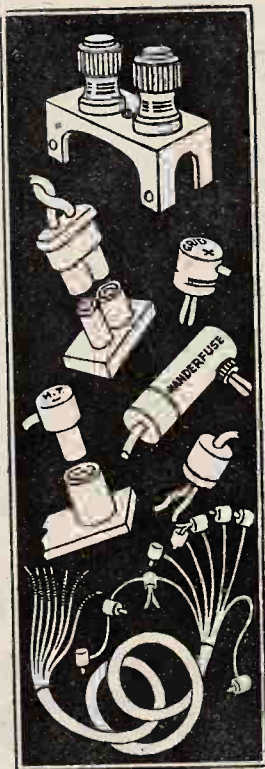
For Screen-grid or Pentode.

★ ★ ★

TWO NEW COMPONENTS.

The new Terminal Mount, Price 8d.
The new "Wanderfuse," Price 1/6.
Spare fuses (150 m/a), 9d. each.

Belling-Lee Terminals: Type "B," 6d. Type "M," 4½d. Type "R," 3d. Wander Plug, 3d. Safety Plug and Socket, 9d. Twin Plug and Socket, 1/6. Indicating Spade Terminal, 4½d. Battery Cords, 9 way, 5/9.
(Also made in 5, 6, 7, 8 and 10 way.)



Patent

STAND No. 134

National Radio Exhibition,
Olympia.

BELLING-LEE
FOR EVERY RADIO CONNECTION

Advertisement of Belling & Lee, Ltd., Queensway Wks., Ponders End, Mdx.

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

Send *your* Goods by Air

Once you have experienced the enormous advantages of transporting freight by air you will never use any other method.

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C.F.H. 42



THE ORIGINAL Jelly Acid Non-Spillable Cell

TYPES and PRICES.

Type	Volts	Cap at 20 hour rate	Weight Charged	Dimensions (in inches)			Price
				L.	W.	H.	
2NS9	2	10	2 lbs	1 3/8	3 3/8	4 7/16	12/-
2NS13	2	15	2 1/2 lbs	2 1/2	3 3/8	4 7/16	14/6
2NS17	2	20	3 3/4 lbs	3 1/4	3 3/8	4 7/16	16/-
2NS21	2	25	4 1/2 lbs	3 1/8	3 3/8	4 7/16	18/-
2AN7	2	30	5 1/2 lbs	2 3/8	4 3/8	7	16/-

The popularity of the C.A.V. Jelly Acid Battery is not explained by the mere fact that it contains jelly electrolyte—there are other jelly electrolyte batteries! There are three reasons why the C.A.V. is the most effective non-spillable yet produced.

THE JELLY ACID. Its composition is unknown outside our own laboratories. It maintains perfect contact with the whole of the plate surfaces, yet allows unrestricted gassing when on charge. It is chemically pure, and allows maximum conductivity.

THE CONTAINER. Of special construction, contains a baffle plate and moistening pad, which serves the triple purpose of arresting acid spray during charge, feeding the electrolyte with moisture to maintain an even consistency, and definitely confines the jelly to the plate chamber.

THE PLATES. These have been specially developed to give the utmost possible capacity when used with C.A.V. Jelly acid.

THE WHOLE. The C.A.V. is the lightest, cleanest, and most compact non-spillable on the market. By avoiding cumbersome acid traps, the greatest possible capacity for bulk is obtained.

Obtainable from our Depots and Battery Agents throughout the country and from all Radio Dealers.

- AND BEST

May we send you copy of our latest Catalogue giving particulars of all types of C.A.V. H.T. and L.T. Accumulators. Write to Dept H 4

C.A.V. Vandervell & Co. Ltd.
ACTON, LONDON, W.3.



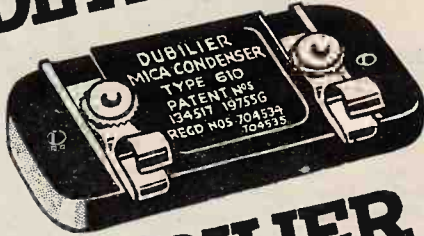
ALL POSITION
NON-SPILLABLE

STAND No. 7.
RADIO EXHIBITION
OLYMPIA, Sep. 19th - 27th.

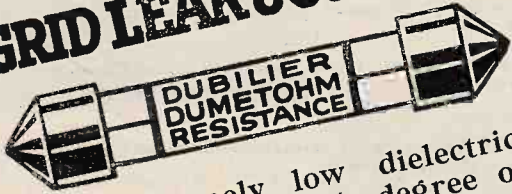


Perfect for Portables

**YOU'LL GET
MORE EFFICIENT
DETECTION WITH A**

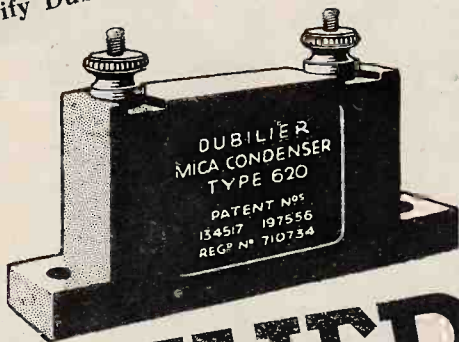


**DUBILIER
GRID LEAK & CONDENSER!**



THE extremely low dielectric losses and the high degree of accuracy of Dubilier Mica Condensers are well known.

These qualities make them invaluable in any radio frequency circuit and especially so in the grid circuit of a cumulative grid detector where very minute high frequency currents are dealt with and where even small losses have an appreciable effect. Specify Dubilier for your next set.



**DUBILIER
CONDENSERS**

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

"KABILOK"
Cabinets
for every receiver at
Stand 132 Olympia



M.C.4

TABLE MODEL MOVING COIL CABINET.
In oak or mahogany.

These Cabinets are supplied with a baffle board behind the grill opening together with a platform for mounting the Unit. The back is entirely open to avoid box resonance. Suitable for the following units:—R.K. Junior and Senior or R.K. Permanent Magnet, Magnavox Special Core, Magnavox Standard, and Marconiphone.

OAK, £1 . 18 . 6 MAHOGANY, £2 . 6 . 0
Of superior finish and unique design.



R.S.2

New Pedestal Cabinet for Receiver and Loud Speaker combined.

This cabinet will accommodate a large number of the popular receiving sets. Is provided with a loud speaker compartment, complete with a baffle behind the grill, also ample space for batteries or eliminator. The back is removable and covered with gauze.

Overall size: 3' 3" high, 2" wide, 1' 1" deep.

In OAK, £3 . 19 . 6 In real MAHOGANY, £4 . 7 . 6

New season's catalogue supplied post free, giving our full range of cabinets and prices, upon application.

**W. & T. LOCK, LTD.,
ST. PETER'S WORKS, BATH.**

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COMPONENTS for ALL-ELECTRIC SETS



Regentone A.C. Power Box
No. 1. Price £2.10.0
 Output when smoothed
 120 volts at 20 m.a.
No. 2. Price £3.10.0
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 160 volts at 50 m.a.



Regentone Filter Compact
No. 1. Price £1.12.6
No. 2. Price £2.5.0



British Patent No. 308749.

Terminals allow use
 as a Potentiometer
 or Series Resistance.
 Resistance value
 ranging from 500
 ohms to 180,000 ohms

Regentone Mains Units are known everywhere for their efficiency, absence of hum, and reliability. It would have been impossible for Regentone to have built up this universal reputation for Mains Units if the components used in these Units were not themselves the right products for the job. Every Regentone Mains Component is the outcome of years of specialised experience in the production of efficient, reliable Mains Radio. The discerning constructor will build his Mains Unit with Regentone Components—themselves the "bits" that go to make up the famous Regentone Mains Units.

Here are two Regentone Mains Components (Power Box and Filter Compact) that save unnecessary construction work and yet give that latitude of application so much appreciated by the real radio enthusiast.

A combination of the Regentone A.C. Power Box and Filter Compact—two connections only—gives you a complete H.T. Unit. The Power Box comprises a Westinghouse Metal Rectifier and a Regentone Transformer. The Filter Compact is a complete smoothing equipment containing a choke of high inductance together with British-made condensers—everything fully guaranteed for twelve months.

Two additional tappings on the Regentone Power Box provide L.T. for A.C. valves, 4 volts up to 4 amps.

THE NEW REGENTSTAT.

This is the only TOTALLY WIRE-WOUND variable Resistance of high ohmic value capable of handling power. Wire is the only resistance element used. The resistance element is wound in spiral formation preventing excessive rise on load. Variable spring loaded arm does not ride on wire resistance element, thereby eliminating risk of breakdown. Special separate Ni-Chrome contacts are provided for variable contact arm.

In two types covering a wide range of values. Price 9/6 and 11/6.

REGENT RADIO SUPPLY CO., Regentone House, 21, Bartlett's Buildings, Holborn Circus, London, E.C.4.

Phone: Central 8745 (5 lines).

EVERYTHING **The G.E.C.** ELECTRICAL
your guarantee

On Price Alone



PRICE
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FOR THE
TRIPLE CAPACITY
UNIT

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7/11
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7/11
23/9
FOR THREE
STANDARD
UNITS

"Magnet" TRIPLE CAPACITY H.T. BATTERY

The complete range of
"MAGNET"

WIRELESS BATTERIES

includes
TRIPLE CAPACITY TYPE
L.4903, 60 volt **13/6**
Price
STANDARD UNIT TYPES
L.4920 60 volt
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Price 12/11

SEE THE RANGE OF
"MAGNET" BATTERIES
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Figure it out! Take three standard unit batteries costing 7s. 11d. each — total cost 23s. 9d. — and compare the price with the New MAGNET Triple Capacity Battery at 13s. 6d. — equivalent to three units for less than the price of two! On price alone, therefore, choose this new wonder battery which brings to wireless a new sense of H.T. economy. In addition, you get three times greater capacity — sustained power and vigorous life.

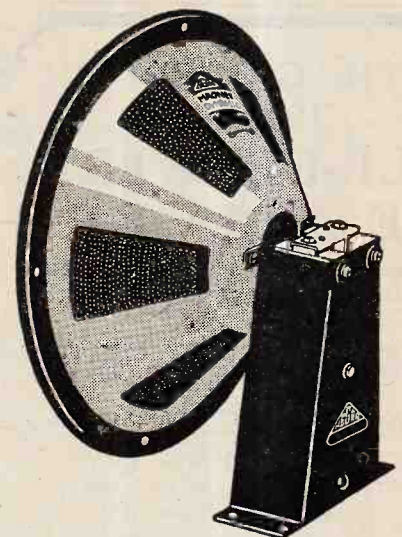
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Advt. of The General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.

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HEGRA the acknowledged BEST



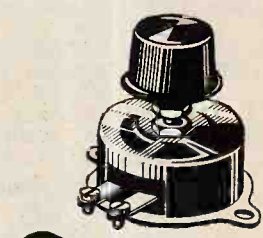
Our justification for stating that the Hegra is the acknowledged best, is found in the following extract from the "Wireless World" of September 3rd. "We have no hesitation in placing this instrument in the highest class of balanced armature cone loudspeakers." The "Wireless World" critic also says: "The reproduction of both speech and music is excellent, and the general effect is indistinguishable from the moving coil loudspeaker with which it was compared." These remarks occur in a review of the performance of the Hegra Magnet Dynamic Loudspeaker. This has been for some time one of the outstanding loudspeakers on the market, and with its re-designed movement which will handle considerably more power, yet with enhanced sensitivity, it will now satisfy the most critical listener in all respects. It does definitely challenge comparison with moving coil loudspeaker performance.

Price of Chassis, complete - 56/-

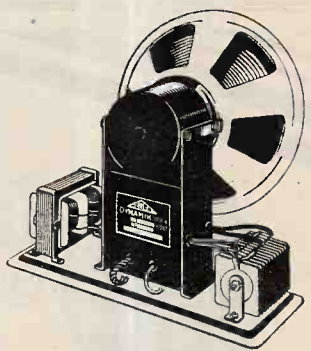
- **THE HEGRA TONE CONTROL.** Specially designed volume and tone control for use with gramophone pick-ups, and for any loudspeaker radio receiver. Special induction free winding, silent in operation, and giving a perfect straight-line characteristic.
 - Type A: Complete with flex and two plugs, mounted in exceptionally well finished black moulding - 9/-
 - Type B: Special model for amateur constructors in metal case, with one-hole fixing - 6/9

- **HEGRA MOVING COIL SPEAKERS** now represent the very latest scientific advance in this important branch of radio reproduction. We illustrate Model A.3 for A.C. operation.
 - Model A.1 for battery or D.C. mains operation - £4.10.0
 - Model A.3 for A.C. operation - £6. 0.0

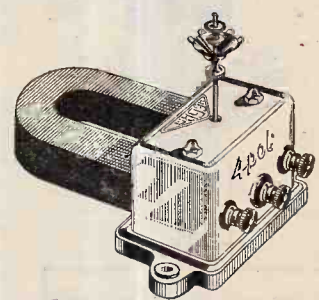
- **TYPE "E" UNIT.** The new four-pole balanced armature unit; wide distance between armature and pole pieces eliminating linear distortion and making adjusting device unnecessary. A flat type unit particularly suitable for portables and speakers where space is restricted. Resistance tapped in three places, enabling the speaker to be used on any type of circuit irrespective of valves used.
 - Unit alone complete with clips - 15/9
 - In chassis form mounted on bronze finish chassis. Complete - 27/-



● PRICE 6/9



● PRICE £6.0.0



● PRICE 15/9



ASK YOUR DEALER FOR FULL PARTICULARS OF THE NEW SEASON'S HEGRA RANGE.

**THE GAM-BRELL
1930-1931**

**ALL-ELECTRIC
RECEIVERS**

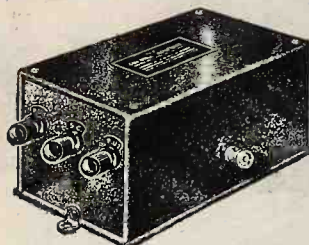
These wonderful sets include many new features not possessed by other receivers.

- VARIABLE SELECTIVITY CIRCUITS GIVING HAIR-LINE TO BROAD TUNING AT WILL.
- A MARVELLOUS STANDARD OF REPRODUCTION.
- S.G., DET. AND POWER VALVES.
- FAST AND SLOW-MOTION DRUM-CONTROL CONDENSERS.
- VOLUME CONTROL ON BOTH RADIO AND RECORD REPRODUCTION.
- RECEIVES NUMEROUS STATIONS WITH, AND A NUMBER WITHOUT, USING AN AERIAL.
- ALL MODELS AVAILABLE FOR D.C. AND A.C. SUPPLY. CABINETS OF OAK OR MAHOGANY.

Full Details on Request.
Leaflet N.R.

WHAT DO YOU WANT?

Just to reproduce records electrically or to obtain reproduction that is practically indistinguishable from the original. The latter surely! Then do hear the



NOVOTONE

Write us now for a copy of our FREE 16-PAGE BOOK, "WN." If your dealer is not demonstrating the Novotone, send us his name and address.

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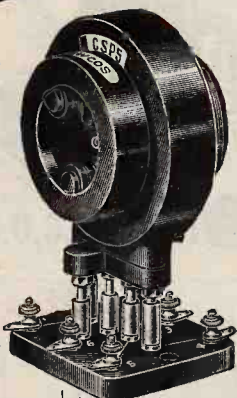
will be able to hear the Novotone demonstrated in ROOM "R," OPPOSITE OUR STAND

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GAMBRELL RADIO LTD.,

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"Results Twice As Good."



The LEWCOS SUPER COIL.

"I should like to say how pleased I am with your Super Coil, as with my 5-valve set I am getting twice as good results as with some others of a different make which I have used."

The above testimonial can be seen on request.

Superior to any other make, the Super Coil illustrated above is one of the greatest of Lewcos achievements.

The following are a few of its advantages:—

1. It fits the standard 6-pin base.
2. The Aerial Coil can be used as a Grid Coil followed by one or more H.F. Stages alternately as a Reinartz Aerial Coil with Plug-on reaction winding.
3. The H.F. Transformer with Plug-on primary winding can be used with 3 Electrode Valves alternately with Screened Grid Valves.
4. Range of Primary Coils gives wide choice regarding selectivity and amplification.

Full particulars will be sent on request.

THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED, CHURCH RD., LEYTON, LONDON, E.10

LEWCOS
Regd.

LARGE STOCKS OF ALL LEWCOS PRODUCTS CARRIED AT ALL BRANCHES.

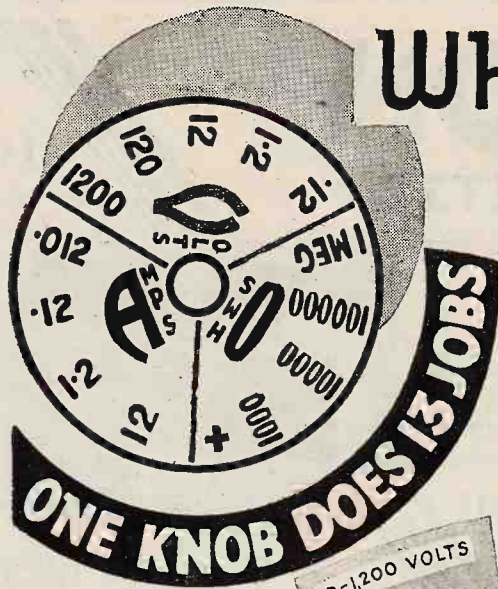
RADIO PRODUCTS FOR BETTER RECEPTION

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A SELF-CONTAINED portable measuring instrument that does the work of several high-priced instruments with the utmost accuracy, dependability and convenience.

Nothing to calculate but its immeasurable worth. No cost after the first cost. No extra accessories—no external shunts or multipliers are required. Such is the AVOMETER, which gives you instantly any one of 13 DIRECT and accurate readings in Amps, Volts or Ohms, at the turn of a single switch, with only one pair of leads, and without the need for calculations of any kind.

*Simple
turn
ONE
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**13 ELECTRICAL
INSTRUMENTS**

in **1**

**OLYMPIA
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107
GALLERY**

£8-8-0

The AVOMETER

British manufacture & dependability. Portable, precise, complete and self-contained.

There is one AVOMETER only. It defies comparison in performance and is justly priced. It is a British standard first-grade instrument, measuring 7½ x 6 x 4 inches and weighing only 5 lbs. To know its value fully you must experience it in use.

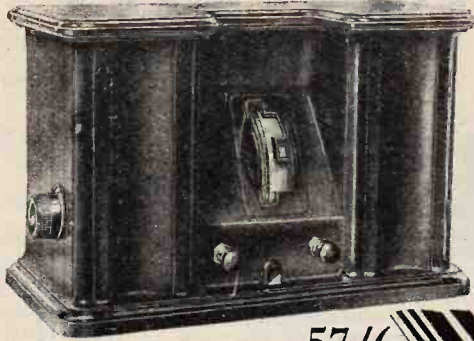
THE AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO., LTD.

Telephone: Victoria 3405/6. WINDER HOUSE, DOUGLAS ST., LONDON, S.W.1. Telegrams: "Autowinder, Churton, London."

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BURTON

GOES ONE BETTER



57/6

THE BURTON EMPIRE TWO, Battery Model. Valves extra.

A compact little receiver of very attractive appearance, designed to give good reception of local station programmes. Tuning is effected by a drum-drive condenser, combined with a volume control. Two push-pull switches provide for changing wave range and for switching on and off. Finished in moulded bakelite cabinet.

Wonderful as the success which BurTon receiving sets have been in the past, the new models now on view at Olympia completely eclipse all previous records, both in the results obtainable and the value for money offered.

Built with scientifically designed components of our own manufacture, all BurTon sets can be thoroughly relied upon to give the most satisfactory and no-trouble service under all conditions. Send for latest catalogue.



£8:12:6

THE BURTON SCREEN GRID THREE Battery model. Valves extra.

A highly selective three-valve receiver incorporating a screen grid high frequency stage and a detector, transformer coupled to a power output valve. Adequate volume is obtained without use of a pentode. Tuning is effected by a single drum dial driving a pair of ganged condensers. A small auxiliary condenser gives fine tuning. Single switch wave range adjustment. Re-action is by a differential condenser system, giving very smooth control.

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OLYMPIA
SEPT. 19
—27

C. F. & H. BURTON, PROGRESS WORKS,

BERNARD STREET, WALSALL.

IMPORTANT DEVELOPMENTS

IN

WESTINGHOUSE RECTIFIERS

ON STAND 239 (EMPIRE HALL)

NEW



HIGH TENSION
METAL RECTIFIERS
FROM 15'- EACH



Call at the Stand for a copy of the 1931 edition of "The All-Metal Way," enlarged to 40 pages of valuable technical and practical data for mains users.

The Westinghouse Brake & Saxby Signal Co., Ltd., 82, YORK ROAD, LONDON, N.1.

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The outstanding features of the New Season

embodying

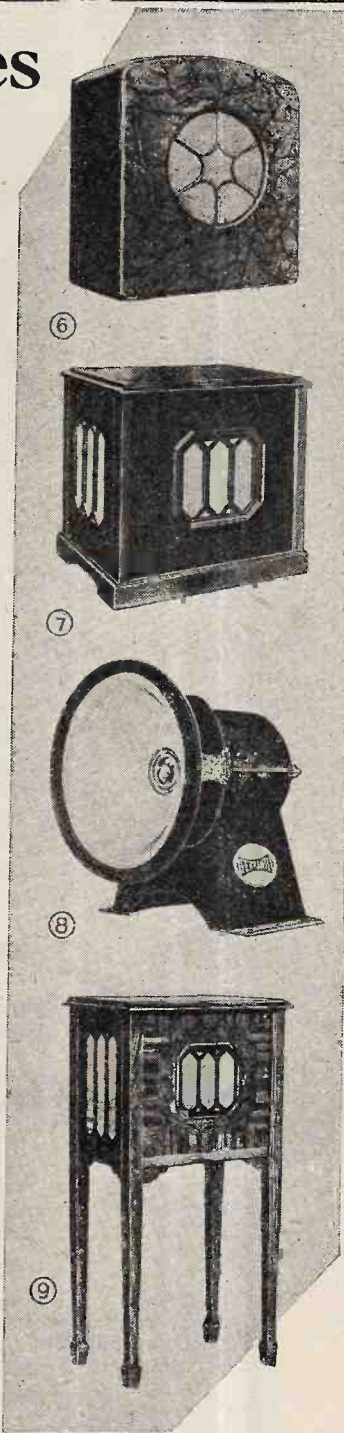
the ESSENTIALS of RADIO

TRUE REPRODUCTION—which is an essential for the critical listener.

SAFETY AND RELIABILITY—an essential feature in apparatus operated from the Mains.

FIRST CLASS WORKMANSHIP—ensuring long life and satisfactory service.

DIGNIFIED APPEARANCE AND FINISH—which please the eye, and enhance the furnishing scheme of the room.



1. 2-Valve A.C. Set in Metal, covered with handsome figured Rexine in choice colours. Specially designed for the Regional Scheme. The operation of a switch will give one or the other of the two programmes from a Regional Station. No dial. No tuning. Price **£16 0 0**

2. 2-Valve A.C. Set in Metal Cabinet as above. A magnificent local station set for a Moving Coil Speaker. Price **£16 0 0**

3. 3-Valve A.C. Set in Metal Cabinet, covered with handsome figured Rexine in choice colours. Performance equivalent to the famous Model 3F (No. 4). Price **£25 0 0**

4. 3-Valve A.C. Set in Oak, Mahogany or Walnut Cabinet. Good range, ample volume and power to work a Moving Coil Speaker. Price, in Oak, **£27**; Walnut or Mahogany, **£28**.

5. Console in Walnut, Mahogany or Dark Oak. A very high grade outfit giving Radio music of delightful quality. Price: Walnut, **£55**; Mahogany, **£55**; Dark Oak, **£53**. Also in Metal Cabinet, covered with Rexine in Blue, Brown or Grey, **£37 10s**.

6. Magnò-dynamic Moving Coil Speaker in Metal Cabinet, covered with Rexine of artistic colours. A fine instrument giving very nearly perfect reproduction. Price **£12 10 0**

7. Dynamic Speakers, A.C., D.C., and Permanent Magnet types in Oak, Walnut, or Mahogany Cabinets. A.C.: Oak, **£17 10s.**; Walnut or Mahogany, **£18 19s.** D.C.: Oak, **£11 12s. 6d.**; Walnut or Mahogany, **£13 1s. 6d.** Permanent Magnet: Oak, **£15 5s.**; Walnut or Mahogany, **£16 14s.**

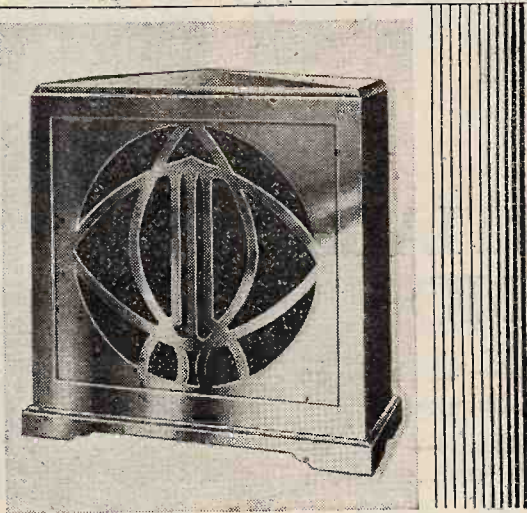
8. Dynamic Speakers, chassis only, ready for mounting in cabinets or baffle. Magnò, **£9 10s.**; A.C., **£11 15s.**; D.C., **£5 17s. 6d.**

9. Dynamic Speakers, similar to No. 7, but in handsome Pedestal Cabinets. A.C.: Oak, **£20 10s.**; Walnut or Mahogany, **£22 5s.** D.C.: Oak, **£14 12s. 6d.**; Walnut or Mahogany, **£16 7s. 6d.** Permanent Magnet: Oak, **£18 5s.**; Walnut or Mahogany, **£20**.

FERRANTI LTD. HOLLINWOOD LANCASHIRE

FERRANTI PRODUCTIONS

See them at Stand No. 47.



Reg. design

Model Z.20. Without doubt the most attractive speaker at the price. Its reproduction will delight the most critical listener. Its cabinet is particularly attractive.

In OAK - - - - £7 : 15 : 0
 MAHOGANY - - - - £8 : 5 : 0

Other Celestion models from £3.

Remember it is your loud-speaker which has the *final word* in the quality of your radio and choose CELESTION. Made by the firm which has specialised for nearly five years in Sound-reproducing instruments.

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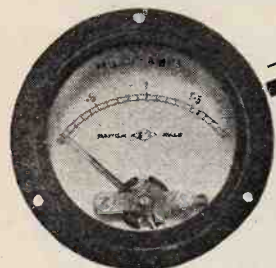
RADIO EXHIBITION - - OLYMPIA

CELESTION

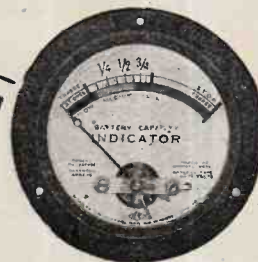
The Very Soul of Music

CELESTION LTD., Kingston-on-Thames

361 Woburn



MOVING COIL INSTRUMENTS



VOLTMETERS
 AMMETERS
 MILLI-AMMETERS

These instruments are guaranteed accurate to plus or minus 1%, each being individually calibrated. Special attention is given to insulation, and only the highest grade of material is employed.

The Voltmeters are available in two patterns, having a resistance of 1,000 ohms and 333 ohms per volt.

BATTERY INDICATORS

A faithful indication of the charge condition of a battery seen at a glance. Made in two types, F7, a Battery Capacity Indicator Meter, and F9, an Accumulator Capacity Indicator, these instruments will tell you the exact state of charge under load of your Battery, also when to charge and when not to charge, and will add 50% to its life. Write for descriptive leaflet and full particulars of our new Mains Meters from 24/-

If not obtainable from your local Dealer write the Manufacturers:

The
Central Manufacturing Co.,

Crown Works
 Birmingham Rd.
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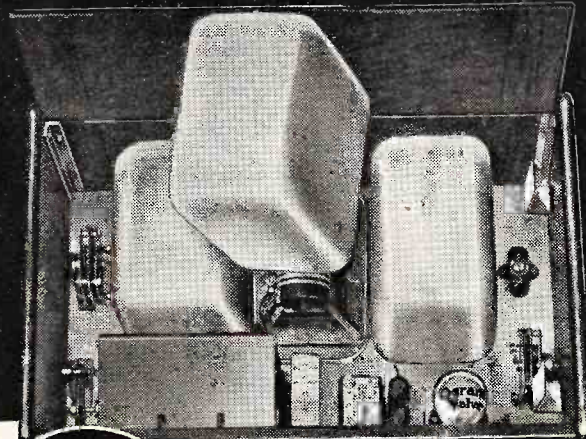
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EVERYTHING **The G.E.C.** ELECTRICAL
your guarantee

Consider

AN OUTSTANDING NEW
4 VALVE S.G. RECEIVER
THAT WILL GET YOU ANYWHERE
SELLING IN EVERY PART OF THE COUNTRY

£11.15.0.



SPECIAL FEATURES

- 1 The two Screen Grid stages give extreme selectivity and sensitivity with an unrivalled range.
- 2 Enormous amplification with perfect stability is given by the complete shielding of H. F. Circuits.
- 3 Equal efficiency guaranteed on both wave length bands.
- 4 Change of wave length is effected by an external switch and the set need not therefore be opened.
- 5 Maximum ease in tuning with a single knob controlling triple gang condenser.
- 6 Assembly is the essence of simplicity.
- 7 Volume control is provided not only to act as such, but to procure extreme selectivity.

Osram

MUSIC **+** MAGNET

PRICE
£11.15.0
INCLUDING
OSRAM VALVES
GECOPHONE
COMPONENTS
AND POLISHED
HEAVY OAK
CONSTRUCTOR'S
CABINET
MADE IN ENGLAND
Sold by all Wireless Dealers

The complete kit is a triumph of skilled design and construction, the like of which cannot be equalled. Never before has such wonderful radio value been offered — so take quick advantage of this opportunity.

Fill in coupon below for POST FREE Instruction Chart, which will tell you all you want to know about the "OSRAM MUSIC MAGNET 4."

HIRE PURCHASE TERMS

You can either buy your "OSRAM MUSIC MAGNET 4" for cash or on these attractive HIRE PURCHASE terms: — £1-3-6 deposit, 12 monthly payments of 18/6.

Prices apply only in Great Britain and Northern Ireland.

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Please send Instruction Chart to
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The "Osram Music Magnet 4"
Instruction Chart
The General Electric Co. Ltd.
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W.C. 2
W.W.

THE SET THAT BRINGS THE CONTINENT TO THE BRITISH ISLES

Cut out coupon and paste on postcard or enclose in unsealed envelope. Halfpenny postage in either case.

Advt. of The General Electric Co. Ltd., Magnet House, Kingsway, London, W.C. 2. NATIONAL RADIO EXHIBITION, Olympia, Stand 46, Ground Floor, New Hall

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JUNIT

MAINS UNIT



SERVANT OF THE SET

STAND 65
OLYMPIA
SEPT. 19-27
MASTER OF THE MAINS

The most complete and efficient mains units available. Will supply any valve set with ample, steady power, and with perfect silence in operation.

UNIT TYPE 150/4 A.C.
 Giving 150 volts at 25 milliamperes load and incorporating 4 volt centre tapped winding for supplying filament current for indirectly heated valves. This type of unit occupies no more space than a 100 v. H.T. Battery. Suitable for operating at full capacity such sets as the Orgola A.C. Model and the new Mullard sets.
Price £5 : 0 : 0

UNIT TYPE 120.
 Giving 120 volts at 20 milliamperes load. This type of unit occupies no more space than a 100 v. H.T. Battery and so may be incorporated within sets which are to be converted to all-electric operation.
Price £4 : 7 : 6

UNIT TYPE 120/T.C.
 Giving 120 volts output at 20 milliamperes load, and also containing trickle charger for 2, 4 or 6 volt accumulators. The unit occupies no more space than a 100 volt battery and can be fitted in a portable receiver in place of the H.T. Battery.
Price £5 : 17 : 6

Ask your dealer for full particulars.
 Advertisement of the Junit Manufacturing Co., Ltd., 2, Rangoon Square, London W.6. (M.C.113)

EDDYSTONE

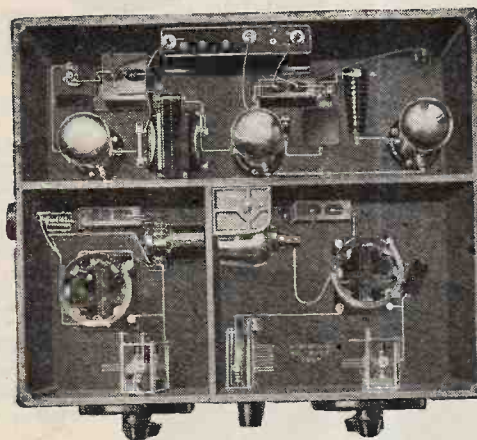
ALL-WAVE FOUR

SHORT-WAVE RECEIVER WITH WORLD-WIDE RANGE FROM POLE TO EQUATOR.

THE new "EDDYSTONE" S.W. receiver contains more clever improvements than ever. Constructed in patent integral AIR and INSECT TIGHT cabinet with components specially selected for tropical use, simple to handle, easy tuning and Loud Speaker results in any part of the world. This S.W. Receiver will appeal to the amateur and expert wireless enthusiast not only for its excellent short-wave reception, but for its brilliant results on all other wave bands. This receiver was selected by the BRITISH ARCTIC AIR ROUTE AIR EXPEDITION because of its outstanding performance under all conditions.



£27 with valves, leads, grid-bias battery, short-wave coils 12.5-85 metres and broadcast coils 250-500 metres. Send for complete list of the new All-Wave Four.



Complete short-wave accessories list is yours on receipt of a post-card.

STRATTON & Co., Ltd.
 Bromsgrove St., Birmingham.
 London Service Depot:
 164, Charing Cross Rd., W.C.2



SEE THE EDDYSTONE EXHIBIT ON STAND No. 28.

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

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FROM
TOR.

contains more
patent
components
easy tuning
world. This
expert wireless
reception, but
This receiver
ROUTE AIR
under



ery, short-
roadcast coils
plete list of

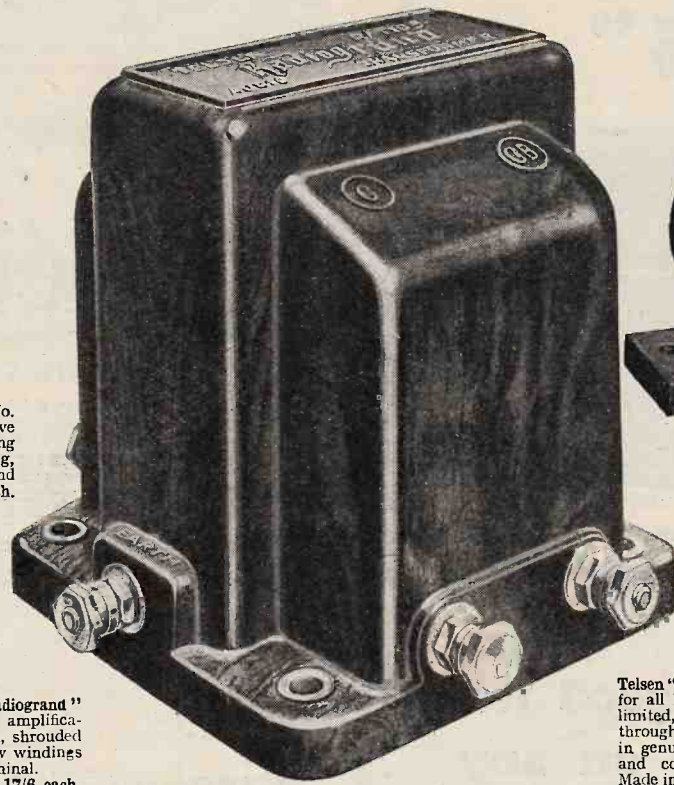


EDDYSTONE
ON STAND
28.

THE EFFICIENCY OF A SET IS DEPENDENT ON ITS COMPONENTS



Telsen Valve Holders. Pro. Pat. No. 20286/30. An entirely new design in Valve Holders embodying patent metal spring contacts. Low capacity, self-locating, supplied with patent soldering tags and hexagon terminal nuts. Price 1/- each.



Telsen 7-1 Super Ratio "Radiogrand" Transformer, giving enormous amplification with perfect reproduction, shrouded in genuine Bakelite, with new windings and core, fitted with earth terminal. Price 17/6 each.

Telsen "Radiogrand" Transformer, new model, shrouded in genuine Bakelite, with new windings and core, fitted with earth terminal. Made in ratios 3-1 and 5-1. Price 12/6 each.



Telsen H.F. Chokes, designed to cover the whole wave-band range from 18 to 4,000 metres, extremely low self-capacity, shrouded in genuine Bakelite. Inductance 150,000 microhenrys, resistance 400 ohms. Price 2/6 each.

Telsen "Ace" Transformer, the ideal model for all Portable Sets, and where space is limited, gives perfect reproduction throughout the musical range. Shrouded in genuine Bakelite, with new windings and core, fitted with earth terminal. Made in ratios 3-1 and 5-1. Price 8/6 each.

Efficiency in component construction is the "Key-note" to successful reproduction in any receiver—no components are apt to make or mar efficiency than the three "Key" components of any set—the transformers, chokes and valve holders.

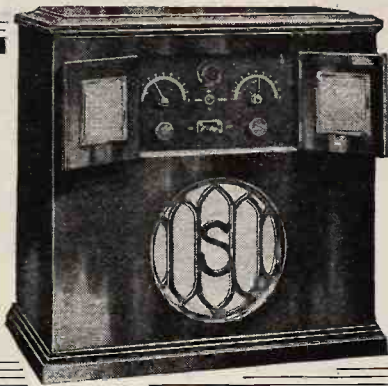
See that your set gives the greatest efficiency possible by incorporating Telsen Transformers, Chokes and Valve Holders—but, better still, make quite sure by using Telsen Components throughout.

TELSEN COMPONENTS

ADVT. TELSEN ELECTRIC CO. LTD., BIRMINGHAM.

A RECEIVER OF DISTINCTION

The Selector Electric
"55"



Complete
(A.C. only)
55 GNS.
or £8 down
and 12
monthly pay-
ments of
£4.10.6

THE name "Selector" is well known and respected in connection with portable receivers, and the experience gained in this field has made possible the production of an entirely self-contained transportable electric receiver of unusual quality and efficiency, embodying a moving coil loud speaker.

The layout of the "55" is so ingeniously contrived that the weight distribution of the components is beautifully balanced, enabling the receiver to rotate easily on the turntable so that full use may be made of the directional properties of the frame aerial.

The Selector "55" permits Home and Foreign stations to be received with perfect clarity and at considerable volume without any suggestion of background. The regional stations can be separated without difficulty.

The high quality of reproduction through the moving coil loud speaker makes both speech and music perfectly natural and gives full justice to both bass and treble notes. Control is exceptionally easy and fine adjustment of reaction is unnecessary even when receiving distant stations. The cabinet is of fine quality mahogany.

You are invited to write for catalogue W.W.1, or alternatively to refer this advertisement to your dealer, who will arrange a demonstration in your home.



SELECTORS LIMITED,
206 Bedford Avenue, Slough Trading Estate, Slough, Bucks.
Telephone: Slough 818.
LONDON OFFICE: 1 Dover Street, W.1.
Telephone: Regent 4771.



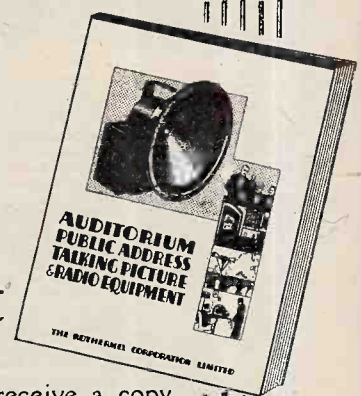
A
good item
on any
programme

*Player's
please*

It's the
Tobacco that Counts

N.C.C.899

Every
Wireless
Enthusiast



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BAND PASS THREE

Selectivity, Quality, and Long Range : How to Get Best Results.

By H. F. SMITH.

IN last week's constructional article no mention was made of the performance to be expected from the "Band Pass Three." With regard to sensitivity, the matter is best summed up by saying that it compares very favourably with the average receiver having a similar arrangement of valves. This is partly due to the fact that the dynamic resistance of its tuned circuits is rather higher than usual, but still more to the high inherent selectivity of its filter; conditions seldom arise where it is necessary to sacrifice signal voltage in order to avoid interference.

True, there is a measurable (but, aurally, almost imperceptible) loss of intensity due to the filter circuit, but this loss can easily be minimised or avoided altogether where extreme range is regarded as being more important than retention of sidebands; this is an important point, and is often overlooked. Not the least of the attractions of a set with filtering is its flexibility; with no more elaborate equipment than three or four spare fixed condensers, one can adjust for almost any desired broadness of tuning, or, alternatively, for optimum coupling between the two component circuits as determined solely from the point of view of loudest signals. Under the latter conditions the filter becomes

nothing more than a two-circuit tuner, but retains its advantages of single-knob control. One can go further, and, by loosening coupling still more, obtain even higher selectivity, but at the expense of volume. All these alterations can be made at a moment's notice by changing the value of coupling capacity.

In designing the set, an attempt was made to avoid the need for wiring in inaccessible positions. It is as well to connect up the on-off switch and the single bias cell before placing the H.F. screening box in position; before mounting the H.F. transformer, the decoupling resistance and by-pass condenser in this box should be wired. As there are no terminals on the coils (except for the H.F. valve anode lead), it will then be found that the remaining connecting points are easy to get at.

Adjustment of Ganged Condensers.

When fitting the coupling shaft between the ganged variable condensers (which should be done before the wave-changing switches are mounted), care must be taken to see that one of the flexible joint screws is in such a position that it may be reached easily with a screwdriver during the process of synchronising the condensers. This operation, by the way, is so simple that it should present no difficulty; no useful purpose would be served in attempting to supplement the instructions already given, but it may be stated that it is desirable to use as little trimming capacity as possible, although, when making initial adjustments, it is well to have a certain amount of latitude.

Hand-capacity effects can be misleading, and it is for this reason that it was recommended last week that the rotor of C_1 should be set with the help of a rod of insulating material, because it is otherwise difficult to avoid bringing the hand near the coil. As a refinement, the projecting spindle

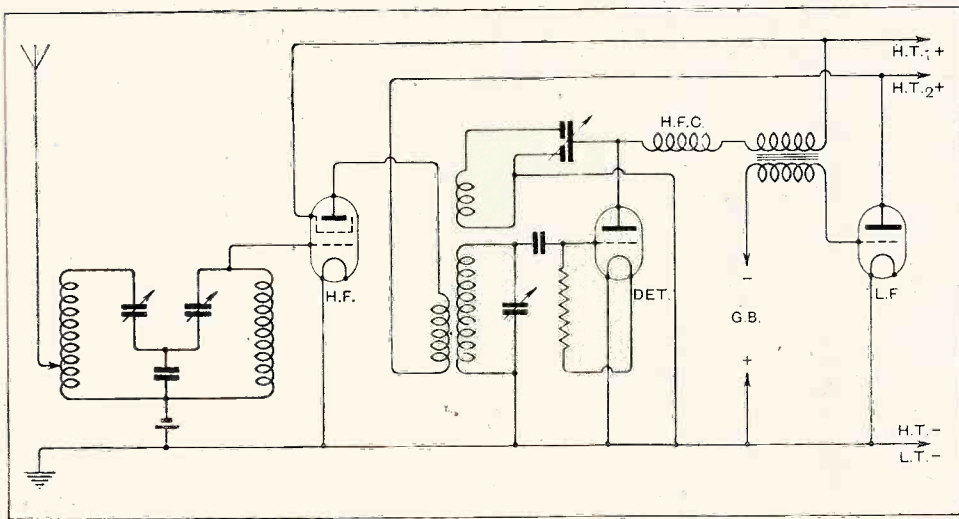


Fig. 1.—Essential details of the receiver are clearly shown by this circuit diagram, which is simplified by omission of the volume control, screening, decoupling resistances, by-pass condensers, and wave-changing switches, etc.

C 25

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Belgium.

Notes on the Band Pass Three.—

of this condenser may be fitted temporarily with a long operating lever, which will of course be removed when the correct setting has been determined. Similar precautions should be observed when adjusting the trimming condenser: it is convenient to slot its control rod with a hacksaw, so that it may be rotated with the help of a long screwdriver.

It will be observed that arrangements are made to feed the H.F. valve screening grid and the detector anode with a common voltage; this is convenient enough for ordinary requirements, but when a large power output is needed, or where a high-impedance detector is used, it is better either to provide a separate H.T. positive lead for this valve or else to feed it from the maximum voltage supply.

Screening is thorough enough almost completely to rule out the possibility of instability on the medium band, provided that reasonable care is taken in construction, and that the H.F. valve is an average specimen. Should there be any tendency towards uncontrollable self-oscillation on the longer waveband, it may best be checked by removing turns—say ten from each of the two sections—from the long-wave transformer primary.

Reverting to the all-important question of filter operation, it has already been pointed out that a coupling condenser (C_m) of 0.01 mfd. as specified will provide what is probably the best compromise. When a capacity of this order is used, there will be two distinct tuning peaks

on the ganged condenser dial, with a separation of nearly two degrees between them: this applies to the middle of the medium broadcast band. As each degree corresponds to a frequency separation of roughly between five and six kilocycles, it will be seen that the usually accepted ideal conditions are closely approached. As we

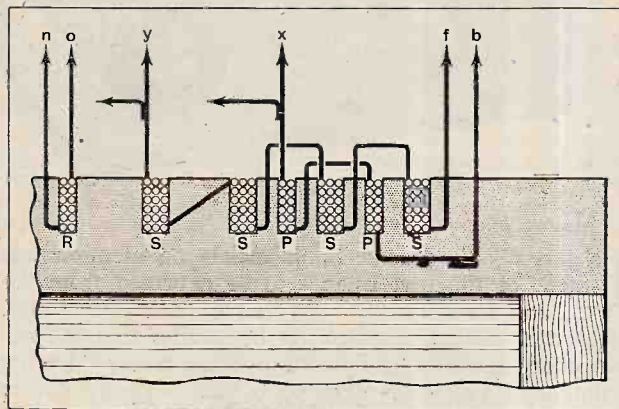


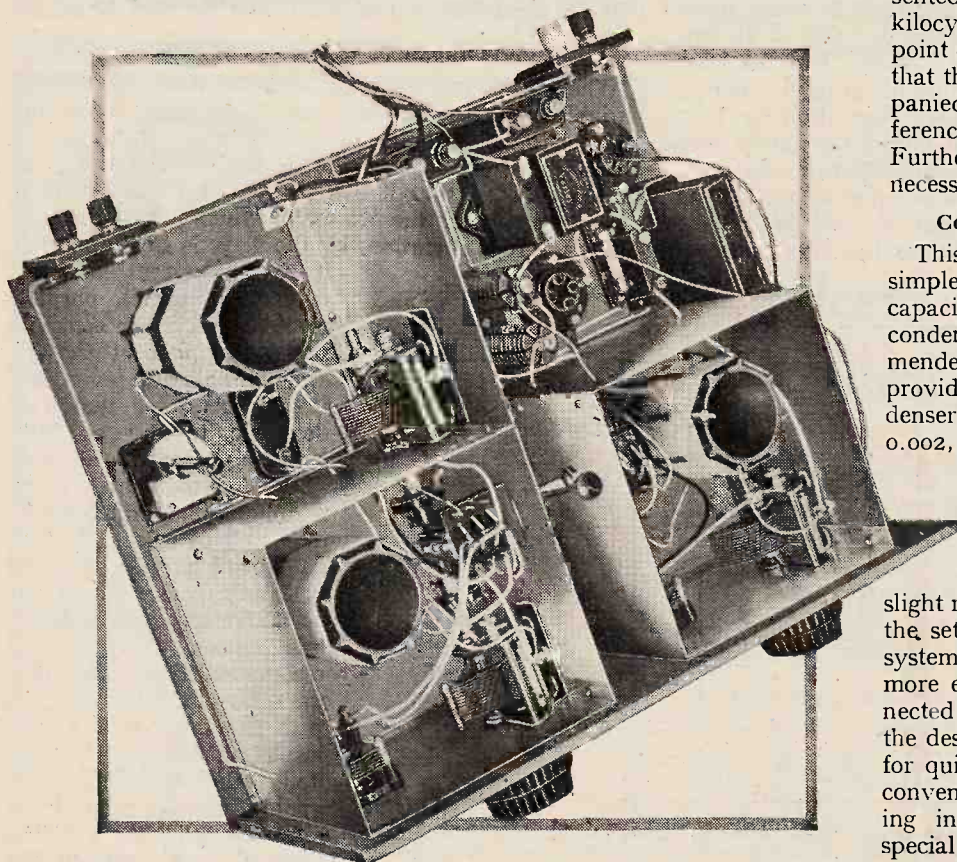
Fig. 2.—Enlarged sectional sketch showing details of the long-wave H.F. transformer. Unlettered arrowheads indicate connections to the medium-wave windings. R, reaction coil; P, primary sections; S, secondary sections.

pass to the upper end of the waveband, these peaks will become more and more widely separated, and, on the wavelength of the Midland Regional station, will be spaced by about four degrees. Although the band represented by this separation (about 20 kilocycles) is not too wide from the point of view of quality, it is possible that the transmission may be accompanied by a background of interference, particularly at night-time. Further, signal strength will be unnecessarily reduced.

