

THE "RADIO PICTURE" FOUR (See Page 143.)

Popular Wireless

Every Thursday
PRICE
3d.

No. 330. Vol. XIV.

INCORPORATING "WIRELESS"

September 29th, 1928.



More About the Exhibition

Special Features in this Issue

The Story of Selenium Short-Waver Mains Units

AN EVENING AT OLYMPIA

The Karolus Television System Berlin's Radio Show

Which Way Round? Placing Your Stations

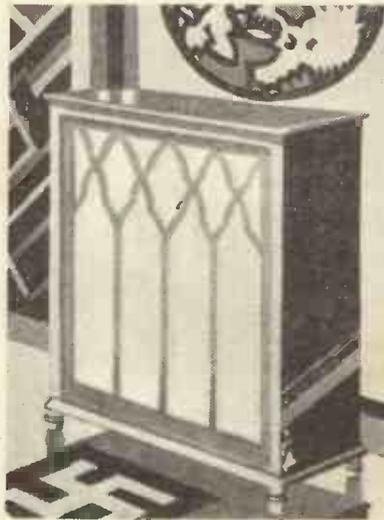
And a further long and illustrated article dealing with the exhibits at the Wireless Exhibition.

THE TRIUMPH OF THE NEW AMPLION SPEAKERS AT OLYMPIA

**Moving-coil quality without batteries,
mains connections or special transformers.**

Judging by the crowds—and there is no safer criterion—the big hit of the Radio Exhibition at Olympia is the new Amplion Speaker. You had to elbow your way to the Amplion Stand to get a sight of it or become wedged in the throng at Amplion House to hear it. But wasn't the thrill of its glorious performance worth it!

Soon it will be heard at every Radio shop throughout the country . . . soon it will be heard in every home. The new Amplion represents an epoch-making discovery in the science of sound reproduction that makes wireless more real . . . natural . . . human.



This is the Pedestal Cabinet in Oak. Price £13 : 10 : 0. Table Models, £9 : 10 : 0 and £10 : 10 : 0. Standard Chassis £6. Power Chassis £8. Other Amplion Models : Cone and Horn Types ; Standard Speakers from 52/6 to £5. Junior Speakers from 35/- to £3 : 3 : 0.

Nightly you'll have the thrill of sitting beside the microphone at Savoy Hill, without the discomfort of being there. Your radio favourites will become your intimate friends, so realistically does the new Amplion convey their personality to you.

An exaggeration? Possibly. But hear this splendid instrument and you will agree that it is a pardonable one. For the new Amplion renders every octave and every tone, and every inflection of every instrument and voice, more accurately. Send for free booklet to:—

GRAHAM AMPLION LTD., SLOUGH
London Showrooms : 26, Saville Row, W.1

**AMPLION
—THE
WORLD'S
STANDARD**

THE NEW AMPLION SPEAKER

**WATCH FOR
THE
AMPLION
RADIO
GRAMOPHONE**

NEW MARCONIPHONE ★ CONDENSERS

THE strength of the house depends on the quality of the bricks—

To secure satisfactory results from your receiver you should make sure that it is built with Marconiphone components throughout. The great resources of Marconiphone enable this world-famous organisation to pursue the most vigorous and untiring chemical research. All Marconiphone components bear the stamp of finished workmanship and unerring accuracy in design.

★ **SLOW MOTION DIAL.**
An inexpensive dial with conventional edge drive, the knob being below the scale opening. Fits standard spindles. Price 5/9.

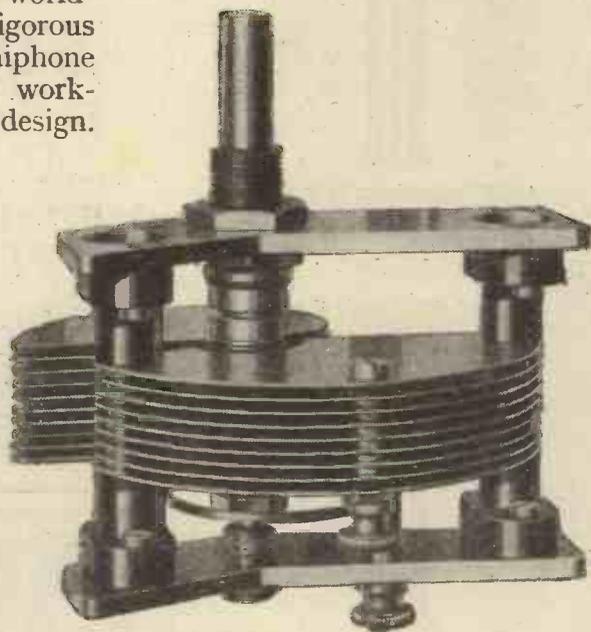
★ **FAST AND SLOW MOTION DIAL.**
A high-class concentric drive dial for fast and slow movement. When correctly fitted no back lash is possible, and the reduction ratio of 18 to 1 allows for the finest adjustments. This is a quality component, and as such is most reasonably priced. Price 9/-.

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High class but moderately priced variable condensers with ball and friction bearings. Nickel-plated finish. The vanes are shaped to give equal spacing of stations over the whole dial, and two capacities will be available. Prices: '0003 15/-, '0005 18/6.

★ **FIXED MICA CONDENSERS.**
A range of mica dielectric condensers for grid circuits, R.C. units, H.F., by-passing, etc., all fitted with terminals and soldering tags and contained in neat, moulded cases. Price, all capacities, 2/6.

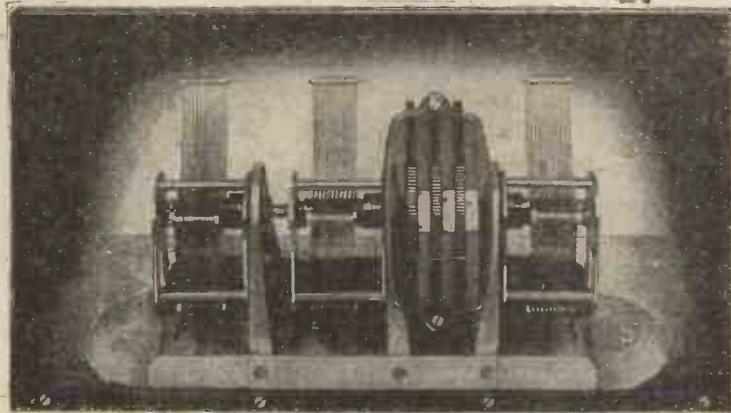
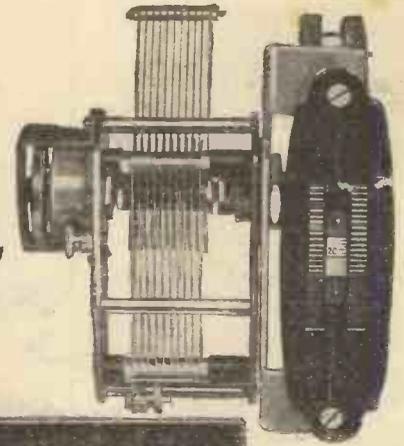
★ **MANSBRIDGE CONDENSER 800 VOLT TEST.**
A range of Mansbridge Condensers tested to 800 volt d.c., and suitable for high-voltage eliminators. The self-sealing properties of the well-known Sterling 300-volt type are retained. Capacities are: '5, 1, 2 and 4 mfd. Prices 3/6, 3/9, 6/-, 10/6.