Coupling Condenser Values.

This can be avoided by the very simple expedient of connecting extra capacity across the existing coupling condenser. It is strongly recommended that the constructor should provide himself with extra condensers having capacities of, say, 0.002, 0.003, 0.005, and 0.01 mfd.

By suitable choice of this shunting capacity value any desired peak separation can be obtained; an alteration may involve the need for slight retuning, but will not prejudice the setting of the ganged condenser system. Of course, two or even more extra condensers may be connected at the same time to make up the desired capacity, and, to provide for quicker and easier changes, it is convenient to fit short leads terminating in spring clips, or to devise special mountings for interchangeability.



view of the receiver showing mounting of the filter circuit components.

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Notes on the Band Pass Three.—

With a constant value of coupling condenser, there is a tendency for tuning peaks to converge towards the lower end of the tuning scale, and finally to coalesce into a single hump. For reasons that have already been explained in this journal, this is not a very serious matter, but those who depend mainly on the shorter-wave transmissions for their programmes might be well advised to fit a fixed coupling condenser of, say, 0.005 mfd., and to make provision, by means of a switch or otherwise, to connect a parallel capacity of 0.008 to 0.01 mfd. when receiving stations at the opposite end of the broadcast band.

Although it is possible to calculate the peak separation resulting from the use of any value of coupling capacity, those who are not mathematically minded may be reassured to know that a sufficiently accurate approximation to any desired conditions can easily be reached by trial-and-error methods on the lines suggested. One of the charms of the capacity-coupled filter is that it always works according to plan.

Care should always be taken to see that the dial controlling C_1 and C_2 is set accurately to the "middle of the signal." For instance, if clearly defined maxima (or peaks) are evident at 150 and 153 degrees, the correct working setting would be $151\frac{1}{2}$ degrees. Turning to the lower end of the scale, and without making any change of coupling capacity, it would be found that no definite peaks were discernible, but that the strength of a certain transmission remained sensibly unchanged as the condenser was rotated between, say, 60 and 61 degrees. Here the right setting would be midway between these points.

Although a filter-circuit receiver works satisfactorily enough with ordinary handling, it gives of its best only when rather special care is taken with regard to the adjustment of its tuning controls. It would clearly be a waste of time to set up all the circuits with extreme precision and then to mistune—or to use the volume control in such a way that it produces mistuning—when receiving an excessively strong local transmission from which the best possible quality is obviously desired. For this reason, it is worth while to adjust the differential aerial condenser, which acts as a volume control, so that its disturbing effect shall be as small as possible.

The connections of this condenser are shown in simplified form in Fig. 3 (a), while the equivalent circuit is shown in diagram (b), where the two sections of the condenser, which operate differentially, are marked C and C_1 ; the aerial capacity is shown in dotted lines. Although this arrangement introduces less disturbance to tuning than does a simple series condenser, it is far from perfect, as an analysis of the network will show that the object of maintaining a constant capacity across

the tapped section of the coil is not fully achieved. It is therefore advised that the extra "balancing" condenser (C_x in Fig. 3 (c)), which was mentioned in the original article, should be inserted. A semi-variable condenser of the compression type, with a maximum capacity of from 0.0003 to 0.0005 mfd. will serve the purpose: its adjustment, which need only be made once, is quite simple, and actually takes much less time to make than to describe.

Having accurately tuned in a strong signal with the volume control condenser set at maximum (preferably after adding a large capacity in shunt with the coupling condenser), slowly turn its knob towards the minimum position until a point is reached where there is a very decided and sudden drop in intensity. Now, without touching any other control, set the added balancing condenser for loudest signals. This adjustment is not critical, but there is a reasonably well-defined

maximum, which indicates that the disturbing effect of the control condenser on the tuning of the circuit $L L_1 C_1$ has been removed. As already stated, compensation does not hold good over the complete range covered by the control, but it is sufficiently close to be effective: indeed, it is extremely hard to detect any alteration of tuning, due to this adjustment, at any point.

Testing for Changes in Tuning.

In any case, it should be realised that the disturbing effect of the volume control condenser will be least when its setting is close to the position at which the balancing condenser C_x was initially adjusted; if this point was well chosen, so that it coincided with the setting at which considerable changes of volume are brought about by comparatively small movements of the dial, no trouble whatever need be anticipated on the score of alteration of tuning. When in doubt, one can do worse than to adjust the balancing condenser when the volume control condenser is set at minimum.

One can easily reassure oneself as to whether this volume control is working properly by observing, after turning its knob towards minimum, whether it is possible to increase signal strength by adjustment of the trimming condenser. When making this test, or, indeed, any other of similar kind, it is always worth while to go to the trouble of temporarily connecting extra capacity across the coupling condenser, so as to avoid the possibly misleading effects of double-humped tuning.

It may be added that a differential condenser with solid dielectric between its vanes, though perfectly satisfactory for its normal function in a reaction circuit in which there is superabundant energy, will introduce some slight losses into an aerial circuit. When extreme sensitivity is of first importance, a component with an air dielectric should be chosen.

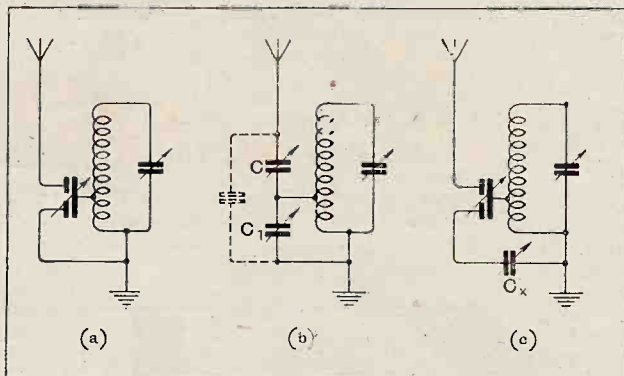


Fig. 3.—Simplified diagram (a) of connections of the differential volume control condenser. Diagrams (b) and (c) show, respectively, the equivalent circuit and how an extra balancing condenser may be inserted.

News of
the Week

CURRENT TOPICS

In Brief
Review.

OLYMPIA PRIZES.

Everyone has a chance to win a prize in connection with the Olympia Radio Exhibition. In addition to the annual competition of *The Wireless World*, attractive prizes are offered each day by the *Daily Mirror* for attendance forecasts. The *Daily Express* celebrates the event with a radio contest to decide the characteristics of the ideal set for 1931.

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THE MUSSOLINI METHOD.

An increase of 120 per cent. in the number of licensed listeners in Italy in eighteen months is attributed to the special Government measures to "repress" the pirate. There were 140,000 licence-holders on July 1st.

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SWEEPS PROTEST.

The chimney sweeps of Warsaw are reported to be up in arms against the nuisance caused by the "forests" of aerials on the city roofs. In a petition to the municipality they declare that aerials not only obstruct them in their work, but imperil their lives. A standard type of aerial is asked for, presumably because the sweeps prefer to have their brushes entangled in a standard manner.

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SIR JOHN REITH.

We understand that Sir John Reith, Director-General of the B.B.C., has accepted an invitation to open the Manchester Wireless Exhibition at the City Hall, Deansgate, on October 8th.

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ANOTHER MILLION, PLEASE.

Having passed the three million mark, the British receiving licence figures are steadily progressing towards four million. The B.B.C. announces that the number of licences issued to the end of July was 3,162,460.

"Saturation point will not be reached," says the B.B.C., "until there is a wireless set in every home, and that is our aim."

It is estimated that a set is to be found in two out of every three homes.

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RADIO FOR POLAR FESTIVAL.

An Oslo correspondent reports the establishment of the world's most northerly wireless station and observatory on Hooker Island, Franz Josef Land, by Prof. R. Samoilovitch and the party which left Archangel with him in July, 1929. The station works on a short wavelength, but receives on long and short waves. It is hoped that in two years time the station will be equipped for participation in the work of the proposed International Polar Year, 1932-33.

STAGE AND STUDIO.

Theatre and broadcasting interests will join hands in October for a German National Theatre-Broadcasting Week. Many important plays will be relayed, and leading actors and actresses will speak at the microphone.

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ABREAST OF THE TIMES.

Twenty-five radio periodicals, including our sister-journal, *Experimental Wireless*, will form the basis for a series of class discussions in the winter radio courses of Wisconsin University.



TWELVE-MILE VOICE. The giant Blatthaller loud speaker on the wireless tower at the Berlin Radio Show. It is claimed that the speaker was heard twelve miles distant. The "membrane" consists of corrugated aluminium sheet with an extreme movement of over $\frac{1}{2}$ inch.

RACES RECALL WIRELESS HISTORY.

The recent America's Cup races held a special interest for the radio historian, for it was during the races of September, 1899, that America had its first practical demonstration of wireless, writes our Washington correspondent. For the contest thirty-one years ago between Sir Thomas Lipton's "Shamrock I" and the "Columbia," the young inventor, Guglielmo Marconi, was engaged by James Gordon Bennett, editor of the *New York Herald*, to report the races by means of the newfangled apparatus for telegraphy without wires. A receiving antenna was erected at Navesink, N.J., while Marconi's spark transmitter was installed aboard the steamer "Ponce."

Thousands of words were sent by reporters on the "Ponce," Marconi and his operators sending by Morse code at a rate of about fifteen words per minute.

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"ALL-MAINS" SHOW IN PARIS.

The Paris Radio Show opens on Friday next, September 26th. According to predictions, it will be the first real "all-mains" show to be held in France.

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THE WAR ON STATIC.

War has been declared on all forms of electrical interference with broadcast reception by the Electrotechnical Union of Czecho-Slovakia (says *The Central European Observer*). The causes of interference were demonstrated on a stand at the September Prague Samples Fair, good business being done in the sale of anti-parasite devices.

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BROADCASTING FOG SIGNALS.

So successful has been the temporary radio telephony beacon at the Cumbre Lighthouse that the Clyde Lighthouses Trustees have decided to erect a permanent installation. The beacon, the first of its kind, enables navigators to overcome the difficulty of judging the distance of a fog syren. After the sounding of each blast of the syren the words "one," "two," "three" are transmitted at intervals corresponding to the time the sound-waves would take to cover one mile. The distance can thus be gauged with fair accuracy.

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HEAVEN HELPS THOSE . . .

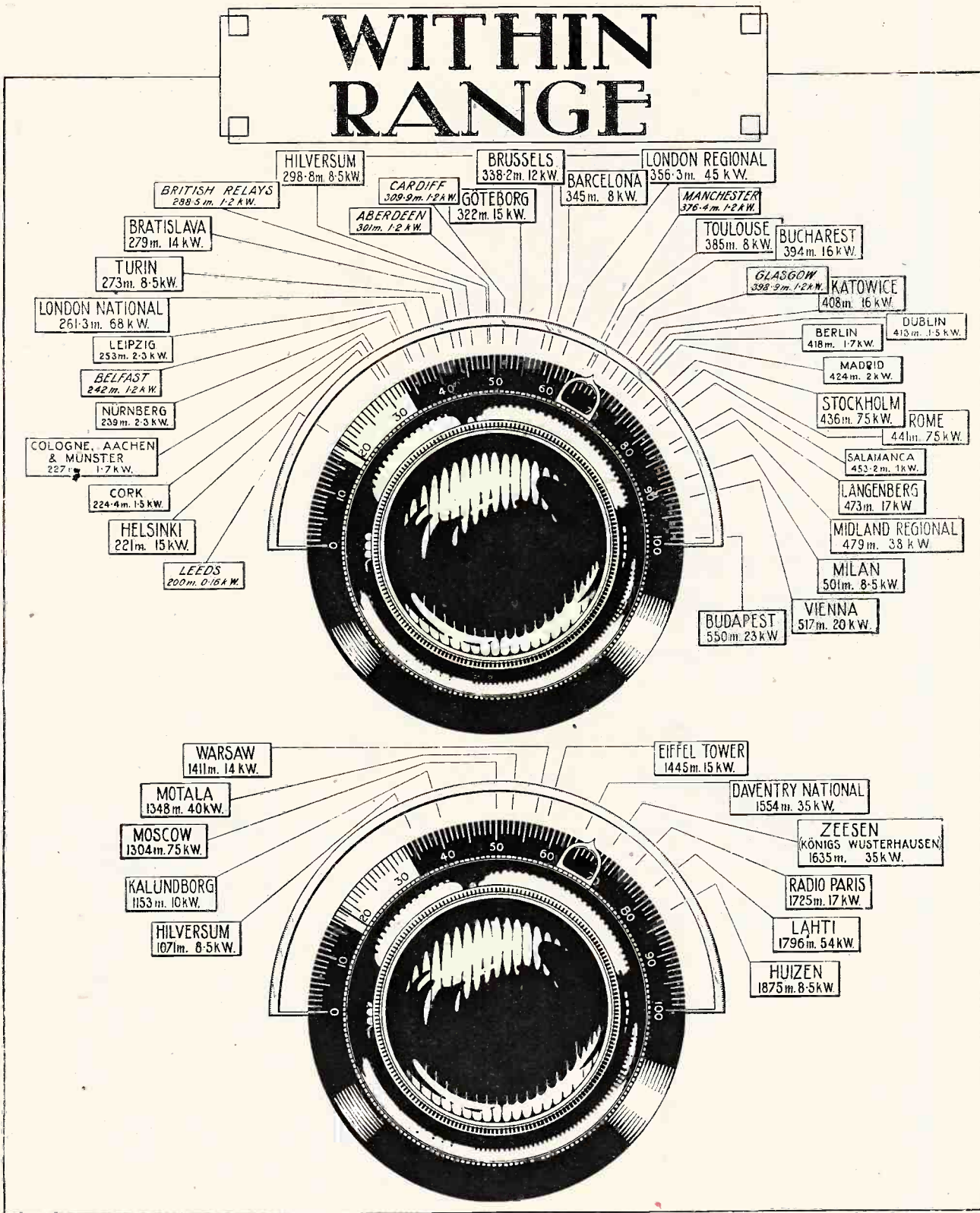
Faced with the possibility that the Colombo broadcasting station would close down from lack of funds, the residents of Ceylon recently opened a "Programme Fund." Within a few weeks over 2,000 rupees were collected, and the programmes maintained their standard. In a triumphant report, the Radio Club of Ceylon states that, in impressing in a practical manner on the authorities the desire of listeners for a high standard of programmes, the moral effect of the Fund cannot be overestimated.

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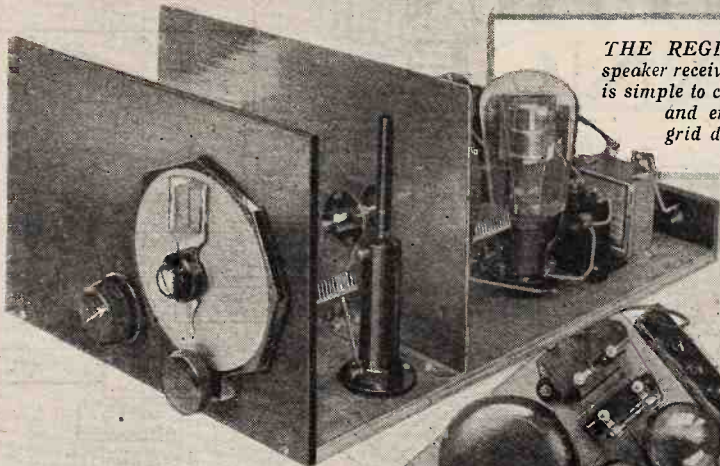
RADIO CLASSICS.

Two classics of radio literature appear in up-to-date garb on *The Wireless World* Stand (No. 4) at the Olympia Radio Show. "The Elementary Principles of Wireless Telegraphy and Telephony," by R. D. Bangay, thoroughly revised and modernised by O. F. Brown, achieves its third edition. Mr. H. M. Dowsett's "Handbook of Technical Instruction for Wireless Telegraphists" reaches its fourth edition in a greatly enlarged form. Both books are published by Hiffe & Sons Ltd., the former at 10s. 6d. and the latter at 25s. net.

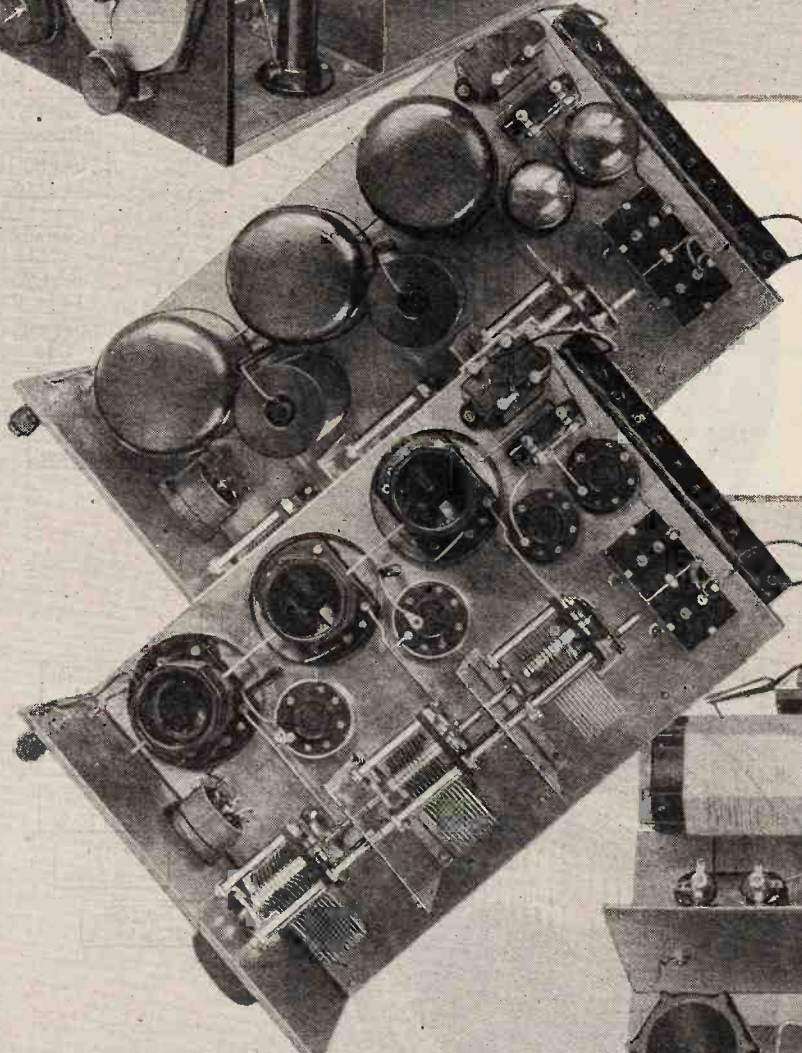
WITHIN RANGE



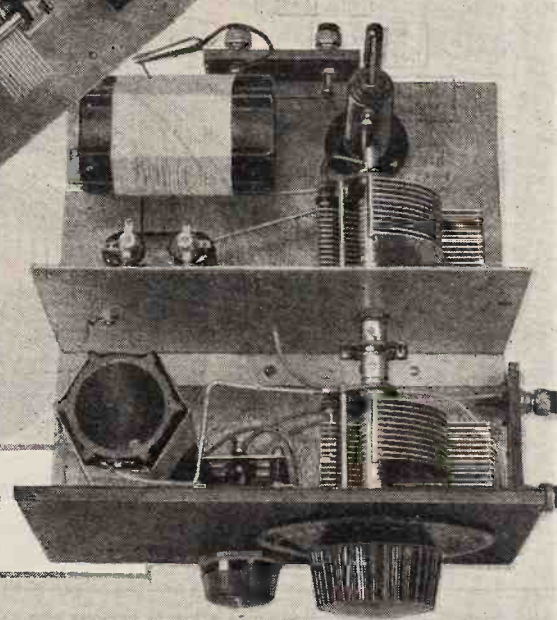
While the precise scale readings will differ in various sets the relative positions of the stations will remain as shown and the chart serves as a valuable guide to their identity. Local low-powered stations are shown in italic lettering. The other stations are those usually heard in this country. Station settings were obtained with a logarithmic scale tuning condenser of capacity 0.005 mfd.



THE REGIONAL ONE. A batteryless one-valve loud speaker receiver with ganged band pass filter. The set, which is simple to construct, is designed for local station reception, and embodies an indirectly heated pentode as power grid detector. ("The Wireless World," August 13th, 1930.)



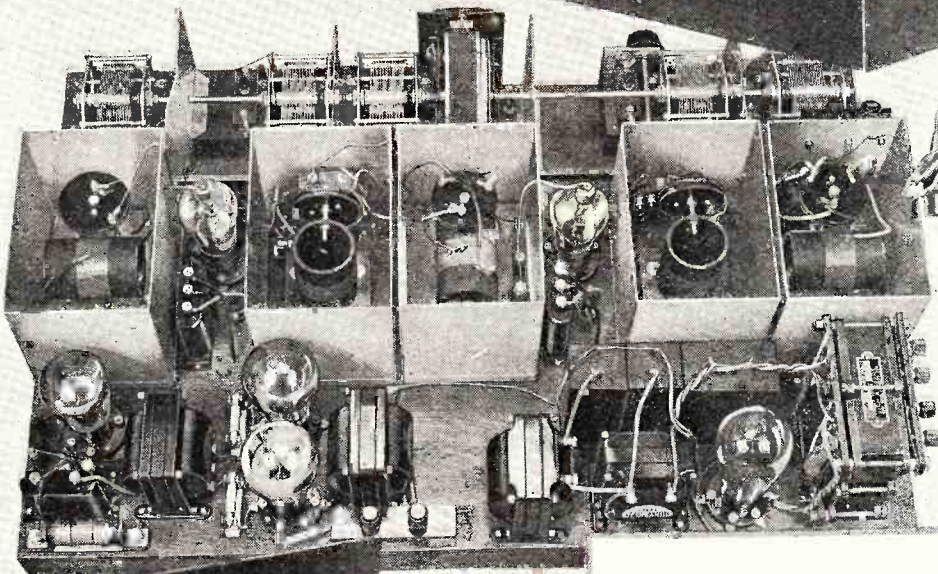
FOREIGN LISTENER'S FOUR. Battery or D.C. mains model. A well-tried favourite giving reliable reception of Continental transmissions with even a modest indoor aerial. Easy to construct and a fore-runner of all screened sets with single dial control. ("The Wireless World," July 9th, 1930.)



BAND PASS UNIT. A simple ganged filter giving high selectivity without loss of sidebands. Easy to operate and does not give rise to the distortion customarily associated with great selectivity. ("The Wireless World," August 27th, 1930.)

SELECTED SETS FROM RECENT ISSUES OF "THE WIRELESS WORLD"—

ALL D.C. THREE. Batteryless three-valve receiver with rejectors for the elimination of local stations. All valve current and grid bias are derived from the mains, and the set gives humless reception when plugged into any D.C. supply. ("The Wireless World," August 20th, 1930.)



THE BAND PASS FOUR. Selective four-stage set for high quality reception. Gives remarkable station separation. Features include: band pass tuning throughout, power grid detection, push-pull output stage, pre-H.F. volume control, single dial tuning, and all A.C. mains working. ("The Wireless World," June 25th, 1930.)



POWER PENTODE TWO. A two-valve all-mains receiver for local station quality reception. Incorporates a power grid detector coupled to a high-voltage pentode. ("The Wireless World," May 7th, 1930.)

—TO BE SEEN ON STAND NO. 4 AT OLYMPIA.

Letters to the Editor.

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

Correspondence should be addressed to the Editor, "The Wireless World," Dorset House, Tudor Street, E.C.4, and must be accompanied by the writer's name and address.

DUPLICATING LONG-WAVE PROGRAMMES.

Sir,—I appreciate fully your editorial in the September 3rd issue of *The Wireless World*, and hope that you will continue your efforts until the B.B.C. give us an alternative long-wave station.

The national long-wave programme is the only one that we in this district can depend on to give us good reception day and night.

The London Regional short-wave programme is good during daylight if there is no Morse interference, but at night it is unreliable because of fading and Morse.

A long-wave alternative station would be more useful for this western county than any western Regional station operated on short waves; we would then be free from Morse and fading on our alternative programme.

I should judge that this applies in many more districts.

Wishing you the best of success in a good cause.

Torquay.

JAMES JOHNSTON.

ALTERNATIVE PROGRAMMES.

Sir,—The great Regional Scheme which was ushered in with such a blowing of trumpets has now been in operation in the London region for many months, and if it is anything like what we were promised all of us in that region are now enjoying a choice of programmes from the two Brookmans Park transmitters. What justification can there be, therefore, for (1) putting out the same item on both wavelengths simultaneously and (2) giving the same item on each wavelength on alternate

nights? With regard to (1), why waste power? Why not close down the Regional transmitter, since, by the very nature of the scheme, we are all able to get the National? With regard to (2), as we are all able to get either station, those of us who desire to hear a particular item have presumably done so on its first transmission, and to put it out again on the other wavelength is merely to waste its sweetness on the desert air.

There can be no financial saving in this duplication of programmes, and we are forced to the conclusion that the vaunted Regional Scheme has already proved a failure, and the B.B.C. have ceased seriously to try to give us alternative programmes. If this is so, surely the continuance of the scheme in other parts of the country is a criminal waste of public funds.

In *The Wireless World* a short time ago a correspondent suggested that the *Radio Times* should be printed in parallel columns. Many months ago I made the same suggestion to the *Radio Times*, and received a reply to the effect that the present arrangement was considered the best possible (from what point of view was not stated), and no alteration would be considered unless there were proof of a general demand for it among listeners. The convenience of programmes in parallel columns to every listener whose set gives him a choice of two or more programmes is so obvious that it is difficult to find a reason for the refusal to consider it, unless forced to do so by the clamour of listeners. Can it be that the B.B.C. fear that its simplicity and lack of duplicated printed matter would expose to everyone the barrenness of the land in the matter of alternative programmes, and the complete failure of the Regional Scheme from that point of view?

C. H.

Sutton.

RESPONSE CURVES.

Sir,—In reply to Mr. Sowerby's letter in *The Wireless World* of September 3rd, may I assure him that nothing in my article was intended as a reproach of his neglect? Mr. Sowerby admits that he had considered the possible bad effect of the aerial on the filter, but did not think it necessary to refer to it. I thought it worth calling attention to, for coupling condensers of the magnitude I used are hardly so "fantastic" as he suggests. For instance, 50 and 100 μ F condensers were included in a set supplied to me by the Marconi Co. I agree that 200 μ F is too large, and I only used it to show its bad effect. I am using 5 and 10 μ F condensers for the London stations.

In this connection I should like to call special attention to the last paragraph on page 105 of my article, in which I explain that the inequality of the peaks of the tuning curve, at first attributed to the differences in the two halves of the filter, turned out to be due to the impossibility of tuning a circuit possessing two peaks.

C. F. JENKIN.

SHORT-WAVE WORKING.

Sir,—A small paragraph in the September 3rd issue of *The Wireless World* stated that the s.s. "Morrissey" VOQH, and the "Bowdoin" WDDE, are transmitting on various wavelengths.

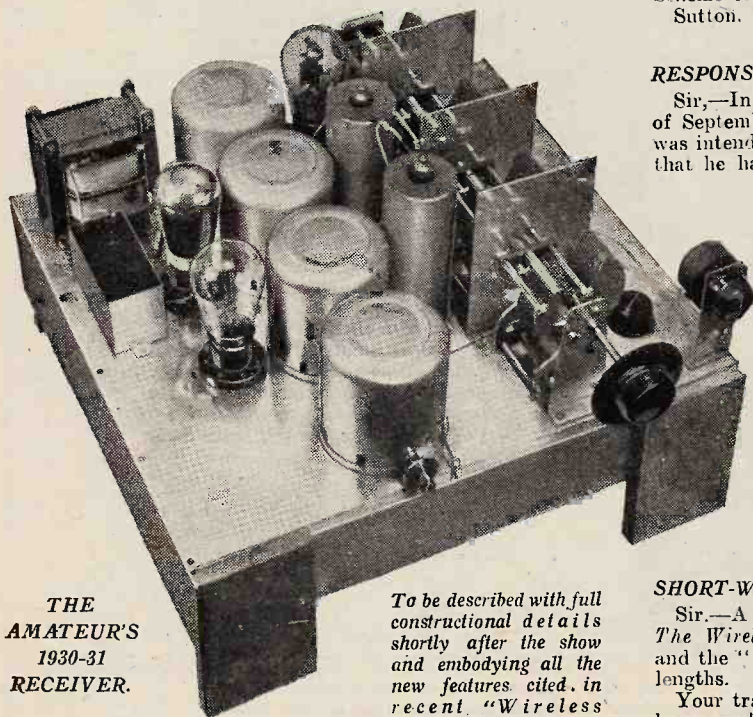
Your transmitting amateurs may be interested to know that I have worked both of these stations, and they are now on the 14,000 kc. amateur band. They both have come down from the 7,000 kc. band, as conditions became too bad there for working.

VOQH has a nightly schedule with W8ADM, and I have had most interesting chats with the three of them. The ships are both keen to contact with amateur stations on the 14,000 kc. band.

S. Devon

(DR.) JOHN R. WORTLEY TALBOT.

Radio G6WT.



THE
AMATEUR'S
1930-31
RECEIVER.

To be described with full
constructional details
shortly after the show
and embodying all the
new features cited in
recent "Wireless
World" articles.

SPECIFICATION: Single-dial control, selective band pass tuning, pre-H.F. volume control, tuned grid inter-valve couplings, power grid detection, high voltage compensated pentode output, complete smoothing and decoupling with a minimum of apparatus, all-mains operation, provision for gramophone and enclosed in radio-gramophone cabinet. Particular attention has been paid to the question of cost. The illustration shows an experimental model. The dial readings shown on page 313 representing good loud speaker reception were made with this receiver connected to quite a modest aerial.

GREEN Condensers are SAFE!



It does not pay to take chances in buying condensers. Remember, they may look efficient, yet, just as a smiling face may hide a harsh nature, so a well-finished condenser case may mask an inefficient interior. But there is a safeguard. *If it has a green case, you are safe in buying it.* For then it is a T.C.C. Condenser.

The green case of a T.C.C. Condenser is a symbol of safety. Inside it is a quarter century's experience in condenser manufacture. Experts know this—and choose T.C.C. "The Wireless World" knows it—and invariably uses T.C.C. Condensers in its sets. You are safe in following its lead.

The new types illustrated above are (left to right): T.C.C. 4 mf. Paper type, 6/3; T.C.C. .01 Mica Flat type, 3/-; T.C.C. Mica Upright type, 1/6; T.C.C. 2 mf. Paper type, 3/10; T.C.C. Electrolytic type, 15/-. Ask your Dealer for complete price list.

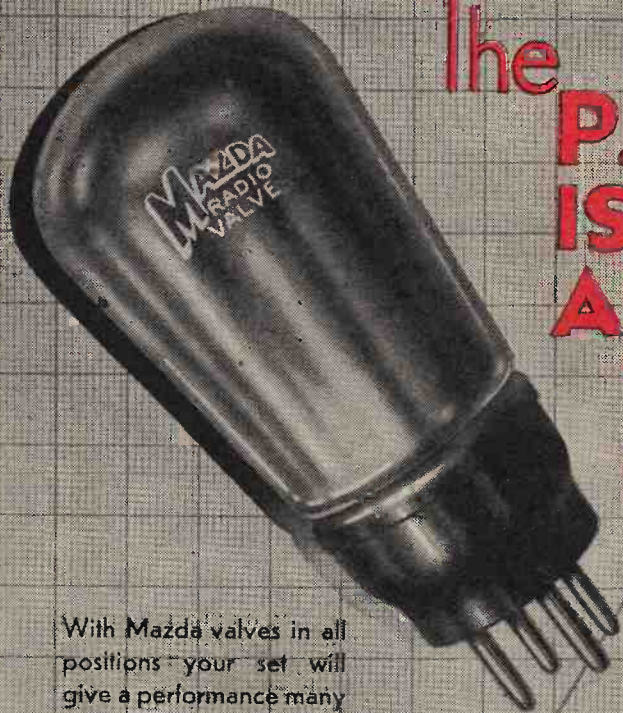


IN THE GREEN CASE

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

5968

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



The P.240 IS BETTER AND CHEAPER THAN A 2-VOLT PENTODE!

With Mazda valves in all positions your set will give a performance many times better than before.

See the Amazing Mazda Valves on the Ediswan Stand (No. 67) at Olympia.

The figures shown, on this page in conjunction with the curves will prove to the discriminating amateur that the output obtainable from the P240 is approximately equal to that of a 2-volt Pentode, while, by virtue of its extremely low impedance, the overall reproduction is consider-

ably superior. The facts coupled with the low price of 13/6 for the P240 make it extremely popular with those who require a power valve of a relatively large output. It will, for instance, work a moving coil speaker at a volume which is ample for ordinary domestic purposes.

THE AMAZING

MAZDA

RADIO VALVES

Examine these figures.....

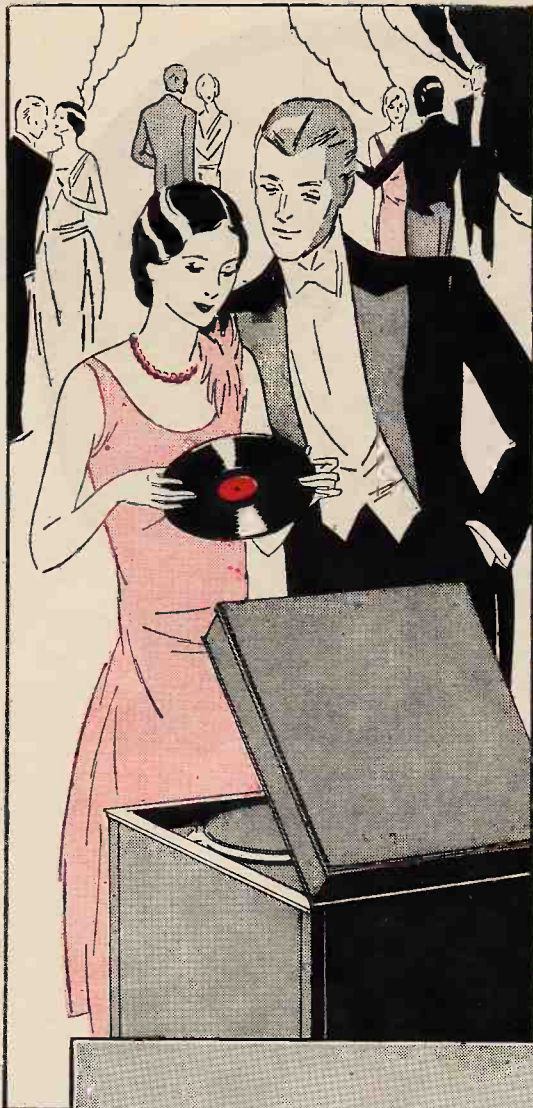
Amplification Factor	-	7
Anode A.C. Resistance (ohms)	-	1,900
Mutual A.C. Conductance (MAN)	-	3.7

The MAZDA
P.240
price 13/6



THE EDISON SWAN ELECTRIC CO., LTD.
Incorporating the Wiring Supplies, Lighting Engineering, Refrigeration and Radio Divisions of the British Thomson-Houston Co., Ltd.
Radio Division
12 Newman Street, Oxford Street, W.1
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EDISWAN



Modernise that old Gramophone

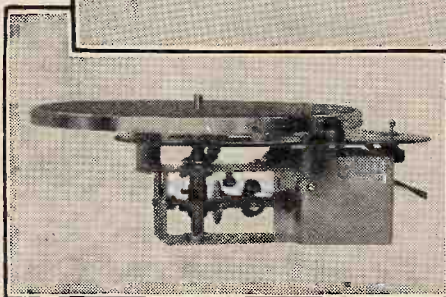
Why pay big prices for electric gramophones when you can modernise your old gramophone for a few pounds? With B.T.H. Electric Gramophone equipment you can make your gramophone as modern-to-the-minute and the equal of factory built machines costing three times the price.

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OLYMPIA STAND NO 67

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the "highest"
when we see it"



—not at any time easy, perhaps, but who, on hearing an "Ideal" Donotone, can fail to recognise the highest achievement in sound reproduction? Its consistent and undiminishing brilliancy of tone is largely due to its patented composition diaphragm and the unique feature of the wonderful tuned gongs. For real radio enjoyment the Donotone is in a class of its own.

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Exhibition Report.

ONCE again the annual Radio Show at Olympia provides the opportunity for an examination of the products of the British wireless manufacturer under conditions where every set and every component can be seen in proximity with the apparatus of competitors, and compared in a critical spirit by the many thousands of interested visitors.

In the introduction to our forecast published in last week's issue, we suggested that the outstanding impression of the Exhibition would be consolidation, and now that we have had the opportunity of visiting the Exhibition in full swing we have found no occasion to modify that view. The days of stunting and experiments by the manufacturers at the expense of the public are over. Everywhere one obtains the impression that the wireless sets of to-day are well finished and remarkably reliable instruments, selling at prices which indicate at once that the purchasing public are to receive excellent value for money. Simplicity and extreme dependability seem to have been the aims of the manufacturer this season. The products have the appearance of being built to stand up to use and to require no servicing of the kind with which the public has in years gone by been all too familiar—servicing which has been necessitated as the result of hasty or ill-considered design and poor manufacture. The sets of this season are a credit to the industry and to British workmanship.

It would be incorrect to say that

F. I.

Stand-to-Stand Visits.

there are no outstanding features of the Exhibition; there are many, and it is because they are so numerous that the visitor may be inclined to form the impression that Olympia, 1930, is not spectacular, but we would differ strongly from such a view and would regard this year's event as unquestionably the strongest and most satisfying exhibition that the British radio industry has yet held.

Manufacturers have undoubtedly paid more attention this year to the requirements of the public in the matter

of ability to receive programmes from abroad, as well as their local British stations. The interest in direct reception is steadily growing, and the public is no longer interested in local reception only, except where cost of the apparatus is a prime consideration. Great strides have been made by the manufacturers in the direction of increasing selectivity, though we believe that with the continual increase in the number of transmitting stations even more attention will have to be paid to this feature in days to come.

In the pages which follow we endeavour to review the Exhibition as a whole, our Stand-to-Stand review having been prepared entirely after the opening of the Exhibition, so that *The Wireless World* report has the particular merit, which we believe our readers will appreciate, that every statement in our review is based on actual inspection of the apparatus at the Exhibition, and nothing has been reported on conjecture or incomplete information.

AUDITION ROOMS AT OLYMPIA

The following firms are conducting demonstrations in the Gallery and first floor of the Empire Hall:—

	Room
Celestion, Ltd.	U
Cole, Ltd., E. K.	T
Columbia Graphophone Co., Ltd.	C
Edison Bell, Ltd.	S
Edison Swan Electric Co., Ltd.	D
Electrical & Radio Products, Ltd.	G
(Successors to Aeonic Radio, Ltd.)	
Epoch Radio Manufacturing Co., Ltd.	O
Ferranti, Ltd.	H
Gambrell Radio, Ltd.	R
General Electric Co., Ltd.	P
Kolster-Brandes, Ltd.	I
Lamplugh, Ltd., S. A.	L
Lissen, Ltd.	V
McMichael, Ltd., L.	A
Marconiphone Co., Ltd.	E
Mullard Wireless Service Co., Ltd.	B
Perfectavox, Ltd.	K
Radio Gramophone Development Co.	N
Sheffield Magnet Co.	M
Ultra Electric, Ltd.	F
Universal Gramophone & Radio Co., Ltd.	J
Varley (Oliver Pell Control, Ltd.)	Q



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STAND to STAND REPORT



ADEY. (261)

This firm are showing several novelties, including a loud speaker built into a hat and also single-valve and two-valve sets in cigar boxes. There is also a single-valve attaché case portable for headphone reproduction, which requires no external aerial for short-range work.

This receiver embodies the "Adey patent circuit."

Adey Radio, Ltd., 99, Mortimer Street, Regent Street, London, W.1.



Adey single-valve portable

AMPLION. (62)

The Amplion exhibit includes several entirely new receivers, in addition to new models of the special high quality set which was introduced a year ago.

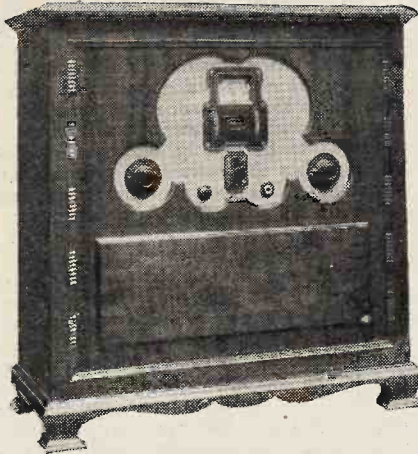
The most interesting of the new sets is the "Two Screen-Grid Cabinet" receiver, which sells at 38 guineas complete. It is designed for operation from either A.C. or D.C. mains, the filament current being supplied in either case from an accumulator, which is automatically charged while the set is in use. By switching on a charging current of the same magnitude as that taken by the valves, and operating the switch through a relay, so that the accumulator is necessarily on charge whenever the valves are alight, a long and trouble-free life for the accumulator should be assured. In a D.C.-operated set this arrangement has the further advantage of ensuring that the voltage applied to the filaments shall not rise enough to damage the valves even if one of them should burn out, while hum is likely to be non-existent.

The frame is entirely enclosed within the cabinet, but advantage can still be taken of its directional properties, for it can be rotated by a knob on the control panel. The circuit provides two

stages of high-frequency amplification, one of which is tuned, the other being aperiodic. With a reaction control as a stand-by, this should provide very

lower anode current. In both cases screening is very thorough, the screening being built up from tin-plate, with well-soldered joints.

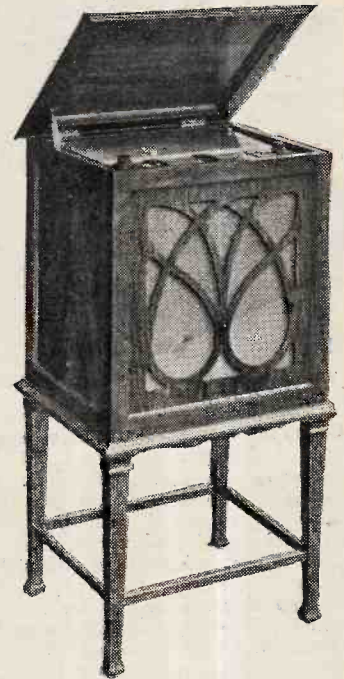
A two-valve all-mains A.C. set, built compactly into an attractive little cabinet, is offered at 15 guineas. This set uses a simple detector-pentode circuit, but it is worthy of note that the pentode employed is of the high-voltage class, so that the output from the set may be expected to be generous. The set is designed to operate the Amplion AB6 loud speaker, of which there is a model finished to harmonise with the receiver. It is claimed that there are few localities where it is not possible to receive five stations at full loud-speaker strength without mutual interference.



Amplion five-valve A.C. mains receiver.

satisfactory range and selectivity. For the output stage a pentode is used, and a good estimate of the volume and quality obtained may be had from the fact that the total anode current drawn is 25 milliamps. Provision is made for connecting a pick-up for gramophone reproduction, and extra loud speaker terminals are also provided.

The Amplion "Two Screen-Grid Portable" employs the same chassis, but is, of course, designed for operation from batteries, and draws an appropriately



Amplion two screen-grid cabinet radio.



Amplion two-valve A.C. mains receiver.

The high-quality receiver introduced a year ago is still available in its original form at the same price (£50), enclosed in a simple metal box, but it is now known as the "chassis model." It is also offered in a large cabinet, complete with a large "Lion" speaker (Model L. 18P), at £65. In this form provision is made for using the mains as an aerial for the reception of the local stations, although a normal aerial is required for foreign or distant stations. A point of interest is that the set proper has been divided into two portions, the high-frequency amplifier and detector being located immediately under the panel at the top of the set,

Stand-to-Stand Report.—

while the L.F. and output stages, together with the mains equipment, stand on the base of the cabinet below the speaker.

The same set is available in a small table cabinet, without speaker, at £55, while there is a battery model, which can take its H.T. from the mains if desired, at £32 10s.

Graham Amplion, Ltd., 25-26, Savile Row, Regent Street, London, W.1.

ARDING & HOBBS. (262)

A comprehensive range of receivers and accessories by the leading manufacturers constitutes the principal exhibits on the stand, but, in addition there is the "Ilminster" range of portable sets manufactured by this firm. Two models are shown, the "Popular Five" and the "Super Four." As its description implies,



The Ilminster Super Four portable.

the "Popular Five" is a five-valve set consisting of two aperiodic H.F. amplifiers, a leaky grid detector and two transformer-coupled L.F. amplifiers. Reaction is provided. A suitcase type container is employed with the frame aerial and loud speaker housed in the lid. The price of this model is £19 10s. inclusive of royalty. The "Ilminster Super Four" is built into a suitcase-type carrying container also, but the electrical circuit is entirely different. In this set four valves only are used, one being a screen-grid H.F. valve coupled by a tuned anode circuit to a regenerative detector and followed by two transformer coupled L.F. stages. Provision is made to receive on both medium and long waves, and this feature is included in the five-valve set, wave change being achieved by means of a switch. The container of this set is covered with imitation crocodile skin and the price is £14 14s. inclusive.

Arding and Hobbs, Ltd., Clapham Junction, London, S.W.11.

ATALANTA. (232)

On this stand is shown a series of screw-drivers intended for single-handed manipulation. They are fitted with a rounded

end, which rests in the palm of the hand, while the blade is rotated by working the finger against a knurled ring. Slip-on box spanners to fit 2, 4, and 6 B.A. nuts are also provided; this feature makes the tool a very useful aid in the construction of wireless apparatus.

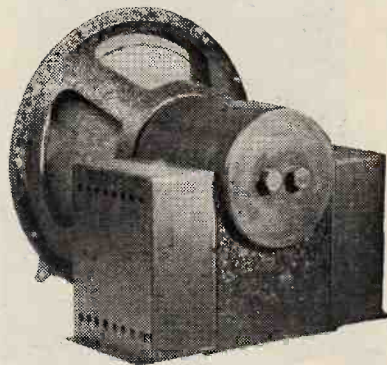
Atalanta, 1-3, Brixton Road, London, S.W.9.

AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO. (107)

The demand among amateurs for the Avometer, to be seen on this stand, has steadily grown. The Avometer is a direct reading multi-range instrument of resistance, current and potential. This season's model has been modified to include a screw-in fuse, which is arranged to be readily replaceable without affecting the calibration of the instrument. This fuse provides a considerable measure of protection for the instrument.

Coil winding machines of highly specialised design are the essential product of this company, the "Macadie" being almost universally adopted in every wireless factory for coil-winding. This year a new type of machine has been introduced modified for mainly hand-winding in place of the larger motor-driven model and possessing many novel features. It will wind coils of any shape, whether round, square, flat or irregular, from $\frac{1}{8}$ in. in length and up to 4 in. in diameter. Any gauge of wire can be used from No. 22 S.W.G. down to such a fine wire as No. 48 S.W.G. The machine winds close up to the cheeks of a coil and automatically traverses from side to side with great precision. This hand-winding machine, in which all spindles are set up on ball races, is light and automatic to operate, can be run up to a speed of 2,500 r.p.m., while its hand rotation gives the operator complete control. Known as the "Douglas" type, this new machine, which is moderate in price, can be supplied with a well-designed attachment for automatically inserting paper between successive layers in a winding.

Automatic Coil Winder and Electrical Equipment Co., Ltd., Winder House, Douglas Street, London, S.W.1.



The A.C. model of the Baker 1931 Super Power moving coil speaker.

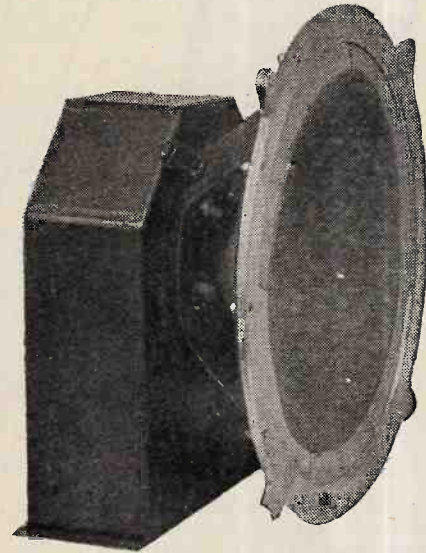
BAKELITE. (255)

Bakelite seems to be gaining ground each year as a raw material for use in the construction of wireless components, and the mouldings produced in it become steadily larger and more complex. This stand is devoted to a display of the manufactures of various firms which use bakelite, and it is shown that, due, at least in part, to the lead given by the wireless trade, moulded fittings have applications in many other branches of industry.

Bakelite, Ltd., 68, Victoria Street, London, S.W.1.

BAKER'S "SELHURST." (137)

The exhibits on this stand consist entirely of moving coil loud speakers of types and sizes to suit varying needs. The 1931 model of the "Super-Power" speaker is available with the magnet



The Baker permanent magnet moving coil loud speaker.

wound either for 6-volt battery or for D.C. mains at the price of £6. The flux-density in the gap is over 13,000 lines per square centimetre, which figure is high enough to justify the claims made for unusually high sensitivity. An A.C. model is offered at £9 10s., in which a full-wave Westinghouse rectifier is used in conjunction with a smoothing circuit for energising the magnet. The magnet in this is identical with that of the D.C. mains model, taking 100 milliamps. at 200 volts; a change-over of the supply from D.C. to A.C. can therefore be met by adding the rectifying unit, which can be used when desired for charging high-tension accumulators.

The "Standard" model loud speaker is smaller in size and lower in price, the battery and D.C. models costing £4 15s. A permanent magnet model requiring no auxiliary source of power is offered at £6; it has been entirely redesigned for the present season.

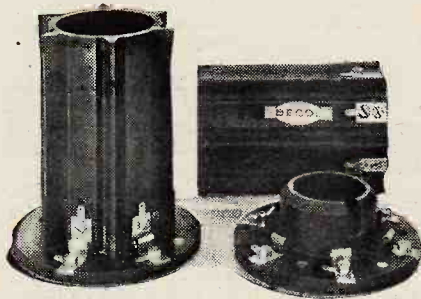
Stand-to-Stand Report.—

All loud speakers are fitted with a moving-coil wound to suit the particular output valve that each customer proposes to use; high-resistance coils are standard, but low resistance coils can be fitted if required. A special pentode model is supplied, in which a linen diaphragm is used to counteract the normal tendency of a pentode to over-emphasise the upper register; this model is fitted with a coil which renders the use of a tapped output choke unnecessary.

Particular claims are made for the high sensitivity of these speakers, and one is shown connected to *The Wireless World* "Regional One" receiver.

Larger models, both with cones and with exponential horns, are also made for public address and cinema work.

Baker's Selhurst Radio, 89, Selhurst Road, S. Norwood, London, S.E.25.



Becol formers with pinless and non-reversible contacts.

BEAVER. (206)

The chief exhibits on this stand consist of sets, accessories and components by the leading manufacturers, but in addition there is a display of Elite components manufactured by this firm. These include air-spaced short-wave coils, plain, centre-tapped and triple-tapped plug-in coils to cover all broadcasting wavelengths, a range of H.F. chokes, and 5- and 7-way battery cables. The "Corona" portable is exclusive to this stand, and embodies the popular five-valve arrangement using two aperiodic coupled H.F. stages, a detector and two transformer-coupled L.F. valves. The price is £9 9s.

There is a junior model styled the "Overseas Five," the price of which is £6 10s. 6d.

Beaver Electrical Supply Co., 5, Great Chapel Street, London, W.1.

BECOL. (253)

The name of Becol has long been synonymous with high-class ebonite products, and it is pleasing to see that the company have added to their well-known range of formers a pinless type with non-reversible contacts for use with a special base. The formers are so arranged as to be fool-proof, in that wrong contact cannot be made, even temporarily. Besides the well-known ribbed coil formers, which are made in various sizes up to 4in. overall diameter, there is a series of lin. formers

with various shaped ribs for H.F. choke construction. Those who have studied the design of inductively-coupled band-pass filters will find that about 10 turns



One-inch Becol formers useful for H.F. choke construction and band-pass filters.

of 22 gauge wire wound around this small diameter former will produce a common coupling coil of about three microhenrys, which is an inductance likely to be required in these circuits. Interesting experiments to produce filters with different peak separations can be made with the small formers.

British Ebonite Co., Ltd., Nightingale Road, Hanwell, London, W.7.

BEETHOVEN. (143)

Every possible application of the portable is covered by the five "Beethoven" models displayed on this stand, and the firm specialises exclusively in the manufacture of portable sets.

(1) The "Beethoven Q.C.R." attaché case portable makes use of a special reaction circuit giving constant reaction over the greater part of the dial, so simplifying tuning for the novice. A Celestion loud speaker is fitted and the price is 17 guineas.

(2) "Twin Screen Grid" portable. An attaché case model designed for range and power, the four-valve circuit comprising two S.G. valves, detector, and pentode output. Price 21 guineas.

(3) "Minor" attaché case portable. A three-valve model with pentode output



Beethoven self-tuning portable.

designed for alternative programme reception. Exceptionally well finished in view of the low price of 10 guineas, in

blue lizard grain case with polished mahogany interior woodwork.

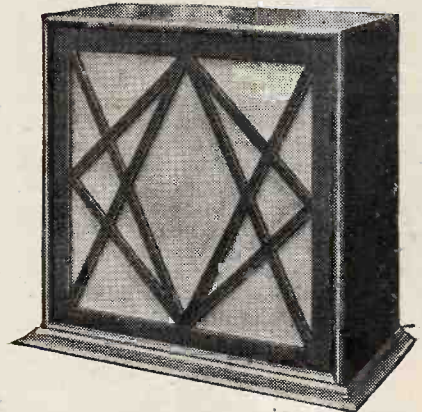
(4) "Screen Grid Super Four" trans-portable. A long range receiver equipped with full-size Celestion speaker, pentode output and super-capacity H.T. battery. 25 guineas.

(5) "Self-Tuning" portable. A dual-purpose receiver which may be tuned in the ordinary way with a variable dial or switched over to a series of pre-tuned circuits, the stations being identified by a multiple-coloured selector switch. Price 23 guineas.

Montague Radio Inventions and Development Co., Ltd., Beethoven Works, Great College Street, Camden Town, London, N.W.1.

BEL-CANTO. (264)

Although this is the first time that Bel-Canto loud speakers have been exhibited at Olympia they already enjoy a wide reputation, built up largely by personal recommendation.



Bel-Canto standard loud speaker.

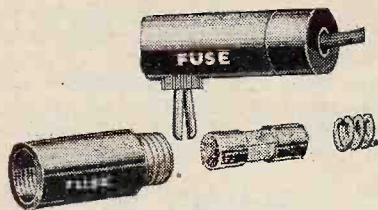
All the products shown on this stand centre round the Bel-Canto balanced armature movement as a nucleus. This unit is of unusually massive construction and should be capable of handling large inputs without chattering. Built round a die-cast backbone the magnet system is provided with pole pieces in which the laminations are unusually thin. No external adjustment is provided for centring the armature, but the spring-arm supporting the cone drive rod is pivoted and can be "pre-set" by two small set screws.

A handsome All-Electric Radio-Gramophone incorporating the Bel-Canto loud speaker is also shown. This model, which is priced at £75, is in a walnut cabinet grilled on all sides, and includes single-dial tuning in the radio section and a tone control for the gramophone pick-up. A cheaper model, the R.G.4, in an oak pedestal cabinet and with a three-valve radio circuit, is a new product for the coming season. For those who object to the low position of the loud speaker in the conventional radio gramophone cabinet, the Table Model R.G.3 has been produced. With this model the loud speaker can be placed at a distance and at any

Stand-to-Stand Report.—

desired height from the floor. Designed for A.C. mains, the circuit comprises a screen-grid H.F. amplifier, power-grid detector, and super-power output valve delivering 1,000 milliwatts of undistorted A.C. to the loud speaker.

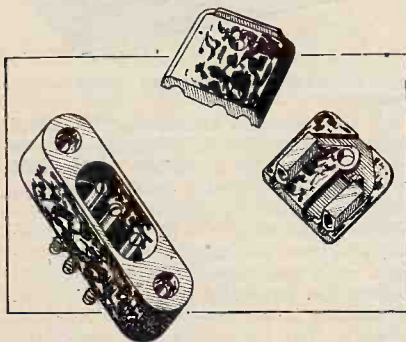
Bel-Canto Radio, Ltd., Warple Way, The Vale, Acton, London, W.3.



Belling-Lee Wanderfuse. Component parts of standard fuse (below).

BELLING-LEE. (134)

The series of terminals so well known to set builders is being shown, together with a number of new accessories. A multi-purpose terminal block consists of a skeleton bakelite moulding designed to take two terminals of any make but is particularly suited to the type with non-rotating head manufactured by this firm. When used with the terminals in a vertical position, one-hole fixing is arranged, but if it is desired to have the terminal heads protruding through the back of the receiver cabinet, horizontal mounting by two-hole fixing can be effected. The terminal block can be attached to a window-ledge or wall.



Belling-Lee three-pin mains connector.

The "Wanderfuse," as its name implies, is a combination of H.T. fuse and wanderplug so arranged that the vertical space taken is no more than that of the conventional plug. The split-pin which makes contact with the H.T. battery socket projects at right angles to the axis of the fuse holder and fuse. The latter is rated at 150 mA. This component, selling at 1s. 6d., by safeguarding valve filaments should pay for itself in a very short while.

A compact series aerial condenser, with clip-on spade terminals at each end, known as the "spadenser," is designed

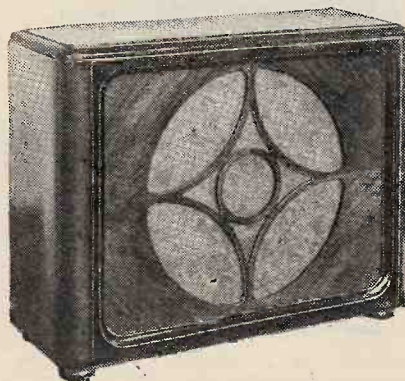
for easy insertion in the aerial lead where increased selectivity is desired. The capacity of the condenser is 0.0002 mfd., and the price 2s. 6d. Among other components being shown are mains safety plugs and sockets, with which it is not only impossible to receive a shock but also cross-connection is prevented by a system of non-interchangeable counter-sunk contacts.

Belling and Lee, Ltd., Queensway Works, Ponders End, Middlesex.

BENJAMIN. (115)

Switches for use in radio circuits are by no means easy to design, and one always looks with interest to the new types as they appear. At the Benjamin stand are to be found two entirely new types of switch. They are similar in their action and general design, but are available as either single or double pole types. The new switches consist essentially of contacts arranged like the staves of a barrel and connection is made between adjoining contacts by a spring-loaded ball. This gives a particularly light movement with a good snap action as there is little tendency for the switch to stop in any other position except where the ball drops in the gaps between the metal strips. The switch may be fixed to any panel up to $\frac{3}{4}$ in. in thickness by the drilling of a single $\frac{1}{4}$ in. clearance hole. Since the ball contacts are carried on a bakelite arm, the spindle is not live and can be mounted when necessary on a metal panel. A reversible plate provides alternative labelling for the positions of the switch. Terminals as well as soldering tags are included. The total diameter of the switch is 2 in. and it projects $1\frac{1}{4}$ in. in the rear of the panel. The single pole switch is of similar general construction as the double pole model, but is fitted with only three contact strips. It makes a good "on" and "off" or radio gramophone switch, and its reversible indicator plate provides for these two requirements. The price of the double pole switch with terminals is 3s. 6d., and that of the single pole model 1s. 9d.

Benjamin Electric, Ltd., Brantwood Works, Tarriff Road, Tottenham, London, N.17.

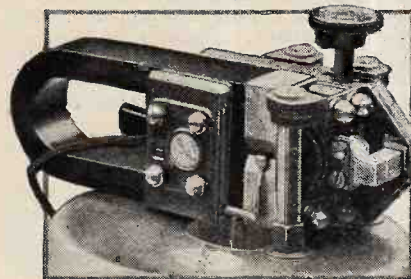


Blue Spot type 71R loud speaker.

BLUE SPOT. (217)

The principal products of this firm are loud speaker movements, cone chassis and complete loud speakers.

There are three types of movement, the well-known 66K and two comparatively recent models, the 66R and 66F, which were recently reviewed in this journal. These are supplemented by a complete range of cone chassis.



Blue Spot type 66R loud speaker movement.

Three loud speakers, Models 99K, 101K and 29K, in mahogany Trobrite moulded cases, are continued from last season, all the new models being housed in quartered walnut cases.

The smallest model is the 41K at 50s. This is the only one of the new series which makes use of the 66K unit, all the others being fitted with the new 66R unit. Of similar design and finish to the 41K, the 51R at 84s. is slightly larger and capable of handling more power. Next in the series is the 71R at £4 15s., with even better cabinet work, and finally the 29R at 6 guineas. The latter is housed in a cabinet of similar design to the Goliath, but executed in quartered and polished walnut.

The Type 88 gramophone pick-up and tone arm with self-contained volume control is being continued, and the same movement has been adapted for fitting to existing gramophone tone arms, the price being 35s.

British Blue Spot Co., Ltd., 94-96, Rosoman Street, Rosebery Avenue, London, E.C.1.

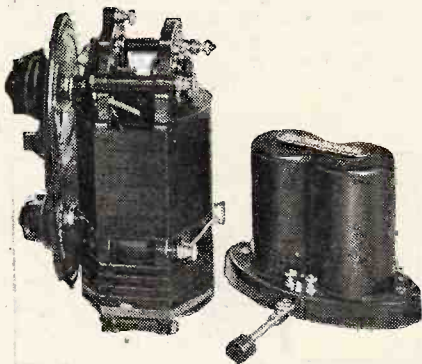
BRITISH GENERAL MFG. CO. (59)

The original aerial tuner produced by this firm has been completely remodelled as far as its constructional details are concerned. It is now wound on a skeleton moulded bakelite former, and is arranged for two-hole fixing, either horizontally or vertically: its escutcheon plate acts also as a dial in either position. Aerial coupling is adjusted by means of a switch giving five alternative positions.

The Triumph L.F. transformer, priced at 6s. 6d., in a ratio of 3:1, has an extremely good specification for its price; the windings are carried in bakelite bobbins, and the core is built up of one-piece stampings. A similar component, with a step-up ratio of 7:1, is also available at 12s. 6d.

British General Mfg. Co., Ltd., Brockley Works, Brockley, London, S.E.4.

Stand-to-Stand Report.—



British General aerial and anode tuning coils.

BRITISH RADIOPHONE. (223)

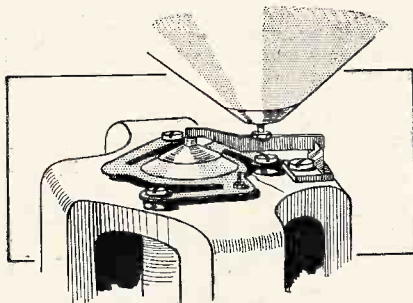
This firm is exhibiting National and Symphony portable sets; both have a similar specification (2 aperiodic H.F. stages, detector, and 2 L.F. amplifiers), but differ in the matter of finish. They are priced respectively at 12 and 13 guineas.

Full technical details are not yet available regarding an advance model of an H.T. eliminator designed for the above portable sets, although it is exhibited on the stand.

British Radiophone, Ltd., Aldwych House, Aldwych, London, W.C.2.

BROWN, S. G. (78)

A radical departure from conventional and accepted practice is to be found in the design of the new Brown permanent



Brown moving-coil loud speaker drive mechanism.

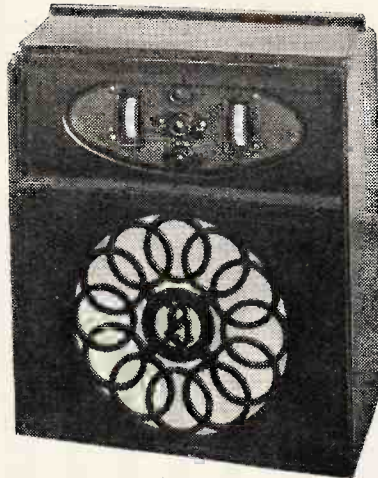
magnet moving-coil loud speaker—temporarily known as the small model to distinguish it from the larger instruments made by this firm under the trade name of "Grosvenor."

The new loud speaker differs from other types in that a lever drive is interposed between the moving coil and the conical paper diaphragm. This lever is lightly pivoted at one end, while its other extremity is secured to an extension of the moving coil former; the apex of the cone is fixed to approximately its centre point. It is claimed that increased sensitivity is obtained in this way, and that any tendency of the actuating lever to vibrate at its own natural frequency is

effectively prevented by the damping effect of the cone.

A speech coil of high resistance is fitted, so the instrument is suitable for direct connection in the output valve anode circuit, although it is preferable to use a choke filter or a 1:1 ratio output transformer. The chassis, ready for mounting in a cabinet or on a baffle board, costs £3 10s.; a cabinet model is available at 6 guineas.

The "Grosvenor" range of Brown moving-coil loud speakers are all fitted

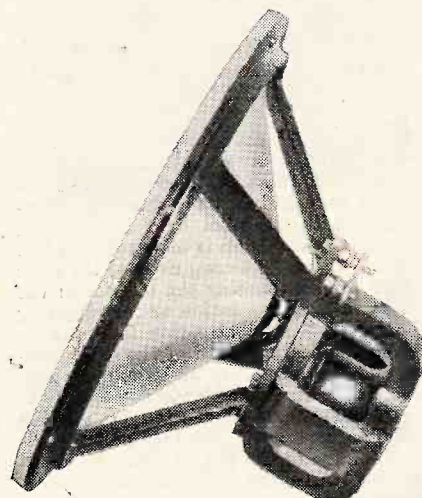


Brown four-valve portable.

with high-resistance speech coils, centred in the gap by means of bakelised fabric spiders, and include a pitch control device.

There is also a new pick-up and tone-arm, supplementary to existing models. The use of perishable rubber as a damping medium has been avoided in this latest design.

Probably the most interesting of the new Brown receivers is the four-valve port-



New Brown permanent magnet loud speaker chassis.

able, with an H.F.-det. 2 L.F. circuit. The coil assembly for the tuned high-frequency coupling is completely enclosed, and elaborate screening is provided for the S.G. valve, of which the filament may be dimmed for controlling volume.

S. G. Brown, Ltd., Western Avenue, North Acton, London, W.3.

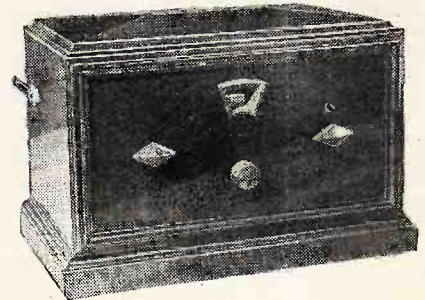
BROWN BROS. (17)

As factors this firm displays a comprehensive range of receiving sets, radio-gramophones, loud speakers, pick-ups and mains units. Special attention is being given to battery charging gear, and in particular the Hewittic mercury arc rectifying equipment.

Brown Bros., Ltd., Great Eastern Street, London, E.C.2.

BROWNIE. (102)

The new receiver at this stand is the "Dominion Mainsset Two" for use with A.C. supply. It is believed that the circuit follows an orthodox arrangement of detector and one L.F. stage. A very pleasing external appearance has been



Dominion Mainsset Two, by Brownie.

produced with a convenient arrangement of the operating controls. The cabinet is of polished walnut, and will harmonise with the best of surroundings. This receiver no doubt meets popular requirements, and sells for £12 15s., including valves and royalties.

Another model, the "Dominion Mains Screen Grid Three," has a screen-grid H.F. stage, and is claimed to give good foreign station reception. A battery-operated three in the same housing as the Mains Three, which includes a walnut cabinet, is also shown. In use it has the compactness of the all-mains set, in that the batteries are totally enclosed. The price complete with valves, the output being a pentode, is £10 15s.

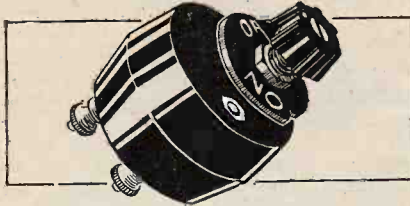
Another popular receiver is the "Dominion Console," a detector-two L.F. set with self-contained loud speaker and totally enclosed batteries. The loud speaker is the four-pole balanced armature type, and is fitted with a 12-inch cone. Provision is made for gramophone pick-up. All "Brownie" receivers are fitted with Cossor valves.

Brownie Wireless Co. of Great Britain, Ltd., Nelson Street Works, Mornington Crescent, London, N.W.1.

Stand-to-Stand Report.—

BULGIN. (103)

Out of the multiplicity of small, though none-the-less important components, mention must be made of the new rotary and toggle switches; the former have a decided snap action, the



Bulgin rotary switch with a well-pronounced snap action.

mechanism of which is totally enclosed in bakelite mouldings with indicating tabs and provision for one-hole fixing. The on-and-off switch sells at 1s. 9d., whilst a single pole change-over model costs 2s. The toggle switches have a quick make-and-break action, and will carry 250 watts; the mechanism is held by bakelised laminae. A shock-proof non-reversible plug and socket selling at 3s. will interest those who are building all-mains sets, and a new design of British-made crocodile clip, with a tubular extension to act as a wire clip, will prove indispensable where trial connections have to be made in rapid succession. There are available also heavy-duty A.C. grid bias resistances, embedded in vitreous enamel. The values are 350, 500, 750, 1,000, 1,500, and 2,000 ohms, all capable of passing 100 mA.

A. F. Bulgin and Co., 9-11, Cursitor Street, Chancery Lane, London, E.C.4.

BULLPHONE. (33)

This firm is specialising in the production of a range of receivers, all of which are enclosed in bakelite-moulded containers. One of the leading models is the "All-Electric Two," with a detector-L.F. circuit, which is priced at £10. There is also a three-valve H.F.



Bullphone receiver in bakelite cabinet.

detector-L.F. mains-driven receiver, as well as two- and three-valve battery sets of similar external appearance.

The "Bullphone" eliminators, both for A.C. and D.C., are also mounted in bakelite containers.

Bullphone, Ltd., 38, Holywell Lane, London, E.C.2.

BURNDIPT. (56)

A new series of A.C. receivers and radio gramophones is the feature which first attracts the notice of the visitor to this stand. The nucleus of the series is a new three-valve, high-efficiency circuit which has recently been developed at the Blackheath Research Department. A specimen chassis is open for inspection in an illuminated glass case and is well worth examining.

The circuit is as follows:—Screen-grid, detector, power pentode, indirectly-heated valves being used throughout. The two tuning condensers are mounted with their spindles parallel to the control panel, the edgewise slow-motion drum dials being mounted side by side, thus permitting either simultaneous or independent

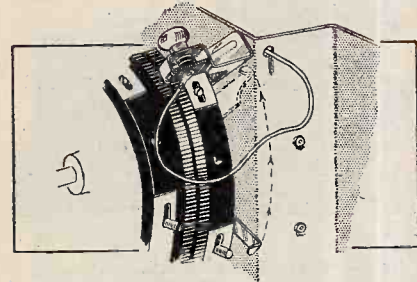


Burndeft A.C. receiver de luxe model 1850.

tuning. The scales are calibrated in wavelengths, the ranges covered being 210-560 and 900-2,100 metres. The designers have had a happy thought in connection with the pilot light illuminating the dials. The lamp is mounted in a bell crank and can be swung clear of the dials either for illuminating the interior of the set for service inspection or for renewing the bulb. Special attention is drawn to the mechanical strength of the steel chassis and the durability of switch mechanisms and variable condensers.

Volume control is effected by varying simultaneously the grid bias and screen-grid voltage of the H.F. valve. Incidentally, as the volume is decreased the selectivity increases; a most useful combination where powerful local interference is experienced.

Special attention has been paid in the detector stage to the achievement of constant reaction in order to simplify tuning for the novice. Terminals are provided for introducing a gramophone pick-up at this stage and radio-gramophone switching is combined with wave-range switch-



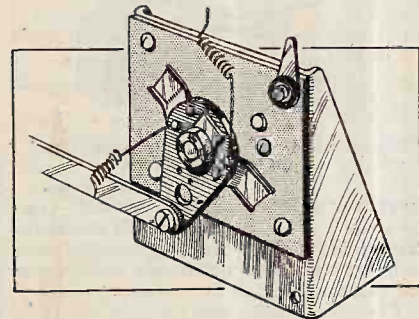
Pilot light mounting in the new Burndeft three-valve chassis.

ing in a single control. A new low-capacity switch with link motion has been designed for this purpose.

Transformer coupling is used both between the detector and the input to the power pentode and between the output valve and the loud speaker. The last stage is capable of delivering 1,000 milliwatts of undistorted power to the loud speaker. The latter is of the balanced armature type and has been designed to Burndeft specifications with a large diameter cone diaphragm.

The mains equipment is built as a separate unit and is housed in a readily accessible metal case. A single mains transformer serves for the majority of supply voltages. There are four primary tappings as follows:—100-110, 200-210, 220-230 and 240-250 volts at 40 to 60 cycles. A double-pole mains switch is fitted in accordance with I.E.E. recommendations and the power consumption is at the rate of 34 watts (30 hours per unit).

In the A.C. receiver de luxe Model 1850, this equipment is housed in a

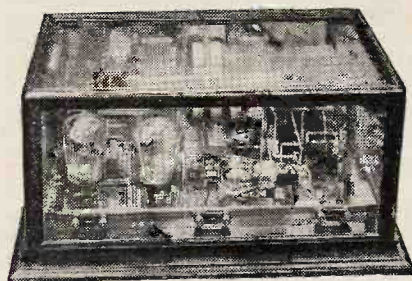


New switch mechanism in the new Burndeft three-valve chassis.

polished oak cabinet of handsome design and sells at 33 guineas; Model 1851 in mahogany costs one guinea more. An attractive feature of these cabinets is the small depth from back to front (10½ ins.)—an advantage in the modern small house.

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The A.C. Radio Gramophone Model 1860 utilises the same basic radio equipment, but is of greater depth and incorporates an induction motor with automatic stop, the well-known Burndept Needle Armature pick-up and a separate volume control mounted at the side of the cabinet for ease of operation. The price is 50 guineas in oak and 52 guineas in mahogany. These models will also be fitted with the R.K. moving-coil loud speaker at 58 and 59 guineas respectively. All who have had any experience with the Universal Screened Five will be glad to learn that it is to be continued unchanged in both battery and A.C. forms during the coming year. Since the last



Three-valve chassis forming the basis of the new Burndept receivers and radio-gramophones.

Show it has been incorporated in the Universal Radio Gramophone de Luxe Model 1830. With its ultra short wave range, in addition to the nominal broadcast bands and the gramophone, a more comprehensive source of entertainment would be difficult to conceive. Another interesting form of the Universal Five receiver is a new bureau model with built-in R.K. loud speaker at 60 guineas.

The "Screened Ethophone" is another well-established receiver to be continued, a new cabinet of simple but effective design in walnut having been evolved for the de luxe model.

The two portables which were re-designed earlier in the year will remain as before apart from detail improvements, the price of the Screened Portable being 19 guineas and that of the Super Screened model £23 10s.

Three types of loud speaker are shown this year. (1) The Cabinet Cone—similar to the loud speakers used in the A.C. receiver de luxe and A.C. Radio Gramophone—at £2 10s. (2) The "Minstrel," with double linen diaphragm at 4 guineas. (3) The R.K. moving coil in a new series of console cabinets at prices from £12 10s. to £14 15s.

The "Needle Armature" pick-up is still continued. This pick-up is used by the B.B.C. for transmissions of gramophone records. A new model for use with talking picture projectors has been designed. This is of massive construction and has an output approximately five times greater than the standard model, but is sold exclusively for theatre use.

A complete range of components, and

demonstration boards showing the construction of variable condensers completes the display on this stand.

Burndept Wireless (1928), Ltd., Eastnor House, Blackheath, London, S.E.3.

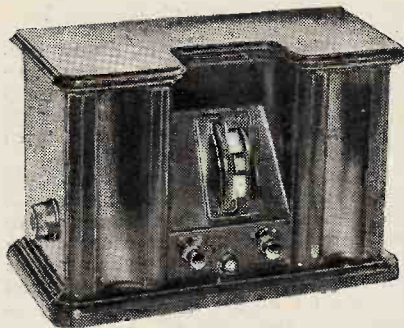
BURTON. (44)

The two-valve "Empire" receiver, with a detector-L.F. circuit and differential reaction, is a good example of the modern tendency to simplify and cheapen the production of this class of set. Priced at £2 17s. 6d. and housed in a moulded bakelite case, the receiver seems to be good value for money, and should be capable of doing everything that can reasonably be asked of it. All wiring is concealed under the chassis sub-base.

A screen-grid H.F.-det.-L.F. set, which is also representative of modern production methods in a rather more ambitious class, is also exhibited. This receiver has ganged control of its tuned circuits with a trimming condenser on the front panel, and costs only £8 12s. 6d. without valves.

The Burton "Economic S.G. Three" is a kit set made up of components produced by this firm, and is complete except for two or three trifling additions. The circuit is an H.F.-det.-L.F. combination, and almost complete screening is provided, as the apparatus is enclosed in a metal cabinet (supplied in parts) with a transverse metal partition. This kit is sold at £3 12s. 6d.

Components for the present season include a differential reaction condenser, compactly constructed and with bakelite end-plates and dielectric of the same material. Dual wave-range tuning coil assemblies for input and anode circuit tuning are wound on ribbed formers: the first has a separate "aperiodic" aerial winding, while a reaction coil is provided



Burton Empire Two.

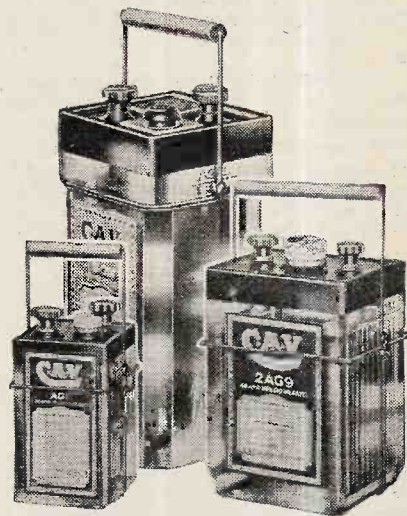
for the intervalve coupling. The "Burton" self-locating valve holder, which is widely known as having exceptionally low dielectric losses, is retained.

C. F. and H. Burton, Progress Works, Bernard Street, Walsall.

C.A.V. (7)

In a large number of portable receivers the carrying position of the set is at right angles to the position when listening, thus

necessitating an unspillable L.T. accumulator. A full range of such batteries with jelly acid are being shown on this stand. The electrolyte of a semi-solid nature maintains perfect contact with the whole of the active plate surfaces and allows free gassing when on charge. Between perforated celluloid sheets is a glass-wool pad, which serves the purpose of arresting acid spray during charge, feeding the electrolyte with moisture and confining the jelly to the plate chamber. There is a convincing demonstration on the stand in which the accumulators are turned over to show their unspillable nature.



C.A.V. two-volt accumulators. The large cell has mass plates.

The all-moulded C.A.V. H.T. accumulators with mass plates are supplied in three capacities—2,500, 5,000 and 10,000 milliamp. hours. They can also be supplied in 30 volt groups mounted in trays with a carrying handle. A new addition to the L.T. mass-plate battery is the 2-volt cell type B.G.M., with a capacity of 45 ampere hours, selling at 8s. 6d., complete with metal carrier.

C. A. Vandervell and Co., Ltd., Warple Way, Acton, London, W.3.

CADISCH. (259)

Acting as distributors for the trade, this company is exhibiting a comprehensive range of the new season's components and accessories. Special attention is being given to the "Crypto" constant potential taper charging plants by the Lancashire Dynamo Company, and to the new radio kit sets.

R. Cadisch and Sons, 5 and 6, Red Lion Square, London, W.C.1.

CAMCO. (140)

It would be difficult to conceive a more varied display of cabinets than that shown on this stand. An addition of two models has been made to the cabinets designed to house the well-known Philips'

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receivers. These are styled the "Philogram Senior" and the "Philogram Junior," the former for the 4-valve model and the latter for the 3-valve set. In addition to providing a handsome accommodation for the set and the loud speaker, provision is made for a gramophone motor and turntable, thus converting either of these sets into an up-to-date radio gramophone.

The "Senior" is a console model, and space has been allowed for housing the records. This is priced at £13 13s. in oak and £14 14s. in mahogany. The "Junior" is of the upright pattern, and stands on Queen Anne shaped legs, and in mahogany costs £9 9s., and in oak £8 8s.

The "Berkeley" radio-gramophone cabinet is a fine example of the craftsman's art, being an exceptionally high-grade piece of furniture, the beauty of which is enhanced by the quarter veneer panelling. On opening the doors there is revealed the panel, which measures 18in. x

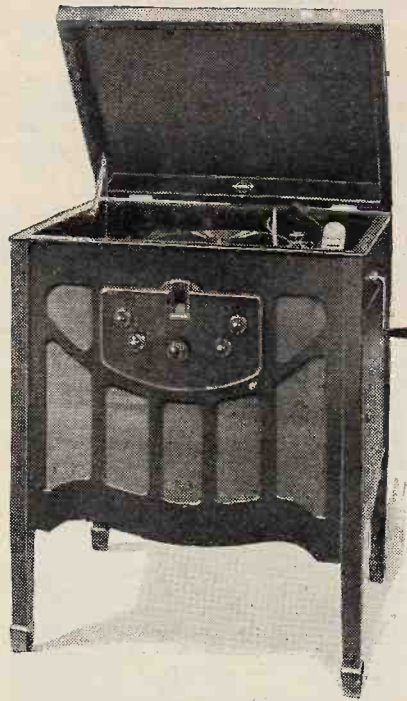
also a 4-pole balanced armature loud speaker unit driving a double linen cone. The tuning condensers are ganged and the price is £18 10s. for the battery model

D12 respectively. Special attention is drawn to the new D50 loud speaker, which, although belonging to the general class of "cone" speakers, will reproduce notes as low as 50 cycles, while it responds at the same time to the highest notes of the musical range. The larger C14 and C24 speakers are still available in their original form, and are particularly suited for handling the output from the more powerful sets.

A new "Junior" radio-gramophone is shown, incorporating a receiver using two screen-grid valves, detector, and pentode, the latter being a PM24A. A moving-coil speaker is used, and the whole is operated entirely from A.C. mains. It is intended for use with an open aerial.

High-power equipment is not unrepresented on this stand, special gramophone amplifiers, ending with LS6a valves, being shown for those who desire to entertain large audiences in hotels or on ship-board.

Celestion, Ltd., London Road, Kingston-on-Thames, Surrey.



Catesby's three-valve radio-gramophone.

and £23 10s. for an A.C. model with L.T. trickle charger. A D.C. version is available at £21 9s., also with trickle charger.

Catesbys, Ltd., Tottenham Court Road, London, W.1.

CELESTION. (53)

The outstanding exhibits, among components, include the new gramophone pick-up, a curve of whose performance is exhibited. It was noticed from this that the response is exceptionally even throughout the whole frequency-range.

A second new instrument of importance is the permanent magnet moving-coil loud speaker, which uses a magnet of fine cobalt steel to ensure permanency during a long life. High sensitivity, as well as full response to both the highest and lowest notes of the musical range, is claimed for this speaker.



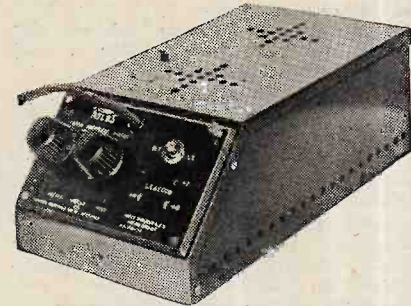
The new Celestion gramophone pick-up.

The well-known C10 and C12 cone speakers have been so thoroughly redesigned for the new season that they have ceased to bear their original type numbers, and are now known as D10 and

CLARK & MOIR. (205)

As radio factors this firm is exhibiting an extensive range of sets and accessories, the products of most of the leading radio manufacturers. Not to be found on the stands of other exhibitors, however, is the Lincone loud speaker chassis. It is of the double cone type, with large and small diameter cones back to back. The linen diaphragms are particularly tightly stretched, and this cone chassis forms the basis for building a very effective loud speaker in conjunction with a standard reed-driven movement. Available in two sizes of about 16 and 20 inches square, and selling at 20s. and 30s. respectively.

Clark and Moir, Ltd., 147-149, Newington Causeway, London, S.E.1.



Clarke's Atlas combined H.T. eliminator and charging unit.

CLARKE'S "ATLAS." (211)

There can be little doubt that the easiest, simplest and cheapest way to convert an existing battery set for A.C. mains operation is to fit an eliminator for feeding its anode circuits and to retain the original valves and L.T. accumulator, keeping the latter charged with the help of a trickle charger. The new "Atlas" unit, Type A.C. 188, performs these two functions: it embodies a West-



Camco Philogram Senior cabinet.

7in., and below this is the loud-speaker fret enclosing a compartment 18½in. x 17in. x 16in. deep in which can be accommodated a moving-coil loud speaker. A baseboard 18in. x 15in. and a loud-speaker baffle-board are included in the price, which is £12 12s. finished in mahogany veneer and £14 14s. in walnut veneer.

Carrington Mfg. Co., Ltd., 24, Hatton Garden, London, E.C.1.

CATESBYS. (260)

In addition to a very comprehensive range of sets, components and accessories by the leading manufacturers, this firm is featuring a 3-valve radio gramophone embodying the well-tried arrangement of screen grid H.F. valve regenerative detector and a power output valve. A double-spring gramophone motor is fitted,

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inghouse metal rectifier, and has three H.T. voltage outputs, one fixed at 150 volts and two variable. At the rated output of 150 volts, it is stated to give 25 milliamps. L.T. batteries of 2, 4, and 6 volts may be charged at 0.5 amp.

Another exhibit is a safety box for the new Mullard "Orgola" H.T. unit; this embodies a switch which is arranged to break the supply circuit automatically when its lid is opened.

H. Clarke and Co. (Manchester), Ltd., Atlas Works, Eastnor Street, Old Trafford, Manchester.

CLASSIC. (113)

The exhibits of this firm consist entirely of portable receivers, of which four are made. The "Pygmy" receivers, made up in suit-case form, measure only 12in. x 12in. x 8in. deep. The "Pygmy Five" employs two aperiodic H.F. stages, weighs only 22lb., takes 6 milliamps total anode current at 99 volts, and sells complete at 15 guineas. The



The Pygmy Screen-Grid Four of the Classic Radio and Gramophone Co.

"Pygmy Screen-Grid Four" has one stage of tuned H.F. amplification, and is very fully screened by soldered tin-plate boxes. It weighs only 23lb., costs 18 guineas, and takes 7 milliamps. plate current at 99 volts. Two similar portables, larger in size, are also on view.

Classic Radio and Gramophone Co., Ltd. 25, Eccleston Street, London, S.W.1.

CLIMAX. (27)

Two mass-production all-mains receivers, for A.C. mains only, are on view at the Climax stand. The two-valve receiver uses a detector-pentode combination, and is designed primarily for regional reception within 50 miles. The anode current is supplied by a half-wave Westinghouse rectifier, which is incorpor-

ated in the set, and enclosed in a metal screening box. A tone control, consisting of a tapping-switch varying the inductance of the primary of the intervalve transformer, is fitted both to this set and its three-valve counterpart.

The three-valve set is identical with the two-valve model except for the addition of a stage of screen-grid amplification; the extra anode-current demands



Climax all-mains three-valve receiver.

are met by fitting a full-wave Westinghouse rectifier. Both sets have a selectivity control consisting of variable aerial coupling, and both are fitted with pick-up terminals. They are sold at 9 and 16 guineas respectively, including everything but the loud speaker.

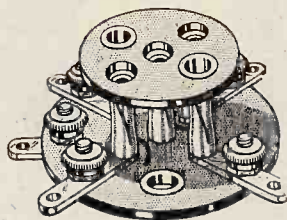
An exceptionally neat and small D.C. eliminator is shown; in spite of its small size it can deliver 50 milliamps. at 200 volts, and has three separately smoothed tapings for lower voltages. The screen-grid tap is decoupled. Price 34s.

A large selection of familiar Climax lines is also to be seen.

Climax Radio Electric, Ltd., Haverstock Works, Parkhill Road, Hampstead, London, N.W.3.

CLIX. (131)

As specialists in the manufacture of plugs, sockets and all types of connectors, it is but natural that Clix should evolve something new in the connector line, which is a definite improvement over the usual type. The principal feature this year is a new range of plugs and sockets in which the resilience, or springiness, has been transferred from the plug to the more robust socket. This break from conventional practice



Clix five-pin valve holder.

conveys many advantages, most important of which is that the socket is so much more robust that it will retain its springiness for longer than the compara-

tively fragile plug. Furthermore, as it is usually located behind a panel, or below a baseboard, there is less likelihood of it being damaged. This cannot be said for the familiar split- or "banana" type plug. With these new sockets solid prong plugs are used.

This new feature is embodied also in the "All-in" terminal and the valve holder, in addition to the range of sockets mentioned above. Three types of resilient sockets are shown; a long pattern priced at 1½d., a short socket at 1d., and an insulated one selling at 2d.

Improvements in design have been made in other Clix lines, particularly in connection with the prongs in all their resilient plugs.

Lectro-Linx, Ltd., 254, Vauxhall Bridge Road, London, S.W.1.

COLUMBIA. (71)

Among the various new models introduced this year by the Columbia Graphophone Co. is a twin-station set which



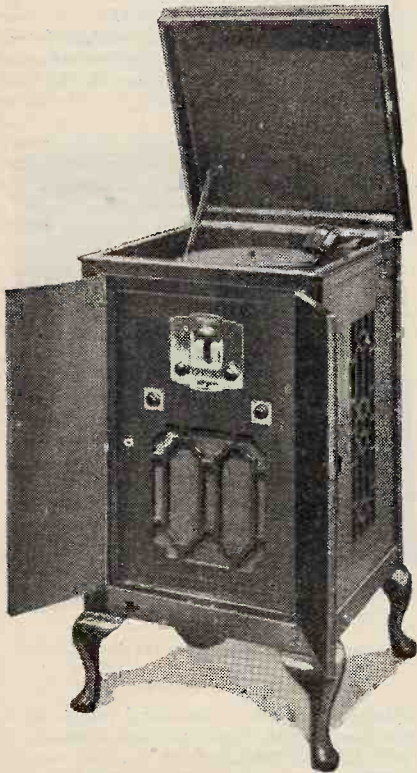
Columbia Twin-station receiver Model 309.

selects either one of two local programmes by the simple expedient of moving a switch. Orthodox tuning controls are not fitted, the circuits being adjusted to the customer's requirements before the set leaves the works. Two valves are used, a detector and a pentode coupled by a low frequency transformer. It is operated entirely from the supply mains, and has a built-in loud speaker. A volume control is provided. The model 309, as it is styled, can be obtained to operate from either D.C. or A.C. mains, and the price in each case is £12 12s. in a polished oak cabinet.

The well-tried three-valve circuit, consisting of a screen grid H.F. stage, a detector and a power stage, is the basic arrangement of the new model 307 all-electric receiver. Tuned anode coupling is favoured between the H.F. valve and the detector, which is of the leaky grid variety, and this is followed by trans-

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former coupling to the output stage. Volume control is by means of reaction, but the selectivity device, which utilises a differential condenser and is included in the aerial circuit, can be used for this purpose. Drum-drive is adopted for the condensers, the circuits not being ganged in the accepted sense. The dial is illuminated. A three-position switch, operated by a lever located immediately below the drum dials, functions as a wave-change and radio, or gramophone, switch. Moved to the left it brings long-wave coils into use, in the centre position coils are chosen for medium wavelengths, and to the right changes over to an external gramophone pick-up. This model is available for A.C. and D.C. supplies and in a polished mahogany cabinet costs 21 guineas, an oak model being listed at 20 guineas.

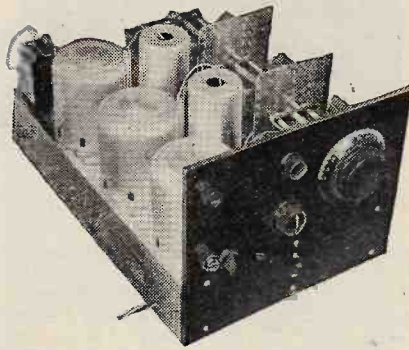


Columbia Radio-Gramophone Model 308.

The same chassis mounted in a handsome pedestal cabinet, and including a four-pole balanced armature type cone loud speaker, is available at 30 guineas in mahogany and 31 guineas in walnut. The model 308 incorporates much the same circuit as the model 307, but has an extra L.F. stage. A moving-coil loud speaker is fitted. Three models are available, one in oak, one in mahogany, and one in walnut. The mahogany and walnut models have double doors totally enclosing the control panel and loud-speaker grille, but the oak model is not so fitted. Prices are 62 guineas in oak, 65 guineas in mahogany and 69 guineas in walnut.

There are two portable sets which can be battery or mains operated, a range of power supply units designed for converting existing Columbia portables from battery to mains drive, a balanced armature cone loud speaker and a moving-coil model. This is of the Rice-Kellogg 8 type with corrugated diaphragm 10in. in diameter and with mains-fed pot. In mahogany or walnut pedestal cabinets the D.C. model costs 16 guineas and the A.C. model 20 guineas.

Columbia Graphophone Co., Ltd., 92, Clerkenwell Road, London, E.C.1.



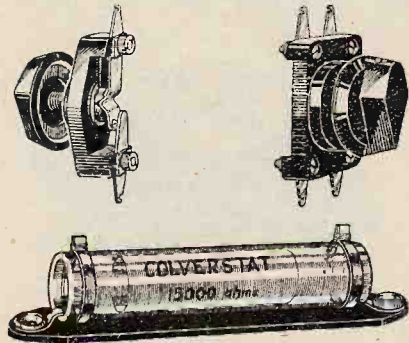
"The Wireless World" D.C. Foreign Listener's Four shown on Colvern's stand.

COLVERN. (45)

There are many new coils and components in this new season's programme. In particular, there is a new type of screen-grid coupling coil, known as the T.G.S.C., which incorporates a wave-change switch and coupling condenser; an entirely new feature being provision for means of ganging any number of tuned H.F. stages for simultaneous switch operation. A cylindrical aluminium screening container is available for shrouding Colvern coils.

Designed essentially as a volume control, the new wire-wound variable Colverstat has a particularly smooth action, and its reliable contact permits of its introduction into grid circuits. It will handle 10 watts and is made in various resistance values up to 50,000 ohms, the price being 5s. 6d.

Fixed wire-wound resistances on glass, rated to dissipate 10 watts, are available

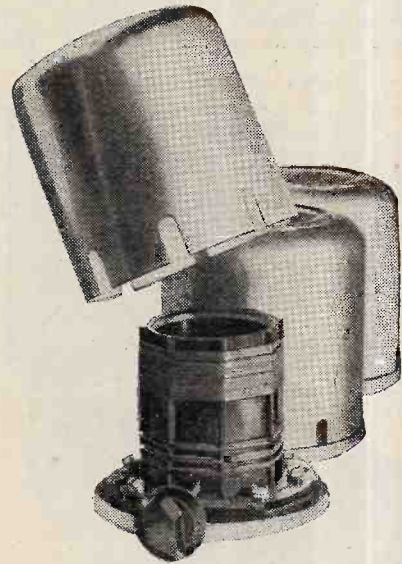


Colverstat wire-wound resistance on glass and (above) ganged wave-change switch.

in values up to 100,000 ohms, and are priced at 2s. 6d. to 3s. 6d. *Wireless World* readers will be interested to inspect a specimen "D.C. Foreign Listener's Four" receiver which has been constructed by this firm to demonstrate the utility of their components.

Visitors to the Exhibition would be well advised to obtain a copy of the Colvern catalogue with 40 pages of illustrated matter. It contains a fund of information on the principles of the tuned circuit and the welcome publication for the first time of measured dynamic resistance of tuned circuits embodying coils of this firm's manufacture. Calculation of stage gain is given, and there are over 20 modern receiver circuits with all component values marked. With the catalogue a useful resistance calculator is given away.

Colvern, Ltd., Mawneys Road, Romford, Essex.



Colvern dual-range coil and aluminium screen.

CONCORDIA. (209)

In addition to a comprehensive range of instrument wires, including Litz, with all types of insulation, there are a number of products specially developed to meet the requirements of the wireless trade.

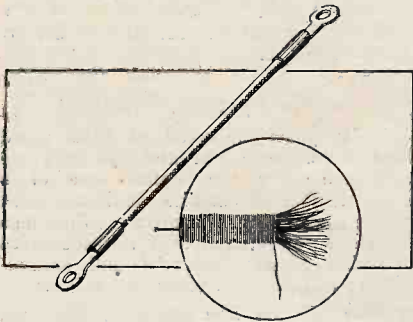
One of the most interesting of these is a range of fine spiral resistance wires, wound on a silk core and designed for constructing non-inductive resistances. Several specimen resistances mounted inside flexible "spaghetti" tubes illustrate the possibilities of this material. Resistances up to 22,000 ohms per foot are available.

To meet the requirements of radio-gramophone manufacturers a range of metal braided wires has been produced for pick-up and loud speaker leads.

"Connectite" is a braided and lacquered wire for the internal connections of sets which is claimed to withstand abrasion and can be freely passed through

Stand-to-Stand Report.—

holes in metal screening boxes and chassis. A similar type of casing is used on the "Herculacker" lead-in cable and is impervious to oil, moisture and exposure to the weather.



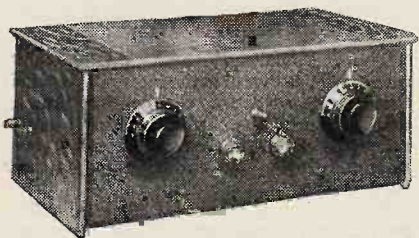
Concordia anode resistance and spiral resistance elements.

A wide range of multiple cables suitable for battery leads is also exhibited.

Concordia Elec. Wire Co., Ltd., New Sawley, near Nottingham.