THE MARCONIPHONE COMPANY LIMITED,
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Showrooms: 210-212, Tottenham Court Road, London, W.1,
and Marconi House, Strand, London, W.C.2.



DUBILIER

K.C. DRUM-CONTROL CONDENSERS



TWO Dubilier Drum-Control Condensers are the latest additions to the already famous "K.C." line.

One, the "K.C." Single Condenser, is operated by two drums for coarse and fine adjustment respectively.

The other, the "K.C." Triple Condenser, has three drums, but no slow-motion device. The drums are sufficiently close together to make possible either simultaneous or independent control of the three condensers.

Come and see these Condensers at

STANDS 102-103

Radio Exhibition, Olympia, September 22-29, where the many other new Dubilier products will be on show.

"K.C." with drum control
and slow-motion
device .0003 or
.0005 **15/6**

Triple "K.C." each Con-
denser, .0003 or
.0005 **38/6**

Triple "K.C." Combin-
ations of .0003 and
.0005 **40/-**



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

3 of the new DUBILIER COMPONENTS

MIDGET CONDENSER.
This small variable Condenser is designed for panel mounting and is particularly suitable for use as a reaction condenser; or it may be employed when a neutralising condenser of large capacity is required.
Complete with knob .0001 or .0002, **5/6**

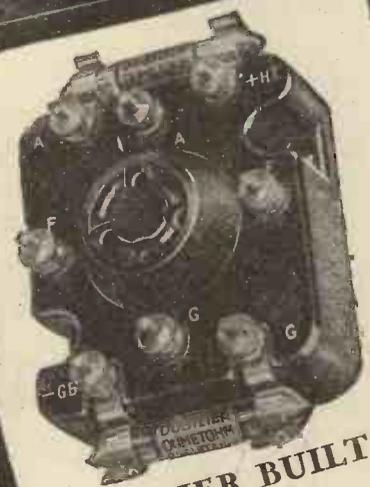
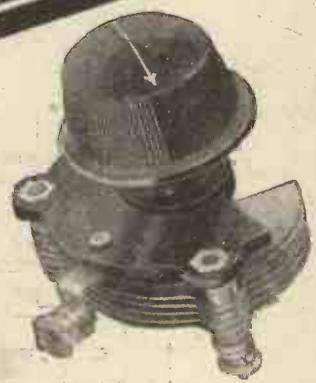
H. F. CHOKE.
To meet the need for a really efficient high frequency choke Dubilier have produced this well-designed component. It can be relied on to function efficiently over the whole broadcast band. The windings are protected by a moulded case, its appearance is neat, and not the least attractive feature is its inexpensive price **4/6**

COMBINED R.C. COUPLING UNIT AND VALVE HOLDER.
This component effects economy of space at no expense of efficiency. And it is worth noting that the valve holder may be used for the valve which either precedes or follows the unit. Otherwise this component resembles the Dubilier Unit without Valve Holder. **8/6**
Complete with 2 Dumctohms, which are detachable

Make a note to visit **STANDS 102/103**
Radio Exhibition, Olympia, September 22-29, where these and the many other new Dubilier products will be displayed.



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Advt. of Dubilier Condenser Co. (1925) Ltd.,
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**DUBILIER BUILT
IS BETTER
BUILT.**

TESTED VALUES OF THE LEWCOS H.F. CHOKE



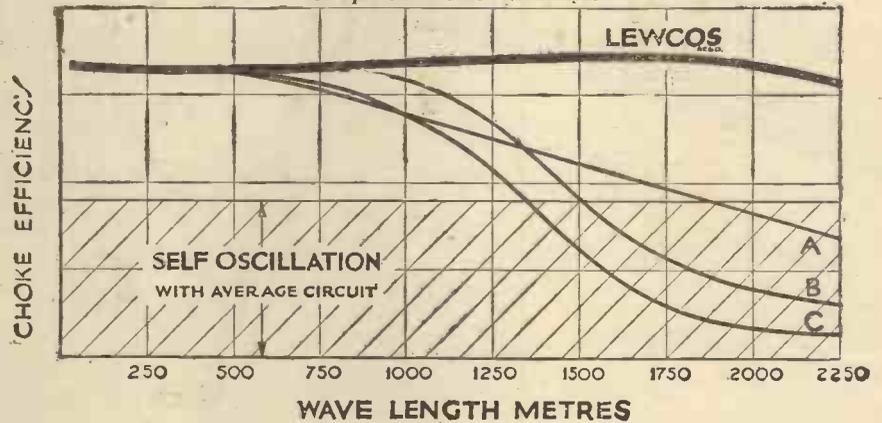
PRICE 9/- EACH

Self-capacity 1.62 micro-microfarads (N.P.L. test).

Natural Wave-length 5,200 metres (tested with Moullin Voltmeter).

The shaded portion of the diagram indicates the danger zone wherein self-oscillation is liable to occur in a receiver. It will be noticed that the LEWCOS H.F. Choke curve is well above the danger zone throughout the whole range of wave-lengths, whereas with the other three makes the opposite is the case.

H.F. CHOKE CURVES
Showing the performance of the Lewcos H.F. Choke compared with other makes



FOR maximum efficiency from your set on all wave-bands from 20-2,000 metres, use the "LEWCOS" H.F. CHOKE. Wireless enthusiasts will welcome the design of this new choke because it cuts down H.F. leakage to a minimum. The terminals are arranged one at the top and the other at the base of the coil to eliminate the risk of additional self-capacity in the wiring of the receiver.

The diagram shows the percentage choking effect of the LEWCOS H.F. CHOKE on all wave-lengths from 20 to 2,250 metres, as compared with three other popular makes A, B, and C.

Obtainable through any good Radio dealer.



LEWCOS HIGH FREQUENCY CHOKE

We are exhibiting at the
**NATIONAL RADIO EXHIBITION,
OLYMPIA,
Sept. 22-29**

The London Electric Wire Company and Smiths, Limited,
Church Road, Leyton, London, E.10.

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WHAT IS SLOPE?



Sergeant Nickel says:
"It's slope that matters"

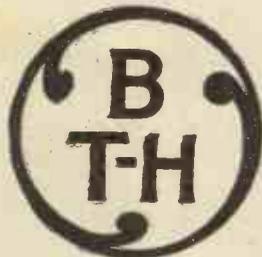
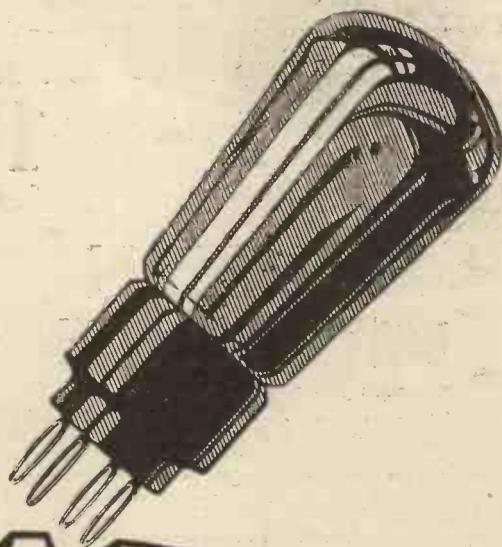
SLOPE is the greatest factor in valve efficiency
**THE STEEPER
THE SLOPE
. . . THE GREATER
THE GOODNESS**

The nickel filament employed in these new Mazda valves gives a steeper slope figure than is possessed by any other valves of corresponding types. Slope is the resultant of a number of other single characteristics, and is the only measure of essential goodness.

No other valves employ nickel filaments and no other valves possess the qualities which result from the use of this material.

*Ask for the valves with the nickel filament
They cost no more than ordinary valves*

MADE IN 16 TYPES—2, 4 & 6 VOLTS



MAZDA

Steep Slope
**NICKEL FILAMENT
VALVES**

See these valves at
STANDS 86 & 101
The National Radio Exhibition
Olympia, Sept. 22nd to 29th

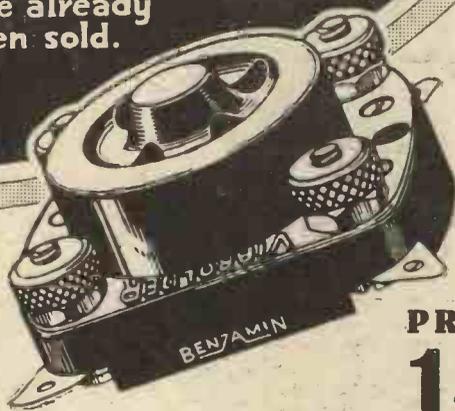
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The British Thomson-Houston Co. Ltd.

TRY THEM ONCE

BUY THEM ALWAYS

**1,500,000
BENJAMIN
VALVE HOLDERS**
have already
been sold.



**PRICE
1/6**

THE
**BENJAMIN
VIBROLDER**

VIBROLDER is the modern way of spelling "valve holder," because Vibrolde means so much more. It is the pass-word to improved reception.

The Vibrolde will fit every British four-pin valve—and what is more will fit it perfectly. The Vibrolde has no float, the valve legs plugging straight into the coils of the anti-microphonic springs which are free to move laterally as well as vertically. Thus perfect contact is assured even if the spacing of the valve legs is irregular.

**A MODERN SET DEMANDS THE
VIBROLDER—THE MODERN
VALVE HOLDER.**

**BENJAMIN
BATTERY SWITCH**

The Benjamin Battery Switch is as up-to-date as the Vibrolde. Two sliding arms ensure a definite double contact while the whole switch works with that "snap" action which denotes excellence of design and workmanship. Terminals are provided for ease of wiring and one-hole fixing is standardised.

This switch may be obtained without terminals but with ready tinned soldering lags. Price 1/-.

See the Vibrolde, the Battery Switch and the full range of Benjamin Components on

**STAND 171
AT OLYMPIA**

**PRICE
1/3**

The original Benjamin valve holder is still retained. Price 2/-.



**700,000
BENJAMIN
SWITCHES**
are now
in use.

**BENJAMIN
RADIO PRODUCTS**
BRANTWOOD WORKS, TOTTENHAM, LONDON, N.17.

Choose the
right valves for

RESISTANCE COUPLING



R.C. 210
2 V. RES. CAPACITY
AMPLIFICATION 40
IMPEDANCE 67,000

R.C. 2

Fil. Volts 2.0 Amp. Factor 30
Fil. Current 0.1 amp. Impedance 150,000

R.C. 210

Fil. Volts 2.0 Amp. Factor 40
Fil. Current 0.1 amp. Impedance 67,000

R.C. 410

Fil. Volts 4.0 Amp. Factor 40
Fil. Current 0.1 amp. Impedance 61,000

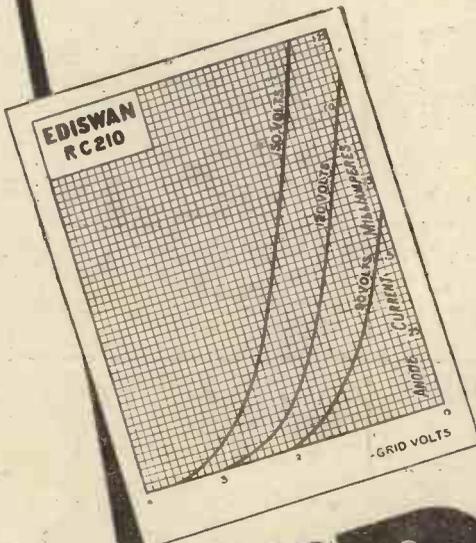
R.C. 610

Fil. Volts 6.0 Amp. Factor 50
Fil. Current 0.1 amp. Impedance 50,000

R.C. 210

Specially designed for use as
an L.F. Amplifier when the
Resistance capacity method of
coupling is employed. It will be
found to give a high degree of
amplification without distortion.

10/6



EDISWAN NEW LOW TEMPERATURE VALVES

Make a point of inspecting the range of New Edison Low Temperature Valves at Olympia, Stand 43, Main Hall.



The
Purest
Music
~
The
Most
Natural Speech



The
Brown "Cubist"
Moving Coil
Loudspeaker

The first practical Moving Coil Loud Speaker requiring no battery to drive it. Splendid volume, life like reproduction and unequalled purity. Incorporates the most advanced principles in loud speaker construction to-day. Polished Mahogany cabinet; oxydised metal flare. Height 20" £15. 15s.

The Brown "Q"

An unequalled example among horn-types. Embodies the famous "Brown" reed-type movement responsible for a quality of reproduction which must be heard to be believed. Elegant design with mahogany flare and burnished metal body. Hear it at your Dealers. Height 23" £15. 15s.

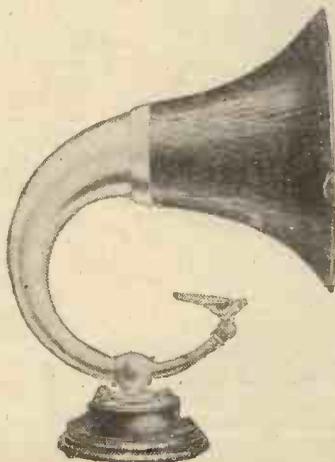
You'll enjoy radio best with a "Brown" Loud Speaker. It helps your Set to better performance; it brings the world's most talented artistes to your side without fault, without loss of musical values or muffled speech. Whether your choice falls on a horn type, a cone or a Moving Coil Unit you may be sure that the "Brown" shows the development of each of these principles at their best. It carries the secret of true music, it satisfies the desire for volume of phenomenal richness, it brings purity of reproduction

The Brown "H.Q."

Possessing the same elegance of line as the "Q" model, this instrument embodies the identical principles of the earliest Brown Loud Speaker and rewards its owner with adequate volume and pronounced sensitiveness. Height 20". In resistances of 2,000 and 4,000 ohms. £6. 0s.

The
Brown "Sphinx"

This peculiarly distinctive design has much to recommend it. Its Cone Unit is unrivalled in its reproduction of sound. It brings a wealth of rich volume blended with purity and smoothness. In mahogany, oak or walnut. Height 16". 2,000 ohms. £12. 10s.