COSSOR. (52)

As this company are the pioneers of kit receivers their latest product—the Empire Melody Maker—is receiving considerable attention. It employs three valves, a 215 S.G. in the H.F. amplifying stage, a 210 R.C. as regenerative detector, and a 215 P. as output valve. Separate tuning is provided for the aerial and H.F. stage, and capacity-reaction is controlled by a third dial. A rheostat adjusts the filament supply to the H.F. valve and to compensate for aerials of high capacity a pre-set series aerial condenser is supplied. The detector is coupled to the output valve by a transformer and there are three H.T. tapplings; one for the detector plate, another for the screening grid and a third feeds the anodes of the output and H.F. valves. Waveband switching is effected by push-pull switches at the top of each coil. The kit sells at £6 17s. 6d. and a copiously illustrated broadsheet gives full details for the constructor



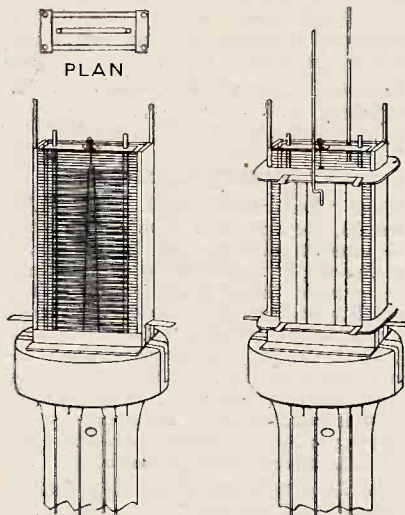
Cossor Empire kit set.

In describing the new Cossor valves mention must first be made of the 215 S.G. and the 220 S.G. These two valves have lately been tested in *The Wireless World* laboratories and have been found

to have excellent characteristics. The grid current curve meets the grid voltage base on the positive side, which means that there is more room than usual for the signal grid swing; furthermore, there is less chance of cross-modulation, as there exists quite an appreciable "straight" in the curve. The next feature of importance is that the mutual conductance is maintained at well over 1 mA. per volt under working conditions, while the inter-electrode capacity in the samples tested has been reduced to the remarkably low figure of about 0.0025 mmfd.

There is also considerable importance in the fact that the losses in the bases of these valves are hardly measurable and have the effect of shunting the preceding tuned circuit with a load equivalent to 5 megohms. Even decapping the valves would make no tangible difference to the H.F. stage gain. It is refreshing to make these comments, as quite a number of S.G. valves on the market to-day have base losses equivalent to a shunt of 500,000 to 1,000,000 ohms.

Provided that meticulous care be taken with external screening the all-round efficiency of these two-volt. battery screened valves should allow single stage gains up to 250 times with 3 in. coils.



Electrode assembly of the Cossor 220 S.G. and 215 S.G. valves.

A great improvement has been made in the constants of the indirectly heated A.C. valves; the 41 M.H.F. now has a slope of 2.3 and an A.C. resistance of 14,000 ohms, while the 41 M.X.P. has a slope of 3 and an A.C. resistance of 2,000 ohms. Two new triodes of interest are the 230 X.P. and the 425 X.P., both being capable with 150 volts H.T. of fully loading the average moving-iron loud speaker. Those who are blessed with A.C. lighting mains will find interest in a comprehensive series of A.C. mains rectifying valves.

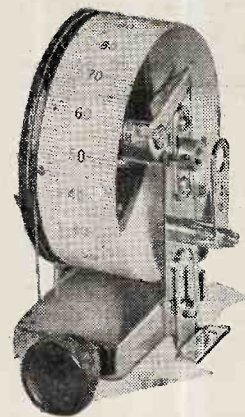
A. C. Cossor, Ltd., Cossor House, High-bury Grove, London, N.5.



Cossor Empire kit set showing dual-range coils with wave-change switch incorporated.

CYLDON. (73)

To those well acquainted with the products of Sydney S. Bird and Sons, and who are in search of new components, the new slow-motion illuminated drum dial will prove a centre of interest. In general construction it consists of a transparent scale carried on a drum and mounted on a base with bearing brackets for the condenser fixings on either side. As there is a reduction between the rotation of the operating knob and the drum it is most desirable that the stop shall be fitted to the operating shaft rather than the condenser spindle owing to the immense leverage obtained through the reduction gear. This is effected in a most ingenious way by four small carry-over catches, one of which moves on with each rotation of the operating knob until they are all lifted over in one direction or the other, when the operating shaft becomes locked. A strong cord in deep grooves on the moulded bakelite drum provides a powerful drive devoid of backlash or slip while a tensioning spring in a recess in the dial keeps the cord at constant tightness. First-class instrument construction is revealed by the use of



The new Cyldon slow-motion drum dial.

steel pins wherever a collar is fitted to a shaft. The entire drum dial can be swung into any position and aligning difficulties with the panel by the use of slotted fixing brackets gives adjustment for height and angle. Practically all types of condensers can be used with the dial.

Looking over the range of Cyldon condensers one notes the differential air dielectric condenser made in two sectioned

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capacities of 0.00005 mfd. to 0.0003 mfd. Careful scrutiny of this condenser which, by the way, calls for mention owing to its application to pre-H.F. volume control, reveals the use of clean-cut transparent bakelite mounting strips as an alternative to the opaque yellow material so often met with. Prices are from 6s. 6d. to 9s. 6d. The short-wave enthusiast will be interested in what is known as the "series gap" condenser which is a double section arrangement with terminal connections taken only from the two stators by which means noiseless operation results as no attempt is made to pick up a contact with the moving plates. A well-finished condenser for the construction of two H.F. stage receivers is the Junior Triple Synchronatone with thumb dial control and a rigid assembly on a stiff plate. The spindles of the three individual condensers are insulated thus removing all complication with regard to the danger of short circuiting grid bias.

Wireless World readers are afforded an opportunity of examining the ganged condenser units developed for inclusion in the "Foreign Listener's Four."

An entirely new development is to be seen in the production of smoothing units for the elimination of mains noise as well as for connection to D.C. to A.C. converters.

Sydney S. Bird and Sons, Ltd., Sarnesfield Road, Enfield Town, Middlesex.



A popular ganged condenser of rigid construction, the Cydon Junior Triple Synchronatone.

DX COILS. (237)

This stand should not be missed by short-wave enthusiasts. In addition to a comprehensive range of standard broadcast coils and tapped plug-in coils, there is a complete set of four short-wave coils for 7s. 6d. The coils are wound to 3in diameter with No. 16 tinned copper wire, and the standard turns are 3, 5, 7 and 9. Alternative numbers of turns up to 9 are supplied to order.

D.X. Coils, Ltd., 542, Kingsland Road, London, E.8.

DANIPAD. (208)

A neat three-valve receiver measuring only 7in. x 3in. x 6in. and known as the "Popular Regional Three" is to be seen on this stand. Housed in a crystalline metal case the circuit comprises a reacting detector and two transformer-coupled L.F. stages. Slow motion dials are fitted, and the price inclusive of valves and royalty is 4 guineas.

The principal features of this stand are ebonite and ebonite products, examples of over 150 components making use of this material being on view.

Danipad Rubber Co., Ltd., 5-7, Market Street, Finsbury, London, E.C.2.

DARWINS. (254)

Permanent magnets for moving-coil loud speakers exhibited in a variety of sizes at this stand give added evidence of the growth and popularity of the moving-coil speaker and the abandoning of the electro-magnetic field. Flux densities giving almost 9,000 lines to the square centimetre even with a generous area and width of gap demonstrate the effectiveness of this season's Darwin magnets. It is noted that the cobalt content is now fixed at 9 per cent. There is the obvious tendency, also, to increase the overall dimensions, and of four types of equal pole and gap size the flux densities range from 3,600 to 9,000 lines as the weights increase from 2½ lb. to 15 lb.

From a useful booklet obtainable at the stand it will be gleaned that the flux density depends upon careful cross-sectioning of the cobalt steel and paying attention to the arrangement of the iron inset. A Grassot flux test meter is shown, and gives direct comparative reading of the magnetic flux across the gaps of the various types.

Darwins, Ltd., Fitzwilliam Works, Sheffield.

DAVENSET. (251)

The "Davenset" H.T. and L.T. chargers, for operation from A.C. mains, will interest all interested in accumulator charging as a commercial undertaking. Accumulator charging equipment is the speciality of this firm. Two main types are available, the H.T.2 at £8 8s., and the H.T.3 at £23 2s. The former has an output of 300 mA. D.C. at 200 volts and the latter 3 amps. at 150 volts. The chargers are well designed, and the more expensive type is completely enclosed except for switches, meters, and terminals.

Partridge, Wilson and Co., 217a, Loughborough Road, Leicester.

DAYZITE. (25)

Many readers will welcome an opportunity of examining on this stand the highly ingenious continuous gramophone which will play eight records on both sides in a pre-selected order. There is a second type which will play thirty-six records on one side only, and both types automatically change the needle and clean the record after playing. If required, these machines can be supplied with an H.F. amplifier to give radio reproduction.

Talking film equipment is being demonstrated, and of special interest is a "sound head" for use with films having marginal recording. A special feature of this equipment is that it can be attached to any standard projector and contains in

a very small compass an exciting lamp and photo-electric cell.

This company also factors the better-known radio sets and components on the market, special attention being given to the new Cossor set, the new Music Magnet, and the 1931 Orgola.

Will Day, Ltd., 19, Lisle Street, London, W.C.2.

DE LA RUE. (128)

It is quickly gleaned at this stand that Thos. de la Rue and Company are responsible for the manufacture of a large number of bakelite mouldings with which we are familiar. Specimen "Telenduron" mouldings are shown in bakelite, plastic, fireproof and acid-resisting materials, in black and colours.

Thos. De La Rue and Co., Ltd., 90, Shernhall Street, Walthamstow, London, E.17.

DEW. (15)

This well-known firm of wholesalers have an attractively laid-out stand displaying a representative number of the most popular receivers by the best makers. In addition to London representatives the firm's country representatives are at the stand to interview provincial traders.

A. J. Dew and Co., 33-34, Rathbone Place, Oxford Street, London, W.1.



The Danipad Popular Regional Three.

DIBBEN. (11)

The "Monarch" and "Cromwell" range of receivers manufactured by this firm is retained for the coming season, and although the fundamental circuits adopted remain unchanged, a number of small improvements and refinements have been made.

The "Straight-Three" chassis, which consists of a regenerative detector and two transformer-coupled L.F. stages and is incorporated in the "Monarch III T," "Monarch III TS," "Cromwell III," and "Cromwell III WS" receivers, is fitted with drum tuning, and provision is now made to use a gramophone pick-up. This can be left permanently connected to the set and

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brought into use when required by means of a switch.

The "Monarch III S.G." is a cabinet-type set embodying the well-tried combination of screen-grid H.F. valve, regenerative detector, and optional pentode or power triode output valve. The condensers are ganged with a trimming device to correct for inequalities in the distributed capacities. The price of this set is 8 guineas, plus royalty in an oak cabinet. A similar circuit is used in the "Cromwell III" all-electric receiver operated entirely from the A.C. mains. A moving-coil loud speaker is included and a power pentode output valve fitted. Housed in a handsome walnut pedestal cabinet this set costs 35 guineas, excluding royalty. A similar instrument, having as an addition an electric gramophone motor with turntable mounted in a small case on top of the main cabinet, is styled the "Cromwell Radio Gram," and is priced at 45 guineas.

A new receiver is the "Monarch Minor," embodying the popular combination of a regenerative detector and two transformer-coupled L.F. stages. Simplification is the keynote throughout, and the price is 67s. 6d., royalties being extra.

Two types of loud speakers only figure this year on their stand, the "Monarch Boudoir," fitted with a 4-pole balanced



Cromwell Electric radio-gramophone by Dibben.

armature-movement and priced at 47s. 6d., and the "Cromwell" moving-coil model. This is housed in a figured oak cabinet, and costs 4½ guineas for a D.C. type, and 7½ guineas for an A.C. model complete with transformer and rectifier.

Wm. Dibben and Sons, Ltd., Antelope Buildings, St. Mary's Road, Southampton.

E 15

DONOTONE. (139)

The new "Ideal" Donotone loud speaker, now shown for the first time, embodies the special feature (peculiar to the products of this firm) of a tone filter consisting of a series of tuned gongs and baffle vanes. Its external appearance is rather more conventional than that of



The new Donotone loud speaker.

earlier types, as the doors are omitted, and instead, the front is covered in with a fret backed with fabric. This model is rather more economical of space than the majority of its predecessors, and costs £6 6s.

Donotone (Regd.) Loud Speaker, 40, Farnival Street, London, E.C.4.

DOWNING. (210)

This firm are makers of cabinets, and specialise largely in work for manufacturers. A wide range of their products is available, including cabinets of the American type, loud-speaker cabinets, both for moving-coil and reed-driven cone types, and some very handsome radio-gramophone and pedestal cabinets.

One of their special productions is an upright pedestal cabinet, with Jacobean turned legs, designed to accommodate the 1931 Osram Music Magnet. As many readers will know, this receiver is operated mainly by knobs projecting through the side of its container; provision is made for mounting it in such a way that this apparent difficulty is overcome. The cabinet costs £5 7s. 6d.

John S. Downing and Sons, Ltd., Crown Works, Commercial Street, Birmingham.

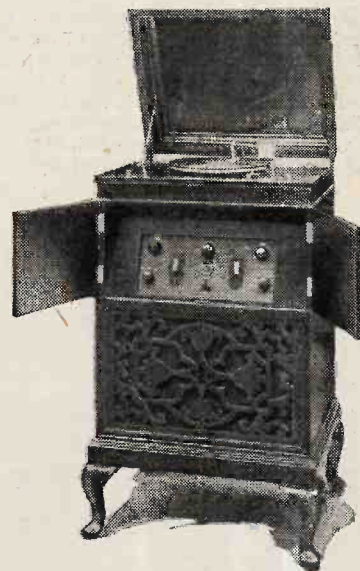
DUBILIER. (50)

The name Dubilier is so closely connected with the manufacture of condensers that the display of a wide range, from paper condensers which have passed a test at 30,000 volts down to the insignificant trifles we put into wireless sets, is taken for granted. Attention is

drawn to the fact that the prices of the condensers more particularly used for receivers, and also of grid-leaks, have recently been lowered. A further point of interest to set-designers is the fact that the range of small mica condensers, as used for intervalve coupling, now includes a greater selection of high voltage rating. There are also variable condensers with solid dielectric which are of recent introduction, and a full range of semi-fixed condensers is now offered.

Complete sets include both 2-valve and 3-valve all-mains receivers; the first is a simple det.-L.F. combination, while the second adds a screen-grid stage to this. Indirectly heated valves are used in both sets, while the coils are toroids throughout.

There are three radio-gramophones, using respectively two, three, and four valves; like the sets, they are available either for A.C. or D.C. mains. All but the smallest of these use moving-coil speakers, and in the largest, of which an illustration is reproduced, a special filter is used as the coupling between the detector and L.F. valves. This filter is specially designed to permit the reproduction of both radio and gramophone music with equal fidelity, compensating for the imperfections of the record and the pick-up. Selectivity is controlled in the 4-valve model by means of a differential condenser, con-



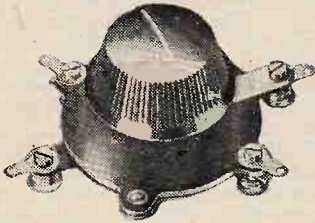
Exterior of the four-valve Dubilier all-mains radio-gramophone.

nected as a static potentiometer, inserted into the aerial circuit, while the volume control takes the form of a potentiometer grid-leak. An interesting point is the provision of Neon-filled bulbs as pilot lights in place of the more usual low-voltage bulbs; the Neon bulb has an almost indefinite life, and acts in addition as a polarity indicator in the case of the D.C. sets. The fitting of induction motors for driving the gramophone

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turntables ensures that there will be no interference due to dirty brushes, and goes far to provide a silent background for the music.

A wide range of components of all types is also in evidence; the attention of



Dubilier solid dielectric differential condenser.

Wireless World readers is specially drawn to the ganged model of the K.C. condenser, which is very suitable for band-pass filters.

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

DULCETTO-POLYPHON. (24)

Although this stand is devoted mainly to a display of receivers and accessories by the leading manufacturers, this firm has for long specialised in the manufacture of electric amplifiers suitable for use in large halls where a big output is required. The success of these instruments has been largely responsible for the production of the "Dulcetto Junior" electric amplifier, which is more suitable for use where a smaller output is required. The loud speaker is not included as this will be in the room where the music is required. The whole of the apparatus is electrically operated, and the price is 75 guineas, including one loud speaker.



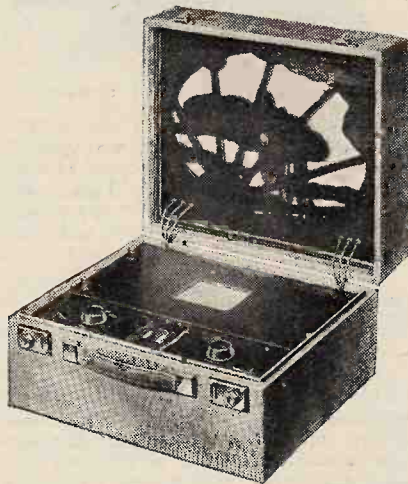
Dulcetto-Polyphon single turntable all-electric radio-gramophone.

A de luxe all-mains radio gramophone, incorporating, on the radio side, a screen-grid H.F. valve, a detector and two parallel-connected pentode output valves and a moving-coil loud speaker, forms another interesting exhibit. An outstanding feature of this set is the inclusion of the "Novitone" compensator, which is brought into operation when the amplifier is used as an electric gramophone. D.C. and A.C. models are made, the former being available for voltages of from 200 to 250. The price of the D.C. model is £75, including royalty. The A.C. version operates on all standard voltages between 100 and 250 and at 40 to 100 cycles. This model costs £80, including royalty.

Dulcetto-Polyphon, Ltd., 2-3, Newman Street, London, W.1.

DUNHAMS. (2)

The majority of the sets featuring in the 1931 programme of this old-established firm are portables. Foremost among these is the "Overseas" portable



Dunhams Overseas portable.

de luxe. This is a suit-case model with a four-valve circuit employing one stage of screen-grid H.F. amplification, and is capable of a wider range of reception than other models in the series. There is provision for a gramophone pick-up and the price is 20 guineas.

The well-known Five-Valve Portable and Transportable, with semi-aperiodic transformer coupling in the H.F. stages, are retained with minor improvements, the price of either type being 17 guineas.

The man who does not want a portable as such, but who appreciates the advantages of a self-contained set, will be interested in the new All-Electric Self-Contained Transportable. This is a mains operated three-valve circuit (S.G., det., pentode) in a vertical type cabinet with built-in frame aerial and loud speaker, selling at 26 guineas.

Dunhams, Ltd., Bellerophon Works, New Wharf Road, London, N.1.

DYNIC INTERNATIONAL. (212)

In addition to a complete range of Dynic battery eliminators, comprising not less than nine models, the Sonodyne automatic radio gramophone is attracting much attention. This machine is fitted with a record self-changing mechanism. The Sonodyne is a high-grade electrically reproducing equipment, with models for home and public requirements.

Dynic International Radio, Ltd., 5-6, Cork Street, Bond Street, London, W.1.



Junior Two receiver made by the Eagle Engineering Co.

EAGLE ENGINEERING CO. (43)

One of the most noticeable exhibits on this stall is the "Chakophone" tuner, designed for the aerial circuit of receivers containing no high-frequency stage. This tuner, which consists of a tapped coil wound on bakelised card has the unusual merit of covering the wave-band from 250 to 2,000 metres without a gap. A swinging reaction coil is included; price 10s. 6d. complete.

The "Junior Two" receiver, selling at £3, including royalties but without valves, uses a detector-pentode combination, and is completely enclosed in a neat metal cabinet.

The new Colassi speaker, which uses a T-shaped adjustable reed, is shown on this stand, and is claimed to mark an appreciable advance in loud-speaker design. Models for both home use and public address work are made.

Eagle Engineering Co., Ltd., Eagle Works, Warwick.

EAST LONDON RUBBER CO. (20)

These wholesale distributors of wireless receivers specialise in the products of most of the more prominent British manufacturers, including Marconiphone, McMichael, Burndept, Pye, etc. They also handle the receivers of Philips as well as most of the best components.

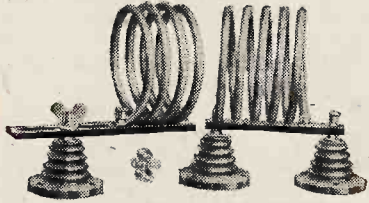
East London Rubber Co., Great Eastern Street, London, E.C.2.

EDDYSTONE. (28)

The chief products of this company are short-wave receivers and associated accessories. The "All-wave Four" receiver has been designed to withstand the exacting conditions obtaining in tropical zones, but it is equally effective in acquitting itself well in arctic circles, where some models have recently been used by an expedition in the Far North.

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The container is cast in an aluminium alloy, with all screening partitions integral with the case. When the lid is fitted the receiver is wholly screened,



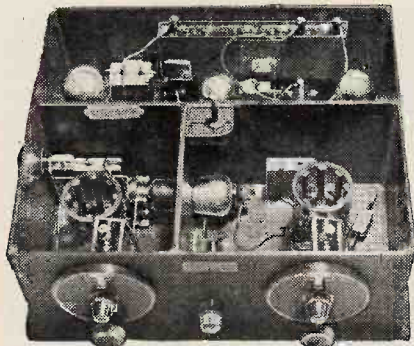
Eddystone transmitting inductance set wound with copper tube.

each compartment being satisfactorily sealed, and the set is airtight and proof against insect attack.

The circuit adopted consists of a screen-grid H.F. stage, using interchangeable 6-pin coils, a regenerative detector resistance coupled to the first L.F. valve, which is transformer-coupled to the output stage. An H.F. transformer is used. The full wave-range of the set is from 12.5 to 2,000 metres, but coils need only be purchased for the various wave bands that the user might feel inclined to explore. Jacks are fitted for a gramophone pick-up, and headphones can be used with the first three valves only. Special tuning condensers with a very low minimum capacity have been developed for this set. The price is £27, including valves, coils, leads and grid-bias battery.

There is a four-valve short-wave kit assembled on a metal chassis, and the circuit includes an H.F. stage, a regenerative detector and a resistance-capacity L.F. stage, in this order. Coils supplied with the kit cover from 12.5 to 85 metres, and also the medium broadcast band of from 250 to 500 metres. The price of the kit is £10 10s.

Short-wave components include a new transmitting inductance set wound with



The Eddystone All-wave Four short-wave receiver.

copper tubing which will dissipate up to 500 watts of H.F. power. These are made for the two amateur wavebands of the order of 20 and 40 metres. A four-turn coil for the 20-metre band costs 9s. 6d., and a nine-turn coil for the 40-metre range costs 13s. 6d.

Stratton and Co., Ltd., Balmoral Works, Bromsgrove Street, Birmingham.

E 17

EDISON BELL. (29)

The range of receivers exhibited on this stand is unusually complete and includes both mains- and battery-operated sets as well as portables.

A new Junior All-Mains Radio Gramophone has been introduced to supplement the Senior Model shown last year. Designed for local station reception and gramophone reproduction the new model has a two-valve circuit—a detector, transformer coupled to a power pentode in the output stage. The loud speaker, which is of the permanent magnet moving-coil type, is coupled to the pentode through a tapped choke-filter circuit. The new model Edison Bell pick-up is fitted and there is a combined scratch filter and volume control, while the gramophone motor is of the induction type.

Among the series of radio receivers the "All Mains Screened Grid Three" is of outstanding interest. A single stage of

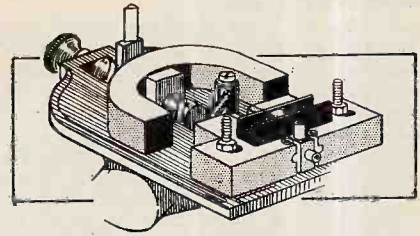


Edison Bell Junior radio-gramophone.

screen grid amplification is followed by a detector, transformer coupled to a power pentode. Connections are provided for a pick-up and a volume control is included. The tuning dials are of the edgewise type with translucent illuminated scales, and these, in conjunction with the artistically designed tuning panel and the tapering sides of the cabinet, give the set a distinctive appearance.

From a wide range of components we would select the new Volume Control Pick-up for special comment. This model incorporates a device for varying the magnetic flux, which, it is claimed, enables the general level of the voltage output to be adjusted without affecting the frequency characteristics.

Edison Bell, Ltd., Edison Bell Works, Glengall Road, London, S.E.15.



The Edison Bell volume control pick-up.

EDISWAN. (67)

The enviable reputation gained by this firm is well maintained in this new season's programme. A compact receiver which embodies interesting circuit details is the "Power Pentode Two." It is designed for all A.C. mains operation, and includes an AC/HL valve, transformer-coupled to an AC/PEN. There is one main tuning dial, which controls the ganged condensers tuning the loose-coupler, and a small trimmer is provided on the panel to provide final balance. Both wavebands are covered, and there is provision for a gramophone pick-up. The price of this two-valve receiver, which will deliver some 1,400 milliwatts and will operate a moving-coil loud speaker, is £14 19s. 6d.

The "Power Pentode Three"—an improved "AC3" receiver—is housed in a pressed steel chassis with bakelite end plates. The circuit comprises a screen-grid H.F. stage, tuned anode coupled to a grid detector followed by a transformer and an AC/PEN output valve. Swinging coil reaction is employed, and, to maintain the proper impedance relationship between loud speaker and output stage, a tapped choke is used. Arranged for D.C. or A.C. mains this receiver sells complete at 20 guineas.



Ediswan Power Pentode Two receiver for all-mains operation.

There is an all-electric transportable set, containing an enclosed frame aerial and balanced armature loud speaker; also a new three-valve battery set at

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£9 18s. 6d. Besides the senior and junior R.K. loud speakers, with electro-magnetic fields, there is a permanent magnet moving-coil unit selling at £6 15s. An all-A.C. radio-gramophone at 35 guineas is being shown. It contains two valves—an AC/HL and an AC/PEN. The output matching arrangements are interesting in that a choke-filter-fed transformer is used to couple the permanent moving-coil speaker. The new valves in the Mazda series are the P220A—a power output valve with a two-volt filament, and the first indirectly heated pentode—the AC/PEN.

Edison Swan Electric Co., Ltd., 1a, Newman Street, London, W.1.



New B.T.H. gramophone motor (Ediswan).

EELIX. (236)

"Eellex" indicating terminals serving the treble duty of wanderplug connector, screw-down or side-hole terminal still hold their ground, and are therefore shown without modification from last year. Well-finished terminals and plug connectors in great variety are Easticks' speciality, and in addition, the attention of the amateur is called to a large variety of ingenious switches of small type so much sought after in set construction. For instance, there is a single-pole push switch with "on" and "off" ratchet action which, arranged for one-hole fixing, sells for 1s. 9d. At this price also we find an "up and down" or "seesaw" switch with panel plate and red and black plungers. Mention might be made also of a useful one-hole fixing switch with lever action and arranged by porcelain mounted contacts to provide a double-pole change over.

An entirely new device is the "Eellex" spring-loaded testing "Prod." Its purpose is to serve as an insulated rod when testing circuits carrying high-tension voltages. Its metallic point is protected, and is only brought into action when a slight pressure is exerted on the spring-loaded sliding cap.

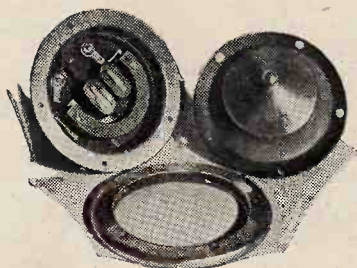
J. J. Eastick and Sons, 118, Bunhill Row, London, E.C.1.

EFESCAPHONE. (119)

The most noteworthy exhibits on this stand are the complete receivers, known by the trade name "Efescaphone," which are available both for mains and battery operation.

The "New Waterloo" receiver employs three valves; a screen-grid H.F.

amplifier, coupled by a centre-tapped tuned anode coil to the detector, and followed by a transformer-coupled output stage consisting of a small pentode. This

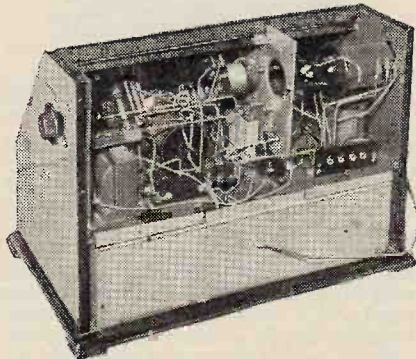


Cone loud speaker unit with diaphragm drive (Efescaphone).

set is designed for operation from batteries, and has therefore been restricted to the moderate anode current of 9 milliamps. It is completely decoupled throughout to ensure that satisfactory results may be had even when the battery has developed a high internal resistance through age, and to permit of the addition of an eliminator if desired. The switch-over from short waves to long is accomplished by a complete substitution of one set of coils for another, and not by the more usual expedient of adding loading coils for the long-wave range.

The "Henley" receiver is an all-mains version of the set just described.

Both the sets described are intended for use with an open aerial, but three portable or transportable sets are offered for those who prefer to use more valves in conjunction with a frame aerial. The "Warwick" receiver is made in two forms, as a transportable self-contained set and as a suit-case portable. A conventional "portable" circuit is used, consisting of two aperiodic high-frequency stages, followed by a detector and two transformer-coupled L.F. stages, the output valve



Henley (three-valve all-mains receiver).

being a PM2. The total consumption is 8 milliamps., drawn from dry batteries.

The third portable set employs a screen-grid valve, and has a circuit similar to that of the "New Waterloo" set, but with the addition of a second low-frequency stage, and with a small power

valve in the output socket. The total consumption is 8 milliamps. from dry batteries.

H.T. units for A.C. mains, and a loud speaker unit of a design which will be seen better from the illustration than by description in words, are other exhibits of interest.

Falk, Stadelmann and Co., Ltd., 83-93, Farringdon Road, London, E.C.1.

EKCO. (48)

Mains sets as well as battery eliminators would now seem to be the correct order in which to classify the products of E. K. Cole, Ltd., since the former are obviously of first importance. A new model is the type 313, which employs three valves and is available for D.C. and A.C.



Ekcone moving coil loud speaker and Model 313 receiver by Ekco.

operation. A screen-grid H.F. valve followed by transformer coupling to a leaky grid detector and transformer coupled to a pentode briefly sums up the general circuit arrangement. The tuning condensers are ganged and driven by a reduction drive which operates a drum type scale, a portion only of which is visible through a window in the escutcheon plate. The dial is calibrated direct in wavelength. Accurate matching of the coils is, therefore, essential in production. A small trimming device is provided.

The aerial is coupled to the first grid coil by a small coupling coil rotating inside the larger former; it provides a ready but effective means of varying the selectivity, and also serves as an input volume control. It operates on the medium wave-band only, other means being adopted to couple the aerial on the long wavelengths. The normal wavelengths covered are 200 to 550 metres and 850 to 1,900 metres.

The A.C. model incorporates a Westinghouse rectifier and A.C. type valves, while the D.C. model is fitted with battery type valves heated from the mains.

Stand-to-Stand Report.—

The price in either case is £22 10s. Provision is made to use a gramophone pick-up.

The cabinet is a bakelite moulding, which is available in three shades: dark jade, dark mahogany or medium oak. These should harmonise with practically all furnishing schemes.

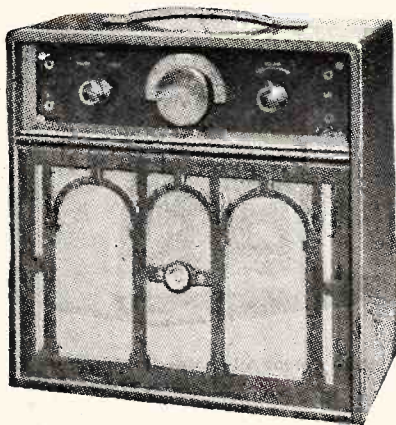
Two types of loud speakers make their appearance for the first time. These are styled the "Ekcone" range, and consist of model 151, fitted with a balanced armature movement and priced at £4 10s., and the L.S. 2, which is a moving-coil model. For D.C. excitation the price is £8 12s. 6d., and the A.C. model costs £11, including mains transformer rectifier and smoothing equipment. These are housed in moulded bakelite cases to match the new sets, types 313 and 312.

There is, in addition, a full range of All-Power Units supplying H.T., L.T., and grid bias from D.C. and A.C. mains.

A recent addition is the model A.C.V., which is intended for use where the indirectly heated type of A.C. valves are fitted in the set. The H.T. output provided is 80 volts for the screen potential and 150 volts at 30 mA. for the anode supply. A 4-volt winding on the transformer supplies up to 4 amps. of A.C. for the heaters or 6 volts up to 1 amp. Grid bias voltages of 1½, 3, 6, 9 and 15 are provided, and the price of the model is £6 6s. It is made for A.C. mains only and Westinghouse rectifiers are incorporated.

Other items of interest include trickle chargers, rectifying units, a range of inexpensive eliminators for simple sets, and an isolating transformer to interpose between the loud speaker and the set when the supply mains are used as a source of power.

E. K. Cole, Ltd., Ekco Works, South-end-on-Sea.



Transportable receiver by Electrical and Radio Products.

ELECTRICAL & RADIO PRODUCTS. (37)

Besides a wide range of portable and transportable receivers and radio gramophones, this firm is now entering the com-

ponent field. A new series of dry batteries is being marketed, of which the 108-volt model sells at 12s. 6d. It is claimed that during a test in which the discharge was maintained at 10 mA. for five hours per day for six days per week, after 11 weeks the voltage had dropped to 70 only from 108. Variable tuning condensers of 0.0003 mfd. and 0.0005 mfd. geared 8 to 1 and selling at a popular price are also available.

The "Transportable Four" receiver, selling at the reasonable price of 17 guineas, has one S.G. high-frequency stage parallel fed to a regenerative leaky grid detector, which in its turn is followed by two transformer-coupled L.F. stages.



Electrical and Radio Products suit-case portable.

There is also a five-valve portable set selling at 16 guineas, with two aperiodic H.F. amplifiers.

Electrical and Radio Products, Ltd., Aconic Works, Horley, Surrey.

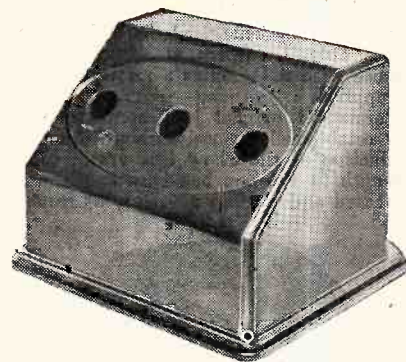
ELECTRON. (34)

This stand is devoted to the display of the well-known convenient forms of Electron wire aerials. Well-insulated extension wire is offered at a moderate price, while earth mats and special insulator pins for neatly supporting lead-in and extension wires are useful adjuncts to an aerial and earth system which can be set up with a minimum of trouble.

New London Electron Works, Ltd., East Ham, London, E.6.

ELO. (245)

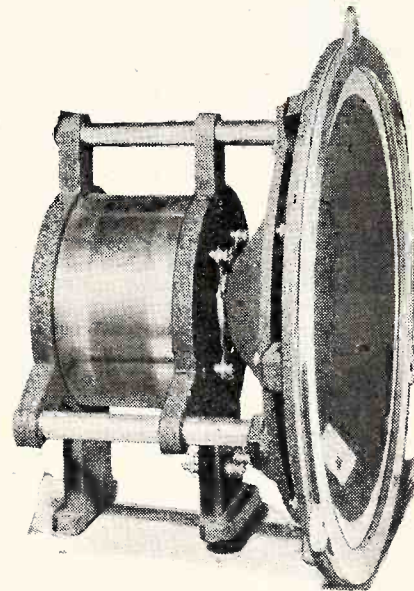
Insulators of every conceivable size and shape, ranging from those capable of withstanding pressures of 100,000 volts or more to tiny plug-connector sleeves are shown on this stand. "Elo" is a synthetic resin compound used in the making of mouldings, and indications are not lacking that there is a growing tendency to adopt this method of manufacture even where insulating properties are, strictly speaking, not required at all. *Bixbys, Ltd., Liversedge, Yorks.*



Receiver case moulded in Elo.

EPOCH. (203)

Convincing testimony of the success of Epoch loud speakers is revealed in the new Epoch 1930-1931 list issued at the stand. It contains a list of cinema theatres throughout the country which are equipped with Epoch loud speakers and the number exceeds two hundred involving, it is stated, the supplying of nearly two thousand instruments. The type of loud speaker referred to is the new Super Cinema model which is of large construction and has a moving diaphragm 14in. in diameter, and is stated to be capable of giving a good sound output with a small super power valve and will fill the largest hall when operated with a valve having a power output of 10



Epoch loud speaker type AE.

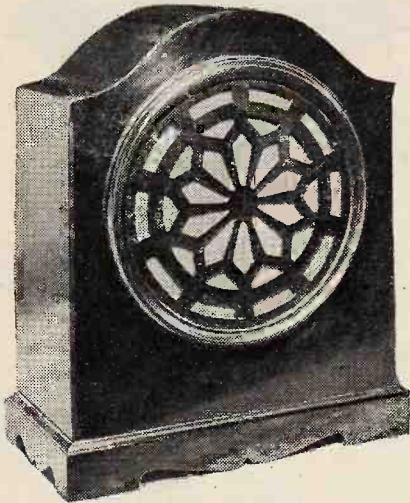
watts. A new innovation is the production of this loud speaker with a compound permanent magnet field.

Of more modest output is a new type called the "Domino" Model 101. Apart from the good quality output claimed it is stated to be particularly sensitive. It

Stand-to-Stand Report.

has a current energised field but consumes only 1 ampere at 4 volts while for use with A.C. mains a rectifying unit is supplied.

Permanent magnet loud speakers have now established themselves since their introduction at the Show last year. Field strength in the gap has been enormously increased and we find a variety of models



New Epoch loud speaker cabinet type C12.

with flux densities equal to the normal electro-magnetic types and with the difficulties of field excitation removed. The most generous model is the type D2 fitted with a 10in. diaphragm, and stated to have a flux density approaching 9,000 lines to the square centimetre.

Particularly well-finished cabinets are available for housing all models. It was pointed out that the cabinets have been matched to the characteristics of the loud speakers so that good overall effect results. Another novel feature is the complete enclosing of the magnet and back of diaphragm with a fabric material to prevent the picking up of metal particles which would eventually reach the gap. The popular permanent magnet models of last year have been reduced in price by 20s., and are now fitted with smaller gaps giving considerable increase of flux density. Coil windings are supplied for all conditions of the output stage and a calculating chart is available showing the matching of loud speaker winding to the valve.

Epoch Radio Mfg. Co., Ltd., 3, Faringdon Avenue, London, E.C.4.

EVER READY. (49)

High tension and low tension batteries for portables are specialities of the Ever Ready Co. All the leading makes are catered for, and tables have been prepared showing the battery types most suitable in each case.

A popular battery for standard broadcast receivers is the "High Power Sixty." Designed for discharge rates

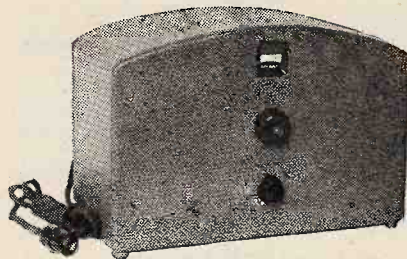
up to 20-25 mA. the dimensions of this battery are 13½in. x 5½in. x 3¾in., and the price is 15s. 6d.

Ever Ready Co. (G.B.), Ltd., Hercules Place, Holloway, London, N.7.

EXIDE. (54)

It is gratifying to note that developments have even taken place in L.T. battery design, and we find on the "Exide" stand two outstanding changes. First, the use of a seamless celluloid top fitted to portable-set accumulators, and secondly, the introduction of jelly acid electrolyte. These cells known as the Exide "Cell-Cell," have a large ampere-hour capacity compared with their size and weight, and an important feature is that when used in a portable set the plates are completely immersed in both the carrying and operating positions. Prices for 2-volt cells embodying this new form of construction and having actual ampere-hour capacities between 7 and 30 are from 10s. to 18s. The "Exide" exhibit includes the well-known types of H.T. and L.T. accumulators in glass containers. It is a special feature of these cells apart from their robustness that the leading-out lugs are actually moulded into the ebonite cover plates so that the creeping of acid and corrosion round the terminals are entirely eliminated.

Chloride Electrical Storage Co., Ltd., 217-229, Shaftesbury Avenue, London, W.C.1.



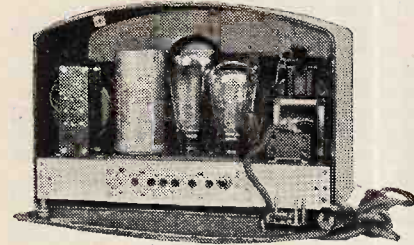
Ferranti two-valve mains receiver, Regional model.

FERRANTI. (47)

As was mentioned in the "Forecast" in our last issue, Messrs. Ferranti have added several new models to their range of complete receivers. These new instruments incorporate several unusual features of interest, of which perhaps the most noteworthy is a complete calibration of each set in terms of wavelength. It is claimed that the accuracy of this calibration is sufficient to enable the sets to be used as wavemeters, for which purpose the scale is engraved with fine lines capable of being read to close limits. The same drum carries both wavelength scales, but the scale not required is covered over automatically in operating the switch controlling the wave-range.

The two-valve all-mains set is available in two models, both of which use a P625 valve in the output stage. The ordinary

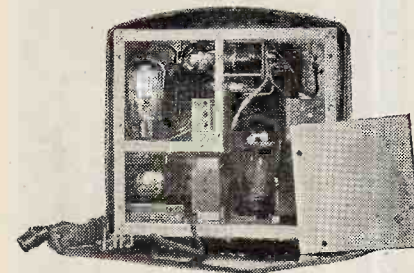
model has the wavelength calibration for the medium waves only, the long-wave dial being marked with wavelengths in the immediate neighbourhood of 5XX's wave, but being blank elsewhere. This is done because a two-valve set will not give loud speaker reproduction of any other long-wave station without pressing



Interior of Ferranti two-valve set, Regional Model.

reaction so far that the quality of reproduction becomes intolerable. The "Regional" model has two pre-tuned circuits, one of which is to be tuned to the National transmitter and one to the Regional. A switch then gives immediate change-over from one to the other. It is interesting to notice that the same switch simultaneously connects in circuit a series rejector wavetrap tuned to the station not required.

The three-valve all-mains set, known as Model 32, is a very similar receiver with a stage of screen-grid high-frequency amplification added. The two tuning condensers are ganged, the calibration being exactly that of the intervalve circuit. To allow for variations in aerial capacity, the "fixed" plates of the aerial tuning condenser can be rocked through a small arc to provide fine adjustment to the tuning of that circuit. Volume and selectivity are controlled simultaneously by adjustment of a series aerial condenser, which shorts out at the end of its movement. An unusual feature is that the reaction, which is controlled by a tiny swinging coil, can



Interior of the All-mains Ferranti receiver Model 32.

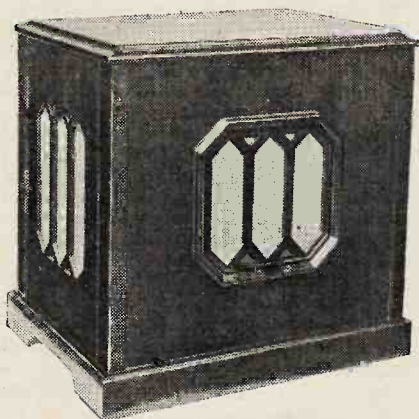
be reversed in direction so as to introduce heavy damping into the intervalve tuned circuit. By this means volume from the local station can be cut down, while at the same time making quite certain that loss of high notes in the tuned circuits is avoided entirely. This receiver sells, complete except for loud speaker, for £25.

Two handsome self-contained Console

Stand-to-Stand Report.—

receivers are offered; the "Senior Console," containing the Model 31 receiver and a magno-dynamic speaker, sells at £53 complete, while the "Junior Console" model, containing a Model 32 receiver and the same speaker, costs £47 10s.

The new "Magno-dynamic" speaker, which is a moving-coil speaker employing a permanent magnet, is on view; the flux-density in the gap reaches the high figure of 8,000 lines per square centimetre, so that adequate sensitivity is assured. It is interesting to hear that the several parts from which the permanent magnet is built up are held together entirely by their own magnetism, and also to learn that a straight pull of no less than a ton and a quarter is required to draw a keeper off the poles of the magnet. This speaker, like the older electro-dynamic model, is made only with a low resistance coil, which has an impedance at musical frequencies of approximately 20 ohms. It can be matched to any required output valve by employing a suitable transformer, of which several models are made.



Ferranti Magno-dynamic speaker in large cabinet.

The new AF7 intervalve transformer, having a primary inductance of 280 henrys on no load and a ratio of 1 to 1½, is also on view. This transformer should find wide application where only a low stage-gain is required, and where an anode-bend detector is to be transformer-coupled to the succeeding valve. It is also available with centre tapped secondary for use in push-pull circuits.

Ferranti, Ltd., Hollinwood, Lancs.

FLINDERS. (22)

As in the past this firm of wireless factors is exhibiting the products of the leading manufacturers. The stand serves as a rendezvous for trader friends from the Eastern Counties.

Flinders (Wholesale), Ltd., East Stockwell Street, Colchester.

FORMO. (72)

While Formo have long been known for the production of low-frequency transformers and tuning coils there is evidence

that they have been particularly active in elaborating their range of variable condensers. In particular a new type of quadruple and triple gang condenser has



Formo eliminator and by-pass condensers.

been produced. A substantial casting gives rigid support to the condenser units while the drum indicating dial with its knob control can be inserted at any condenser section of the casting giving latitude in regard to the disposition of the condensers inside the set in relation to the controls on the panel. A pigtail connector is concealed inside the shaft. The escutcheon plate carries an additional knob which, in set construction, can be employed for operating one of the circuit switches. The drum dial is illuminated and the bakelite escutcheon plate is available in various colours and finishes.

A dual gang condenser is also shown which is a combination of the illuminated drum dial and Formo right and left hand log-scale condensers. An important feature of the mechanical make-up is that an additional knob to the main tuning control may be arranged to rotate the stator of one of the condenser units. By this means the ganged tuning can be brought quickly into step. Formo condensers, while embodying all features essential to good design are offered at competitive prices. Capacities from 0.00015 to 0.0005 mfd. cost 4s. 6d. A midget condenser is shown very suitable



A new Formo quadruple ganged condenser.

for series aerial circuit volume control of the trimming of tuned circuits. A differential condenser of the solid dielectric type for use in reaction control is another interesting component, being compact, fitted with pigtail connector and operating knob, and is priced at 3s. 9d. for a capacity of 0.00015 mfd. Formo-Densors are also shown, being well known in that they were probably the first "variable" fixed condensers of the small compression type to appear on the market.

An entirely new departure is the production of Formo high voltage mains condensers. To meet the popular requirement in mains set construction these condensers are rated at a test voltage of 600 to suit a working voltage of 300 volts. Unlike the orthodox make-up for smoothing condensers these new components appear in cylindrical bakelite cases. A 2 mfd. condenser costs 2s. Mica condensers of low capacity known as Mika-Densors are another new Formo production. They are totally enclosed in bakelite and of circular shape, the 0.0003 mfd. size being priced at 6d.

Formo Co., 23, Golden Square, Piccadilly Circus, London, W.1.

FULLER. (221 & 265)

One of the leading exhibits of the Fuller Accumulator Company is a range of non-spillable cells for portable sets, with capacities of from 14 to 40 ampere-hours. These are of the jelly electrolyte type, and are capable of working in any position. As a number of different sizes are made, a suitable cell is available for nearly every type of receiver.

The company has recently introduced a series of dry-cell H.T. batteries, including a special 108-volt pattern for portables, rated at a maximum discharge



Group of Fuller batteries.

of 20 milliamperes, although a demonstration carried out on the stand shows that the battery is capable of supplying considerably more current.

A representative collection of L.T. and H.T. accumulators is also shown.

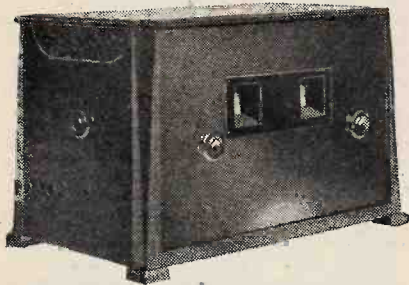
Fuller Accumulator Co. (1926), Ltd., Woodland Works, Chadwell Heath, Essex.