Brown
LOUD SPEAKERS

S. G. BROWN, LTD.,
Western Avenue,
North Acton,
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Supplied by all first-class
radio stores



Exide

WEEK

BEGINS

OCTOBER

1

Here is that buying opportunity that battery-users everywhere wait for! Exide Week! This year the opportunity is greater than ever. Not only have Exide prices recently been reduced, but the range of Exide Batteries for every purpose has been increased.

Traders all over the kingdom are making special displays. Be advised to consult your nearest Exide dealer or Service Agent on the question of your wireless and car batteries. Most important of all — specify an Exide — the long life Battery.

REDUCTION IN PRICE OF THE FAMOUS Exide W. H. 10 VOLTS

At its new price this battery represents value that is extraordinary indeed! For those without an electricity supply in their homes, here



5,000 milliamperes hours.

is a battery, which, quality and capacity considered is the most economical High Tension unit available to-day.

REDUCED FROM **7/6**

NOW **6/3**

EXIDE BATTERIES, Clifton Junction, Nr. Manchester.

Here it is
 The wonderful **NEW**
Cossor Melody Maker
THE SENSATION OF OLYMPIA



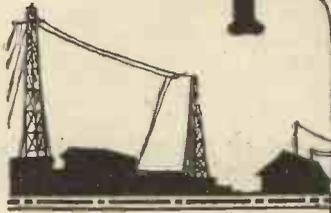
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This wonderful new "Melody Maker" gives "knife edge" selectivity . . . better tone . . . enormous volume . . . longer range . . . it will bring you programmes from over 20 stations . . . amazingly simple to build . . . no drilling . . . no soldering . . . no wireless knowledge required . . . it's as simple as Mecano . . . everything you need packed in a sealed carton . . . even the tools . . . and the handsome all-metal cabinet . . . and the three Cossor Valves . . . absolutely nothing more to buy . . . fill in the coupon now!

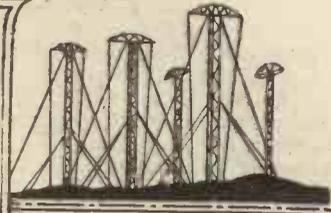
**Built by anyone
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Please send me free of charge one of your Constructor Envelopes which gives full details of the new Cossor "Melody Maker"
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Popular Wireless



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RADIO NOTES AND NEWS.

The Queen's Hall Proms—Oh! Oh! Mexico!—Prince Honours the P.O.—The Announcer's Chance—Identity of Stations—Wireless Controlled Ships—The Waterpipe Earth.

The Show that Passed.

TO-NIGHT sees the now well-known "grand crush" at Olympia, when crystal users are spurned under the feet of the valvers crowding to see a one-and-sixpenny valve which strikes the half-hours and can be used as a flash-lamp; when the lads make a final collection of lists, samples, souvenirs and cigarette pictures; when stand attendants feel as limp as drowned kittens and the band has played "Zampa" for the 1,004th time. Good-old Olympia!

The Queen's Hall Proms.

I HAVE the impression that these concerts are this year somewhat better tempered to the ear of the low and the middle brow, which is, I take it, an improvement. Anyhow, they have been excellent so far, both in matter and in reproduction, and I now make my annual bow to the B.B.C. and forgive 'em all for the sake of the "proms."

Care of the Battery.

THE "News of the World" says: "For testing the health and performance of the accumulator there is nothing to beat the hydrometer." Well, I don't know. I have heard of them being tested by being hitched to wireless receivers. Our contemporary adds: "It is essential to maintain the correct gravity of the acid if long life is to be expected, and no voltmeter will give this information." Maintaining my correct gravity with an effort, I beg to point out that, whether you expect to live to a ripe old age or not, you do not need a hydrometer to tell you the "correct gravity" of an accumulator. You need a book or an electrician.

What the Battery is.

BEFORE proceeding to the next item on the agenda, I must tell you this one, a schoolboy's essay on the accumulator (abridged): "The accumulator was invented by Plant and Edson, in a spirit of progress. Plates of active stuff are put into a glass box and covered with sulfuric acid of specific gravity according to whether the thing is empty of electricity or full up. On being charged the sell has

two volts and an electrolyte, but if discharged it will not do so, which means that the chemical reactions have been reversed." Oh, quite!

Oh, oh, Mexico!

HERE'S a chance for the gilt-edged Valve Barts. to score a hit with the family—or her. It is announced that, any odd revolution permitting, San Lazaro, a suburb of Mexico City—where the presidents are bumped off—will broadcast

Mexican news at 9 a.m. and 9 p.m. daily. Call, XC51; wave-length, 44 metres. Why, it's a cinch for a real short-wave Bart., though I don't know what he can do with the news when he gets it. ("Bang! That was General Gonzalez. Deeply regretted. Next President, please.")

The Prince Honours the P.O.

THE Prince of Wales, who apparently has little time for driving home the slogan, "Safety First," but who is the living embodiment of the Empire-building slogan, "Let's take a chance on it," recently visited that weary old white elephant of P.O. wireless ambition called Rugby, and ascended one of the masts in a lift. Well, I have had my whack of ascending masts—in a "bo'sun's chair," strictly on business—but I have never tackled 820 feet, nor ever will. At that height the blinking things seem to sway like bamboos. His R.H. certainly possesses his full share of what is commonly known as "nerve." More power to him.

SHIP'S SENTINEL SOUNDS SOS.



This operator is adjusting a ship's "automatic listener," which keeps a wireless watch for distress calls even when no operator is listening-in. All ordinary calls are ignored by the selector device, but if an SOS comes along it rings bells in the operator's cabin, in the radio-room, and on the bridge.

Interlude to Tragedy.

PINK lights, please, and soft music. Imagine the wives and gossips listening to an afternoon programme at the point where a piano solo broadcast from Dallas, Texas, was finding out all the weak points of the loud speakers. Gaily the ice-water pitcher circulates. Cheerfully the huge slices of melon wet the ears of the American kids while the mommas speak of the operations of their spouses, in real estate, cotton, oil, or wheat. "Dollars" is the tune and big business the accompaniment, as the soft Texan

(Continued on next page.)

NOTES AND NEWS.

(Continued from previous page.)

afternoon progresses. Suddenly—oh, horrors! (to be continued in our next).

The Announcer's Chance.

SUDDENLY—as I said—the announcer's voice heralds blood and death. For, idly glancing out of the window, the heir of freedom with a capital "F" had noticed an unusually interesting murder. No common, everyday Chicago-like murder would cause an American announcer to turn a hair, but this—but this was different. Oville Matthews, head of a local bank, with numerous pellets in his interior, was still running. So was his assailant. Journalist uppermost, the announcer lost his control and, switching off the murderous piano, gave the lucky listeners a first-hand account of the tragedy.

Stop Press.

THE gentleman with the gun had quarrelled with Oville Matthews over an election bet. Oville, being semi-civilised, did not carry pistols all round his belt. But he died to make 10,347 listeners happy. Gee!—as the American poet says—what a happy land is England!

Identity of Stations.

MY recent note has brought a number of suggestions from readers. V. du B. S. (Carnarvonshire) is in favour of the call-letters being sent in slow Morse on a gong or bell. No; the general public will not learn to read the Morse code. Esperanto is easy to learn, and I cling to my own suggestion. Failing that, the central authority at Geneva might number all the stations, and then each number could be given by strokes of a gong, with intervals between the tens and hundreds.