G.E.C. (46 & 68)

All-electric A.C. mains receivers and loud speakers of entirely new design are exhibited. Much interest is being shown in the method of construction, and the chassis interiors displayed reveal metal framing, effective screening, well-arranged wiring, and the many devices for effecting simultaneous tuning, wave-change switching, and decoupling. The three-valve model type B.C.3130, priced at £18, including royalty and valves, embodies a screen-grid H.F. stage, a pentode output and valve rectifier. Two operating knobs provide a tuning control which is easy and convenient to operate, while the volume control and plunger action wave-change switch arranged on

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the end of the cabinet give ready distinction between the function of the various controls and leave a fairly clear front



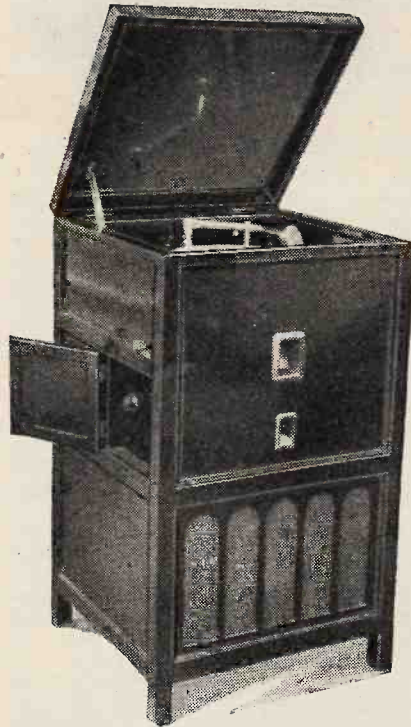
G.E.C. three-valve all-electric receiver.

panel. Pre-H.F. volume control, which is so essential if selectivity is to be maintained by the avoidance of overloading of the H.F. valve, is provided. Good station-getting properties can be expected with this receiver, and on the score of quality it is to be noted that the use of the moving-coil loud speaker is recommended. The valves are the Osram M.S.4, M.H.4, and P.T.625. The design of the cabinet is dignified, the finish being a smooth ebony black, while the front panel is artistically carried out in dull gold shading to black.

For first-class and reliable reception of the principal European stations the four-valve set, type B.C.3140, has been introduced. A noticeable feature is single-knob control placed in the only correct position for convenient working, which is on the side of the cabinet. On the front is the slightly recessed and illuminated indicating dial together with a snap action "on" and "off" switch. The two H.F. stages make use of the Osram M.S.4 valves, and wave-change switches are gang-operated along the

simple but attractive lines, the woodwork being well-finished walnut. Including valves and royalty the price is £30. Stepping up in the range there is the complete A.C. mains radio-gramophone type B.C.3150, incorporating a receiver very similar to the B.C.3140 just described, with the addition of gramophone equipment and moving-coil loud speaker with its associated field energising rectifier.

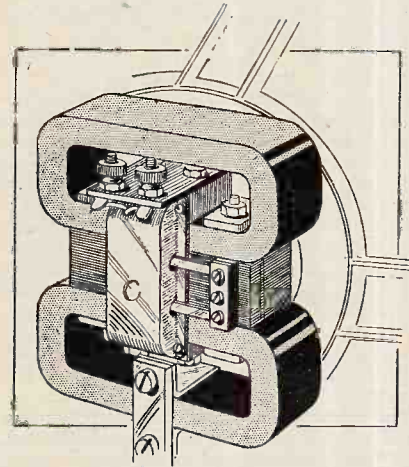
A loud speaker described as being of the inductor-dynamic type makes its first appearance (type B.C.1850).



G.E.C. radio-gramophone with long range receiver and single-dial tuning for use with A.C. supply.

tion to the customary regulation of volume.

A separate stand is devoted to the display of the complete range of Osram



Inductor loud speaker movement by G.E.C.

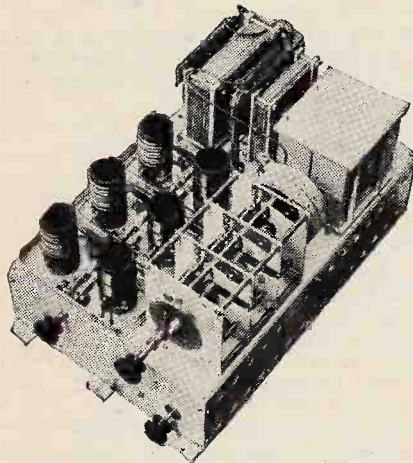
valves, details of which have already appeared in the pages of this journal. Indirectly heated valves have undergone considerable improvement in their characteristics, as is evidenced in the M.H.L.4 with its amplification factor of 20 and an A.C. resistance of 8,000. The M.H.4 has an improved slope of 2.2, and should prove a highly satisfactory detector. Among output valves mention might be made of the new P.X.4, in which the slope has been increased to the remarkably high figure of 3.3. For battery-operated portables the new H.2 valve having an amplification factor of 35 and an A.C. resistance of 35,000 should have much appeal, especially as it is under-



The moving-coil loud speaker of G.E.C.

stood that a new method of filament support is now introduced, rendering the valve entirely non-microphonic.

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.



Chassis-built interior of the new G.E.C. four-valve receiver with coil screening cover removed.

coil-containing compartments. The detector valve is the M.H.4, and the output a P.X.4, while the rectifying valve is the U.10. Cabinet work is carried out on

Listened to in the "Gecophone" demonstration room one could recognise the desirable condition of an apparently uniform frequency response in which the high notes are preserved and generous base amplitudes are possible.

In addition there is the "Gecophone" moving-coil loud speaker, type B.C.1805, available for use with D.C. or A.C. supply, in the latter case incorporating rectifying equipment with Osram U.5 valve. Careful research with generous facilities for actual measurement carried out at the G.E.C. Wembley Laboratories are behind the production of this loud speaker, so that without further personal comment one can believe that its performance is up to a high standard. Large moving-coil loud speakers are also being demonstrated complete with gramophone and amplifier equipment for cinema and general public entertainment duty. These have an output stage of two parallel connected L.S.6A valves, and are fitted with a tone control in addi-

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GAMAGE. (244)

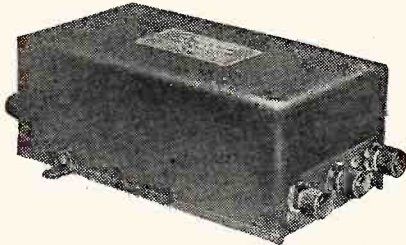
Particular interest attaches to the comprehensive range of receivers. The "All Mains Popular Three" sells at the extremely low figure of £12 17s. 6d. complete. The circuit consists of a regenerative leaky-grid detector, followed by two transformer-coupled L.F. stages. Automatic grid bias is obtained from a voltage drop across a resistance in the common H.T. lead.

A "Screened Grid Three" set for battery operation sells at 10 guineas, whilst an all-mains model with similar circuit is retailed at 17 guineas.

A. W. Gamage, Ltd., Holborn, London, E.C.1.

GAMBRELL. (106)

Gambrell all-mains receivers have been redesigned and this season's models are smaller and housed in very attractive cabinets. A range of handsome radio gramophones is also shown. Three- and four-valve models predominate but there is an inexpensive "two-valver" for reception of the local and higher powered stations only. This set is mounted in a



Gambrell new Novotone, Model J.

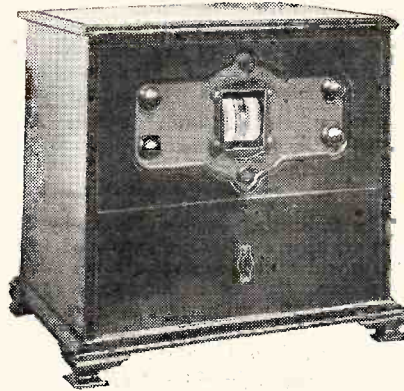
crackle-lacquer finished wooden cabinet of pleasing design and costs £13 10s. for the D.C. model and £16 10s. for the A.C. version.

A four-valve chassis consisting of a screen grid H.F. valve with tuned anode coupling, a regenerative detector and two low frequency amplifiers form the nucleus for a number of models. In some cases minor modifications have been introduced to meet the special requirements of the particular set. The circuits are separately tuned, drum control being adopted which confers the advantage of semi-ganging. In cabinet form the A.C. model is priced at £33 and a similar model for D.C. drive costs £27.

A special feature of all Gambrell radio-gramophones is the inclusion of the "Novotone." This year there are three versions of this tone compensator available, the type H for high resistance pick-ups, the type S for standard models, priced at £5 each, and a new junior model designated the type J. This has the same general electrical characteristic curve as the larger models but the voltage step up is 1 to 1.4, whereas in the others a step up of 1 to 2.6 is attained. The price is £3 3s.

Gambrell Radio, Ltd., Buckingham House, Buckingham Street, Strand, London, W.C.2.

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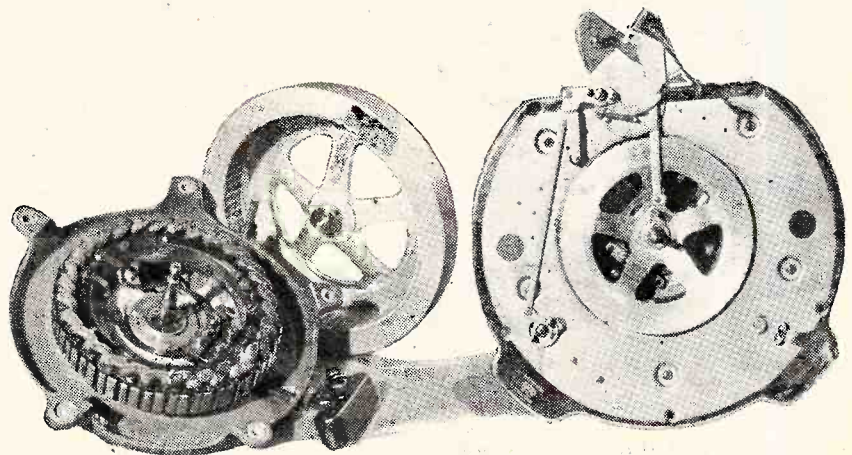


Gambrell all-electric-four receiver.

GARRARD. (256)

The radio enthusiast building a radio-gramophone should take an opportunity of visiting this stand in the Empire Hall where some entirely new features in gramophone construction will be found. Clockwork motors in radio work are of less importance than the electrically driven types but it is worth observing that a high-class double-spring motor capable of playing two sides of a 12in. record can be purchased for 30s.

Of outstanding interest in the electric models is the new self-setting automatic stop. Thus at the completion of the playing of each record a system of levers and catches becomes tripped and stops the motor. Unlike previous devices of this sort the stopping mechanism is automatically set and the user is not involved in operating a trigger as was formerly the case. Referring to the Garrard "Universal Electric" type we find, apart from the obvious excellence of manufacture, such features as good ventilation, band drive and hence avoidance of gears, complete assembly on a rigid top plate, a motor that is built from castings, a 24-section mica insulated commutator and an armature that is wound with double silk covered wire. A new pattern gover-

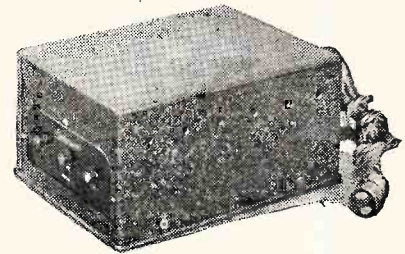


Garrard induction-type gramophone motor of unique design.

nor is fitted which, it was explained, eliminates hunting.

An entirely new model makes its appearance at this show. For use on A.C. supply, it is of the induction type in which an assembly of laminated rings secured to an aluminium wheel rotates around fifteen pairs of poles. The drive to the main spindle is direct, the power is generous and running is absolutely steady. A minimum of space is occupied by the adoption of a shallow construction, this being often a very necessary feature in the making up of a radio-gramophone. Well finished enamel castings house the underside of the motor, and the total depth does not exceed 3in. This motor is fitted with the fully automatic stop which, as well as switching off the current, applies a brake, while lubrication is introduced down a hollow central shaft.

Garrard Eng. and Mfg. Co., 17, Grafton Street, London W.1



Gowinex A-type eliminator.

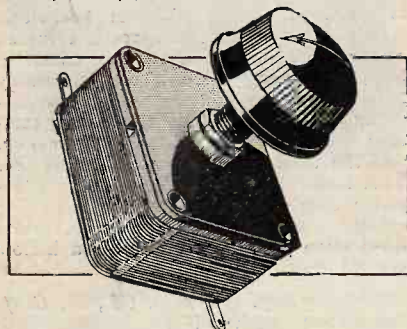
GODWINEX. (104)

Of the large number of interesting exhibits on this stand that which is likely to attract the most attention is the wide range of eliminators. There are D.C. and A.C. models with outputs suitable for the most modest sets and also for ambitious receivers dissipating many watts in the output stage. A D.C. eliminator, known as the D.S. model, giving 15 mA. at 150 volts, and provided with a tapping for the detector valve, sells at the low figure of 27s. 6d. An A.C. model cap-

Stand-to-Stand Report.

able of delivering 20 mA. at 120 volts and having a separate tapping, sells at £3 7s. 6d. It is known as the "A" type and incorporates a half-wave Westinghouse metal rectifier.

J. Dyson and Co., Ltd., 5, Godwin Street, Bradford.



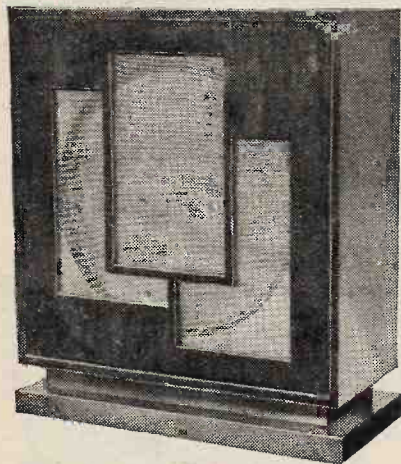
Graham Farish "Ton-a-Kap" 0.01 mfd. variable condenser.

GRAHAM FARISH. (76 & 108)

The "Electrosciant" pick-up made by this firm has been considerably improved, and by the use of a more powerful magnet, together with a different method of damping, it is claimed that outputs up to two volts R.M.S. are obtained, so that only two valves are necessary for adequate amplification. The price is 22s. 6d.

A useful series of condensers of midget proportions, known as "Parvor" stamp condensers, are available to home constructors this season. Capacities from 0.0001 mfd. to 0.01 mfd. are made, and the prices range from 9d. to 1s. 6d.

"Microsciant" variable condensers enclosed in a square bakelite case are obtainable with either log-law or straight-line capacity vanes. There is another type of variable condenser, known as the



Cabinet cone speaker type A.C.4 by Graham Farish.

"Aeroficient." Two new low-frequency transformers with ratios of 3 to 1 and 5 to 1, selling at 12s. 6d. and 14s. 6d. respectively, are to be seen on the stand.

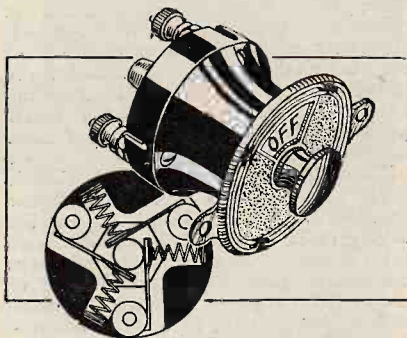
Perhaps one of the most valuable new components is the "Ton-a-Kap" variable condenser with the high maximum capacity of 0.01 mfd. For tone control in L.F. circuits and for providing constant peak separation in H.F. band-pass filters, such a condenser has wide application.

Graham Farish, Ltd., Masons Hill, Bromley, Kent.

GRIPSO. (202)

The indicating switches made by this firm are now available in improved form, and would appear to have distinct advantages over the usual components of the same class. Spiral springs in compression are fitted in such a way that the blades are forced into close contact with the central bridging piece; the present three-hole method of fixing makes a much sounder job than does the use of a single hole, as originally.

Three types are available. A two-point switch, suitable for filament switching or simple waveband changing, is provided with a dial giving the alter-



Gripsco three-point switch, showing arrangement of contact springs.

native readings of "on-off" or "long-short." The three-point switch, which is particularly useful for various modifications of the "Hartley" circuit or for switching certain tuned-grid H.F. inter-valve couplings, has a dial with the same readings. A third pattern, of the "three-point intermittent" type, can be used for waveband changing or radio-to-gramophone switching.

The Gripsco Co., 32, Victoria Street, London, S.W.1.

GROSVENOR. (263)

The display at this stand consists of a very wide selection of dry batteries for all purposes. Single, double, and triple capacity batteries are shown, but for commercial reasons no definite recommendation as to the most economical discharge rate of each type is made.

Grosvenor Electric Batteries, Ltd., 2-3, White Street, Moorgate, London, E.C.2.

H.S.P. WIRELESS. (122)

The star model of the range is the "Super-twin Two-Screen Grid Portable," which has two S.G. H.F. valves with tuned-grid couplings, a regenerative de-

detector and a pentode output. Four valves are used and the price of the set is 29 guineas.

There is a five-valve "Super Range" model embodying the popular aperiodic



H.S.P. five-valve Super Range portable.

H.F. stages, a detector and two transformer-coupled L.F. amplifiers. This includes a special aerial arrangement, and the price is 22 guineas.

In all H.S.P. sets the wave change switch has three positions, viz., long waves, off, and medium waves. The off position breaks both H.T. and L.T. supplies. Risk of burning out valves when changing an accumulator by accidentally dropping an L.T. lead on to the H.T. battery is entirely avoided.

H.S.P. Wireless Co., Langford Works, Weston-super-Mare.



The Halcyon Grandola radio-gramophone.

Stand-to-Stand Report.—

HALCYON. (144)

This company is showing complete receivers and radio-gramophones only; the following models are made:—

First, there is a suit-case portable set employing one stage of tuned high-frequency amplification with a screen-grid valve.

The All-mains Transportable Four uses a similar circuit, but has a much greater power output. It is available for either A.C. or D.C. mains, the filament current being taken from an automati-



Halcyon all-mains transportable four.

cally charged accumulator in the latter case. There is also a battery model at a lower price.

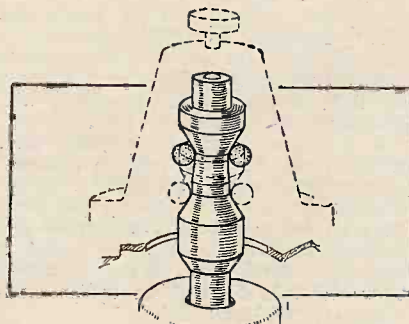
The All-mains Table Radio-gramophone is an attractive instrument of comparatively small size; on the radio side it duplicates, except in appearance, the Transportable Four, but uses a moving-coil speaker in place of the Air-Chrome cone.

The Grandola Radio-gramophone is a large instrument with many refinements of detail. The frame aerial is enclosed, but can be rotated by a knob on the panel. Two pentodes in parallel supply the moving-coil speaker with 3,000 milliwatts of undistorted power. This instrument, like those already described, can be obtained for either A.C. or D.C. mains, and costs 85 guineas in either form.

Halcyon Wireless Co., Ltd., 27a, Pembroke Villas, Notting Hill Gate, London, W.11.

HARLIE. (141)

The new Constant-Speed Electric Gramophone Motor is the principal exhibit on this stand. Designed for 50 cycle mains, the driving motor is of the



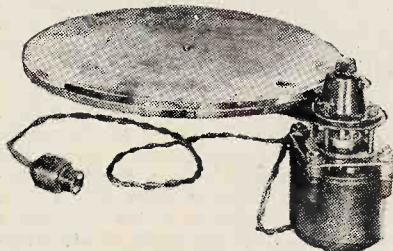
Harlie variable pulley speed control.

synchronous induction type, and is silent in operation both mechanically and electrically. The starting torque is excellent and the motor soon attains its synchronous speed, even when started with the pick-up on the record. Small variations in the turntable speed are brought about by a variable "V" pulley on the motor shaft, the adjustment being fitted with an indicating dial. A specially prepared endless rubber belt is used to transmit the drive.

The Harlie pick-up has been brought up to date with one or two refinements. Correct needle track alignment is now assured by setting the pick-up at an angle to the tone arm, and stops are fitted to prevent the swivel joint from remaining vertical.

Free stroboscope discs are being distributed from this stand as an advertising medium.

Harlie Bros. (Edmonton), Ltd., Balham Road, Lower Edmonton, London, N.9.



Harlie Constant Speed gramophone motor.

HENDERSON WIRELESS & ELECTRICAL SERVICE. (231)

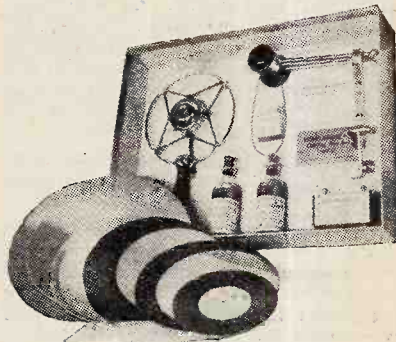
The chief activity of this company is the distribution of proprietary sets and components. Perhaps the most prominent feature of the exhibit is the A.E.D. self-winding gramophone motor, selling at 6 guineas. It is impossible for electrical interference to take place during the playing of a record, as the motor is rotated by a double spring clockwork mechanism until the record is finished, when an electric motor is automatically brought into action to wind up the spring motor should this be required. There is an electric stop, which not only arrests the turntable and switches in the winding motor, but also cuts out the amplifier.

Henderson Wireless and Electrical Service, 54, Queen's Road, Brighton.

HILLMAN. (18)

This firm are wholesale agents, and their display is largely composed of the products of well-known manufacturers. They are also distributors of the "Home Recorder," an outfit enabling anyone with a receiver, a gramophone pick-up, and a turntable, to make his own gramophone records.

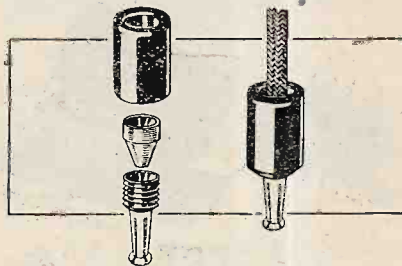
The equipment provided includes a microphone, complete with transformer, traverse gear and grooved pulley for attachment to the turntable spindle, a record-cutting diamond in a holder, and 12 blank records in various sizes. Extra blanks are obtainable at a cost of between 6d. and 1s. each, depending on their diameter.



Home recording outfit for making gramophone records.

To record the voice direct, the normal function of the pick-up is reversed, and it is converted into a cutter by fitting it with the special diamond point in place of a needle. Impulses from the microphone are passed to it via a transformer. Records of broadcast transmissions are made in a similar way by connecting the pick-up to the loud speaker terminals of the receiver. The complete outfit is sold at £5 5s.

Messrs. Hillman Bros. are also exhibiting the new "Lisenin" wander plugs, which seem to be a distinct improvement



New Lisenin wander plugs showing details of wire grip.

over the usual devices of this sort. They are made with ball ends, and, being of the springy, double-slotted type, should engage firmly in sockets of widely differing internal diameter.

Hillman Bros., 123, Albion Street, Leeds.

Stand-to-Stand Report.—**HOBDAY. (13)**

Messrs. Hobday Bros., Ltd., have a very representative display of sets and components by prominent manufacturers. Their stand provides a particularly good opportunity for trade visitors to make their choice of apparatus to stock for the season.

Hobday Bros., Ltd., 21, Great Eastern Street, London, E.C.2.

HOUGHTONS. (10)

This well-known firm of wholesale distributors are displaying a representative collection of new season's sets.

The Pifco Radiometer is also exhibited; it is an inexpensive combined measuring instrument, reading L.T. and H.T. voltages, and also anode current. Sockets for making quick continuity tests of 4-pin or 5-pin valve filaments are mounted on the body of the meter, which includes a single dry cell, and so can be used for continuity tests without an external battery.

Ensign, Ltd., 88, High Holborn, London, W.C.1

HUNT. (133)

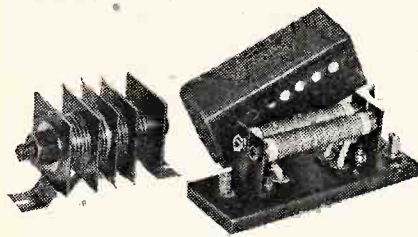
This firm supplies many component parts, particularly to the trade. Apparatus is not displayed, but a representative of the firm is in attendance to discuss requirements with prospective buyers.

A. H. Hunt, Ltd., H.A.H. Works, Tunstall Road, Croydon, Surrey.

HUSTLER, SIMPSON & WEBB (247)

This firm are showing what is undoubtedly the cheapest two-valve set in the Exhibition. It consists of two valves, a detector, with reaction and an output stage also, waveband switching to cover wavebands of from 250 to 500 metres, and from 1,000 to 1,800 metres. Enclosed in a metal case, little larger than a box camera, this bijou set is priced at 50s., including valves.

Hustler, Simpson and Webb, 56-7, Tanner Street, Bermondsey, London, S.E.1.



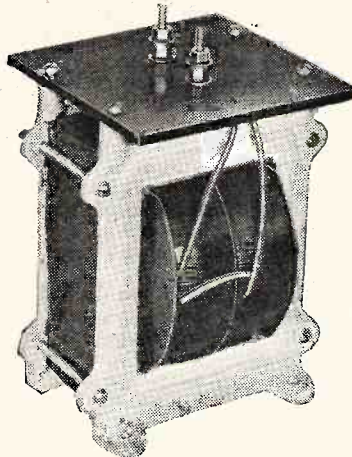
Igranic-Elkon metal rectifiers, H.T. and L.T.

IGRANIC. (240)

The policy of the Igranic Electric Co. has been always to cover a field as wide as possible, and this year they are extending their activities to assist the deaf. The apparatus consists of two units, one a three-valve amplifier with all batteries contained in a small carrying case, and the other a case con-

taining an Igranic transverse current microphone and a pair of telephones. The amplifier is resistance-capacity coupled, and as a small output valve is sufficient for the needs of a telephone, the H.T. consumption is exceedingly low. The price of this outfit is £40.

So far as receivers are concerned, there is the range of "Neutrosomic Sevens"—seven-valve super heterodyne receivers—in much the same form as last year. This set has now been incorporated into a handsome radio-gramophone, which is operated entirely from the A.C. mains. The price is £150, and the equipment is completely self-contained.



Igranic 20-henry L.F. choke, type C 300.

Igranic chokes are of the "constant inductance" types; that is to say, within certain specified limits the inductance remains practically unchanged with variation in D.C. through the windings. The smallest of these is the C 15, which weighs only 6½ oz., and maintains an inductance of 20 henrys when carrying D.C. up to 15 mA. The price of this choke is 10s. 6d. At the other end of the line is a C 300 model, a 20-henry choke costing 55s. and rated to carry 300 mA. of D.C. without change in its inductance value. The D.C. resistance of the winding is 140 ohms.

Five types of mains transformers for use with H.T. rectifiers are shown. These provide a wide range of output voltages; the type E.H.1, giving 180 volts at 30 mA. when used with a half-wave rectifier, has, also, a grid-bias winding giving 30 volts at 2 mA. A popular model should be the E.H.4, which is designed for full wave rectifiers, the secondary giving 300+300 volts and a grid-bias winding to provide 45 volts at 3 mA. This model costs 29s., and the price of the E.H.1 is 21s. In addition, there is a comprehensive range of transformers for L.T. supply and use in trickle chargers. Many of these transformers are intended to be used with the "Igranic-Elkon" metal rectifiers, of which numerous types are shown.

There is also a wide range of bridge-connected metal rectifiers for L.T. supply units and trickle chargers.

Two types of loud speakers make their appearance this year. One is a moving-coil instrument fitted with a corrugated cone diaphragm and having a mains transformer and Igranic-Elkon metal rectifier incorporated; it is for A.C. mains operation and priced at £7 15s. The other is a horn type loud speaker, also of the moving-coil class, but with a pot wound for a 6-volt field supply. This model is intended for use in conjunction with their public address equipment.

There is a new Igranic "Special" pick-up, priced at £4 4s., and a gramophone response corrector, to give a better balance to the reproduction, which is priced at £3 17s. 6d. There seems no end to these new Igranic devices, and space will not permit of continuation. Mention must be made, however, of the "Midget" L.F. transformer, with a primary inductance of over 60 henrys when carrying no D.C. and weighing but 6½ oz. The ratio is 3 : 1, and the price is 10s. 6d.

Igranic Electric Co., Ltd., 147, Queen Victoria Street, London, E.C.4.

ITONIA. (21)

The two principal exhibits on this stand are all-electric radio-gramophones. The Model 500, priced at 65 guineas, has a four-valve radio circuit with a single-dial tuned S.G. stage, detector and two L.F. stages, for which an undistorted power output of 6 watts is claimed. Model 501



The Itonia Short Wave III.

has a modified radio circuit and costs 45 guineas with Air Chrome speaker in oak.

The Itonia Short Wave III has been designed for wavelengths from 10 to 150 metres, and is neatly fitted into a solid mahogany cabinet, the lower compartment of which is designed to take both H.T. and L.T. batteries. Coils are included

Stand-to-Stand Report.—

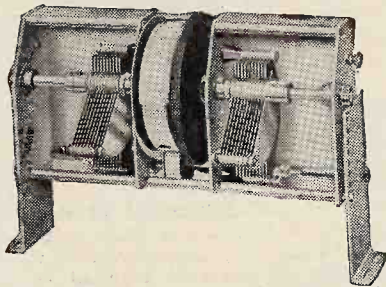
for the medium broadcast band, and the whole equipment, including valves and batteries, is £20 15s.

The Itonia Autocrat V is a suitcase portable with a straight circuit comprising two H.F. stages, detector and two L.F. A similar circuit is used in the Transportable V, and both these models retail at 16 guineas. The Screened Grid IV is designed for range as well as quality, and is fitted in an antique-finished hide case, the price being 20 guineas. All three portables are fitted with local station receptors and Ultra Air Chrome loud speakers.

Itonia Gramophones, Ltd., 58, City Road, London, E.C.1.

J.B. (63)

A new form of gang-operated condenser has been introduced under the name "Chassismount Drum Thumb Condenser." It is arranged to consist of two to six sections and its right-through spindle carries the drum dial. Trimmers are fitted to each condenser unit to compensate for small differences in the stray capacities in the associated tuned circuits. All sections of the fixed plates are adequately screened from one another, moving plates, of



Chassismount Drum Thumb condenser by J.B.

course, being at equal potential. A good feature is that the "Chassismount" is attached to the baseboard and not the panel, and the mounting strips provide for a critical adjustment of height. These condensers are finding application in recent set designs. Mention might be made among the range of standard J.B. condensers and dials of the differential reaction condenser with bakelite dielectric in which the centre spindle is insulated.

Jackson Bros., 72, St. Thomas Street, London, S.E.1.

JOHNSON & BOLSON. (142)

Going from stand to stand around the Exhibition one cannot fail to closely compare the varying prices asked for almost similar equipments. On reaching this stand, therefore, it comes as a surprise to find a five-valve portable of good appearance and built with standard equipment costing £8 7s. 6d. free of royalties. True it is not in the most modern class, but the two H.F. set with its aperiodic couplings has given good service until recently in the majority of portables as well as pro-

viding easy operation. This set, named the "Servis" (Harris Williams Manufacturers, Ltd.) is fitted with Six-Sixty or Cossor valves, tunes to both wave ranges, has Ever Ready batteries and accumulator, Six-Sixty loud speaker, and is enclosed in an oak cabinet.

Another set at this stand, the "Servis Table Model Three," is an entirely complete transportable set of the detector 2L.F. type. Its components comprise Six-Sixty or Cossor valves, Six-Sixty loud speaker, Young accumulator, Ever Ready H.T. battery, Faradex intervalve transformers,



Portable radio-gramophone by Johnson and Bolson.

and polished oak cabinet. With a twelve months' guarantee, the price is £5 17s. 6d. There is also a five-valve portable of the suitcase type with similar standard equipment to the models just described, except that it is fitted with an Oldham unspillable accumulator which, in a rexine-covered case, is priced at £7 19s. 6d. There is an extensive range of more expensive sets displayed.

Johnson and Bolson, Ltd., Carlisle Works, Carlisle Street, London, S.E.1.

JUNIT. (65)

Mains units are exhibited at this stand and represent a new addition to the range of Junit products. With an all-metal exterior the rectifier is shown built as a chassis carrying a moulded terminal panel. A novel three-cornered device accommodates the eliminator to various mains voltages without exposing the mains-connected metal parts. In overall dimensions the eliminator corresponds with the standard H.T. battery, and can therefore be used as a replacement in portables. Models



Junit eliminator chassis.

are available for supplying either H.T. alone or with an additional rectifier for keeping an accumulator in a charged condition. Westinghouse metal rectifiers are used. Terminal mountings in moulded bakelite, valve holders and plunger switches are also shown.

Junit Mfg. Co., Ltd., 2, Ravenscourt Square, London, W.6.

KABILOK. (132)

Cabinets carefully designed to meet the needs of the home constructor bearing in mind technical requirements is the impression gained from an examination of the Lock products. Most of the cabinets are quoted as being designed to suit the dimensions of certain sets and particular types of loud speaker. For instance, the many thousands who have constructed the Osram "Music Magnet" or the Mullard "S.G.P." receiver will be interested in the combined receiver and loud speaker cabinet model R.S.I. In the range of rectangular cabinets we find a variety of sizes but, in addition, cabinets specially made for the "Master Three Star," the Ferranti "Screened Three" and the Mullard "Orgola III."

Of special merit is the loud speaker cabinet of unique design and with distinctive grille dimensioned to accommodate Blue Spot, Brown, Amplion, Farand or Ormond loud speakers. This



Lock loud speaker cabinet.

cabinet has shaped marginal facings toned, to a darker shade with moulded base and feet to harmonise.

W. and T. Lock, Ltd., St. Peter's Works, Bath.

KALISKY. (23)

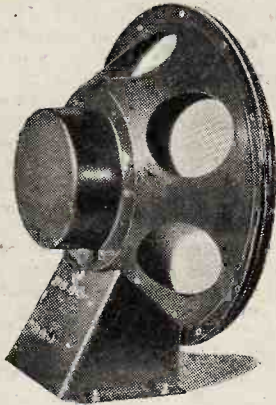
This firm act as factors for proprietary components, such as loud speakers and kit sets; they also manufacture a number of products of their own under the trade name of "Sopranist." There are the "senior" and "major" accumulators selling respectively at 7s. 6d. and 4s.; also an accumulator tester at the modest price of 6d. A well-finished binocular H.F. choke is being sold at 2s. 10d.

S. Kalisky (Aldgate), Ltd., 75, Aldgate High Street, London, E.1.

Stand-to-Stand Report.—

KOLSTER-BRANDES. (55)

A great deal is expected for 250 guineas, but this is the price of the "Five-Valve Radio Gramophone," with two turntables, that occupies a prominent position on this stand. Such a magnificent piece of furniture has surely not previously housed a wireless receiver. The instrument incorporates a six-valve, five-stage receiver, consisting of two



Kolster-Brandes permanent magnet moving coil loud speaker.

screen-grid H.F. valves transformer-coupled, and followed by a regenerative detector which is coupled by resistance capacity to a first stage L.F. amplifier. The last stage is fed by a transformer, the output valves being in push-pull. This stage is rated to dissipate approximately 6 watts of undistorted power.

Tuning of the receiver is simplified by ganging the variable condensers and employing a concealed drum device operated by a slow-motion knob with the scale visible through a window mounted centrally on the panel. The radio set is housed in the centre section with the two turntables on either side. Below the control panel is mounted a moving-coil loud speaker behind a handsome fret.

A new range of loud speakers has been developed, especially in the moving-coil class. There is the K.B. 125 chassis, with 6-volt pot. winding, which costs £6 10s., and in cabinet form £12 12s.

It has a low-resistance speech coil and input transformer. Then there is the permanent magnet type K.B. 203 in chassis form costing £5 5s., and in cabinet £10 10s. This incorporates a triple ratio input transformer providing step-down ratios of 15:1, 23:1 and 31:1, these being suitable for output valves whose impedances are of the order of 1,200, 3,000 and 7,000 ohms respectively.

Kolster-Brandes, Ltd., Cray Works, Sidcup, Kent.

LAMPLUGH. (124)

The outstanding exhibit on this stand is the "Silver Ghost" Inductor Dynamic loud speaker. The well-known "Far-

rand" principle is employed, and loud speakers are being manufactured at the Tyseley works under licence. Due to the constant air gap and the small restoring force required, the reproduction—particularly in the bass—is comparable with that of loud speakers built on the moving-coil principle. Visitors to the stand will have an opportunity of judging the quality themselves as the demonstration room is on the opposite side of the gangway, while a large-scale model on the stand serves to illustrate the principle of operation. Three models are shown, a chassis at £3 10s., a standard cabinet model at £5 10s., and a de luxe cabinet model at £6 10s.; both cabinet models are supplied in oak or mahogany at the same price. The windings have a standard impedance suitable for output valves of 1,500 to 3,000 ohms A.C. resistance. A mid-tap is provided for use with push-pull output valves.

The list of receivers is headed by the "A.C. Screened Grid IV," a console receiver with built-in loud speaker ("Inductor Dynamic"). There are four stages (H.F., det., and two L.F.) with indirectly heated valves, the whole being metal shrouded and complying with I.E.E. rules. Another all-mains set on show is the "A.C. Screened Grid III," which is available either as a console or table model. Two battery-operated models are of the detector and two L.F. type with built-in Regional wave trap for the medium wave band. The "works" of the two latter receivers are sold separately in the form of a chassis which is known as the "Chassisrad Popular III."



Lamplugh A.C. power unit.

Finally, there is the A.C. Power Unit, an entirely new production, giving all sources of power required to operate a receiving set. The voltages available are as follows:—*Smoother H.T.*, 250 volts at 60 mA for output valve, 150 volts for first L.F., etc., and 80 volts for screen grids. *L.T.*, 4 volts at 4 amps. for A.C. valve heaters, 2 volts for adding to 4-volt winding, giving 6 volts at 0.5 amp., and a separate winding giving 4 volts at 2 amps. for the rectifier heater. *Grid bias*, 30 volts tapped at 15 volts for

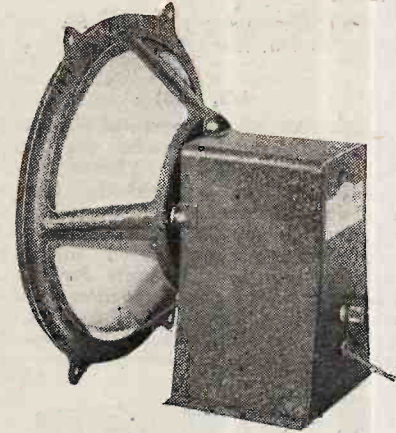
use with an external potential divider if necessary.

S. A. Lamplugh, Ltd., King's Road, Tyseley, Birmingham.

L.E.S. DISTRIBUTORS. (16)

This stand is devoted to the interests of the trader, the firm being wholesale distributors of the leading lines of the manufacturers.

L.E.S. Distributors, Ltd., 9, St. Martin's Street, Leicester Square, London, W.C. 2



Lamplugh inductor dynamic loud speaker.

LEWCOS. (41)

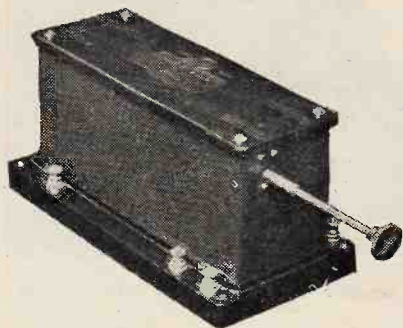
One of the most useful of the new products of this firm is likely to be the "Dual Coil Unit," Type D.C.G/2, which comprises all the coils required in the construction of a modern set with a single H.F. stage. The necessity for providing screening is avoided, as the coils are isolated from each other by a metal transverse partition across the screening box in which they are mounted.

The assembly comprises medium- and long-wave "aperiodic" aerial-grid transformers, and also a double-wound interval transformer assembly with a reaction winding. The overall measurements of the unit are approximately 4½ in. high, 9 in. wide, and 4½ in. deep. Telephone type switch-gear, specially designed to avoid contact troubles, is employed; it can be operated by a knob projecting through the side of the receiver, or, with the help of link mechanism supplied to order, from the front panel.

The 5:1 ratio Lewcos L.F. transformer is now produced either in a metal or moulded bakelite case; its rated primary inductance when 1.5 mA. is flowing is 97 henrys, and its published frequency response curve shows well-maintained amplification between 50 and 4,000 cycles, with a slight dip at about 1,000 cycles, introduced to compensate for the fact that most loud speakers tend to over-emphasise frequencies of that order. An-

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other L.F. transformer, with a 3:1 step-up ratio, is designed to have constant primary inductance when passing current values up to 10 mA., and so should be suitable for direct insertion in series with the anode of a power grid detector.



Lewcos screened coil unit.

An L.F. choke has also been produced. This component is rated at 30 henrys, is intended to pass currents up to 30 mA., and has a D.C. resistance of 570 ohms.

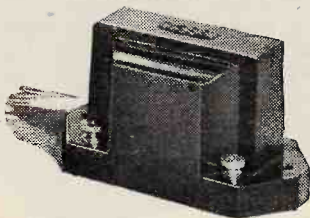
The new Lewcos anode resistances are of the disc type, and are made in values of from 5,000 up to 50,000 ohms. They are provided with sockets to engage with pins fitted in a special holder in order that quick and easy changes may be made. There are also compression-type variable condensers with maximum values of 0.0002 and 0.001 mfd., and two or three special types of coil.

A broadsheet of blueprints showing full details, both theoretical and practical, of four different circuit arrangements in which the new coils may be used, is now available for distribution. All these sets are of the H.F.-det.-L.F. three-valve type.

London Electric Wire Co. and Smiths, Ltd., 7, Playhouse Yard, Golden Lane, London, E.C.1.

LISSEN. (40)

Practically every component required for a wireless set is manufactured by this company. Included among this new season's products are the "Hypernik" transformer with nickel iron core, selling



Lissen new 3 to 1 transformer.

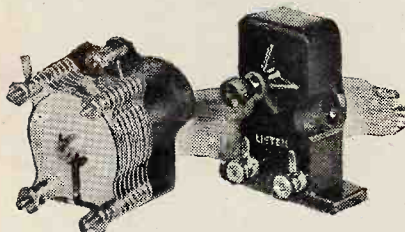
at 12s. 6d., and a new inexpensive bakelite shrouded 3-to-1 transformer with silicon steel core, selling at 5s. 6d. A differential condenser for control of reaction, having the advantage of an air dielectric, retails at 5s. There is a useful compression type mica pre-set condenser for series aerial connection having a capacity of 0.0003 mfd. to 0.002 mfd.

E 29

This component is arranged for vertical or horizontal mounting. The "Colossus" two-valve set contains a detector and power output valve and retails complete at the remarkably low figure of £3 10s.

Lissen valves have been substantially reduced in price. The H.F., L.F., and G.P. types sell at 5s. 6d., while the power and super-power valves are 7s. 3d. and 8s. respectively. The price of the screen-grid valve is 12s. 6d.

Lissen, Ltd., Lissenium Works, Worples Road, Isleworth, Middlesex.



Lissen differential condenser with air dielectric (left) and pre-set condenser (right).

LITHANODE. (135)

A very comprehensive selection of low-tension accumulators of all sizes and types is offered by this firm. They have recently introduced a complete line of cells in glass boxes, which are the most attractive type to the experimenter. It is especially to be noted that the plates used are thinner than the average, thus reducing the likelihood of serious damage resulting from an accidental momentary short circuit. The plates are, in fact, the same as those used for starter batteries on motor cars, which receive more outrageous treatment than is likely to be meted out by even the most careless wireless enthusiast. The cells are available both with ebonite separators and in ribbed glass boxes without separators.

Separators of glass wool are used in cells which are likely to be so handled that the acid leaves the plates and runs entirely into the well of the unspillable device; the plates are thus kept moist and in good condition. This company is marketing an ingenious trap used in cells which, though normally kept upright (transportable sets) are liable to be shaken about violently.

Lithanode Co., Ltd., 190, Queen's Road, Battersea, London, S.W.8.

LOEWE. (207)

In addition to the extremely compact receivers using multiple valves, which are a feature of this company's activities, there is shown an attractive loud speaker in a Caucasian walnut case. This uses an adjustable four-pole balanced armature unit which is primarily designed to follow the Loewe multiple valve, but which is suitable for use after any power valve or pentode of normal A.C. resistance. It sells at 2 guineas, complete in its cabinet.

Loewe Radio Co., Ltd., 4, Fountayne Road, Tottenham, London, N.15.

LOTUS. (30)

Three-valve receivers for battery, A.C. and D.C. mains working are principally shown. The battery model styled the S.G.P. embodies a screen grid H.F. stage, a detector that delivers a generous signal output and a pentode valve. Selectivity is controlled by alternative aerial tappings, while the circuit reveals volume control in the form of a variable high resistance in the lead to the grid of the S.G. valve. In effect this resistance forms an H.F. potentiometer through the grid to filament capacity of the valve and possesses all the merits of pre-H.F. volume control by which reasonably good selectivity is maintained in the vicinity of a high-power station. The price of the set in oak or mahogany cabinet complete with valves is £12 10s.

Next in the range is the three-valve S.G.P. kit arranged for easy construction, and making use of similar components and circuit to the battery model just described. The price is £6 5s., but this does not include valves or cabinet.

For D.C. or A.C. working there are the S.G.P. all-electric models. Again the circuit remains much the same, but an eliminator is included which, in the case of the A.C. model, makes use of a valve rectifier. In addition a pilot lamp is also to be found on the A.C. set. All-mains working in the case of both models correctly implies the avoidance of grid batteries. An elaboration of this model is the inclusion of a loud speaker in a hous-

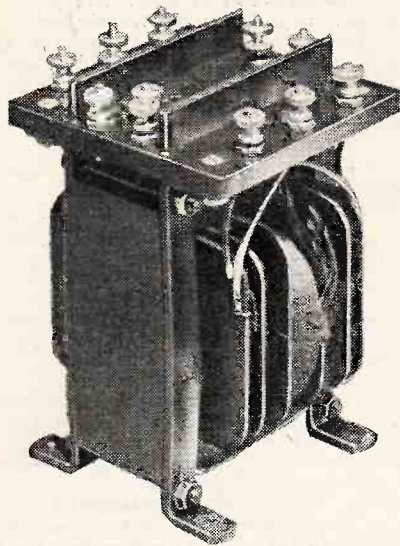


Lotus all-electric transportable set.

ing which forms a hinged lid so that as a mains set it is entirely self-contained, and there are no auxiliaries. This mains receiver is supplied in the A.C. model as an assembled radio-gramophone chassis, the rectifier being built as a separate totally enclosed unit. The ideal set meeting most requirements is a mains operated transportable receiver, and we find such a set in the Lotus range. The set is of the

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vertical cabinet type with front loud speaker, is robust and reasonably portable. It has three valves and a frame aerial and is fitted with the necessary swing-about turntable. Provision is made



Mains transformer for use in eliminator construction (Lotus).

for the use of an external aerial. Further in the range we may inspect console models in various styles and at prices up to £35.

Among components one cannot overlook the well-known Lotus tuning condensers, while of new introduction is a mains transformer for all-mains set construction. With windings for 250-0-250 volts and filament current to rectifier and receiver valves this transformer is priced at 32s. 6d. Differential and reaction condensers, drum dials, inexpensive valve holders, jacks and switches are all well established Lotus components, and are again to be found at the stand.

Garnett, Whiteley and Co., Ltd., Lotus Works, Mill Lane, Old Swan, Liverpool.

"LOUD SPEAKER" CO. (214)

Three- and five-valve portables are the principal exhibits, and both embody distinctive features. The five-valve, for instance, is easily convertible for either A.C. or D.C. mains operation, and when needed for outdoor use batteries may be readily dropped into place. In design the three-valve is one of the most advanced types of portable to be found, in that, apart from modern valves and circuit arrangement, it includes a moving-coil loud speaker of light construction.

"Loud Speaker" Co., Ltd., Palmer Works, 2, Palmer Street, London, S.W.1.

M-L. (222)

This stand is devoted to a display of Anode Converters and Rotary Transformers for stepping-up D.C. and converting D.C. to A.C. for operating A.C. all-electric sets and gramophone amplifiers

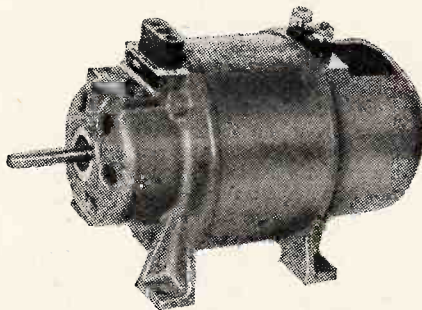
from the D.C. mains. All machines up to 100 watts capacity employ permanent magnets, and a double-wound armature is used. The use of permanent magnet fields are claimed to confer a definite advantage in small machines as the efficiency is generally better and the field coils, often a source of trouble on a small scale, are avoided.

The majority of the models shown this year are familiar in appearance, but some minor improvements have been made in the armature assembly. The principal modification has been fitting both commutator and slip rings on the same end of the shaft, thus leaving the other end free to mount a small fan to maintain a current of air through the armature terminal for cooling purposes.

When using these machines to operate a sensitive receiver interference is sometimes experienced due to commutator ripple and roughness of the supply mains. To overcome this a special anti-interference unit has been developed for each class of machine by means of which it is claimed every trace of interference can be eliminated.

Hand-driven generators for portable transmitting sets are shown and a display of bakelite mouldings of every description is available for inspection.

M-L Magneto Syndicate, Ltd., Victoria Works, Coventry.



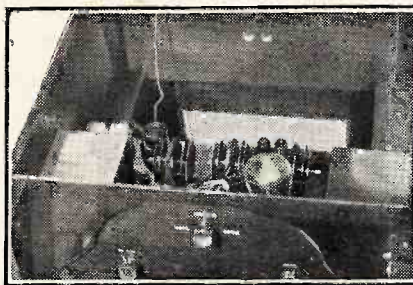
M-L rotary transformer for conversion of D.C. to A.C.

M.P.A. (213)

This firm offers a very wide range of high-grade wireless and gramophone reproducers; there are so many different models that it is impossible to discuss more than one in the present report.

The instrument selected is the "Ethatrope Minor Radio Exchange," for records and local reception only. Although described as "minor," this instrument is capable of an undistorted power output of 2,600 milliwatts, which is handled by the moving-coil speaker incorporated. It is made in both A.C. and D.C. models for all-mains operation. The radio circuit consists of detector, L.F., and power valves, and is fitted with a switch for changing over from one alternative to the other, both of which are pre-tuned by the tuning discs seen in the photograph. The reaction is also independently set for the two stations, and there are two rejector circuits to ensure that each station is received clear of the other. Reaction can be adjusted so that both stations, whatever their

relative power, come in at exactly the same strength, so that the simple turn of the switch is the sole adjustment necessary to turn from one to the other.



Interior of the Ethatrope Minor Radio Exchange (M.P.A.).

In all this company's radio-gramophones, whether more or less ambitious than that described, moving-coil speakers are incorporated.

M.P.A. Wireless (1930), Ltd., 62, Conduit Street, London, W.1.

McMICHAEL. (57)

First class sets are sometimes reduced to a position of secondary importance on a particular stand, by the fact that the exhibitor has created other designs of outstanding merit which, by comparison, must necessarily take precedence when looking for novel features. Thus at the McMichael stand we find the well-known "Super Range Portable Four" which has undoubtedly proved itself one of the most successful of portables. This set remains unchanged except for a modification of the loud-speaker grille.



The well-arranged front control panel of the McMichael mains set.

The new season's set is the McMichael "Mains Three" which, by its general appearance and arrangement of its controls will make a strong appeal to the listening public. Behind its well-finished walnut exterior we find circuit principles of special interest to the enthusiast. The mains screen-grid valve is the Mullard

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S.4VA, one of the most recently introduced valves and capable, with small input, of giving a high degree of H.F. amplification before reaction takes charge to produce regeneration. The detector will deliver a high-signal output by the use of the carefully chosen Mazda A.C./H.L. valve. An enormous undistorted power output results by the use of the super-power pentode, the Mullard P.M.24A, the inclusion of which reveals that a particularly high voltage is delivered from the rectifier in the base of the set. The correct output conditions for the use of this pentode demand a tapped output choke and for this purpose an easily accessible plug and socket allows adjustment of output conditions to be made and the loud speaker and valve impedances correctly matched for best quality. Pre-H.F. volume control is a most desirable feature, yet its incorporation is sometimes avoided owing to the fact that ganging of the tuned circuits may be upset. An examination of the interior of the set reveals an intricate mechanical action whereby the ganging is correctly maintained and the calibration



Interior view of the McMichael three-valve mains set.

held in spite of change of linking with the aerial capacity. Thumb dial and drum dial have disappeared and in their place we find a slow-action knob operating a pointer travelling along an open horizontal scale calibrated in wavelengths to both the long and short wave ranges. This scale facilitates station finding and the settings are inappreciably affected by operation of the reaction control. Uniform illumination of the scale by a long tubular lamp as well as the fitting of a glass dustproof cover are refinements worthy of note. On a panel at the rear of the set we find a socket permitting of the use of gramophone pickup, loud-speaker connector, aerial and earth terminals as well as a changeover plug permitting of the use of the mains as an aerial. Removal of the back to gain access to the interior breaks the mains circuit and exposes, in particular, the

piston-like construction of the compensated volume control.

Of similar general exterior design is the McMichael "Battery Three." It includes all the tuning features associated with the model just described and again incorporates a judicious selection of valves drawn from various manufacturers. In the H.F. stage is the Cossor S.G.220, the new valve with a low interelectrode capacity, the detector is the Osram H.L.210 while in the L.F. stage is the Mazda 230 pentode.



McMichael table model loud speaker fitted with permanent magnet and moving coil.

This year we find McMichael completing the range of their radio equipment by the production of loud speakers. Incorporating the large type Swift Levick magnet referred to elsewhere in these show report pages, the permanent magnet moving coil loud speaker is fitted with a controlling knob at the back which in its various positions correctly matches loud speaker winding to the valve, be it a low impedance power valve or a pentode of comparatively high impedance. The cabinet is walnut and is of first-grade furniture finish. Also enclosed in a walnut cabinet is a cone-type loud speaker with an attractive grille of similar design to that adopted for the super-range portable.

L. McMichael, Ltd., Wexham Road, Slough, Bucks.

MAGNUM. (121)

The "Band Pass Four" is the principal exhibit, being probably the only receiver in the Exhibition embodying the band pass principle throughout its several stages. Built on an aluminium frame, the set is compact and its operating controls are conveniently located. The mains equipment is distributed from under the base, and the battery eliminator is fitted with Westinghouse rectifier.

The range of Burne-Jones components has been extended, and includes multi-contact switches, suitable for use with H.F. circuits and arranged for ganged control, "spaghetti" wire-wound resistances consisting of a wire-wound core run through insulating sleeving and a wire-wound potentiometer. This last men-

tioned component consists of a wire-wrapped thread held in a circular recess and to which reliable contact is made by



"Band Pass Four," built by Burne-Jones.

a floating spring disc. Used for voltage regulation this potentiometer gives a moderately close control as can be tested at the stand where the potentiometer is connected to a voltmeter. The watts rating for these potentiometers is a little more than one in the 50,000 ohm size, and the price is 7s. 6d.

Burne-Jones and Co., Ltd., 288, Borough High Street, London, S.E.1.

MAINTEN. (219)

Mainten eliminators for portable set use are condensed into a case measuring approximately 9in. x 5in. x 3in. in the case of the A.C. model, and 7½in. x 5in. x 3in. in the case of the D.C. type. The A.C. model is enclosed in a blue metal case with nickel fittings, and all exposed H.T. and mains connections are fully insulated. A total output of 20 mA. is provided by the Westinghouse rectifier, and three separate output voltages are available. One is variable between 0 and 80 volts, and two are fixed at 60 and 120 volts respectively. This model is suitable for use in all types of portables up to 5 valves, and including screen-grid valves. The price is £4.

The D.C. counterpart of this model provides identical output voltages at the same total current, and the price is £2 10s. There is also another model,



Mainten D.C. M.50 battery eliminator.

similar so far as the H.T. supply is concerned, but has in addition an L.T. trickle charger incorporated. It is for use on A.C. mains, and charges the L.T. battery at ¼ amp. when the set is not in use. Provision is made to charge 2-, 4- or 6-volt accumulators, and the price is £5 7s. 6d.

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There are two large models for use external to the receiver styled the D.C.M.50 H.T. eliminators and made for D.C. and A.C. supplies. These are for use where a load of 50 mA is required, and two fixed tapplings give 150 volts and "power" respectively, and two are variable between 0 and 100 volts. The D.C. model costs £3 15s., and the A.C., which has in addition an output of 4 volts at 4 amps. for A.C. valves and is fitted with a valve rectifier, costs £5 15s. An A.C. mains trickle charger to charge 2, 4 or 6-volt accumulators at $\frac{1}{2}$ amp. costs £2 7s. 6d. All "Mainten." products are metal-cased, and all "live" parts in contact with the mains are fully insulated.

In addition there is a range of metal cabinets for mains sets and H.T. units and a portable set turntable at 3s. 6d.

Mainten Mfg. Co., Ltd., 22, Gray's Inn Rd., London, W.C.1.

**MANUFACTURERS' ACCESSORIES
CO. (201)**

Although the activities of this firm are mainly concerned with the wholesale distribution of standard products, they are exclusive agents for the "Unique" portable, a detector-L.F. three-valve self-contained set selling at the low price of £5 15s. complete. Cossor or Mullard



M.A.C. "Unique," portable.

valves are fitted as standard. An external aerial may be connected to increase range, although the set is capable of short-range reception when working on its self-contained frame.

Manufacturers' Accessories Co. (1928), Ltd., 85, Great Eastern Street, London, E.C.2.

MARCONIPHONE. (38 & 120)

Although the new Marconiphone four-valve "Console" set (type No. 560) is interesting enough as a good example of

the most advanced principles in circuit design, its constructional features are even more likely to attract attention; it is all too seldom that one sees a wireless receiver built on real engineering lines.



Marconiphone two-valve receiver.

In essentials, the set is a mains-driven combination of two high-frequency stages, grid detector, and pentode output for working on A.C. supply systems. No aerial is needed for ordinary requirements, but may be connected for long-range work. The three tuning condensers are ganged, and we are informed that a system of testing has been devised to ensure that no set is passed out of the works unless perfect synchrony is attained. Tuned-grid H.F. couplings are used between the H.F. valves.

A super-power pentode output valve, coupled to the detector by a transformer, feeds a permanent-magnet moving-coil loud speaker through a transformer fitted with a loading resistance across its secondary.

An ingenious dual-volume control is provided; with regard to wireless signals, it functions by regulation of screen-grid volts. Needless to say, provision is made for using a pick-up, and, for gramophone reproduction, the control operates as an input potentiometer. Both these operations are carried out by rotation of a single knob.

All important components, with the main exception of the ganged condenser assembly, are mounted on an inverted tray, which is the nucleus of the chassis, in such a way that their terminals project through to the underside, where parts associated with anode feed circuits, etc., are accommodated. Almost all wiring is concentrated in one compartment—under the tray—and in consequence is easy to trace.

Components on the upper surface of the tray, such as coils and transformers, are screened by metal covers. Above them are mounted the tuning condensers, which are carried by stout brackets.

The chassis drops into its compartment in the upper part of the console cabinet, and the set is operated from above; its control panel may be completely covered by sliding doors. Cabinet work is fully up to the usual Marconiphone standard, and is in dark walnut without any undue attempt at ornamentation.

Every piece of electrical apparatus and every mechanical device must be subject to the possibility of breakdown; the

Marconiphone Company have realised that neither they nor anyone else can entirely avoid this unpleasant possibility, and so they have devoted much thought to devising a scheme whereby a failure at any point may quickly (and cheaply) be located and remedied. The scheme of construction, as already described, helps greatly towards this object, as everything is accessible, but the new "Colour Code" system of wiring is of even greater assistance.

All earth-potential leads are in black sleeving; heater (or filament) leads, brown; anode leads, yellow; H.T. feed leads, red; grid leads, green; and so on. As soon as this code is memorised it becomes almost as easy to trace circuits direct from the set itself as to read a theoretical circuit diagram; the system is to be adopted from now onwards in all Marconiphone and H.M.V. sets and radio-gramophones.

The Type 560 receiver, as described, costs 38 guineas complete.

There is only one other new receiver—an inexpensive detector-L.F. two-valve set, with a specially designed aerial-coupling circuit to minimise the prevailing trouble of interference. The battery model, which employs a pentode, costs £8 with valves, but without accessories, while the A.C. version has a M.L.4 output valve and is priced at £11 10s. Both sets can be used as gramophone amplifiers, and are mounted in very neat flat polished oak cases.



New Marconiphone Console receiver.

The H.2 Marconi valve, with a voltage factor of 35 and an impedance of 35,000 ohms, is an innovation this autumn. Its characteristics make it specially suitable for grid circuit detection, and its electrodes are supported in such a way that the production of microphonic noises is entirely precluded. The new U.10 power rectifier is capable of giving an output sufficient for the vast majority of sets.

Marconiphone Co., Ltd., 210, Tottenham Court Road, London, W.1.

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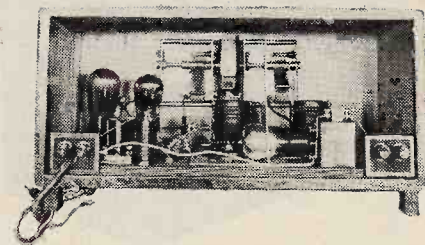
MATCHLESS RADIO MFG. CO. (246)

This firm specialises in the manufacture of coils and tuner units for set makers. A comprehensive display of cabinet work of all kinds is also shown, including loud-speaker cabinets, receiver cabinets, and radio-gramophone consoles.

Matchless Radio Mfg. Co., 105, Great Eastern Street, London, E.C.2.

MULLARD. (36 & 101)

The most important exhibits on this stand are valves for every purpose. In view of the widespread interest in all-mains receivers it is interesting to note that there is a number of new A.C. valves in which special attention has been



Mullard 1931 Orgola kit set.

given to the output stage! The cathode of an indirectly heated valve is generally long, and, furthermore, is maintained at the same temperature throughout its length. It is difficult, therefore, by virtue of the restricted area occupied by the grid, to control completely the electron stream, which leads to curvature at the lower end of the anode current/grid volts characteristic. This shortcoming hardly matters in valves of small output, but for heavy power output a limitation is imposed on the linear working of the valve.

The output valve of a receiver obviously has no subsequent amplification, therefore, provided its filament is thick and does not respond to the frequency pulses of A.C. mains, it is not necessary to include the complication of an independent emitter. These considerations have led the Mullard Company to produce a series of directly heated valves with filaments consuming 1.0 amp. at 4.0 volts. A further advantage of this design is that so long as the mains transformer has a separate winding for the output stage, automatic grid bias with almost perfect decoupling can be arranged.

The AC.104 belongs to this new class, and has the high mutual conductance of 3.5, an amplification factor of 10, and an A.C. resistance of 2,850. The AC.064 and the AC.044 are also output valves with filaments having the same consumption; the same high mutual conductance is maintained, but the A.C. resistance is even lower, being in the case of the AC.044 but 1,150 ohms. It is now a case of buying a moving-coil loud speaker of fixed impedance and having a wide range of output valves from which to choose the correct A.C. resistance. The undistorted A.C. output of these three valves

in the order that they have been mentioned varies from about 900 to 1,300 milliwatts. The PM.24B—a pentode with an enormous power output—also belongs to the type with heavy directly heated filament. The maximum anode and screen voltage are 400 and 300 respectively.

Among the new screen-grid valves, mention should be made of the S4VA and S4VB, both having A.C. resistances lower than that of the S4V. These two valves, which have the remarkably low inter-electrode capacity of about 0.0015 mmfd., have been manufactured in response to a demand for a range of screen-grid valves in which a variety of A.C. resistances can be chosen to suit the characteristics of some specific coil which the designer may have in mind. The S4VB, for instance, has an A.C. resistance of 250,000 ohms, and the highly satisfactory mutual conductance of 3.5 mA. per volt. When an S.G. valve has a high mutual conductance and a negligibly low interelectrode capacity, the stage amplification is only limited by the dynamic resistance of the tuning systems and the imperfections of external screening. It should be possible with the new Mullard screen-grid valves—which have indirectly heated cathodes—to attain stage gains of 400 to 500 with carefully designed circuits. The well-known 354V valve, which has excellent characteristics for power grid detection, is now being manufactured with improved characteristics; the maximum anode voltage has been increased to 200, and the A.C. resistance reduced to 11,700, raising the mutual conductance to 3 mA. per volt. The 164V and the 104V can also be used with 200 volts H.T.

One of the new season's "Orgola" kit sets to be seen on the stand, and concerning which copiously illustrated literature is provided, contains three valves. The popular combination of a screened high-frequency stage followed by a regenerative detector and transformer-coupled pentode is adhered to. Single dial tuning is arranged with provision for slight adjustment of one tuned circuit should synchrony not be maintained. The aerial tuning system contains a loose coupler, while wave-changing is effected by ganged switches. A differential condenser affords a smooth control of reaction. A second kit set containing two S.G. stages is being shown. Here again ganged tuning is provided and comprehensive screening for the coils is arranged. The detector and L.F. circuits are similar to those of the three-valve set.

Mullard Wireless Service Co., Ltd., Mullard House, Charing Cross Road, London, W.C.2.

MURPHY RADIO. (252)

This stand is devoted to a single portable receiver upon which the resources of the firm are at present concentrated.

Housed in a walnut cabinet of distinctive design with a projecting ledge upon which to rest the hands while tuning, the circuit consists of a screen-grid H.F. stage, detector, and two transformer-coupled L.F. stages. From a technical

point of view this set is specially interesting, as the two tuned circuits are accurately ganged, while the resulting single-control calibrated in wavelengths should make a special appeal to the layman.

A 108-volt H.T. battery rated at 12 mA. is supplied, yet the average current consumption has been reduced to approximately 8 mA. without sacrificing quality of reproduction. The L.T. accumulator is mounted on an acid-proof rack to prevent damage to the cabinet through acid creeping over the outside of the cell.

Provision is made for an external loud speaker, and a gramophone pick-up jack is also fitted. The price, including valves, batteries, and turntable is 17 guineas. A waterproof case and carrying straps are available as an extra.

Murphy Radio, Ltd., Broadwater Road, Welwyn Garden City, Herts.



Murphy portable and waterproof carrying case.

NATIONAL. (39)

The unfamiliar name of this firm must not be taken to indicate that it is a new company, with all its experience yet to gain, for it has behind it the combined resources of Messrs. Peto and Radford and the Hart Accumulator Company, who have joined forces.

They offer "Dagenite" accumulators, both high and low tension, for all wireless purposes. The majority of the low-tension accumulators, except slow-discharge types, can be had either with or without the "Tell-Tale" device incorporated. This consists of three coloured pellets, each housed in a separate groove, which float or sink according to the specific gravity of the electrolyte, and so give a visible indication of the state of the charge of the cell.

A good range of high-tension accumulators in glass containers is also shown.

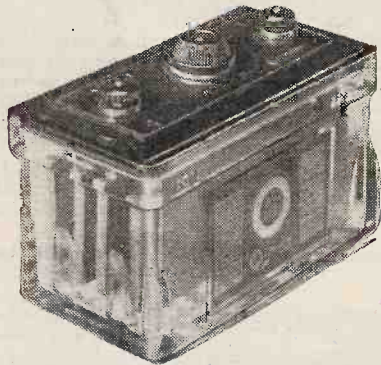
National Accumulator Co., Ltd., 50, Grosvenor Gardens, London, S. W. 1.

OLDHAM. (64)

"O" type cells are the feature of this exhibit. These cells embody several novel features of construction, and in

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particular include unusually heavy negative plates, while the positives are built in twin form. The purpose of this modification is to obviate the slow charge and discharge rates of the "mass type" accumulator. On the other hand the use of the normal interleaved plates often results in sulphation, owing to the insufficient use made of the battery and the fact that there is a danger of working it to a state of complete discharge. By



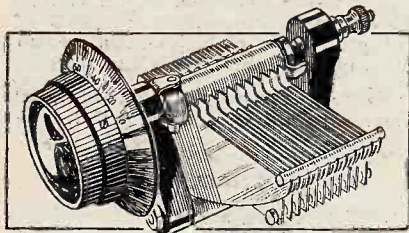
"O" type Oldham cell of squat dimensions, showing the new plate construction.

way of comparison with the mass type accumulator, a recharge which would normally take forty hours is given as eight for the "O" type. Supplied dry charged the addition of acid will result in the battery delivering 70 per cent. of its rated capacity before recharging. The "Oldham" range of batteries in glass and celluloid cells includes the well-known air-spaced H.T. cells as well as special types of unspillable accumulators in celluloid cases for use in portables.

Oldham and Son, Ltd., Denton, Manchester.

ORMOND. (75)

The reputation of the Ormond Engineering Co., Ltd., as manufacturers of variable condensers is well maintained by their new model No. 4. Log-law aluminium vanes mounted on slotted spindles are assembled between massive end pillars of high-grade bakelite. Special attention has been given to the question of rigidity, and it is impossible to make the vanes touch by twisting the end plates. Smooth action is ensured by friction washers and pads, and the slow-



New Ormond No. 4 condenser.

motion model selling at 6s. is fitted with a ball-bearing reduction gear. The plain type costs only 4s. in all capacities. For those who prefer an external slow-motion dial a new model Type R/360, with a reduction gear of 10 to 1, has been introduced at 2s. 6d. Another interesting dial is the "Duo D.I.D."; this is the well-known dual indicating dial with a central knob giving a direct drive in addition to the slow-motion control.

The well-known 4-pole adjustable loud speaker unit is the foundation of a new corner cabinet loud speaker retailing at 79s. 6d. in oak.

In addition to the "Screened Grid Portables" in cabinet and suit-case form, a new "Mains Transportable Screen-Grid Three" has been produced for 1931.

Ormond Engineering Co., Ltd., Ormond House, Rosebery Avenue, London, E.C.2.



Ormond corner cabinet loud speaker.

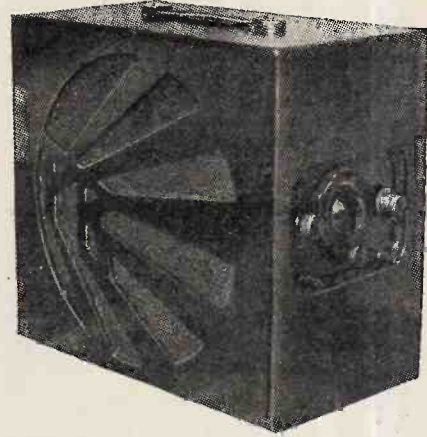
OSBORN. (258)

Ready-to-assemble cabinets, polished or plain, and in all types of wood likely to be required form the chief exhibits on this stand. In addition, there is a comprehensive range of table, pedestal, radio-gramophone and loud-speaker cabinets in all sizes and shapes. This firm supply prepared wood for home construction, sawn to size and cut to any length. A full range of loud-speaker frets is also shown.

Chas. A. Osborn, Regent Works, Arlington Street, New North Road, London, N.1.

P.R. PRODUCTS. (224)

P.R. Products include a comprehensive range of three- and four-electrode valves in the 2-, 4- and 6-volt class; screen-grid H.F. valves and super-power output valves are included. There is an A.C. H.T. eliminator with Westinghouse metal rectifier giving 90, 100 and 120 volts at a load not exceeding 20 mA. The output voltages are not variable, and the price is £3 10s.



P.R. Products three-valve portable receiver.

Other interesting items include sets of parts to build a loud speaker, a range of loud-speaker cone diaphragms, and a 3-valve transportable set priced at £7 7s. The circuit consists of a leaky-grid detector followed by two transformer-coupled stages, and the wave range is from 200 to 2,000 metres. Three other variations of this model are available, a de luxe at £9 9s., mains version, including L.T. trickle charger and a de luxe mains set at £15 15s. This includes a trickle charger also.

P.R. Products, P.R. House, Newgate Street, London, E.C.1.

PANDONA. (218)

The exhibits on the Pandona stall consist entirely of portable receivers, of which three models are offered. The "Standard Five" and "Super Five" use the same chassis, employing two aperiodic H.F. stages; the former consumes 7 milliamps. only, while the latter has a super-power valve in the output stage and draws a total of 10½ milliamps. from a larger battery. The "S.G. Four" is a companion receiver to the "Super Five," employing a tuned screen-grid stage in place of the aperiodic amplifier.

Pandona, Ltd., 184, Aston Road, Birmingham.

PAREX. (227)

Screening boxes of various sizes, together with inter-circuit screens of different shapes and dimensions are shown on this stand. There are also aluminium receiver chassis of several different designs.

Stand-to-Stand Report.—

Coils for the "Band Pass Four" and other receivers described in this journal are available.

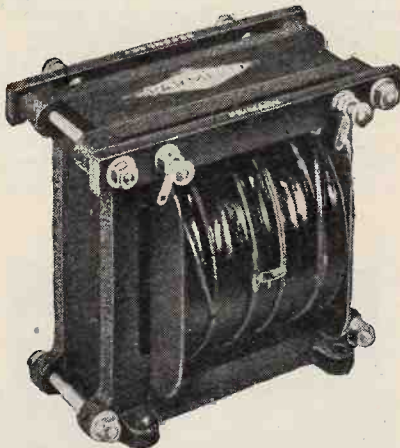
Among other new products are aluminium panels with an imitation wood surface, differential reaction condensers with air dielectric, television scanning discs, and an H.F. choke selling at 3s. 6d.

E. Paroussi, 10, Featherstone Buildings, London, W.C.1.

PARMEKO. (248)

The products of this firm have always exhibited what can truly be described as sound radio practice. Their mains transformers and chokes, the range of which has been added to this season, still show the same high standard as is evident from an inspection of their efficient voltage regulation curves.

An interval transformer, with constant inductance primary, merits attention. Although with no D.C. passing, the inductance of the primary is 86 henrys, when 15 milliamps. are passed the inductance drops to only 75 henrys. To produce this constancy the core is gapped and it must not be forgotten that sudden changes of A.C., such as are obtained with transients, do not materially affect the inductance. It is, therefore, claimed—and probably with some justification—that the definition in the reproduction of certain instruments is improved. For power grid detection where large anode currents are to be expected, this transformer, which can handle 15 mA., should be most valuable. The ratio is 2 to 1, and the price, 35s. A mains



Parmeko constant-inductance L.F. transformer.

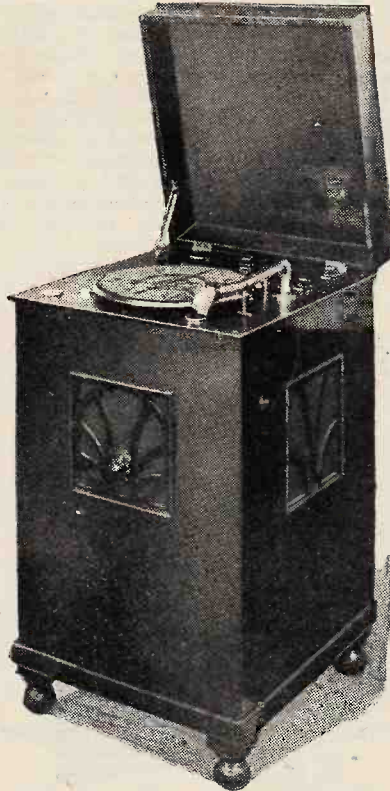
transformer of universal application with three valve all-mains sets is Type 2 D/I. The secondary delivers 260-0-260 volts 40 mA., 5.5 volts, and 4 volts 3 amps. The windings are centre-tapped. Such a transformer will feed a modern S.G. set with a power triode or power pentode in the output stage. A complete range of transformers wound to suit the popular type of Westinghouse metal rectifiers, including the new H.T.5, H.T.6, and H.T.7 is now available. Those who con-

template the use of heavy output valves should not fail to examine a series of special chokes of remarkably low D.C. resistance.

Partridge and Mee, Ltd., 74, New Oxford Street, London, W.C.1.

PERFECTAVOX. (241)

Radio-gramophones exhibited by this Company have not only the outstanding merit of superb finish but also conform to the very latest practice in circuit design.



Perfectavox Minor radio-gramophone.

The "Minor," selling at 47 guineas, represents good value for money. It is an all-mains model for use with an outside aerial or, where the latter is difficult to erect, the mains may be pressed into service. The input to the radio portion of the set is connected to a series aerial condenser and this, in turn, is connected to the tuned-aerial transformer. The first valve is a Mazda AC/SG, which is coupled by an H.F. transformer to an AC/HL, working on the anode bend principle. In order to keep H.F. currents out of the L.F. amplifier a choke, with a condenser at either end connected to earth, is employed. The detector is coupled to a Mazda AC/PEN by a 7 to 1 step-up transformer. A tone control and an impedance-limiting device are included, and the circuits are screened and decoupled with the greatest care. We listened to a demonstration of this radio-gramophone and were most impressed by the large undistorted output that was obtainable from the moving-coil

speaker housed in the lower part of the cabinet. The tone control was effective in that the brilliance of high notes could be retained, for instance, during certain passages of dance music and could be slightly suppressed with a soprano voice.

Perfectavox, Ltd., Alexandra Works, High Street, Yeadon, near Leeds.

PERTRIX. (243)

Pertrix dry-cell H.T. batteries need no introduction, their propensities towards longevity being well known, and a wide and varied range of these batteries forms the principal exhibit on this stand. The standard capacity sizes, for which the discharge current should not exceed 12 mA., are shown in 60-, 90-, 100-, and 120-volt units, and prices range from 8s. to 15s. 6d. The super capacity size will withstand a discharge of 20 mA., and these are made in 60-, 100-, 120-, and 150-volt units. In this class the prices are 13s., 21s., 25s. 6d., and 31s. respectively. A battery of this capacity will meet most requirements, as the current taken will usually fall within its economical discharge rate.

Where a super-power output valve is employed it will generally be found more satisfactory to use the heavy duty, or possibly the super heavy duty type, as the first mentioned will comfortably cope with current demands up to 30 mA., while the last mentioned may be discharged at 50 mA. or over. The super class is made in 45-volt units only, tapped at the mid point and the price is 19s. 6d. each.

In addition to the supply of H.T. power, Pertrix, Ltd., are providers of L.T. power and a wide range of filament accumulators are shown in glass, celluloid and ebonite containers. These are identified by the distinguishing letters P X G, for glass, P X C for celluloid, and P X E for ebonite containers.

Pertrix, Ltd., 233, Shaftesbury Avenue, London, W.C.2.



Pertrix 40 ampere hour L.T. accumulator.

Stand-to-Stand Report.—

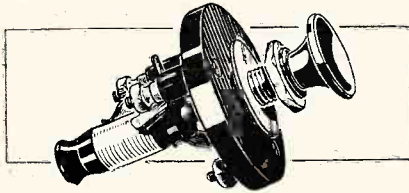
PETO-SCOTT. (110)

Visitors to this stand may see a fully representative selection of the new season's sets and components by leading manufacturers. "Pilot" Kits of parts for home construction are a special feature of the stand.

Peto-Scott Co., Ltd., 77, City Road, London, E.C.1.

PIONEER. (226)

This stand is devoted almost exclusively to switches. They are of the plunger type, and are suitable for "on" and "off," wave-change switching, or



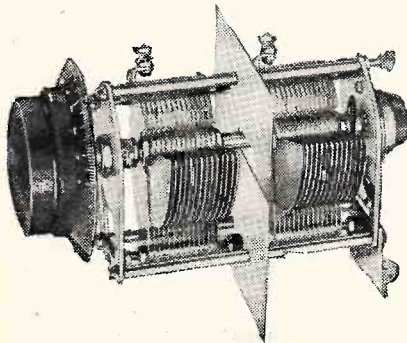
The Pioneer switch.

for the introduction of gramophone pick-up. Careful examination reveals several good points, such as the increasing of the pressure of the spring blades at the time of making contact, generous contact area, ebonite insulation, turned and polished operating knob, soldering tag as part of spring blade, and slotted as well as hexagon terminal heads—in fact, all those many little points that make a switch reliable. Prices are from 1s. 3d. to 2s. Reversible indicating plates are included as well as a nickel-plated cover washer. Midget type condensers are also exhibited.

Pioneer Mfg. Co., Cromwell House, Fulwood Place, London, W.C.1.

POLAR. (118)

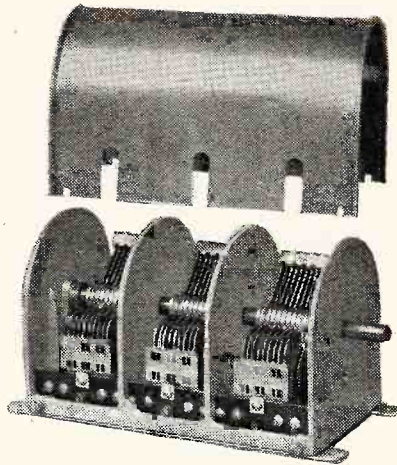
This company specialise in the manufacture of variable condensers, to which quite recently has been added some of the semi-variable compression type designated the "Polar Pre-set" condenser, of which two types are made; one with a maximum capacity of 0.001 mfd., and



Polar two-gang condenser, with screen.

the other 0.0005 mfd. The price is 2s. in each case. This year there is a larger display of ganged condensers, a sure sign that simplification of control is the aim of every set manufacturer.

A neat and easily fitted assembly is the new loose spindle universal type all-brass condenser, which can be fixed to the baseboard or partitioning screens as required. The moving vanes are assembled on a hollow shaft, through the centre of which can be passed a 1/4 in. spindle, thus linking together two or more condensers in gang formation. A small grub screw serves to fix each set of moving vanes to the common spindle. Thus it is a simple matter to adjust each set separately to ensure satisfactory ganging. The condensers are listed as separate items or in gang form, the prices being 7s. 6d. single, 15s. 2-gang, and 22s. 6d. 3-gang. These prices do not include the dial. The Polar "Disc Drive" is suitable for single or ganged assembly, where the condensers are at right angles to the panel. The price of this is 5s.



Polar Tub Three-Gang condenser.

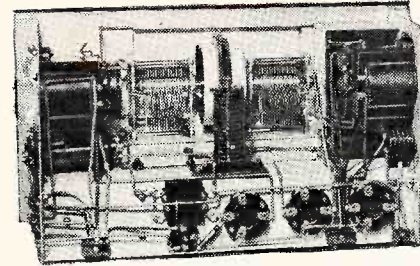
There is shown also an improved slow-motion drum drive, with knob control, which is located centrally below the scale. This can be fitted to any combination of gang assembly, or to any condenser with a 1/4 in. spindle, which is mounted parallel to the front panel. The price is 8s. 6d.

Another interesting assembly is the "Tub Three-Gang" condenser. This consists of a three-compartment die cast aluminium container with removable cover, and in each compartment is mounted a 0.0005 mfd. condenser with trimmer. All condensers are accurately matched, the capacities being guaranteed to within 1 micro-microfarad up to one-fifth of the total capacity in each case, and then to within 1 per cent. over the remainder of the scale. The price of this unit is 45s.

Wingrove and Rogers, Ltd., 188, Strand, London, W.C.2.

PORTADYNE. (74)

The "Portadyne" portable receiver contains one stage of tuned screen-grid amplification, a detector, and two transformer-coupled L.F. stages. The compact layout of the chassis can be appreciated from the illustration. The output valve is an Osram 240, feeding a "Celestion" loud speaker. The anode-



Chassis of the Portadyne portable receiver.

current consumption is 7 1/2 milliamps. at 108 volts, and the set, weighing 28 lb. complete, sells at 22 guineas.

Whittingham, Smith and Co., Portadyne Works, Chase Estate, Park Royal, London, N.W.10.

PYE. (31 & 32)

We have by now got into the habit of looking forward to something rather exceptional in the Pye exhibit; the firm has certainly not failed us this year, as a big step forward has been made by the designers of their self-contained sets for 1931. Gone are the two aperiodic H.F. stages of tradition, which, as often as not, amplified only by virtue of stray reaction; in the new "Twintriple" range of receivers we find an up-to-date H.F. amplifier with two tuned H.F. stages and a stated overall amplification of from 1,000 to 1,500 times. The tuning condensers for these circuits, as well as that for the frame aerial, are operated by a single control;



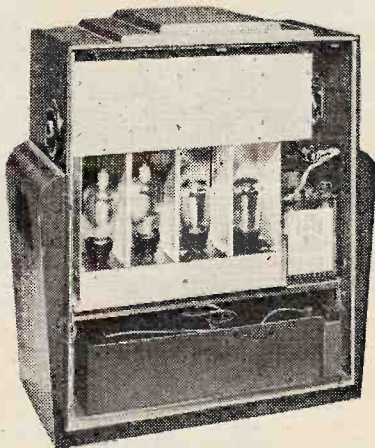
Pye transportable set, a new product.

Stand-to-Stand Report.—

there is a trimming condenser with an external knob, to allow correction to be introduced into the input circuit when necessary—as it may be, for instance, if the set is operated close to large masses of metal. It is stated that this correction, once made, will hold good over the entire tuning range.

There is no reaction control in the ordinary sense, so the finding of any station within range is merely a matter of turning a single knob. A certain measure of regeneration can, however, be brought into play by manipulation of the volume control, which regulates screening grid voltage for the H.F. valves.

Anode bend detection is embodied in the battery set, while the A.C. model includes a power grid detector. There is a single L.F. stage, of which the output, where A.C. valves are used, amounts to as much as 600 milliwatts. A gramophone pick-up can be used, and provision is made for connecting an external loud-speaker. Both medium- and long-wave tuning scales are directly calibrated in wavelengths.



Interior of the Pye portable.

Constructionally, the sets have the appearance of a sound engineering job. The chassis system of building is followed, and, naturally enough, screening is exceptionally thorough. Coupling coil assemblies for each circuit are mounted in a separate compartment, and, in addition, are "potted" in metal containers. These precautions are taken as much to avoid any alteration of inductance by external influences (with consequent ill-effects on the constancy of the ganging system) as to avoid harmful interaction.

Externally, appearance is up to the usual Pye standard. Where full portability is required, a carrying handle of the conventional type is fitted, but where it is merely intended that the set shall be moved from room to room, heavy ebonised wooden "wings," with recessed hand grips, are screwed to each side of the cabinet: these additions have the effect of considerably improving its proportions from the artistic point of view. Naturally, the A.C. model is supplied only in

"transportable" form. The cabinets are finished in figured walnut.

With regard to cost, the battery and A.C. receivers are priced, respectively, at 22 guineas and 28 guineas complete. A special Celestion loud speaker is fitted.

There is also a new A.C. radio-gramophone, embodying the highly successful "All-Electric Three" receiver, which is an H.F.-det.-L.F. set with many interesting features. This instrument is fitted with a B.T.H. permanent magnet moving-coil loud speaker, a Garrard electric motor, and an Edison Bell pick-up, and is sold at 60 guineas.

Pye Radio, Ltd., Paris House, Oxford Circus, London, W.1.

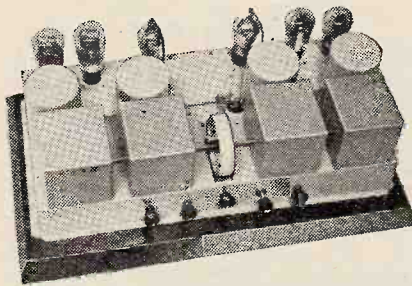
R.G.D. (126)

The R.G.D. radio-gramophones have many points of interest, both with regard to their circuit arrangements and to details of their construction. Visitors to Olympia have an opportunity of judging the excellent quality and very considerable volume afforded by these instruments, as they are being operated in a demonstration room adjoining the stand.

Referring to the new "de luxe" type, models for A.C. and D.C. mains are produced. For purposes of description, these may be considered as one; their general specification is identical except for the output stage.

A capacity-coupled input filter precedes the two H.F. amplifying valves; the present writer cannot claim to have yet examined all the apparatus in the exhibition, but believes that there are few, if any, other instances where this highly satisfactory method of tuning is employed. All four variable condensers are ganged. A power grid detector is followed by two L.F. stages.

In the A.C. receiver, two Mullard D.O.25 valves are used in parallel, while in the D.C. version, where lower anode voltages are available, A.C.P.1 valves are substituted.



Receiver chassis of R.G.D. radio-gramophone.

The post-detection volume control is ingenious, though extremely simple, and serves also as a change-over switch from "radio" to "gramophone." By using a centre-tapped potentiometer with its mid-point earthed, matters are so arranged that signals from either source can be faded in or out at will without any annoying clicks. Pre-detection volume control is effected by variation of screening grid voltage.

R.G.D. radio-gramophones are fitted with an effective form of tone correction device which gives a wide range of control.

With regard to construction, a fairly conventional chassis system is employed, but all moving parts, such as linked-switch gear, are unusually robust, and so are unlikely to give trouble. All wiring and such components as decoupling resistances, etc., are concealed under a sub-base, on top of which are mounted the variable condensers and coil assemblies; these are "potted" in individual metal containers. Rectifying and smoothing equipment is built into an entirely separate chassis, which, on assembly, is mounted below the receiver proper. Moving-coil loud speakers are fitted to all models; and, in the matter of price, these instruments compare very favourably with others having a much less ambitious specification.

Radio Gramophone Development Co., 72, Moor Street, Birmingham.

R.I. (61)

The features of outstanding interest on this stand may be divided under three main headings: (1) The Madrigal All-Electric receivers. (2) Two new H.T. units. (3) L.F. transformers and chokes with nickel iron cores.



The R.I. tapped choke.

The basic circuit of the three-valve Madrigal, which was originally introduced more than a year ago, has given such consistently satisfactory results that it has been decided to retain it with certain important improvements for the coming season. In the output stage one of the new Mazda AC/PEN power pentodes has been substituted for the power valve originally used and the anode voltage has been increased by about 30 per cent. This has resulted not only in a greater reserve of power handling capacity, but also in a considerable increase in the overall sensitivity of the set. The loud speaker is coupled to the pentode through the medium of a centre-tapped "Hypercore" choke. An additional choke of the same type has also been included in the H.T. smoothing circuit with the object of removing the last trace of 50-cycle hum. The ganged tun-

Stand-to-Stand Report.

ing condensers have been redesigned and are excellent examples of precision tool making. Visitors to the stand will be able to inspect these in the specimen chassis on view. Incidentally, the condenser dial is now calibrated directly in wavelengths and is illuminated by a pilot light. Provision is now made for the attachment of a gramophone pick-up, the change-over switch from radio to gramophone being situated on the terminal panel



R.I. mains H.T. units, A.C. and D.C. types.

at the back. The same volume control serves for both sources of input. The compact appearance of the receiver when mounted on its moving-coil loud speaker pedestal cannot fail to create a favourable impression, while the cabinet work—particularly in the walnut model—is of the highest possible standard. The receiver alone for either A.C. or D.C. costs £30, and the pedestal with moving-coil loud speaker, 18 guineas for A.C. and 15 guineas for D.C. mains.

The two new mains H.T. units are of exceptionally neat and compact design. The cases are of moulded bakelite with well disposed ventilation louvres, and the terminal sockets are arranged in accordance with the I.E.E. recommendations so that the units are virtually shockproof. Each model has three independent output tapings as follows:—(1) Fixed power output 140 volts, 20 mA. (2) Variable voltage 0-150 for detector. (3) Screen-grid voltage 60 to 80. Anode current for intermediate L.F. stages or H.F. valves is best derived from the power tapping through suitable decoupling resistances. Alternatively, the "Det." socket may be used, as the full output current of 20 mA. may be taken from this source if necessary. The dimensions of the A.C. model, which incorporates the latest type of Westinghouse rectifier, are 9in. x 5in. x 3in., so that the eliminator can be housed in the space normally occupied by the H.T. battery. The D.C. model is even smaller and measures only 6in. x 4in. x 3in. Not the least attractive feature of these units is the price; the A.C. model retails at £4 15s. and the D.C. at £2 12s. 6d.

Radio Instruments, Ltd., have consistently advocated the use of nickel iron alloy in the cores of L.F. chokes and transformers, and have done a good deal of pioneer work in bringing this class of component to its present high standard. In addition to the "Hypermu" L.F. transformer which was exhibited at Olympia last year, the nickel-iron series now includes the following:—(1) The "Hypermite" L.F. transformer measuring only 2½in. x 1½in. x 2¼in., weighing

7oz. and giving a primary inductance of 50 henrys. (2) The "Hypercore" L.F. choke with an inductance of 20 henrys at 50 mA. and a maximum inductance of 30 henrys. (3) The "Pentomite" output choke specially designed to work with the A.C. power pentode in circuits such as "The Wireless World Regional One." This choke has a larger core than the "Hypercore" and gives inductances of 60 henrys at 10 mA. and 45 henrys at 50 mA. (4) Variable ratio output transformers for anode currents up to 50 mA., and a similar series for push-pull output stages.

A notable addition has been made to the series of transformers designed for use in conjunction with Westinghouse metal rectifiers. This is the E.Y. 20, which supplies the new Type H.T.5 rectifier and is to be sold at the extremely reasonable price of 17s. 6d.

Radio Instruments, Ltd., Purley Way, Croydon, Surrey.

R.L.S. (228A)

While an early visit after the opening of the Show did not allow of an inspection of the internal construction, one was



R.L.S. loud speaker.

afforded an opportunity of listening to one of the new loud speakers of this new exhibitor. The results were strikingly pleasing with good upper register and absence of obvious predominance of certain frequencies. It is interesting to note that the loud speakers shown are said to be fitted with a movement incorporating a wire-wound armature. The field may be of the permanent magnet type or, in the larger models for cinema use, a current energised field is provided. It would seem that the armature is capable of acquiring a generous displacement, whilst there is probably no lack of sensitiveness. The cabinet work examined was well finished, and the price of the home model is £4 4s.

Radio Loud Speakers, Ltd., Cranmer Works, Cranmer Court, High Street, Clapham, London, S.W.4.

RADIO SERVICE. (235)

Listeners who are not fortunate enough to have electric light mains in their

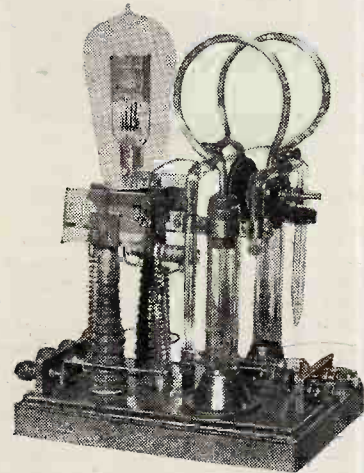
houses and live within a twelve miles radius of Charing Cross will welcome a comprehensive service scheme for both low-tension and high-tension accumulators. As an example, an exchange scheme every month at the rate of 14s. 10d. a quarter can be arranged in respect of a C.A.V. H.T. accumulator having a voltage of 120 and a capacity of 2,500 mA. hours. It is claimed that under given discharge conditions the cost is less than the purchase price of the number of small dry batteries which would be necessary during a quarter.

Another example, in this case a L.T. accumulator exchange scheme: for fortnightly exchange the rate per quarter would be 4s. 6d. for a 2-volt accumulator of any capacity and 7s. 6d. for the 6-volt type.

Radio Service (London), Ltd., 105, Torriono Avenue, Camden Town, London, N.W.5.

**RADIO SOCIETY OF GREAT
BRITAIN. (229)**

This stand is observed to be the rendezvous of radio enthusiasts and particularly those interested in experimental and communication work. Readers will be interested in the specimen apparatus shown, which includes a 1.0 to 1.5 metre transmitter. The set, which is shown in the accompanying illustration, was built by Mr. J. Noden (G.6TW) of Nantwich, who was the winner of the Wortley Talbot Trophy this year for his pioneer work on ultra-short waves. It will be remembered that in conjunction with Mr. E. T. Somerset (G.2DT) he was probably the first to establish 5-metre two-way



The 1 to 1.5 metre transmitter on the Radio Society's stand.

working. Mr. Somerset's 5-metre transmitter-receiver is also shown as well as the Society's short-wave set. The stand is manned by such members who are able to afford the time, and information is willingly given on experimental problems, particularly those associated with short-wave work.

Radio Society of Great Britain, 53, Victoria Street, London, S.W.1.

Stand-to-Stand Report.—

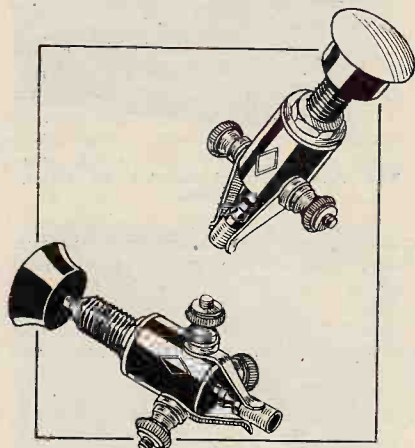
READY RADIO. (238)

The chief products of this company are components, of which a very comprehensive range is shown. There are variable condensers with air-dielectric and bakelite dielectric, the latter more suitable for reaction control than tuning, heavy-duty wire-wound resistances, and numerous examples of coils for all purposes. In addition, complete constructor's kits, receivers and a range of cabinets, are shown.

Ready Radio (R.R., Ltd.), 159, Borough High Street, London Bridge, S.E.1.

RED DIAMOND. (138)

The activities of this firm are devoted almost entirely to the production of small but useful components. There is a new 3-point switch which has been designed especially for wave-change switching of inductances. A two-point switch



Red Diamond switches.

with a decided snap-action is also available, and sells at 1s. 3d. A useful accessory selling from 2s. to 3s., according to length, is an ebonite-shrouded combined lead-in tube and lightning arrestor; a third contact near one end of the component is connected to earth.

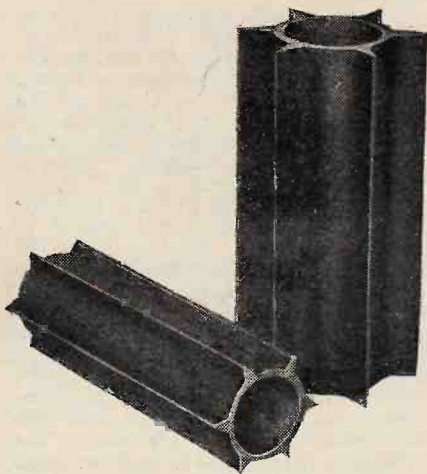
Besides a number of turned ebonite knobs of high finish there is a complete range of bushes, both threaded and plain, which can be used to insulate spindles passing through metal or wood.

Jewel Pen Co., Ltd., 21-22, Great Sutton Street, London, E.C.1.

REDFERN. (204)

Ebonite panels, coil formers, H.F. choke formers, and lead-in tubes are to be found on this stand. "Ebonart" radio panels with guaranteed non-metallic surface can be had in various finishes, cut to standard dimensions. A surface which is highly attractive in moiré silk; panels of which cost only a few pence more than plain finish. "Ebonart" panels are also available with a polished mahogany finish, and a type known as "Bulwark" can be had with a wavy

surface. Readers of this journal need hardly be reminded of the excellent dielectric properties of ebonite. Inductances wound on ribbed formers where



Redfern coil formers, a deep ribbed model is shown on the right.

the turns are mostly air-supported have a remarkably high dynamic resistance at resonance. Deep-ribbed formers are being shown, which facilitate the construction of section-wound coils of high efficiency. They are also useful in constructing H.F. transformers in which the primary turns are sandwiched between the secondary sections.