Rubbing It In.

AS a rule, the wedding music is considered of secondary importance as compared with the dresses and the size of pa's cheque. Yet an American couple, at hitching-time, are reported to have felt it necessary to have the music played by Maitre E. Schelling, he being situate in Geneva. So the transatlantic radio-telephone service was enlisted, and they had the felicity of hearing the Wedding March and Chopin's Polonaise in F major shoved over wire and ether from Geneva. I expect it cost a pot of dollars, and I hope they believe it was money's worth.

Is Home-Construction Fading?

WELL, I should just say not. A lot of us went over the new works of the Benjamin Electric, Ltd., last month and saw some wonders. These people began to make scientific apparatus twenty years ago, and have, as a result, made a name for themselves and their products. Over a million and a half radio valve holders have been made and sold by them during the past two years. Now, they don't all go to home-constructors, I suppose; but as so many firms make their own, I think the "fans" must have accounted for lots of them. Which proves that set-making is humming, doesn't it?

Wireless-Controlled Ships.

DO not think that because the Germans have been sculling their ship, the *Zahringen*, around by wireless remote control, that they are therefore years ahead of us. Prior to 1914, I learn, the British Anti-Submarine Committee were using a radio-controlled submarine as a target. *Agamemnon* was, at the end of 1918, converted into a target for the Atlantic Fleet, and was navigated in and out of the shots by means of wireless. *Centurion* was so converted in July, 1927. So the "effete" Briton is still leading in something!

PCJJ and H.H.O.R.

VERY alphabetical title, what? Thanks and O.K. to W. J. S. (Devonport), R. N. (Leath), S. F. (Acle), and a lot more, for letters affirming that PCJJ has not lost power. A number of readers suggest that H.H.O.R. might do well to overhaul his aerial and earth and the connections thereof. N.B.—H.H.O.R. R.S.V.P.

SHORT WAVES.

The doctor's little daughter had strayed into his surgery, and was watching, wide-eyed, as he tested the heart and lungs of a patient. Suddenly she spoke:
"Getting any new stations, daddy?"
"London Calling."

"Legal Question to be Decided—Is a Woman a Person?" runs a newspaper heading.
Well, they have been called loud speakers.

Farmer's Boy (returning from fishing):
"That city fellow must have been foolin' me when he said he had a lot of tuck fishin' for DX up here. I ain't caught one o' the durn things yet."
"Radio News."

An attempt is being made, we understand, to popularise the saw as a musical instrument for broadcasting. But why return to the original when so many life-like substitutes have been discovered?

Mrs. See: "Turn off the radio, dear. The static is awful!"

Mr. See: "It isn't static, my love. It's only one of those modern music concerts."

WIRELESS.

Unhappy boy, half-hidden in the corner, fiddling with wires and valves and other gadgets,
Questing for far-flung jazz, but getting merely shrieks from the ether;

Hear, in these vague and stifled protestations,
Voices of gods still strong, though out of fashion,
Angry with those who seek to probe their secrets,
Being unworthy.

Had you but lived in days of peerless Helen,
Other, indeed, the doom that had descended;
Flaming, a bolt of extra-special sulphur,
Straight from Olympus.

—E. S. B. The Observer."

Personal Note.

A NUMBER of kindly men have thought fit to blue time and stamps in order to take notice of the fact that I was ushered unto this rummy world on this very date as ever was. Out of my ripe experience—for it's 92 years ago, or it feels like it—I will give unto them the following pearls of wisdom as thanks, with especial warmth to "O.V.2" of Derby. Keep your accumulator "topped up," and get rid of your H.T. battery as soon as poss. Use and enjoy health, youth, and money while you've got 'em. You never know what kick is in waiting. Be kind to everyone, and learn how to compromise. Look after teeth and valves as though they were diamonds.

The Water-Pipe Earth.

KINDLY turn to page 902 of "P.W." for Sept. 8th, and read the letter signed "Erebus." Will some reader whose profession brings him into contact with gas and water pipes tell me whether water pipes differ from gas pipes in regard to the number and nature of their joints? Therein probably lies the answer to the puzzle. The conductance of iron is greater than that of lead. Is not the gas generally laid on in iron pipes and the water in leaden? Experts in pipes, forward, please!

A Chance for Traders.

THREE HUNDRED POUNDS will be awarded to the radio dealer who puts up the best dressed window during the "Ever-Ready" Company's Selling Week, October 1-6. The window must be devoted exclusively to "Ever-Ready" goods. Six consolation prizes of £50 each will be awarded by the Company to the next six best window-shows. Intending competitors should apply at once to the Company for an entry form. Here's a chance to get just that little extra capital your business needs.

Winter Radio Evenings.

THE Alma Institute, Southwark Park Road, S.E.16, re-opened the activities of its Wireless Society on September 17th. It welcomes new members to its bosom. The fee is one shilling, for the session lasting till Christmas. Tuesdays and Thursdays, 7-30 p.m. Lectures and constructional work. Further details from Mr. S. F. Harris (G 5 S H), 13a, Winstead Street, Battersea, S.W.1.

These Valve Baronetcies.

YET another charming infant of fifteen, to wit, N. J. B. (Lowestoft), having become a man before his father (and not made room for his uncle), calmly takes up his pen and in a fair round hand demands admittance to the not so ancient but exceptionally honourable order of Barts. (Valve, "P.W."). He gives a list of stations he has received L.S. on 1-v.-2, 44 all told, including 27 Continentals and Melbourne (3 L O). It's a whale of a set, and something ought to be done about it. Cigar or nuts, young friend? You can't ask dad to pay for Letters Patent, what with the price of bacey and so forth.

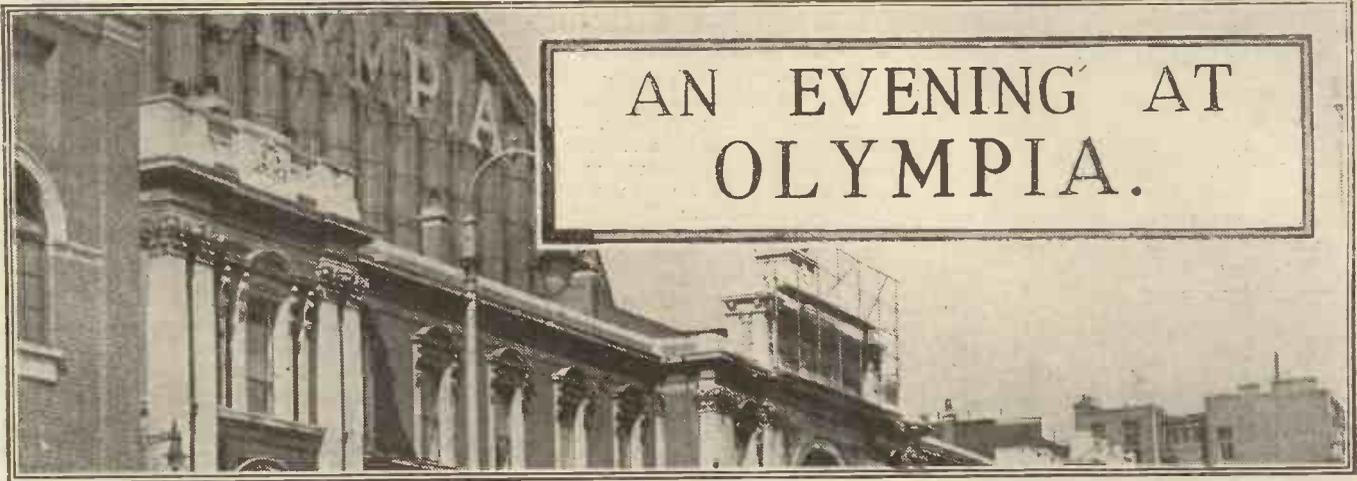
The Sleeper Wakes.