To avoid damage due to the corrosive action of sulphuric acid the Redfern accumulator tray made of acid-resisting rubber should prove extremely useful. There are various sizes retailing from 1s. 6d. to 3s. 3d.

Redfern's Rubber Works, Ltd., Dawson Street, Hyde, Cheshire.

RED STAR. (109)

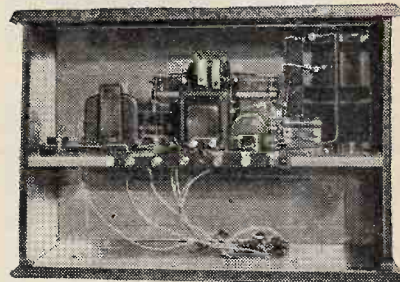
Red Star Radio, Ltd., are specialising in the production of straightforward detector-L.F. receivers at prices so low as to have seemed impossible even as little as a year ago.

The three-valve model embodies a detector, normally functioning on the grid circuit principle, followed by two trans-

former-coupled L.F. stages. Provision is made for an easy change-over to anode bend detection; as pointed out by the makers, this is often beneficial when the set is operated close to a powerful station or when interference from electrical apparatus or power circuits is experienced.

As sent out, the receiver is completely screened, but a part of the metallic shielding may easily be removed if desired. There are alternative tappings on the aerial coil, so that coupling may be adjusted to suit the user's requirements in the matter of selectivity. The tuning inductance is wound on a ribbed former of large diameter. Tuning and reaction condensers—the latter is of commendably high capacity—are operated by edgewise dials. One always suspects the variable condensers in a cheap receiver, but in this case such suspicion is not justified; the components fitted work exceptionally well and smoothly. The remaining control is a three-position switch for the filament circuit and wave-band changing.

Wood and metal in combination are used in the construction of the containing cabinet, of which the front and top are



Interior of Red Star three-valve receiver.

of oak; the sides and the entire lower portion are of metal, finished in a neutral colour. There is space for batteries in the lower part of the cabinet.

Telsen components are used throughout in the construction of this receiver, which costs only 84s. A similar two-valve set (detector-L.F.) is produced at 63s., and seems to offer as good, or even better, value for money than the three-valve receiver.

Red Star Radio, Ltd., Aston Road, Birmingham.

REES MACE. (117)

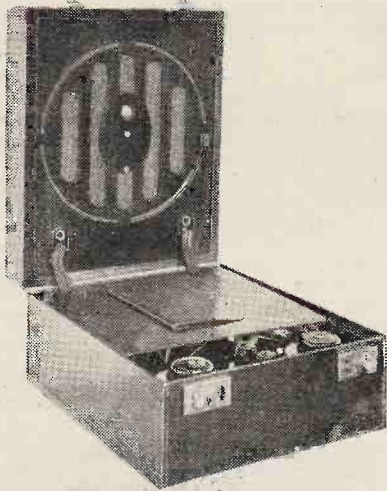
It is difficult to believe that there is a lighter or more compact portable set than the "Gnome," weighing but 20 lb. and measuring 13in. x 11in. x 6½in. In spite of the restricted space there has been found room for no fewer than four valves and a 99-volt H.T. battery, to say nothing of a 2-volt 16 amp.-hour jelly acid accumulator, giving 30 listening hours per charge. The tuned anode method of coupling is used between the screen-grid valve and the detector, and two "Hypermite" transformers couple the L.F. stages. The total anode current taken by the valves is 6 mA., of which



Red Star receiver.

Stand-to-Stand Report.

0.75 mA. passes through the primary of the first L.F. transformer and 1.25 mA. through the second. The equipment includes an H.T. fuse and a jack for the connection of an external aerial and earth. The price of this receiver is 19 guineas.



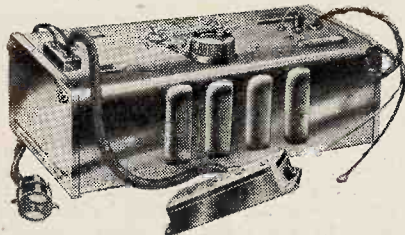
Rees Mace Gnome portable set.

The "Tourist Seven," selling at 39 guineas, is a seven-valve super heterodyne suit-case portable, weighing only 35 lb.

Rees Mace Mfg. Co., Ltd., 39a, Welbeck Street, London, W.1.

REGENTONE. (51)

Battery eliminators for A.C. and D.C. mains are the principal products of this firm. This season a special display is made of small compact units of a size and shape suitable for fitting into portable sets. The Regentone Radio Supply Co. were among the pioneers of this type of power unit. In all models a special feature is made of a non-reversible mains plug which fits into a three-pin plug on the unit.



Regentone portable eliminator model W5, with trickle charger.

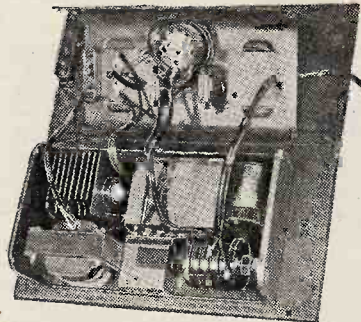
Another feature of interest in connection with their units is the provision of a "high and low" power switch.

Many of the portable set eliminators include, also, a L.T. trickle charger and in all A.C. models Westinghouse rectifiers are used. The W5 is a typical example

of this type, and has an output of 20 mA. There are three tappings, one fixed at 120 volts, one for screen-grid volts, and one continuously variable. The price is £5 17s. 6d.

Where a variable resistance is employed for voltage regulations, wire-wound resistances are used and many fine examples of the new Regentstat are shown. Special contacts of in-chrome wire separate the slider from the fine wire resistance element, thereby preventing mechanical strain on the resistance element. Two types are made. Type A at 9s. 6d. each, ranging in value from 500 ohms to 120,000 ohms, and type B at 11s. 6d. each, which goes up to 180,000 ohms. The last mentioned dissipates more power than the type A.

There is a new four-valve A.C. receiver with ganged condensers and only one tuning control. Two screen-grid H.F. stages are employed, a leaky grid detector and a super power output valve. It is assembled on an aluminium chassis with coils and valves completely screened. The mains unit is carried on a separate chassis



Interior view of the W5 unit.

and each unit can be removed easily for inspection and repair without dismantling the whole set. The price of this is £31 10s.

Regent Radio Supply Co., 21, Bartlett's Buildings, London, E.C.4.

RIDGED CONE. (112)

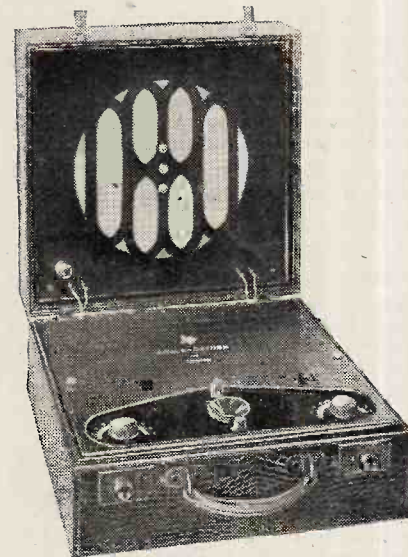
Indoor aerials for use where space is limited or in flats where the erection of an outdoor aerial is impracticable are the principal exhibits on this stand. Five types are shown, including the R.C. Standard Round—a 12ft. cage aerial; the R.C. Collapsible Spiral; the R.C. Popular Super flat type aerial; and the R.C. Regional aerial. Model masts of the Brookmans Park type are used to display these aerials.

Ridged Cone Co., Ltd., York House, Southampton Row, London, W.C.1.

ROLLS GAYDON. (237A)

One of the most interesting portables exhibited by this firm is the "New Ranger." There are two high-frequency stages incorporating screen-grid valves, and to facilitate operation both stages are tuned by ganged condensers. Re-

action is applied to the interstage coupling by means of a differential condenser, and a grid-detector is employed. The output stage includes a pentode valve



The New Ranger portable by Rolls Gaydon.

coupled to a Celestion loud speaker. The instrument belongs to the true suit-case portable type, and sells at 22 guineas.

The "Phantom Regional" is another suit-case model, with two tuned and ganged screen-grid stages; the price is 42 guineas. There is also an all-mains radio-gramophone and a transportable receiver.

Rolls Gaydon Sales, 77, Rochester Row, London, S.W.1.

ROLLS RADIO. (35)

A portable set incorporating two stages of screen-grid amplification is exhibited



Table model all-mains radio-gramophone by Rolls Radio.

Stand-to-Stand Report.—

here. Both stages are tuned, the coils in one stage being kept of small dimensions to reduce the inevitable stray couplings. The detector valve is transformer-coupled to a pentode, making a total of four valves. The receiver draws 14 milli-amps., which is enough for reproduction of good quality and reasonable volume, from a double-capacity 120-volt Hellesen battery. Provision is made for using a pick-up, and the whole set sells at 34 guineas.

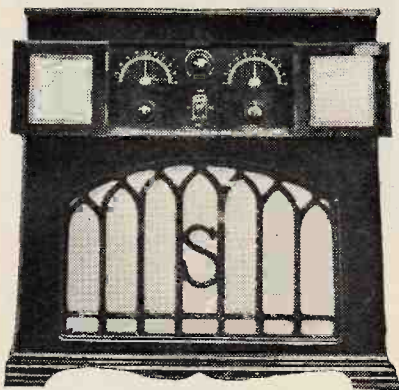
The table model A.C. mains radio-gramophone illustrated is also to be seen on this stand; it uses a three-valve circuit with a pentode in the last stage. With a cone speaker, it sells at the same price as the portable.

A large console type radio-gramophone is also made, using an electric gramophone motor and a moving-coil speaker driven by a high-voltage pentode.

Rolls Radio, Ltd., 138, St. John Street, Clerkenwell, London, E.C.1.

SELECTORS. (114)

A transportable set with an interesting circuit is the "Electric 42." This four-valve receiver, which retails at 42 guineas, can be supplied for D.C. or A.C. mains.



Selectors Electric 42 transportable receiver.

The H.F. stage contains a screen-grid valve coupled by tuned anode to a regenerative leaky-grid detector, which in its turn is linked to two transformer L.F. stages. There is a differential control of reaction which is applied to the intervalve coupling. Special care has been taken in the screening of the detector valve. All Selector sets are sent out with calibration charts, and in this case 35 stations are logged and entered before the receiver is despatched.

The "All-Electric 55," which has recently been reviewed in this journal, is a table model transportable for all-A.C. mains operation. A moving-coil loud speaker is included.

Judging by the difficulty in obtaining a close view of the "Selector Vox" Radio Gramophone it must be assumed that the

excellent reproduction that it gives has already gained the public's appreciation.

Selectors, Ltd., 206, Bedford Avenue, Trading Estate, Slough, Bucks.

SEL-EZI. (14)

Telsen transformers are a feature of this stand, the firm being wholesale distributors for these products and Red Star receivers. In addition, there is a general display of sets of other makers and a good selection of popular components.

Sel-Ezi Wireless Supply Co., Ltd., 6, Greek Street, London, W.1.

SELFRIDGE. (242)

A good selection of the best products of various makers is shown here. Television enthusiasts will find some interesting announcements on this stand.

Selfridge and Co., Ltd., Oxford Street, London, W.1.

SHEFFIELD MAGNET CO. (125)

As manufacturers of permanent magnets of the cobalt and tungsten types this firm has long turned its attention to the construction of loud speakers and loud-speaker movements. They were among the pioneer manufacturers of permanent magnet moving-coil loud speakers, and are now exhibiting a high flux density model which without cabinet is priced at £9. Loud-speaker units of the reed type are also shown, and one unit, the "Skylark," designed to be sensitive and suitable for popular requirements, is priced as low as 10s. 6d. Its mechanism is totally enclosed, and the D.C. resistance is 2,000 ohms. Another movement, the "Honesty," is a four-pole arrangement, and to facilitate the construction of a complete loud speaker is associated with the Honesty Triple Lined diaphragm. The latter consists of three concentric cones arranged to produce a uniform response by a combination of resonances. Another unit of the double-magnet type is the "Kukoo," which, priced at 25s., has a differentially arranged armature. A 15in. lined cone diaphragm is available for use with this model, and is priced at 12s. 6d. The various models can be heard in an adjoining demonstration room.

Sheffield Magnet Co., 116, Broad Lane, Sheffield.

SHERWOOD. (130)

The stand is devoted exclusively to the display of permanent magnet moving-coil loud speakers, revealing the important trend towards the substitution of the permanent magnet for the electromagnet. This firm interested itself, nearly a year ago, in the supplying of parts for following out the permanent magnet loud speaker design given in the pages of this journal. Complete loud speakers are supplied in various types and sizes as well as a permanent magnet kit priced at £3 10s. The diaphragms and coils are well finished, and from the general dimensions, the type of diaphragm material used and the method of suspension it can be assumed

that performance is up to the highest standard. Moving coils are available with various windings.

To facilitate the ready assembly of the complete moving-coil loud speaker devoid of the complication and cost of field excitation, a range of cabinets is also available. These are of good appearance and range in price from 37s. 6d. to 63s.

An interesting development introduced into the large permanent magnet models is that of back centring, for it will be readily seen that front centring alone will not entirely ensure free movement of the coil in the gap when the amplitude is considerable. For this purpose a small felt guide ring is inset into the back face of the outer pole and ensures a parallel movement of the coil.

A. M. E. Sherwood, 66, Hatton Garden, London, E.C.1.

SIEMENS. (70)

Price reductions combined with minor improvements in cell construction are to be noted. The portable set battery Type H.2, for instance, has been reduced from 18s. 6d. to 15s. This battery, like all



Siemens Crystacel accumulator.

other Siemens batteries, is fitted with seamless zinc cell containers, an important feature affecting the life of a cell while the purity of the zinc has reached the figure of 99.5 per cent. Moreover, 20 per cent. more electrolytic material is now introduced into each cell, giving increased life with lower internal resistance. A popular 60-volt battery offered at a popular price is the Type V.1, selling at 8s. A vertical cell assembly results in this battery taking up but little table space.

These new Siemens cells start with a moderately high voltage per cell, which is maintained at even high rates of discharge. In fact, it is claimed that a heavy rate of discharge does not to any great extent decrease the ampere hour capacity.

It is not generally realised that Siemens make accumulators for the radio market.

Stand-to-Stand Report.—

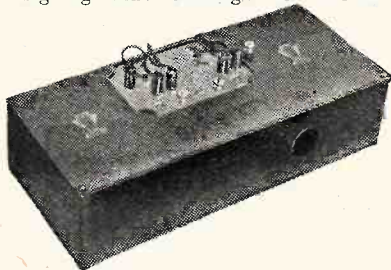
Accumulators known as "Crystacel" to be seen at the stand reveal the adoption of all the desirable features in accumulator construction, such as strong glass containers with internal ribs which hold the plates securely in position without the use of separators, a moulded lid fitting closely round the lugs, thus eliminating terminal corrosion, an extra deep gap beneath the plates and insulated terminals.

The "Full O'Power" booklet, available at the stand, is a helpful guide to the use of dry batteries in radio sets.

Siemens Bros. and Co., Ltd., Caxton House, Westminster, London, S.W.1.

SIX-SIXTY. (58)

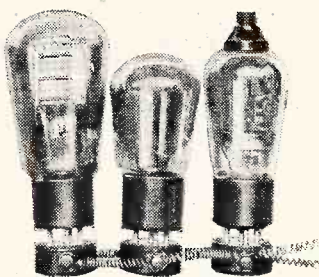
An innovation for the new season is an A.C. conversion equipment which offers to owners of relatively modern battery sets still giving satisfactory performance a means of securing the great advantages of all-mains operation without completely redesigning and rewiring the receiver.



Six-Sixty A.C. conversion set.

The unit comprises a rectifier and smoothing equipment and eliminates H.T., L.T., and grid bias batteries. Indirectly heated A.C. valves must be used in the receiver, for which purpose the well-known Six-Sixty 5/4-pin adaptors are used. The conversion equipments are made to suit some sixty well-known commercial battery receivers, and the prices range from about £8 to £11.

A range of 14 grid leaks from 0.01 to 20 megohms are selling at 1s. 6d. each, and a neat bakelite holder at 1s. will be of interest. Among the new valves are the SS.625 S.P.A. and the SS.4X S.G.A.C.



A trio of Six-Sixty valves: power output, general purpose and screen grid types.

The former is an output valve, which requires a grid bias of 33 volts at 200 volts H.T., whilst the latter is an indirectly heated A.C. screened valve having an A.C. resistance of 485,000 and a rated mutual

conductance of 3.3 mA. per volt. There is a new series of directly heated A.C. valves with 4 volt 1 amp. filaments.

Six-Sixty Radio Co., Ltd., 17-18, Rathbone Place, London, W.1.

SMURTHWAITE. (116)

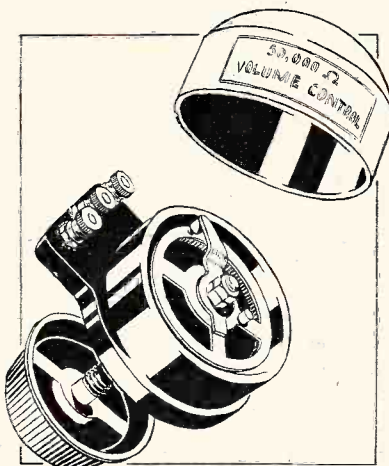
The main activities of this firm are devoted to construction of receivers, amplifiers, and, in fact, every kind of radio apparatus, to special order. Many fine examples of their work are displayed on this stand, including a modified version of *The Wireless World* "Band Pass Four" to fit into a special cabinet.

There is a 60-watt two-stage amplifier capable of delivering 10 watts of speech current, and assembled on a base-board. Its main function is that of a gramophone amplifier, and it is designed especially to meet overseas conditions.

F. W. Smurthwaite, 15a, Onslow Gardens, Wallington, Surrey.

SOVEREIGN. (136)

The stand of this company is notable for an interesting display of components of the smaller variety. Of these, a potentiometer type volume control, consisting of a composition resistance with wire overwound for making contact with the rotating arm, attracts attention. This is made in two models, in one of which the arm makes contact directly with the wire, while in the other the arm, as it rotates, presses a springy disc into contact with the resistance element, as shown in the accompanying sketch.



Sovereign 50,000 ohm volume control.

This "Super" model sells at 6s., the standard model costing 4s. 6d. Both are available in a range of resistances from 25,000 ohms to 2 megohms.

Wire-wound anode resistances were also on view, the core being sectionally wound with silk-covered constantan wire on an ebonite bobbin. Values from 1,000 ohms to 100,000 ohms are made, and the current-carrying capacity is generous.

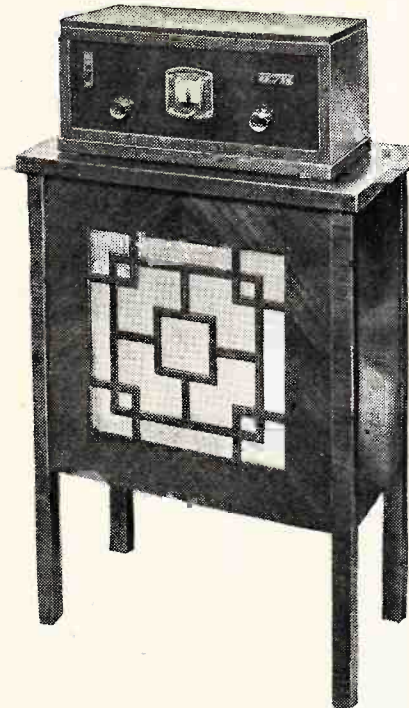
Other components included single and binocular H.F. chokes, semi-variable

condensers of various capacities, and a two-pin plug and socket with a most ingenious spring grip for the connecting wires.

Sovereign Products, Ltd., 52, Rosebery Avenue, London, E.C.1.

STANDARD BATTERY CO. (42)

The activities of this firm have for some time past extended beyond the production of the Standard Wet H.T. bat-



Wates Universal A.C. Mains Four and pedestal loud speaker.

teries, for which they are noted, and this year we welcome them into the fold of set manufacturers. So far one type of receiver only is available, the Wates "Universal A.C. Mains 4," which, as its description implies, consists of four valves. The set is entirely A.C. mains operated, and comprises a screen-grid H.F. valve, a regenerative detector, a first stage L.F. amplifier, and a super-power output valve. The first three valves are of the indirectly heated A.C. type, while the output valve is directly heated. Tuned anode coupling is used, the two tuning condensers being driven by drum dials mounted adjacent and disposed centrally on the panel.

The L.F. couplings are resistance-capacity throughout, and volume is controlled by a differential reaction condenser. Volume can be controlled also by the aerial selector switch, but the function of this fitment is to afford various degrees of selectivity. Wave-band change is by means of a switch, and the range is from 200 to 2,000 metres.

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The anode potentials are derived from a valve rectifier, and smoothing is carried out on generous lines. Provision is made to use a gramophone pick-up.

The receiver is housed in a plain but well-finished walnut cabinet, which can be supplied finished in oak or mahogany as desired. An automatic mains cut-out comes into operation when the back ventilating plate is removed for inspection purposes, thus guarding the user against accidental shocks. The price of the set is £25, including valves and royalty.

The same chassis, but with the addition of an electric gramophone motor and a Wates "Star" loud speaker with double-cone diaphragm, is available in the form of a handsome radio-gramophone in a pedestal cabinet. Finished in mahogany, this costs £51 10s., and in walnut £54 10s. complete.

Standard Battery Co., 184, Shaftesbury Avenue, London, W.C.2.

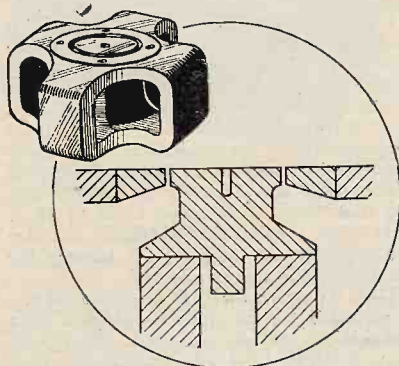
SUNCO. (19)

This firm is exhibiting in its capacity of wholesale dealer, and its well-arranged display is intended to appeal to the trader rather than to the amateur. It consists entirely of apparatus which is mentioned in connection with the stands of the respective makers.

Sun Electrical Co., Ltd., 118, Charing Cross Road, London, W.C.2.

SWIFT LEVICK. (129)

At last year's exhibition this firm stood alone in the production of a revolutionary type of permanent magnet for moving-coil loud speaker construction. During the year these magnets have established themselves, and a visit to the Swift Levick stand this year reveals enormous improve-



Swift Levick magnet, showing the improved method of pole centring.

ments. The range of magnets has been considerably increased, and a small magnet no more than 2in. across the face is shown, yet it is a thoroughly reliable component possessing high flux density with its gap of small area and width. It has, we understand, been specially designed for the requirements of Messrs. S. G. Brown, who were early to draw attention

to the scientific design of permanent magnet systems. Very large magnets are also shown supplying high flux density to a large area of gap. It is now accepted that Swift Levick magnets have attained flux densities normally associated with electromagnets, and whereas last year flux densities were estimated at 5,000 to 8,000 lines to the square centimetre which, after allowing for leakage were more probably in the order of 3,000 to 5,000 lines, we now find magnets to a flux density of 10,000 or even 11,000 lines to the square centimetre. As contrasted with the former types with 35 per cent. cobalt, this year's magnets are all 9 per cent. cobalt, giving a mixture capable of possessing much greater flux density. These magnets are finding their way into talking film equipment, as is evidenced in the demonstrating of the "Film Industry Talkie Speaker."

It has become customary over the past year to fit soft iron pole pieces where the cross section of the metal tapers off and the flux density becomes high. In this connection a new method of pole centring has been developed by Swift Levick, wherein the centre pole engages on to the machined face of the magnet steel, and is finally located by a centre-pin embedded in a lead-antimony alloy. Flux densities are endorsed by a National Physical Laboratory certificate displayed at the stand.

Swift Levick and Sons, Ltd., Clarence Steel Works, Sheffield.

SYLVEX. (127)

In addition to a wide range of proprietary receivers and components there is a display of "Sylverex" and "Reactone" radio crystals, as well as specimens of crystals in bulk. "Sylverex" materials for cone loud speakers such as cone papers and tinsel fabrics are also exhibited.

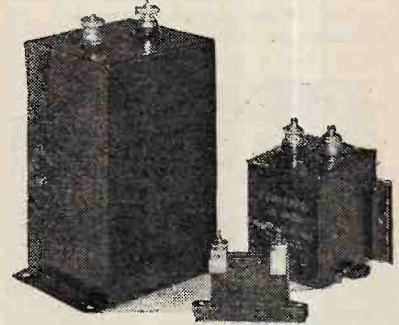
Sylvex, Ltd., 144, Theobald's Road, London, W.C.1.

T.C.C. (145)

The activities of this company, as its name implies, are entirely directed to the design and manufacture of condensers of all types and sizes. Their stand contains all the smaller condensers with which the user of wireless receiving apparatus is familiar, and shows, in addition, a selection from the larger condensers used for high-voltage and transmitting work.

A special feature of the newer models of rolled-foil condensers with paper dielectric is the reduction of the total impedance which they offer to high-frequency currents. All decoupling condensers are intended to act as far as possible as direct short-circuits to the signals they are meant to by-pass, and the new non-inductive condensers provide a closer approach to perfection in this direction than has hitherto been attained. The T.C.C. 1-mfd. non-inductive condenser offers a measured impedance of less than a third of an ohm to high-frequency currents of all wavelengths between 200 and 600 metres.

Electrolytic condensers rated for a continuous working voltage of 100 volts, and compressing the enormous capacity of 250 mfd. into a reasonably small space, are now offered. With such large smoothing



T.C.C. 100 volt 250 mfd. electrolytic condenser, with some smaller models.

capacities available, it is even possible that decoupling would cease to be needed with any ordinary receiver.

Telegraph Condenser Co., Ltd., Wales Farm Road, North Acton, London, W.3.

"TANNOY" PRODUCTS. (111)

The "Senior Radio-Gramophone," recently reviewed in this journal, is the outstanding exhibit on this stand. In addition to representative examples of cabinet work there is a finished chassis open to inspection. A "Junior" model with a lower power output is also represented.



Tannoy Senior Radio-Gramophone.

Foremost among receiving sets of the "table" type is the "Model R3." This remarkably compact receiver is mains-operated, and incorporates a screen-grid H.F. stage, detector and power pentode capable of driving a moving-coil loud speaker. A Westinghouse rectifier is housed in the quartered walnut cabinet, and provision is made for connecting a

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pick-up. Single-control tuning, with an illuminated dial is another attractive feature of this set, which sells for 19 guineas.

The power pentode is also standardised in the "R2" receiver, which is a self-contained mains-driven two-valve set retailing at 10 guineas.



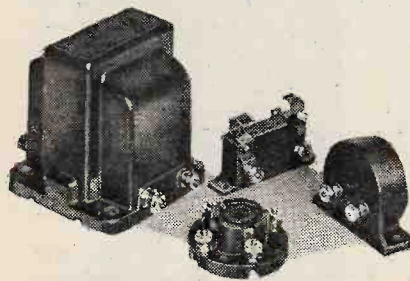
Tannoy type R3 receiver.

Last but not least there is the well-known C.P.2 mains unit specially designed for portable sets. On the H.T. side there are three tapplings, one fixed for screen-grid potential, one variable, and the third fixed giving 15 to 20 mA. at 120 volts. The L.T. side charges 2-, 4- or 6-volt accumulators *in situ* at approximately 0.5 amp. Both L.T. and H.T. sections are equipped with Westinghouse full-wave rectifiers.

"Tannoy" Products, 1-7, Dalton Street, West Norwood, London, S.E.27.

TELSEN. (69)

The L.F. transformers made by this firm have recently been redesigned, and are now fitted with brown bakelite shrouds and an earthing terminal making internal contact with the core. The "Radio-grand" is manufactured with ratios of 3:1, 5:1, and 7:1, and the "Ace" in 3:1 and 5:1.



New Telsen components.

A number of new components have recently been placed on the market, and as they are now exhibited for the first time are examined with particular interest. A uniform finish has been adopted, brown bakelite mouldings being used throughout, which gives an attractive appearance.

Fixed condensers, in capacities up to 0.002 mfd. are arranged for either upright or flat mounting, and are provided with grid leak clips. The new valve holder, of the resilient-socket, self-locating type, should ensure excellent contact; it is fitted both with terminals and soldering tags.

There is also a neat H.F. choke, with a bobbin winding housed in a circular bakelite shroud with feet for mounting.

Telsen Electric Co., Ltd., Miller Street, Birmingham.

TONEX. (233)

The "Tonatuna," a tapped coil with reaction for sets not using a high-frequency stage, and the "Unibox," which contains the necessary tuning coils and screens for a stage of screen-grid amplification, are shown here.

Tonex Co., Walker Street, Blackpool, Lancs.

TRELLEBORG. (228)

The multitudinous uses to which ebonite is put in the assembly of an average wireless set is well defined by the comprehensive display of turned and machined parts shown made from Trelleborg's ebonite. In addition there are numerous styles of finish for panels which are shown polished black, to tone with mahogany cabinets and many other shades.

There is also an interesting display of coil formers, H.F. choke bobbins, condenser insulators and switch parts.

Trelleborg Ebonite Works, Ltd., Union Place, Wells Street, London, W.1.



Trix 25 watt amplifier, with valve cover removed.

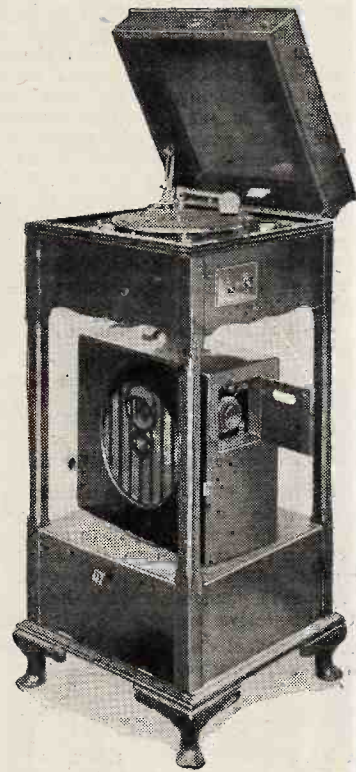
TRIX. (249)

This firm has recently introduced a range of power amplifiers mainly intended for electrical gramophone reproduction in restaurants and cafés, but also suitable for other purposes. The intermediate model, with an output valve anode dissipation of 25 watts is typical; it is an A.C. mains-driven instrument employing valve rectification, with three amplifying stages. Indirectly heated valves are used in the first two positions, with a D.O.25 or L.S.6a at the output end, with 400 volts applied to the plate.

This amplifier is fitted with sockets for a monitoring milliammeter and with enclosed fuses; its stages are coupled by resistance and transformer (in that order). There is a socket from which rectified current may be taken for energising a moving-coil loud-speaker field magnet, and alternative outputs are provided (by

means of a tapped transformer) for high- or low-resistance loud speakers.

The 60-watt model is similar, but employs a Cossor 660T as an output valve.



Trix combined radio-gramophone and portable set.

The smallest amplifier of the series has only two stages, and is fitted with a Mazda AC/PEN; a D.C. version of this latter instrument is available. Prices range from about £15 to £45.

Trix portables have for some time been specially arranged for easy conversion to mains H.T. feed; this change-over is now helped by the fact that the makers are fitting automatic grid bias in all models. The advantages claimed, apart from adaptability to conversion, is that there is no bias battery to be attended to, that grid voltage is practically self-regulating, and that there is no more waste of H.T. volts than if the very common practice of using end cells of the H.T. battery for the grid circuits were adopted.

The "Combinola" is a radio-gramophone cabinet with space in which a Trix portable set may be mounted. By inserting a multiple plug into sockets provided in the receiver, the internal batteries are disconnected automatically so that anode feed current may be derived from the mains: at the same time, the L.T. accumulator is charged from the same source.

A number of power transformers are shown, and it is stated that the firm is able to make special components of this sort at short notice to suit individual requirements.

Eric J. Lever (Trix), Ltd., 89, Clerkenwell Green, London, E.C.1.

Stand-to-Stand Report.—

TRUVOX. (123)

The outstanding feature here is the extended use of a balanced armature unit in conjunction with an exponential horn. A two-valve all-mains receiver for A.C. or D.C. which sells at £8 without speaker, or 11 guineas with a 66in. horn speaker, is illustrated. In the D.C. model smoothed current taken directly from the mains is used for the filaments; there is no accumulator. The set is fitted with choke-filter output.

There are a number of radio-gramophones of various types, mostly mains-operated, for ordinary home use, the undistorted speech output running up to 1,400 milliwatts. The company's own pick-up, which is claimed to reduce "scratch" to the absolute minimum without loss of brilliance, is used on all gramophone reproducers.

For public address work amplifiers of the largest size are available.

Universal Gramophone and Radio Co., Ltd., Ryland Road, Kentish Town, London, N.W.5

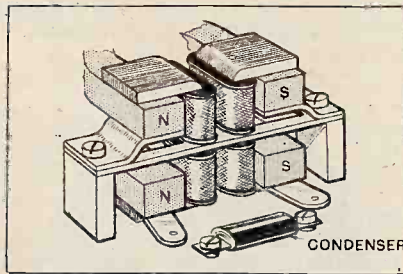


Truvox all-mains two-valve set, with exponential horn loud speaker.

TUNEWELL. (9)

Loud-speaker units and diaphragms are the principal exhibits. A unit of the four-pole differential type with a pair of magnets is claimed to give remarkably even response over the frequency range. Fitted with a back plate this unit is easily mounted in a cabinet with terminals and adjusting screw conveniently placed. Metal mounting plates are also available for securing the unit to a baffle board. A complete loud speaker can be built with this unit for £1 17s. 6d., while in a well-finished mahogany cabinet the price is £3 3s. The "Tunewell Super Three" receiver is also shown. It is a compact, metal-enclosed set of the detector two L.F. class. An interesting feature is the inclusion of an adjustable wave trap for

removing local station interference. The price is £3 19s. 6d., royalties being extra. A 16-page list is obtainable at the stand, giving details of plunger switches, bakelite dielectric condensers, coils, coil formers and bases, H.F. chokes, low frequency



Tunewell four-pole loud speaker unit.

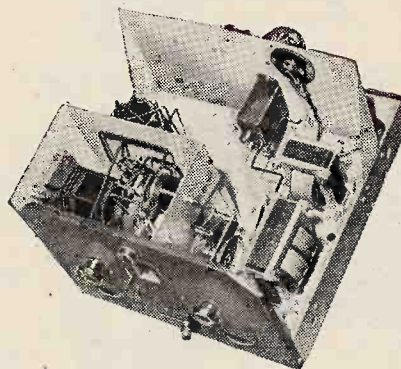
transformers, as well as several circuits showing the method of using "Tunewell" coils.

Turner and Co., 54, Station Road, New Southgate, London, N.11.

ULTRA. (77)

The "A.C.3" receiver is certainly one of the least conventional of its class, and has several interesting features. It is an H.F.-det.-L.F. combination for A.C. mains drive, with indirectly heated screen-grid valves as H.F. amplifier and detector. The latter valve is coupled to the output valve by a resistance; the "tuned grid" system is used on the H.F. side. Reaction control is provided, but it is stated that this aid to sensitivity is seldom needed.

Both tuned circuits are ganged, provision being made to "trim" the aerial by rocking its variable condenser stator through a few degrees. An absorption circuit is fitted for the elimination of strong local medium-wave signals when receiving on the lower part of the long-wave band; interference of this sort is all too often ignored with many receivers.



Chassis of Ultra three-valve receiver.

A bulb fuse is fitted in series with the rectified H.T. output positive lead, and it is pointed out—with reason—by the manufacturers that the usual practice of fitting fuses in the mains input leads may

fail to confer immunity from the ill-effects of possible short-circuits.

Construction is neatly carried out, and appears to be robust. In particular, the combined multi-contact switch should withstand hard wear and tear without developing intermittency.

As most readers are aware, the "Ultra Air-Chrome" loud speaker comprises two stretched linen diaphragms of widely different sizes; the larger vibrates freely at low frequencies while the smaller takes care of the high notes. Two new models have been introduced for this season: the "Popular 50" selling at 50s. in either oak or mahogany cabinet, and the "U.99" at 90s. A console model with a top fitted to accommodate the "Ultra A.C.3" receiver, is another new production.

The new Ultra pick-up is fitted with a four-pole balanced armature movement, and special pains have been taken in the design of its arm (which is counter-weighted) to ensure almost perfect tracking.

Ultra Electric, Ltd., 661, Harrow Road, London, N.W.10.



The Ultra Air-Chrome Popular 50 loud speaker.

UMELLO. (234)

First acquaintance with the exhibits on this stand leaves the impression that loud speakers only are shown, but closer examination reveals that the supposed loud speaker is a complete self-contained all-mains set. The circuit favoured is the popular 2-H.F. with aperiodic couplings, a detector, and two transformer-coupled L.F. valves. An H.T. battery-eliminator with L.T. trickle charger is included and provision made to cover all broadcast wavebands.

With a view to overcoming the detrimental effect of the presence of a short-circuited long-wave frame in juxtaposition to the medium-wave winding, a system of series-parallel connected sections is employed.

The mains-operated model costs £12, and there is also a battery version at £9 9s. For outdoor use, the eliminator can be removed and a dry battery substituted.

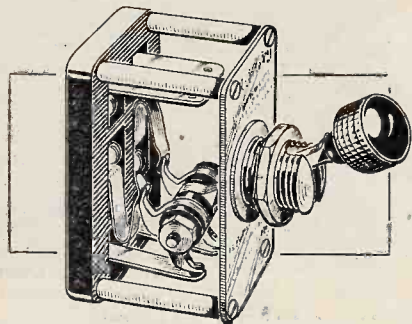
Umello, Ltd., 12, Doughty Street, London, W.C.1.

UTILITY. (60)

Two new Utility switches are exhibited. The first is of the quick break, snap

Stand-to-Stand Report.

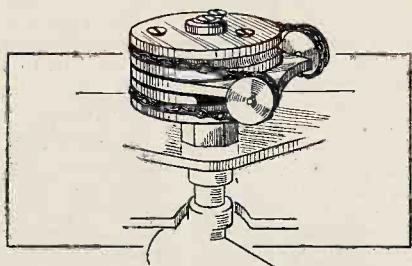
action, single-pole on-off type, suitable for insertion in mains circuits; this little component measures only $\frac{7}{16}$ in. deep by $\frac{3}{16}$ in. wide by $1\frac{3}{8}$ in. high. Single-hole mounting is provided, and the contacts appear to be amply robust and self-cleaning; they are, therefore, unlikely to cause any trouble. The fixing bush is completely insulated, and so the component is suitable for mounting on metal panels without special precautions.



Utility anti-capacity switch.

There is also a new anti-capacity change-over switch similarly devised for single-hole mounting—an unusual feature in lever-operated switches. Solid silver contact studs are fitted throughout, and the component is extremely economical of space. Models are available with from 2 to 6 poles.

An entirely new reduction gear is used in the "Utility" drum dial, which embodies a spring-tensioned chain operating on the block-and-tackle principle. This works exceptionally smoothly and provides a reduction of 2:1 with a very open scale—equal, in fact to twice the diameter of the dial actually used. The system would seem to be well suited for controlling filter circuits where there is no need for any great reduction ratio.



Utility condenser drive reduction gear.

A similar dial is made in knob-operated form, both for simple condensers and gauged pairs. The latter application of the device would appear to be most promising, as a second knob on the escutcheon plate is arranged to rock one of the stators through an arc of six degrees, thus dispensing with the usual external trimmer. This latter dual condenser assembly is easily screened.

It should be noted that all these dial escutcheon plates have provision for illumination of the scale; this can be

arranged by fitting a special lighting bracket, which is another new product, as also is a range of compact and inexpensive bakelite-dielectric condensers intended both for tuning and reaction control purposes.

Wilkins and Wright, Ltd., Utility Works, Holyhead Road, Birmingham.

VARLEY. (105)

A number of new models have been added to this firm's range of all-mains receivers. A model which will attract some interest is the "Senior All-Electric Transportable" on account of its neat and workmanlike appearance, especially in chassis form. It embodies the popular three-valve combination of screen-grid H.F. valve, detector, and power output. Tuning condensers are ganged and the circuits trimmed by rocking one stator. Housed in a handsome walnut cabinet this set is priced at £26 for the A.C. model. There is a pedestal cabinet in



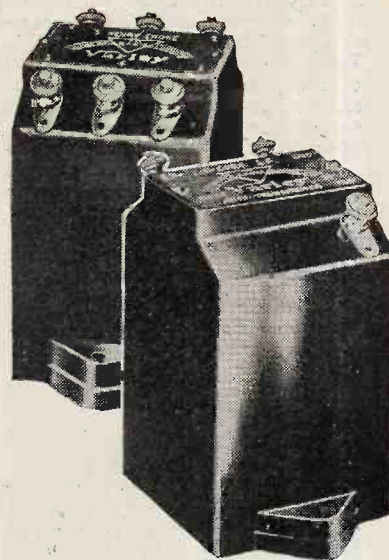
Varley Senior All-Electric Transportable receiver and moving coil loud speaker.

which is incorporated a "Baker Selhurst" moving-coil loud speaker to match the above set, so forming a convenient stand. The cabinet, with an A.C. model loud speaker, costs £17, a D.C. model being available at £14.

Varley components are no less numerous than hitherto, and some interesting new models are to be seen. A double push-pull intervalve transformer has been developed to provide a means of applying a separate grid bias to each push-pull amplifying valve. It has a common primary but two separate secondary windings. This component may be used to precede an output stage with two parallel-connected valves and separate bias applied to each. Then there is a similar model but with the primary also in two separate parts, a

comprehensive range of output transformers and intervalve components, some of which are wound on a bi-metal core.

A tapped L.F. choke of 3 henrys inductance has been introduced for use as a tone-control device. It has five tapings, giving 0.5, 1.0, 1.5 and 3 henrys respectively, has a D.C. resistance of 47 ohms, and costs 8s. 6d.



Varley tapped 3-henry choke for tone control and auto-transformer.

A range of power-transformers and L.F. smoothing chokes is to be seen. In the latter class is a super model carrying 300 mA D.C. and inductance 10 henrys, priced at £3. The D.C. resistance is 100 ohms. In contradistinction to this is the 300 henry choke to carry 10 mA., and having a D.C. resistance of 3,000 ohms. Its function is to choke-feed an L.F. transformer where power grid-detection is used; the price is 25s.

The Varley gramophone pick-up has been modified slightly to correct for variations in the amplitude of the recording at the two extreme ends of the audible scale. It has a rising characteristic below 250 cycles, and cuts off at 4,000 cycles. The price is 37s. 6d., and the tone arm costs 35s.

A new volume control is shown, the total resistance being 300,000 ohms. The principle of the resistance is a potentiometer, and the price is 6s. 6d.

Varley (Oliver Pell Control), 103, Kingsway, London, W.C.2.

VOLTRON. (215)

The "Dynaplus" kit set, a fairly conventional H.F.-det.-L.F. combination of three valves, is the leading exhibit on this stand. The receiver is neatly arranged; it makes use of effective coils, and so should have a good range. The complete set of parts, without valves or accessories, is sold at £3 12s. 6d. A cabinet with built-in loud speaker to

Stand-to-Stand Report.—

accommodate this receiver is priced at 50s.

The same set is available as a ready-wired receiver in a cabinet at £5 15s.



Voltron Table Grand receiver.

There is also a "Dynaplus" L.F. transformer, as included in the set mentioned above; this component is mounted in a moulded bakelite case, and is priced at 6s. 9d.

Voltron Electric, Ltd., 3, Queensway, Ponders End, Middlesex.

W.B. (66)

A new moving-coil speaker employing a permanent magnet is shown at this stand. The magnet is made of Darwin Cobalt steel, and produces a flux-density of 8,880 lines per square centimetre in the



W.B. permanent magnet moving-coil loud speaker.

gap. An 8-inch cone is used, which is centred by means of a paper disc attached to the centre of the pole-piece. The moving coil is made only in low-resistance type, and requires an output transformer of suitable ratio.

A small speaker, employing an adjustable unit, is housed in an exceptionally neat bakelite case, and sells at the attrac-

tive price of 2 guineas. It is of high impedance type, especially suitable for following a pentode.

Various valve-holders, including one that can be mounted either horizontally or vertically, and a battery switch designed for reliability, are among the other exhibits on view.

Whiteley, Boneham and Co., Ltd., Nottingham Road, Mansfield, Notts.

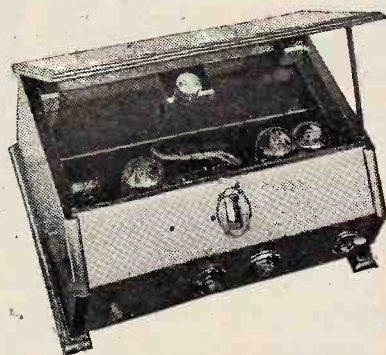


W.B. bakelite cabinet cone speaker.

WATMEL. (12)

Two new receivers were examined at the stand. Each made use of three valves, the one having an H.F. stage and the other two L.F. stages. These receivers are designed to give satisfactory programme reception with easy operation, and are offered at the lowest possible price. In each case one dial control is arranged, and it is interesting to note that in the model incorporating an H.F. stage aperiodic H.F. coupling is effectively used in conjunction with a screen-grid valve. The type L.F. model has transformer-coupled stages. The price for either set is £5 10s.

Among Watmel components the Watmel "Universal Dual Wave Tuner, Type 31" provides the home constructor with an easy



Watmel three-valve A.C. mains receiver.

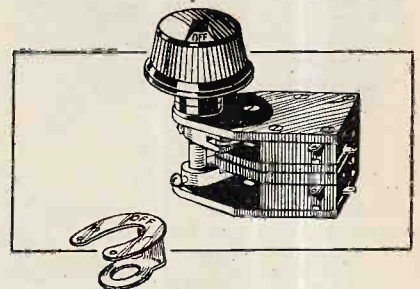
means of building an inexpensive set. A descriptive pamphlet shows its use with practical wiring diagrams in two- and three-valve sets. The wave ranges are

approximately 200 to 600 and 1,000 to 2,000 metres, and the method of wave change, which one would suggest has been developed from practical test, should maintain good selectivity with avoidance of that evil possessed by many coils in the past whereby a powerful local station comes in on short-wave settings when switched over to the long-wave range. Watmel H.F. chokes are shown and data on their performance given. In addition there are screening boxes of a now popular size, being almost a 6in. cube.

Watmel Wireless Co., Ltd., Imprint Works, High Street, Edgware, Middlesex.

WEARITE. (250)

A new series of neat quick make-and-break switches are among the most interesting exhibits on this stand. These switches are entirely enclosed in sectionalised bakelite mouldings and the operating spindle and cams are insulated from the contacts so that they can be mounted on metal panels without special preparation; the only exposed "live" parts are the tags for soldering the connections. The contacts are rated to break 3 amps. at 250 volts. Demonstration panels showing the working of the delayed action types are available for inspection. The new switches are available either with lever actions or a new type of indicating window dial. The latter is of very neat design, and a series of interchangeable xylonite scales are in course of preparation.



Wearite delayed-action switch.

Among new mains components will be found a set of mains transformers for the new Westinghouse H.T.5, 6 and 7 rectifiers.

Wright and Weaire, Ltd., 740, High Road, Tottenham, London, N.17.

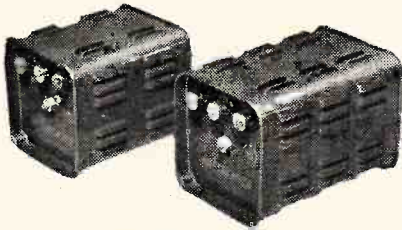
WESTINGHOUSE. (239)

A new range of dry metal rectifiers has been added for the new season. These are styled H.T.5, H.T.6 and H.T.7. The first will deliver 20 mA. at 120 volts, the second 25 mA. at 175 volts, and the third 28 mA. at 200 volts. The prices of these instruments, which range from 15s. to 21s., compare favourably with those of a full-wave rectifying valve. These rectifiers will give half-wave rectification, unless the voltage-doubling bridge circuit be used, in which case full wave-rectification is obtained. The popular units H.T.1, H.T.3 and H.T.4 are retained, as are also the R4 series and the A3 and A4.

Stand-to-Stand Report.

Where large power outputs are required, as in radio-gramophones or public address systems, there is a great deal to be said in favour of a separate rectified grid bias supply, for which purpose the GB1 metal rectifier is specially designed. A negative bias up to 40 volts is available, while for grid potentials up to 120 volts the H.T.3 can be pressed into service. A separate winding for 45 volts on the mains transformer is necessary in the case of the GB1, but the slight added complication is compensated for by the absence of feedback, which is sometimes difficult to prevent with "automatic bias." The A3 and A4 rectifiers are admirably suited to the charging of 6-volt batteries, as well as for supplying filament current to D.C. valves. The input transformer for these two rectifiers must deliver from 12 to 14 volts. Dry metal rectifiers, being electronic in action, have the advantage of a very long life and do not need mains transformers with relatively high voltage windings.