THE well-known U.S.A. firm, the Sleeper Radio Corporation of New York, has produced one of those very *de luxe* sets which only film stars or jazz music writers can buy. It has a self-winding electric clock in the panel. I want to know—as the Sleeper people made it—has it an alarm bell? And do they give a "slumber wear" suit with every set sold? If not—America is not what it might be.

Back Numbers.

G. B. (Ilkeston) is fitting and hates the thought of selling his "P.W.'s" as wastepaper. So do we, but authority forbids us to advertise them for disposal even as a gift. I suggest that our friend should offer them to a hospital or to the reading-room of a local club; failing that, to a radio club or society. We thank him for his kind remarks and beg other readers to give superfluous back numbers to the Boy Scouts or the British Legion, etc.

ARIEL.



OLYMPIA is in full swing this week. It is packed with people searching round for radio bargains. It is full of marvellous inventions, crammed with good apparatus, and teeming with technicians. But suppose a novice noses round at the radio exhibition, how much will he be able to take in?

The following suggestions for an evening's entertainment at Olympia are written for the man who may not have made a study of radio theory, but who does want to hear the programmes as well as possible. Let us suppose that he has only a few hours in which to spend only a few bob. What is the best way to set about it?

A Timely Tip.

One point is worth mentioning right at the start. That is, that if there is any particular thing you simply *must* have, make straight for it! The show is such a big one, the side shows are so attractive, and there is such a crowd hustling and bustling about, that time goes before you can look round, and unless you make a bee-line for it you may find that the very thing you came to see is the thing you have not found at three minutes to closing time!



Here is a unit for getting all your high tension from the electric-light mains. It plugs into a lamp-holder and gives either a "high" or "low" range of H.T. voltages, according to the position of the small switch at the front. It is a "Benjamin" product, and is capable of giving a large and well-smoothed output.

The expert finds Olympia a thrilling show—but is it of real interest or benefit to the novice in radio?

This is the aspect of the National Radio Exhibition dealt with in the following article.

By P. R. BIRD.

The review of the exhibition which appears in "P.W." will help you here. You can see at a glance the leading lines on the various stands, and make up your mind in the train or on the bus which one you will visit. Having arrived at the show, and taken one good look at the crowd, plunge in and do your little bit of business before nosing round.

Then having got that off your mind, so to speak, you can give the rest of the evening up to entertaining yourself. This won't be difficult. Whatever doubts you had will be dispelled on the doorstep! Before the band has finished the first number you will realise that Olympia is all right. In fact, Olympia is tophole. Good old radio exhibition!

One good thing about it is that you are not obliged to buy a thing. You are not obliged to refuse anything, either, so that if people like to give you an interesting book, sample, or leaflet you can take them with a clear conscience and enjoy them when you get home! Some of them are well worth reading, too. So do not refuse details of anything that you are interested in at present, or that you may be interested in in the future.

An Earth with a Thirst.

Just at first it is a good plan to bear in mind your own set, and how you could improve it. You will see different aerials, for instance, and all sorts of things which might improve your reception. Do not forget the earth, either. There are some good earths on show, including some that retain moisture like a sponge (at least like a sponge, when compared with the dry old thing you may have at home).

Another lead-in, too, might do your set no end of good. And what about a new crystal, or a nice lightning arrester that will save the family from fright when there is a thunderstorm on?

If you have a valve set you will certainly be interested in the slow-motion dials, and other various good tuning gadgets.

These, of course, are particularly pleasing to the man who goes in for long distance, but as one can do that very well on a one-valve set at this time of the year, there is no reason why you should not have a look at the various stunts invented for your benefit.

By the time you have inspected the 'phones and noticed how much lighter and cheaper they are than they used to be, you will be getting thoroughly interested. Having broken the ice and got into the swing of the thing, you will be finding on all hands evidences that the radio people have not been asleep all the summer.

For the Constructor.

Lots of the little gadgets are of the handy and practical type that you cannot help being interested in. That corrosion cure for accumulator terminals, for instance. Those new battery leads or patent flux. Everything looks so tempting that even if you have not a valve set at present, you will begin to think about the time when you will construct one. For, if Olympia is interesting to the listener who listens and

(Continued on next page.)



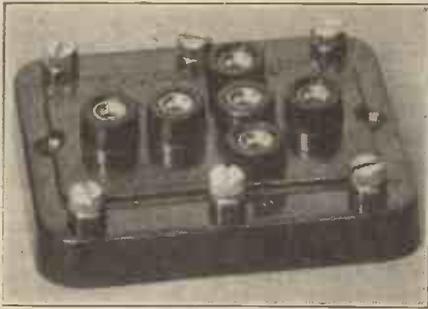
Can you beat it? Many amateurs who started without experience a year or so ago, can now turn out perfectly professional-looking receivers. The above was made by a Brixton reader of "P.W."

AN EVENING AT OLYMPIA.

(Continued from previous page.)

does nothing else, it is certainly a kind of paradise for the home constructor.

First of all, the constructor, or would-be constructor, will be delighted to find how



Even if you "wind your own" you must have a good coil base, or your results will suffer. The above is a Colvern product.

the whole affair has been simplified. Those Wireless Constructor Envelopes and the booklets issued by the valve people are good cases in point, for they make the whole thing seem so simple and so certain, that it seems a crime to put up with a crystal set.

What with life-like photographs of the set, close-ups of every wire, and all sorts of good advice thrown in, any doubts that you might have had about your ability to make a set will vanish into thin air.

Soldering Simplified.

Fortunately, in order to be a constructor there is no need to have "oodles of boodle." In fact, it is doubtful whether anybody enjoys wireless so much as the man who saves money by "making his own." Once you get going and acquire the knack of the thing, you can save no end of money by making your own apparatus.

For instance, at one time it was a dreadful job to wind a coil for wireless, but in the course of an evening at Olympia you will find suitable coil

formers, ready-shaped and holed, and fairly crying out for the wire to go round them.

It is the same with the other little difficulties which at one time seemed inseparable from the lot of the home constructor. For instance, if you have always had trouble in keeping the top of your soldering iron clean you will find here a soldering iron with a detachable top which after the main iron has been heated can be popped on by a simple movement of the thumb and is as clean as a new pin and ready for soldering. Another good stunt which will delight the man who always gets flux all over himself and the bench, as well as over the joints he is soldering, is in the form of a flux gun.

Flux de Luxe.

This artful device has a long nozzle which puts just as much flux as you require and no more, right on the spot where you want it. Only those who have had experience with what a really bad-tempered tin of flux can do in the way of making a mess, will be able to realise the beauty of this little gadget. But it is only one of the many good ideas that one will come across in an evening at Olympia.

There are plenty of others from double-

other. Then when you get home you can fit it in the cabinet both ways, see which you like better, and go ahead.

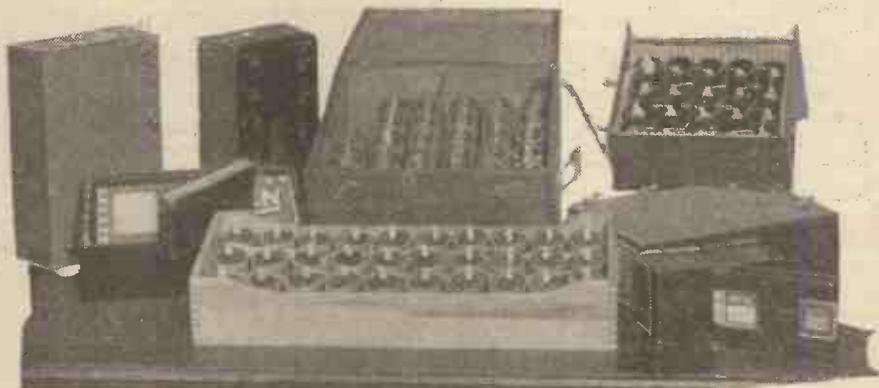
Apart from the making of a complete set, either crystal or valve, there are other little constructional gadgets—such as paper for making your own loud-speaker cone—which promise great fun combined with economy. Moreover in buzzing round looking for tit-bits amongst the stands you are bound to come across some good ideas which are new to you.

The Other Attractions.

Perhaps you had not realised that your old gramophone for instance, could be given a complete tonic, and pick-me-up by attaching a pick-up, enabling it to work a loud speaker. And talking about loud speakers you will discover that there is no need to trail a long flexible wire from the set to the room in which you are using the speaker.

At Olympia there are all sorts of remote control devices which are so simple to fit that it is a pleasure to instal them and which will let you work the loud speaker in any part of the house.

By the time you have investigated this, and a cheap unit for getting the H.T. from the mains, and had a look at a cheap home-



Here is a representative group of batteries which shows how far radio specialisation has gone since the days when one class of battery was used for all kinds of sets.

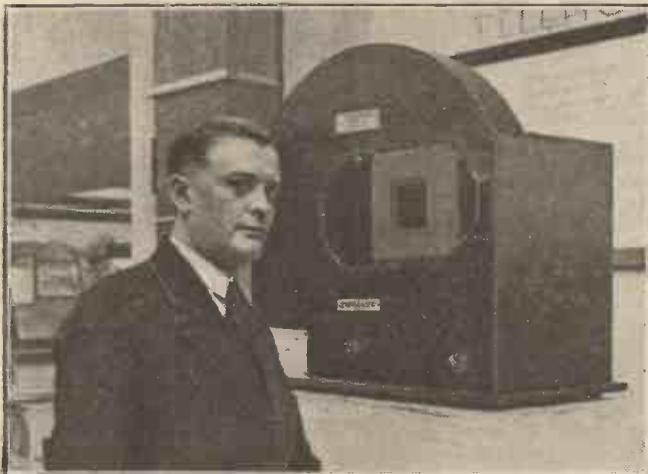
faced panels to complete kits for constructors. The advantage of a double-faced panel is worth lingering on for a moment. Suppose you have a cabinet at home which wants say a 21 in. x 7 in. panel, and when you go to buy it the dealer says, "What colour?" Perhaps you thought previously that all panels had to be black, but nowadays the shops have all sorts of coloured and variegated panels, some of them matching the wood perfectly.

If you cannot make up your mind whether the set would look better with a black panel or with one with a mahogany finish, you can get one of these double-faced panels, which is mahogany on one side and as black as the ace of spades on the

made loud speaker, you may begin to wonder whether you couldn't manage to buy a valve set after all? You will find, too, that half of the firms do not expect you to pay cash down for it, but that the out-of-income stunt is just as popular at Olympia as amongst the furnishing people.

All this time the bands are playing, the crowds are pushing and you have not been bothering your head with anything except the really practicable. As a matter of fact it is no good outlining the many other interesting things you will see because by this time you will surely be lured away from a business-like look round and will be off to enjoy some of the novelties. The B.B.C. exhibit, for instance, is one which you simply cannot miss, and in addition to this many of the larger firms have managed to stage attractive side shows and crowd collectors.

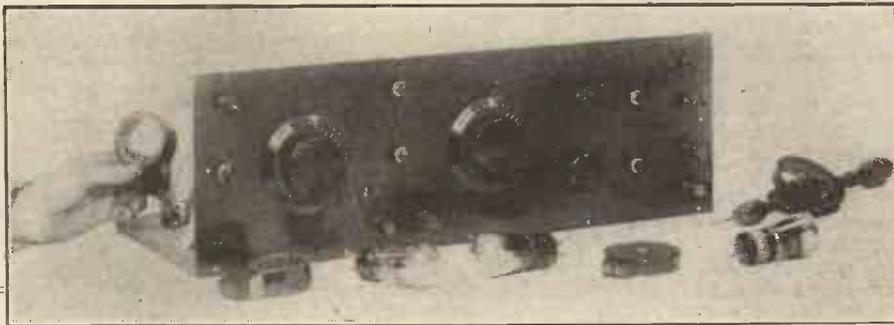
Before you have seen half that you wanted to the time is up, and if you are going to catch that last train you will have to hurry for it. You may be tired when you sneak into bed that night, but it will be worth it. For what a lark it all is! What a tale you will have to tell your radio pals to-morrow about your evening at Olympia.



At the Berlin Radio Exhibition, which has just closed, there were two television systems on show. One of these exhibits was that of Denes Mihaly, the brilliant young Hungarian inventor, who is here shown with his television apparatus at the German show.

THE "P.W." "RADIO PICTURE" FOUR.

Next month the B.B.C. will be broadcasting pictures experimentally from Daventry 5XX. Here is the first set specially designed for use with the radio-picture instrument.



This set is also a first-class, long-distance, loud-speaker receiver, covering long and short waves without coil-changing. Designed and Described by the "P.W." RESEARCH DEPT.

THE most interesting time to get into any new thing is surely right at the beginning, when matters are still a trifle experimental and things have not settled down to a more or less rigid routine, for there is then the pioneer's joy of watching a new service develop and gradually achieve something like perfection.

Anyone who remembers the thrill of the first real broadcast programmes to the listeners of those days will assuredly endorse this view, and will probably add that he got more real satisfaction out of the set with which he first managed to get the old Writtle (2 MT) station, however distorted it sounded, than anything he has built since. There is something about being present at the making of history, and even helping therein, which appeals to all of us.

A Promising New Service.

Those of our readers who have memories of the beginnings of broadcasting will need no telling to convince them of the pleasures of taking part in the early development of any such service, and we only stress the point for the benefit of more recent converts who missed the early days and so may not realise quite how fascinating such times can be.

The point arises rather forcibly just now, for we are apparently on the eve of the commencement of another service of great

interest to the wireless listener, one, moreover, in which it would be doubly to be regretted were we to miss the early efforts, specially interesting as they are sure to be.