Westinghouse Brake and Saxby Signal Co., Ltd., 82, York Road, King's Cross, London, N. 1



Westinghouse new dry-metal rectifiers for H.T. supply.

WHITELEY. (257)

Besides a full range of apparatus by various makers, this stand offers a portable set at 8 guineas. Five valves, including two aperiodic H.F. amplifiers, are used, and the total consumption is 8 milliamps. from a dry battery.

In addition, a small A.C. mains unit, giving up to 20 milliamps. at 150 volts, and having three tappings, is sold at £4 10s., and there is a 108-volt dry battery for 7 mA. discharge, at 8s. 9d.

Wm. Whiteley, Ltd., Westbourne Grove, London, W.2.

YOUNG ACCUMULATOR CO. (225)

"Young" accumulators have already established a reputation for themselves in the spheres of lighting and traction, and many of the features which have contributed to their success are incorporated in the series of smaller batteries designed for wireless work.

The "Wilderman Separator," for instance, is common to all types except those with "mass" plates widely spaced. The material used is ebonite, which is specially treated during vulcanisation to give it a high degree of

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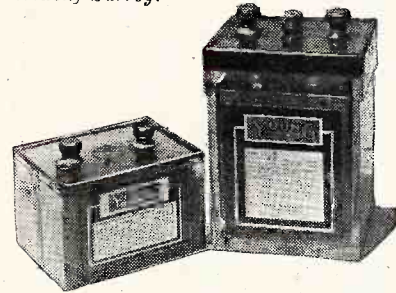
porosity. The actual figure is 70 per cent., i.e., the separator takes up 70 per cent. by volume of electrolyte when immersed. This effects a material reduction in the internal resistance of the cell, while it is claimed that capillary action in the minute pores assists in equalising the specific gravity of the acid during discharge.

In addition to a full range of L.T. and H.T. accumulators in glass containers there is a large variety of jelly electrolyte cells designed for portable receivers.

An electrolytic rectifier for home battery charging from A.C. mains is also offered at the reasonable figure of 25s. Known as the Young "Chromal" rectifier, this component requires no transformer, the charging current being regulated by the size of lamp fitted to the special adaptor provided. The arrangement of the electrodes in each of the four cells forming the rectifier bridge is designed to promote circulation of the

electrolyte, and is conducive to cool running. Each anode is surrounded by a gas-tight cathode tube, with holes drilled near the bottom through which the gas bubbles into the main body of the electrolyte. The charging current is approximately 120 mA. with a 60-watt lamp.

Young Accumulator Co. (1929), Ltd., Burlington Works, Arterial Road, New Malden, Surrey.



Young accumulators, type ZYG, in glass container, and type RC5 with jelly electrolyte.

ZEITLIN. (26)

Apart from a three-valve "Regional Portable" set, small in size and low in price, which cannot be seen elsewhere, this stand is devoted to a selection of the products of all makers.

V. Zeitlin and Sons, Ltd., 54, Lamb's Conduit Street, London, W.C.1.

BRITISH BROADCASTING CORPORATION.

IF the British Broadcasting Corporation stand in the National Hall Gallery lacks the flamboyance of some of the others, it atones for this in good measure by its varied display of apparatus. The collection is interesting alike to the technical visitor and the student of wireless history.

Public attention centres on the working section of the exhibit, i.e., the amplifier supplying music and speech to the three hundred loud speakers distributed throughout the Show. To protect venturesome visitors from over-familiarity with high-tension terminals, the whole of the amplifying equipment is contained in a cubicle with large windows giving a good view of the power amplifier with its four paralleled valves, providing an output of 1,500 watts. The necessary current is obtained from two generators, also visible, driven by a motor on the stand, and supplying respectively 3,000 volts H.T. The visitor can also see the miniature "studio" and control room in which announcements are made, and the amplifier is connected either to the Savoy Hill control room or a gramophone pick-up.

Seen alone, the original 2LO transmitter of the 1922-25 era might still wear an air of importance, but the B.B.C. officials have placed it cheek by jowl with specimens of the very latest equipment of the Brookmans Park type. As

a result, the older apparatus appears strangely frail and experimental. It is well labelled, and the visitor can easily identify the rectifier, modulator, and other panels making up the complete transmitter.

The apparatus specially brought from Brookmans Park includes a main-closed circuit coil; a variable oil dielectric condenser operated by a car steering wheel; a water-cooled valve jacket and an insulating hose former, these together forming a complete unit.

The increase in the number of Continental and other long-distance relays lends special interest to a collection of portable apparatus used for line testing.

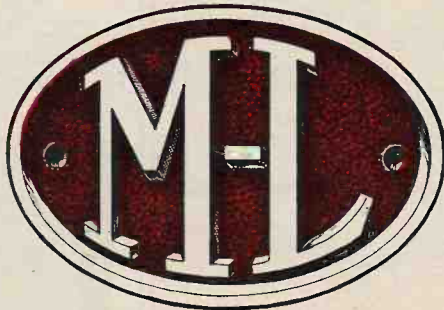
A human story is recorded in the section devoted to microphones. The original Round experimental microphone of 1922 is shown with a legend explaining that during the test period with this instrument various forms of packing were used to separate the several diaphragms. Among them was a sixpence, but one night an engineer, finding himself without money, extracted the sixpence. Since then the microphone has never worked so well! In addition to the Round microphone are the Solid Back type, the Western Electric, the Magnetophone, and the Reisz.

There is an interesting display of transmitting valves, both ordinary and water-cooled.



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Pioneers and leaders in sound reproduction, Columbia are setting at Olympia to-day new standards whereby good Radio may be judged. The range has been increased to provide



SPANS EUROPE

Very efficient 3 valve circuit — Screen-grid, Detector, Pentode. Illuminated controls, tuning calibrated in wavelengths, tunable aerial coupling. All-Electric. A.C. or D.C.

Model 307 Oak 20 gns.

„ Mahogany 21 gns.



As Model 307 but complete with speaker built in pedestal cabinet.

Model 331.

Mahogany 30 gns.

Walnut - - 31 gns.



THE FAMOUS 304

Unquestionably the finest receiver of the day. 5 valves, including 3 Screen-grid. Illuminated tuning dial calibrated in wavelengths. Immense power and range. All-Electric. A.C. or D.C.

In Oak 26 gns.

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THE SUCCESSFUL PORTABLE

Single dial tuning. Wide range of stations. Faithful tone.

Model 303 in Oak 16 gns.

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Power unit for above A.C. 10 gns. and D.C. 7 gns.



RADIO SIMPLIFIED

Alternative programmes without tuning! Just a switch! No dials or controls. All-Electric. A.C. or D.C. Built-in Speaker. in Oak 12 gns. Model 309



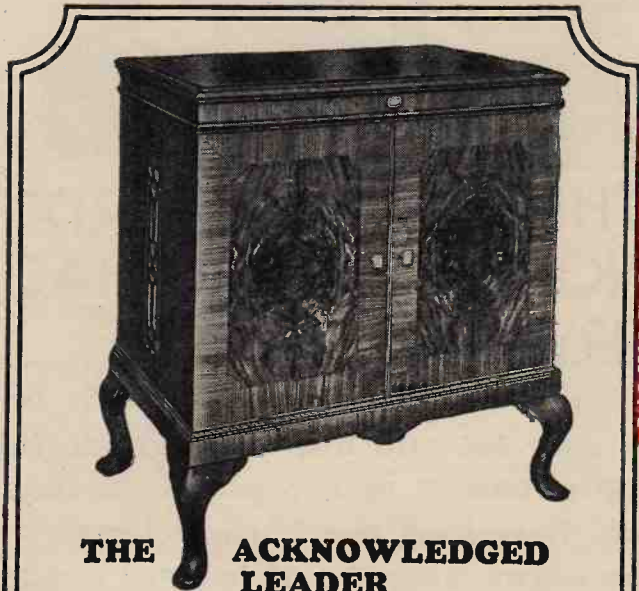
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Acclaimed the finest radio-gramophone of the day by every critic of importance, this famous instrument incorporates the 304 circuit. In addition numerous refinements, powerful L.F. amplification, and moving-coil speaker are fitted. All-Electric. A.C. or D.C.

Model 302. In Oak 80 gns., Mahogany 90 gns., and Walnut 95 gns.



THE NEW 308

The Columbia Radio-Graphophone Model 308 is designed to make a worthy companion to the 302. The Model 307 circuit is incorporated, with extra L.F. amplification, and moving coil speaker. All-Electric, for A.C. Mains.

In Oak 62 gns., Mahogany, 65 gns., and Walnut 69 gns.

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"Wireless World," Sept. 24.

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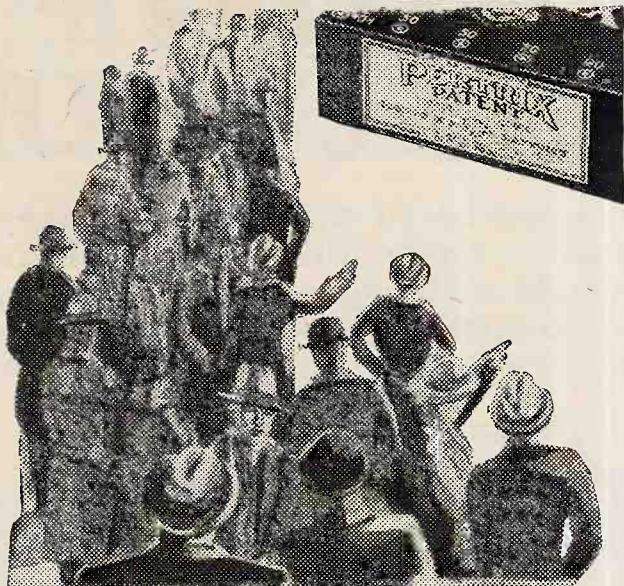
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STAND No.
243

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PERTRIX

NON-SAL-AMMONIAC DRY BATTERIES

PERTRIX LIMITED, Britannia House,
233, Shaftesbury Avenue, London, W.C.2.

Works: Redditch.

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READERS' PROBLEMS



"The Wireless World" Supplies a Free Service of Technical Information.

The Service is subject to the rules of the Department, which are printed below; these must be strictly enforced, in the interest of readers themselves. A selection of queries of general interest is dealt with below.

A Compact Eliminator.

My three-valve receiver comprises an H.F. stage (S.G. valve) anode-bend detector, and 1 L.F. stage. It has been working quite well with a common feed of 150 volts for all anode circuits; an intermediate voltage tapping is provided for the screening grid. These voltages are obtained from dry batteries, but an A.C. mains supply is now available, and I should like to use it.

As the set is of a type that has been described as inherently free from harmful interaction between its circuits, it seems to me that it should be possible to feed it from a simple eliminator such as that described for the "Regional One"; this instrument appeals to me on account of its compactness.

Will you please tell me if it is likely to be suitable, and also say if any modifications would be necessary?

C. M. F.

If the H.F. coupling of your receiver is in the form of a double-wound transformer or "parallel feed" device, it is probable that the eliminator to which you refer will be suitable, and that no important alterations to it will be necessary. As the voltage delivered will be excessive for your requirements, an absorbing resistance, of a value depending on the cur-

rent to be passed through it, will be needed; this resistance will be connected between the positive output terminal of the eliminator and the positive H.T. terminal of the set.

Provision must be made for fairly critical adjustment of screening-grid voltage; probably the most convenient way of doing this is to shunt the winding of a 50,000-ohm potentiometer across the eliminator output, and then to take the output from the potentiometer slider.

o o o o

Impregnated Windings.

I propose to coat the windings of my tuning coils with shellac varnish, but before doing so would like to know whether this will have the effect of changing their inductance values.

B. G.

No change of inductance need be anticipated, but the self-capacity of the windings is bound to be increased by impregnation, as the amount of solid dielectric material between adjacent turns will be increased. A lower external capacity value will be required to tune any of the coils to a given wavelength, and the effect will be very much the same as if inductance had been increased.

o o o o

Checking Ganging.

I have just been testing a 2-H.F. receiver with single-knob control of its three variable condensers, and have come to the conclusion that imperfect "ganging" is responsible for its rather poor performance.

My reason for thinking so is that the experimental addition of a small capacity (actually about one-fifth of the total capacity of a neutralising condenser) across the first intervalve coupling circuit makes an appreciable improvement in signal strength.

Do you think that my assumption is correct?

N. R.

Yes; it may fairly be assumed that, if the addition of capacity to any individual tuned circuit makes an improvement with regard to signal strength, the normal tuning of that circuit is incorrect. This is quite a good way of testing a ganged receiver when it is not fitted with trimming condensers, but great care should be taken to avoid the introduction of any factors likely to disturb the normal constants of the circuits. For instance, it is possible to reduce appreciably the inductance of a tuning coil by removing, or even by partially removing, the lid of a screening box during the test.

Simple Waveband Switching.

Will you please show me how a three-point switch should be connected for waveband changing in a tuned grid H.F. circuit? This intervalve coupling is to be used to link a screen-grid H.F. valve to an anode-bend detector, and both medium- and long-wave coils are to be centre-tapped.

R. G.

The switch connections are as shown in Fig. 1, where C is the H.T. stopping condenser, L the medium-wave inductance, and L₁ the long-wave loading coil. The first winding must, of course, be split, so that the loading coil may be inserted at its centre point.

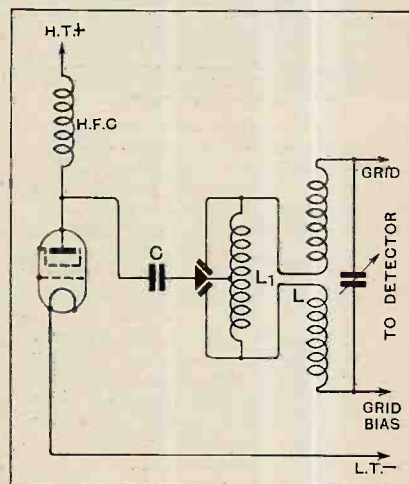


Fig. 1.—Parallel-feed H.F. intervalve coupling with three-point switch for waveband changing.

This simple wave-changing arrangement is thoroughly practical, and has the advantage that the feed lead is automatically joined to the centre point of the grid coil on both wavebands without any elaborate switches or complicated switch wiring. Although a direct connection to the grid end of the coil is even simpler, and will generally afford greater amplification, it may fail to provide stability, and will in any case afford less selectivity than is obtained by converting the medium- and long-wave coils to what are, in effect, 2:1 ratio H.F. transformers.

RULES.

The free service of THE WIRELESS WORLD Technical Information Department is only available to registered readers and subscribers. A registration form can be obtained on application to the publishers.

(1.) Every communication to the Information Department must bear the reader's registration number.

(2.) Only one question (which must deal with a single specific point) can be answered. Letters must be concisely worded and headed "Information Department."

(3.) Queries must be written on one side of the paper and diagrams drawn on a separate sheet. A self-addressed stamped envelope must be enclosed for postal reply.

(4.) Designs or circuit diagrams for complete receivers or eliminators cannot ordinarily be given; under present-day conditions justice cannot be done to questions of this kind in the course of a letter.

(5.) Practical wiring plans cannot be supplied or considered.

(6.) Designs for components such as L.F. chokes, power transformers, complex coil assemblies, etc., cannot be supplied.

(7.) Queries arising from the construction or operation of receivers must be confined to constructional sets described in "The Wireless World"; to standard manufactured receivers; or to "Kit" sets that have been reviewed in their original form and not embodying modifications.

A Basis for Conversion.

I have a three-valve H.F.-det.-L.F. battery set, and propose to convert it for operation from D.C. mains by altering the filament circuits to correspond with the arrangement adopted in the "All-D.C. Three," described in your issues of August 20th and August 27th. Unfortunately, I have not enough knowledge to trace out the circuit diagram, and, although my own set is on similar lines, it is sufficiently different to make it impracticable for me to work blindly from the practical wiring plan. Would it be possible for you to let me have a simplified diagram of the filament, grid and plate circuits? J. D. D.

We hope and think that the accompanying diagram (Fig. 2) will make this matter clear to you. The original com-

electrical appliances other than lights, but if you are, it should be fairly easy to find out, by the method of elimination, if any particular piece of apparatus is responsible.

It would be wise to examine all fuses, and to see that the holders are making good contact with their clips or sockets, which should be cleaned if necessary. Individual lighting switches, especially those interrupting the current for a number of lamps, may be suspected, and their contact springs should be scraped, and possibly bent to restore their original shape, if they appear to be distorted. Before spending much time on the fittings, however, it is advisable to try to localise the trouble by removing, one at a time, the fuses through which the various separate lighting circuits are fed.

A Pre-Detector Fault.

Up to the present I have been unable to obtain any signals whatever from my newly constructed receiver, which is a straightforward 3-valve H.F.-det.-L.F. combination, with two-circuit aerial tuner, grid detector, and transformer coupling for the H.F. and L.F. amplifiers. The set seems to be quite "dead," and gives no sign of life beyond a "plop" in the loud speaker, which is produced by rotation of the reaction condenser. All batteries show full voltage on measurement, and the valves have been tried with satisfactory results in another receiver with a somewhat similar circuit arrangement.

Can you give me any indication as to where the fault is likely to be?

T. W. D.

It is fairly safe to assume that the reaction "plop" is an indication that everything beyond (and including) the detector grid circuit is in order, or at any rate, that there is nothing very seriously wrong with this part of the receiver. This can be confirmed by joining the aerial, via a small condenser, to the H.F. valve anode terminal, when the set should function as a simple regenerative detector-L.F. combination.

The fault may lie in the aerial tuner, in the H.F. valve circuits, or in the H.F. transformer primary. We cannot be more explicit than this, but, now that your field of search is narrower, we think that the source of trouble should be located fairly easily.

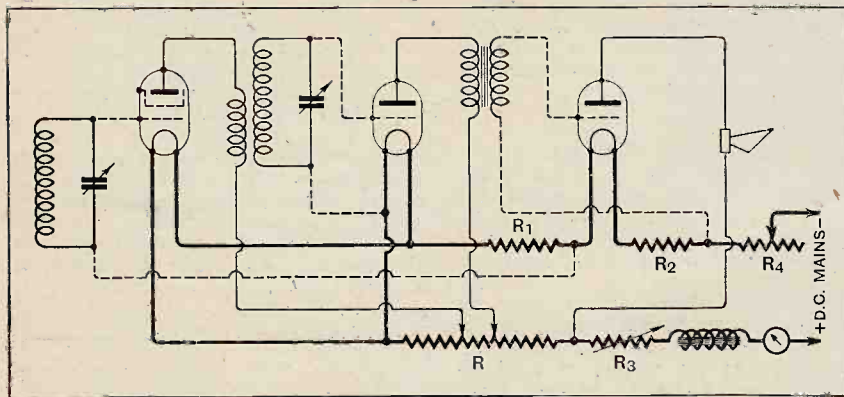


Fig. 2.—Basic circuit arrangement of a D.C. mains receiver with series-parallel valve filaments. Individual grid and plate circuits are clearly shown.

plete circuit is of necessity somewhat complicated, due largely to the presence of decoupling resistances and by-pass condensers; these have been omitted.

The filament circuits are shown in heavy lines, while grid leads are in dotted lines. Connections of all grid return leads and H.T. feed wires are made quite clear.

The function of the various filament circuit resistances should be properly understood; R_1 is the H.F. valve bias resistance; R_2 , the L.F. amplifier bias resistance; R_3 , variable resistance for fine adjustment; R_4 , resistance for absorbing surplus mains voltage in excess of 200 volts.

o o o o

Faulty Electrical Fittings

For some time I have been troubled by intermittent cracklings in my loud speaker. This has been traced—conclusively, I think you will agree—to my household electric light system, as the noises disappear entirely when the main switch is "off."

The electric supply company has tested my wiring, and report that its insulation resistance is exceptionally high, and that everything is in perfect order. Meanwhile, the trouble persists, and, indeed, gets steadily worse. Will you advise me where to look for its source? S. E. M.

You do not say if you are using any

Excessively Loud Gramophone Reproduction.

Guided by the instructions published in the "Readers' Problems" section of your issue for July 30th, I have fitted a gramophone pick-up to my "Band Pass Four." Unfortunately, volume is excessive for my needs. I have tried the effect of increasing the series 100,000-ohm resistance to 250,000 ohms, but this does not seem to make any difference. Will you please advise me as to what should be done? T. B. R.

In the first place, we would point out that the 100,000-ohm resistance to which you refer is for "decoupling" the grid circuit; it has no appreciable effect on volume. As in every other case, some additional means of reducing intensity must be provided when output is excessive, and we advise you to fit a potentiometer: its resistance element will be shunted across the pick-up, while its slider and one end of the resistance will be joined, respectively, to the "gramophone" stud of the change-over switch and to the junction point between the decoupling resistance and by-pass condenser. A circuit diagram showing pick-up potentiometer connections was given on the page immediately preceding that on which the conversion diagram to which you refer was published.

FOREIGN BROADCAST GUIDE.

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(Poland).

Geographical Position: 50° 16' N. 19° 2' E.
Approximate air line from London: 836 miles.

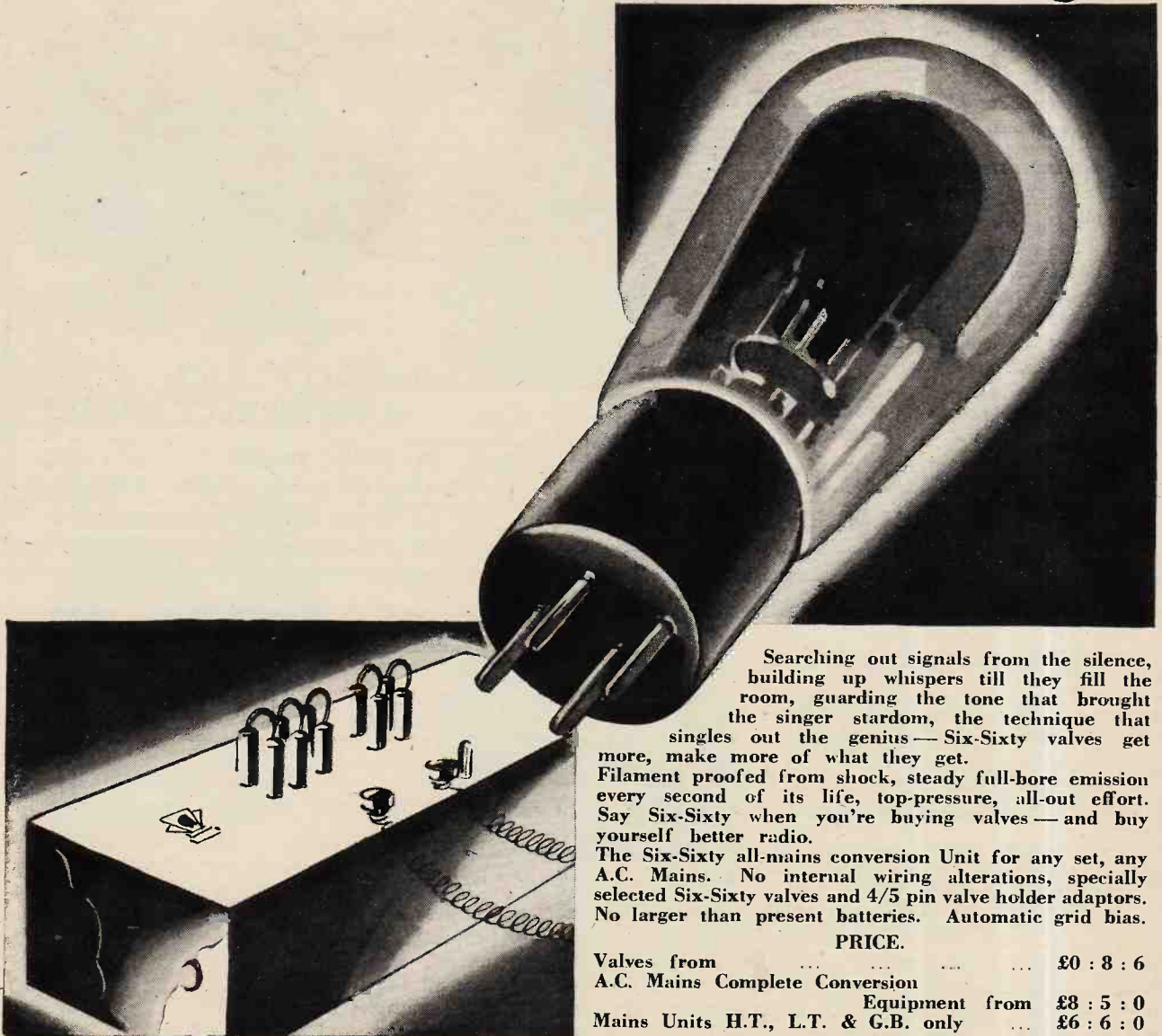
Wavelength: 408 m. Frequency: 734 kc.
Power: 16 kW.

Time: *Central European Time.
*Coincides with B.S.T.

Standard Daily Transmissions.

10.15 B.S.T. (Sun.) sacred service; 11.58 fanfare from St. Mary's Tower at Cracow; 13.00 weather; 15.30 concert; 18.45, variety; 20.15 main evening programme; 22.00 news; 23.00 dance music (Tues., Thurs., Sat.); on Sundays, from Restaurant Oaza, Warsaw; (Wed., Fri.) answers to foreign correspondents per microphone. Man and woman announcers. Call (phonetic): *Rhalo! Rhalo! Polskie Radio Katowice-vee-see.*
Interval Signal: Metronome (deep metallic sound).
Announcements are made in the Polish and French languages.
The station frequently relays transmissions from Posen and Warsaw.
Usually closes down with a few bars of the Polish National Anthem.

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they make more of what they get**



Searching out signals from the silence, building up whispers till they fill the room, guarding the tone that brought the singer stardom, the technique that singles out the genius— Six-Sixty valves get more, make more of what they get.

Filament proofed from shock, steady full-bore emission every second of its life, top-pressure, all-out effort. Say Six-Sixty when you're buying valves — and buy yourself better radio.

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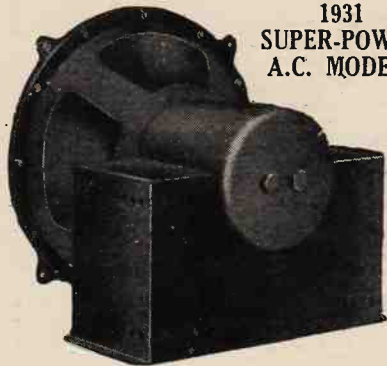
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W.W.93

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G4

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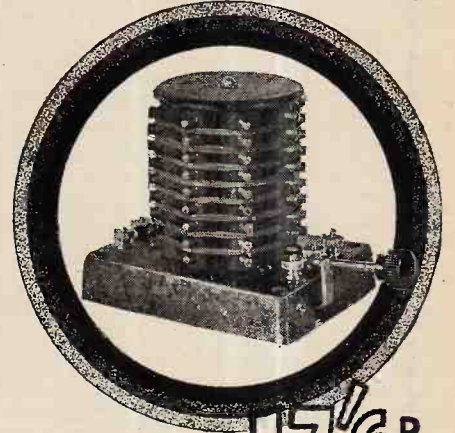
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M.C.11

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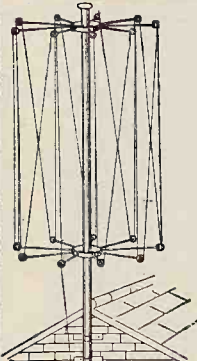

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4V. 6-60 Receiver, with valves, £6; climax transformer, 12/-.—Hawkins, Station Lane, Wombwell, Barnsley. [1464]

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Receivers for Sale.—Contd.

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IN View of the Difficulty of Making Fair and Definite Offers for Material that we have not inspected, it is requested that apparatus tendered for part exchange be kindly forwarded to us for valuation; no business can be proceeded with in connection with part exchange until material tendered has been examined; in this connection there need be no fear, material is sent to us from all over the world, not a single item of customers' property has ever been lost or mislaid; rejected offers from Xmas last amount to only 3.

IN Order to Furnish a Guide, the part exchange allowance may be gauged as approximately 50% of the list price of the article or articles tendered; for some articles the allowance will be more, and for others somewhat less; the allowance is entirely determined by the demand for individual articles, considering also their condition and production age; amateur constructed receivers cannot be accepted in part exchange as receivers, their value lying wholly in the components contained in them; only modern apparatus in good condition is accepted in part exchange; material cannot be purchased by us for cash.

TERMS of Part Exchange Business: A minimum of 50% of the value of an order, plus carriage charge where due, is payable in cash, unless the value is below £1, when a minimum of 10/- is payable; should the part exchange allowance exceed 50% of the total value of new requirements, the difference will be credited against future orders; material may be deposited against a credit note, which may be utilised at a later date; the maximum amount allowed to stand to the credit of any one individual is £200.

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AS Soon as Apparatus is Discarded from Use, dispose of it, don't keep it; it is not only wasteful, but expensive; the longer you keep it the older it is, and the older it is the less value it is; exchange it for a part exchange credit note, the value of which is constant, and can be disposed of if necessary by the holder with greater ease and facility than an article or collection of articles can ever be.

YOU Will Do Well to Deal with Appleby's; there is more in part exchange than the mere allowance; there is that something which begets confidence, that care that makes for efficiency; in the recent words of an old customer: "Quite an embarrassing boldness of purpose and an almost monotonous accuracy; you will know that it is all British—British capital and British behaviour; you will know also by dealing there that you are helping to employ British people."

SINCE the Day This Service Started it has Steadily Grown, not on rash advertising or subscribed capital, but on the volume of attainment only; and in these days businesses do not grow by that means for nothing, therefore we are privileged to invite you to utilise this service, wherever you may live; if you send your material by a carrier, pack it well, carriers are only human, and it is better to be safe than sorry; if you live in London, call to see us, you will like the atmosphere, it savours more of sport and art than the searing curriculum of commerce.

APPLEBY'S, Chapel St., St. Marylebone, London (opposite Edgware Rd. Metropolitan Station, or 4 minutes from Marble Arch, Oxford St.). Tel.: Paddington 8928 (3 lines). [0340]

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CONSULT Us Before Buying Elsewhere.—Read and Morris, Ltd., 31, Eastcastle St. (facing back of Warrings), Oxford St., W. [1450]

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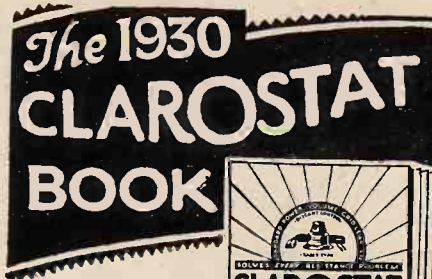
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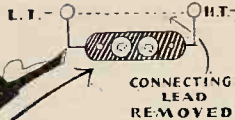
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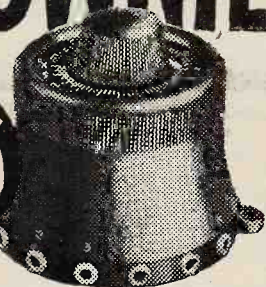
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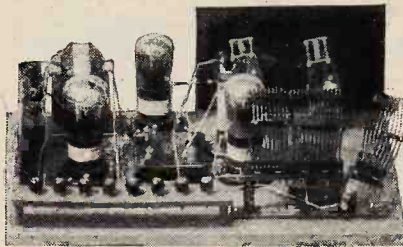
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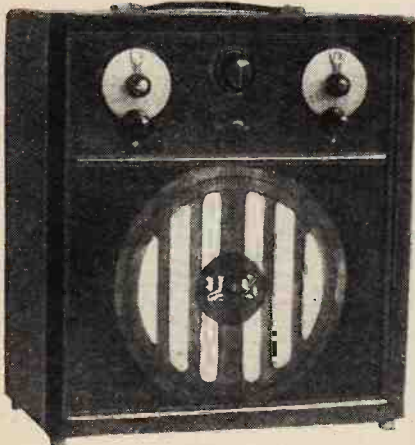
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SOUND SALES—Better to hear a Magnavox before you decide than to envy one later.—Below.

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SOUND SALES—Special British field transformers, tapped primary, 200-240v., suitable for converting battery speakers to A.C. mains, made by Parmeko exclusively for Sound Sales; 16/-.—Below.

SOUND SALES—Special transformers for field supply from 25 to 50 cycle A.C. 100v. mains, enabling you to run your speaker from 25 cycle supply—secondary output as above 7-9-and 12v.; 20/-.—Below.

SOUND SALES—All Magnavox speakers supplied to operate from 25 cycle 100v. mains if required.—Below.

SOUND SALES—Magnavox D.C., 110v. to 250v.; 55/-.—Below.

SOUND SALES—You seldom need service to Magnavox, but when you do let us solve your speaker problems.—Sound Sales, Tremlett Grove, Highgate. [1491]

CELESTION Model Z20, oak cabinet, 6 weeks' old; price £5; deposit system if required; cost £7/15.—H. Price, Lynton Cottage, Bridge, near Canterbury. [1485]

MULLARD E Speaker, 25/-, makers' replacement; 10/- allowed for 66K towards new 66R.—120, Stuarsts Rd., Yardley, Birmingham. [1542]

CELESTION C12, mahogany, perfect. £3/10; Farland dynamic, new. £2/10.—D. Heybourn, Altwood-Bailey, Maidenhead. [1526]

MAGNAVOX Speaker Units, moving coil, type R4, 6 volts, £5; type 201, 6 volt, £5; type 109, 180-300 volts D.C., £5/5; all 10% cones, new.—Reasbeck, 18, Derwent Grove, Holbeck, Leeds. [1516]

MOVING COIL, 6-volt, steel pot, highly efficient, sensitive; approval, £3/5.—Santher, Cromwell Lodge, Newtown, Malvern. [1511]

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3.5 Megacycle Crystals; 17/-; control without reaction.—Smith, Bryn Rodyn, Colwyn Bay. [1476]

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FILAMENT Volts 6, plate volts 400 (maximum), grid bias 84 volts (approx.), impedance 800 ohms, amplification factor 3.8, mutual conductance 4.35 m.a./volts; price £5/10; see article "The Wireless World," 24th July, 1929, then send to North London Valve Co. Ltd., 22½, Cazenove Rd., Stoke Newington, London, N.16. [0341]

AMERICAN Diatron Tubes; send for prices.—Agent, Perry Co., 32, Dawes Rd., Fulham. [1483]

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COMPONENTS, ETC., FOR SALE.

BELLING-LEE Panel Fittings are designed to give an expert finish to any home-constructed set; catalogue post free.—Belling and Lee, Ltd., Queensway Works, Ponders End, Middlesex. [0018]

COMPONENTS Lent on Hire—Details from Alexander Black, Wireless Doctor, 55, Ebury St., S.W.1, Sloane 1655 [0329]

M.C. Speakers, pick-ups, cone speakers, microphones, transformers, etc., send for list.—G2VM, 27a, Bridget St., Rugby. [1435]



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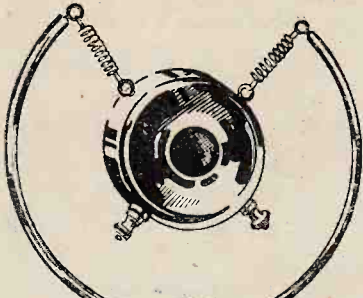
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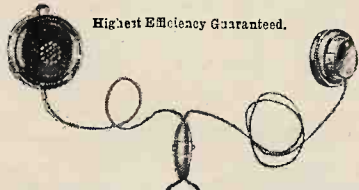
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SURPLUS Valves, components; cheap.—Write, 1M/PWOM, London, W.C.1. [1501]

FERRANTI Milliammeter 0-1.5, in stand, 22/6; Ferranti O.P.M.40, 18/-; Ferranti resistances and holders, 2/6 each; Centralab 25,000, 6/-; Centralab table volume control, 1/2 meg., 8/6; Clarostat, 4/-; magnum, 10,000, 3/6; electrad 100,000, 5/6; Varley 50,000 potentiometer, 6/6; Mazda A.C./S., 10/-; Sargent M.H.L.4, new, 9/-; R.I. high frequency choke 4/6; Utility mite condensers, 0.0003 and 0.0005, 4/- each; Utility and Wearite switches, new types, 5 T.C.C. 0.1 mica, 4/- each; 1 0.05 mica, 3/-; T.C.C. 4 mfd., 5/-.—Temple, Knockdolian, Comrie, Perthshire. [1500]

RECENT Purchases.—Hypermo, 11/6; A.F.5, 15/6; pair latest Lewcos Q.S.G., Q.A.C. coils, 15/-; Lissen needle pick-up, with arm, £1/2.—Marler, 104, Laburnum St., E.2. [1493]

MARCONIPHONE M.C. Speaker Chassis, 6 volt, with output transformer, £2; A.F.(C) and P.M.I.(C), £2 the pair; Marconi M.C. field transformer, type J, 22/6; Kuprox metal rectifier, 20 volt 1 amp., 10/-.—Wright, 7, Rawcliffe Rd., Chorley, Lancs. [1489]

R.K. M.C. Speaker, 6 volt field, also 6 volt 100 Ohms, as new; £6/10.—26, Watson St., N.16. [1487]

TWO A.C./R., A.C./5G., 3 P625A, A.F.3, 6 A.C. holders, half list; transformers, Cosmos, A and B, 25/-; another, 250 to 500, 4, 7-5, all C.T., 30/-; another, 230 4v., 8/-; T.R.C. choke, 5/-; G.R. transformer, 4/-; 50 H, 100 m.a. choke, 25/-; B.T.H. G.P.U., 15/-; Mellox cone, 17/6; wanted, Crescent 0-50 m.a., perfect.—Hargreaves, 23, Walmsley St., Hull. [1486]

LEWCOS Binocular S.P. Transformers, 2 long, 2 short, 28/6; 3 Cosmos A.C./G valves, adaptors, 8/6 each; B.T.H., Bowyer-Lowe, pick-ups, 10/- each; R.I. retroactive tuner, 6/6; R.I. tapped anode coil, 5/-; or all £4.—"Setao," "Wildys," College Gardens, New Malden, Surrey. [1482]

FULLER 100 volt 3,000 milliamp accumulator, 30/-; Oldham 2 volt 80 amp. accumulator, 9/-; Ferranti A.F.3, 15/-; linen loud-speaker, valves, coils, condensers, dials, cabinet, etc.—Bond, 10e, Villa St., Walworth, S.E.17. [1481]

OSRAM Music Magnet, complete with valves, 85/-, perfect; Parex Titian coil, 7/-; Watmel dual, 7/-; Harlie wave trap, 3/6; Ferranti A.F.5C, 22/6; Ferranti O.P.3C, 15/-; Ferranti A.F.3C, 16/6; Ferranti O.P.4C, 12/6; Cossor transformers, 10/6, all as new.

6-VOLT Valves, P.M.5X, 4/6; P.M.256, 6/6; P.M.5B, 4/6; Cossor 610R.C., 4/6; Cossor 610H.F., 4/6; Radion P525, 3/6; A.C. valves, Marconi M.S.4, 12/6; Mullard S.V.4, 12/6; Mazda A.C./S.G., 12/6; Mazda A.C./P1, 9/-; Mazda P.P.13/425, 12/6; L.S.5, 12/6; Cosmos A.C./R, 4/6; Cosmos A.C./P1, 5/-; Mazda A.C./S, 10/-, all as new.

VARLEY 100,000 ohm Resistances, 2/9; 80,000, 2/9; R.I. 250,000 4/-; T.C.C. Mullard, fixed condensers, 0.0001, 0.0002, 0.00025, 0.0005, 0.001, 0.002, with leak clips, best types, boxed, 1/- each; 1 T.C.C. 4 m.f. mansbridge 800v. working, 9/-; all goods absolutely as new.

SEE Advert. These Columns, September 10th, for list of bankrupt bargains, all goods mentioned available, and note full address.—G. A. Ryall, 182, Kennington Rd., London, S.E.11. [1476]

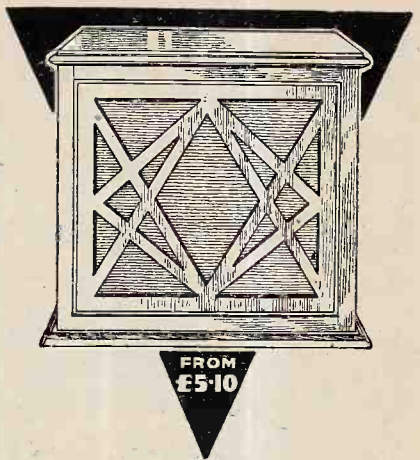
SHORT Wave Converter (Magnum) 20-80 meters (2 coils), plugs into set, no alterations, as new; £2/10.—May, 51, Graham Mansions, Hackney, London, E.8. [1471]

RADIO HOUSE, HUDDERSFIELD, issues the Reliability Wireless Guide, which will be sent post free upon request by Messrs. J. H. Taylor and Co., 15, Macaulay St., Huddersfield. [7823]

PART Exchange.—See our advertisement under Receivers for Sale.—Scientific Development Co., 57, Guildhall St., Preston. [0228]

ELECTRICAL Clearance.—2-valve transmitting sets, 15/-; Morse transmitting sets, 12/6; lin. spark coils, 6/-; 2in. spark coils, 17/6; super microphones, 2/6; microphone transformers, 2/6; television motors, electric, 110 or 220v., D.C., 10/-; 1/4h.p. motors, 110v., 30/-; 50v. 4a. dynamos, 35/7; 20v. 6a., 40/-; 100v. 10a., slow speed, £7; portable telephones, 17/6; earphones, 1/3; telephone H.T. generators, 6/6; Morse keys, 3/6; buzzers, 2/6; 1 mfd. condensers, 1/6; hand telephones, 5/-; shunt regulators, 10/- to £1, all sizes; 1,000 ohm chokes, 1/-; magnetic relays, 12/6; P.O. relays, 6/-; Ford ignition coils, 4/-; 1/4h.p. 220v. motor, shunt wound, 50/-; Mark III Star crystal sets, 40/-; D.I.II buzzers, platinum contacts, 5/-; Dewar switches, 1/-; 12v. car dynamos, 25/-; 6 or 12v. car starter motors, 12/6; cash with order or c.o.d. all goods guaranteed; send now, list now ready.—Galpin, 1, Queen's Rd., Peckham, London, S.E.15. [1538]

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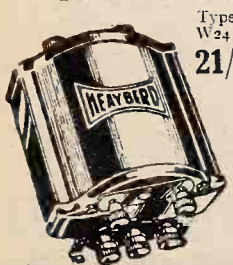
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ELIMINATOR, 50 milliamps and 4 volts 5 amps., £4; L.T. charger, 2 amps., 30/-; mains transformers, £1; G.E.C. pick-up, 12/6; Marconi 120 henry choke, 10/-, all new; Blue Spot speaker, 35/-; pick-up and tone arm, 6/-; 4-volt motor, 5/-; 5 meg grid leaks, 10d.; L.F. chokes, 5/-; L.F. transformer, 6/-; 5 ceramic shortwave coils, 5/-.—Capper, 20, Parkers Rd., Sheffield. [1543]

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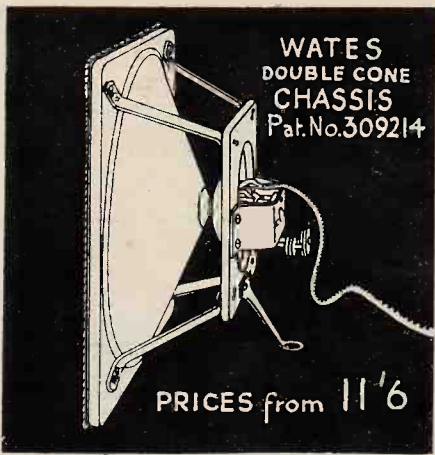
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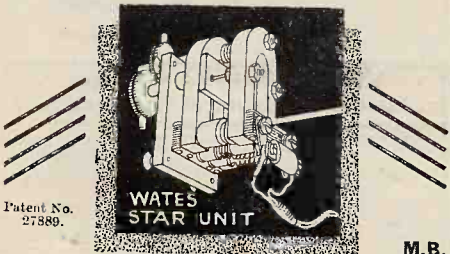
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- WANTED,** Wates duplex or Brown's L.S. unit, cone, Scotts. or exact aerial tuner.—McPhee, Blackburn, Bathgate. [1517]
- WANTED,** testing set, Hunt's or Ferranti's.—Particulars to O'Brien, 17, Effingham Rd., Bristol. [1537]

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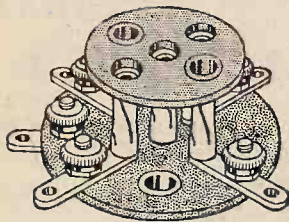
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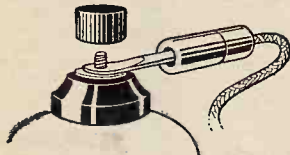
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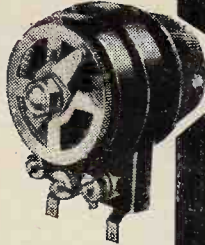


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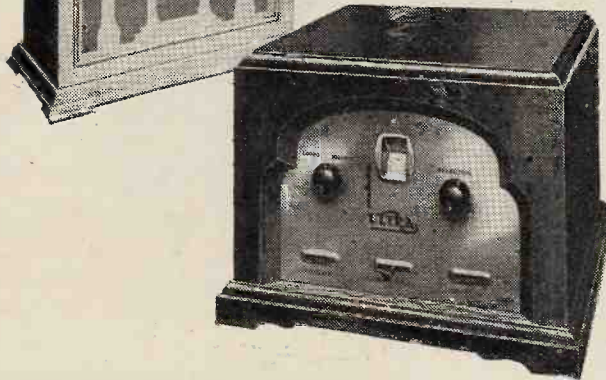
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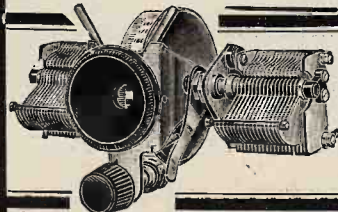
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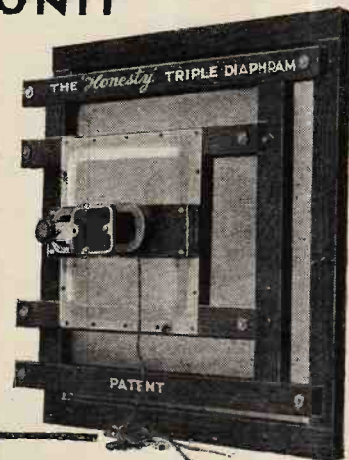
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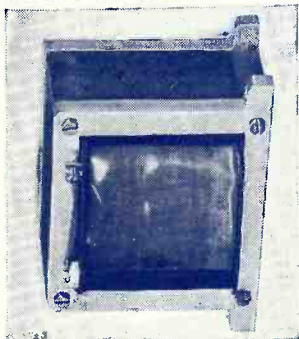
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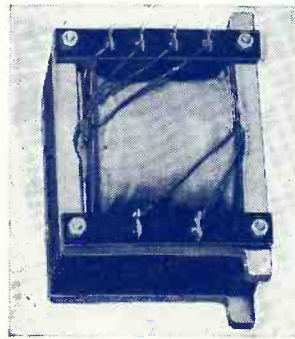
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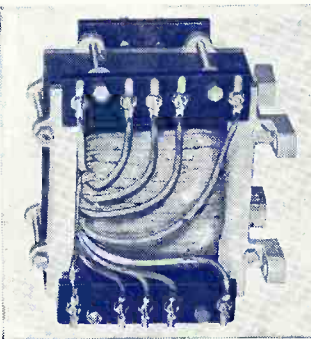
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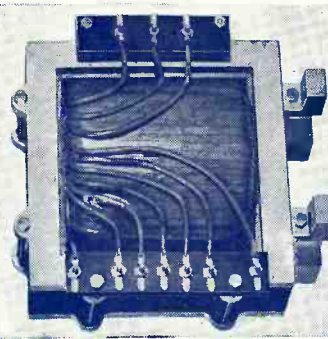
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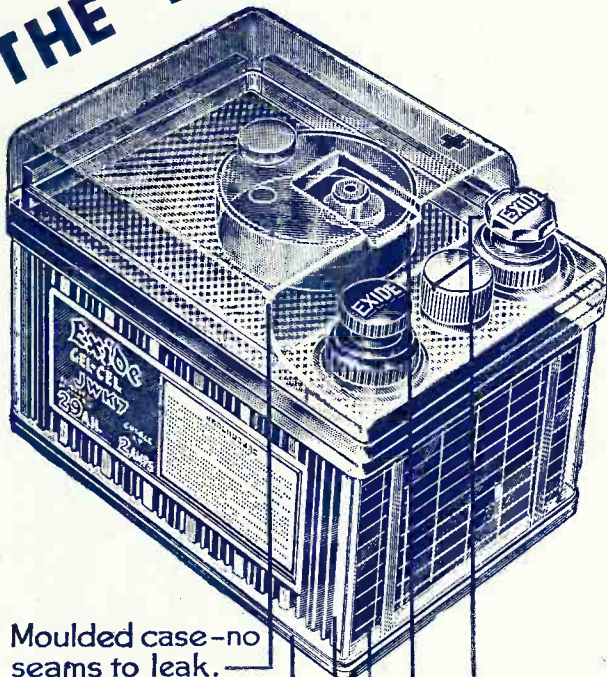


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