We refer to the new service of wireless pictures (not to be confused with television) on the Fulton system about to be in-

upon whose efficiency he can rely, provided that he has a suitable radio set to drive it.

It is the service rather than the apparatus which is in the experimental state, and there is thus no need to feel that it might perhaps be as well to hold back a while until the early struggles are over and a more perfect machine is available. The work remaining to be done is largely a matter of finding out how best to use the efficient apparatus now at our disposal, and in this we can all help without running the risk of buying fairly expensive apparatus which might become obsolete in a short time.

An Early Start.

Why not have a shot at it right away? The design of a set for the purpose is a perfectly straightforward business, the picture recording machine will probably be on the market by the time these lines appear in print, and the first experimental service is just beginning from 5XX.

There can be little doubt, even at this stage, that the service will be an interesting one right from the start, for not merely is the B.B.C. making a start, but we learn on good authority that arrangements are proceeding rapidly on the continent also, and many of the larger European stations will soon be joining in. Radio Paris, for example, is an almost certain starter in the very

(Continued on next page.)

FROM WIRELESS PICTURES (1928) LTD.

'We have examined the circuit and lay-out of the four-valve Picture Receiver which has been offered to us for test purposes by 'POPULAR WIRELESS.' Owing to extreme pressure of work we have not, unfortunately, been able to arrange a test, but, as far as can be judged from a careful examination, the set should be entirely suitable for use in conjunction with the FULTOGRAPH Picture Receiver.'

augured in an experimental form by the B.B.C. and many continental broadcasting authorities. Here the experimenter has the advantage of being assured that even the earliest efforts will be of quite a high standard of perfection, and further of being able to buy a recording machine

COMPONENTS AND MATERIALS REQUIRED.

- 1 Panel, 24 in. x 7 in. or 8 in. x 1/4 in. (Any good branded material, "Kay Ray" ebonite, Resiston, Ebonart, Becol, Red Seal, etc.)
- 1 Cabinet to fit, with panel brackets and baseboard 10 in. deep (Canco, Raymond, Pickett, Bond, Artcraft, Caxton, Makerimport, Gilbert, etc.)
- 2 .0005 mfd. variable condensers, with slow-motion drive or vernier dials. (Brandes in set. Any good make which the constructor may desire, e.g. J.B., Lissen, Cyldon, Igranic, Bowyer-Lowe, Raymond, Dubilier, Gecophone, etc.)
- 1 .0001 or .00015 mfd. reaction condenser (Peto-Scott, Cyldon, Igranic, Bowyer-Lowe, J.B., etc.)
- 1 Volume control of the high-resistance potentiometer type, not less than 1 meg. (Burne-Jones 2-meg. type in set. Any good make.)
- 2 Push-pull type on-off switches (one of these can be of any ordinary L.T. type, but the other must be of the kind commonly used for wave-

- change switching. Examples are the Lissen, Lotus and Burne-Jones).
- 2 Lotus jack switches, single-pole change-over type, No. 7.
- 1 Lotus jack switch, double-pole on-off, No. 8.
- 5 Sprung valve holders (Any of the good standard makes, Igranic, Benjamin, Marconiphone, Lotus, W.B. Burndept, Wearrite, B.T.H., Burne-Jones, Redfern, Bowyer-Lowe, etc.)
- 3 Baseboard - mounting single-coil holders (Lotus, Burne-Jones, Raymond, Peto-Scott, etc.)
- 1 Standard loading coil (Paroussi, Burne-Jones, Wearrite, etc.)
- 1 Neutralising condenser (J.B., Gambrell, Bowyer-Lowe, Burne-Jones, Igranic, Peto-Scott, etc.)
- 1 Standard type copper or aluminium screen, 6 in. x 10 in. (Burne-Jones, Paroussi, etc.)
- 1 H.F. choke (R.I.-Varley, Igranic, Lissen, Dubilier, Lewcos, Cosmos, Burne-Jones, Colvern, Bowyer-Lowe, Climax, etc.)

- 1 L.F. transformer (New type Lissen in set. Any good make, R.I.-Varley, Ferranti, Igranic, Mullard, Philips, Marconiphone, etc.)
- 1 250,000-ohm anode resistance and holder, preferably wire wound (R.I.-Varley, Mullard, Lissen, Igranic, Dubilier, etc.)
- 1 2-meg. and two 1/2-meg. grid leaks with holders (Dubilier, Lissen, Mullard, Igranic, Ediswan, Marconiphone, etc.)
- 1 Fixed condenser, .0003 mfd. (Lissen, T.C.C., Dubilier, Igranic, Clarke, Mullard, Marconiphone, Burne-Jones, etc.)
- 1 ditto, .001 mfd. (See above).
- 1 ditto, .01 mfd. (See above).
- 2 Mansbridge type condensers, 2 mfd. (Mullard, Lissen, Dubilier, Ferranti, T.C.C., Hydra, Hunt, etc.)
- 13 Engraved or indicating terminals (Belling-Lee, Igranic, Eelex, etc.) (For suitable markings see diagrams.)
- 1 Terminal strip, 12 in. x 2 x 1/4 in. Wire, flex, screws, G.B. plugs, etc.

THE "P.W." RADIO PICTURE FOUR.

(Continued from previous page.)

near future, Hilversum is a "probable," while the larger German and Austrian stations are expected to have pictures "on the air" very speedily.

Just what sort of views will be broadcast from each is at present a matter of guess-work, which, perhaps, heightens the interest of the situation. From the B.B.C. we can probably look forward to news pictures at least, but some of the continental stations are sure to have some unconventional ideas for our entertainment.

The Requirements are Simple.

Now as to what is needed to take part in these evidently fascinating developments. First of all, it is to be understood that you will require to purchase the actual picture-recording machine itself, and this can be regarded much as one would a rather expensive loud speaker, i.e. as something to be hitched on to the output terminals of your set, the part of the apparatus which is directly under the control of the experimenter himself being the receiver

proper, just as it would be in the case of a special new loud speaker.

Here is what you require in the set itself. It need give only quite moderate loud-speaker signals from the station to be received, and this means that for the reception of the experimental picture transmissions of 5 X X only quite a modest

Finally, as to the size of the set. As we have already pointed out, if you intend to be content with the B.B.C. transmissions from 5 X X, quite a simple affair will do, and such a receiver as the "Sceptic's Three" will serve excellently, with the addition of a suitable change-over switch on the output terminals.

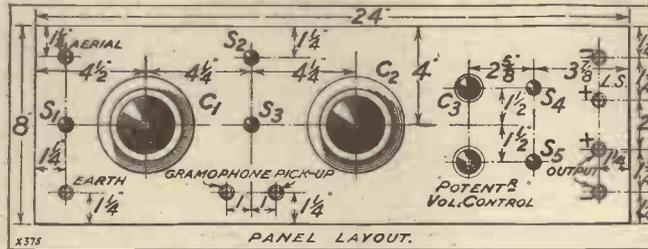
Since, however, it was felt that the continental picture transmissions will be sure to excite great interest, it has been decided to make our first design a fairly large set, which should be capable of bringing these in quite easily and at the same time giving a really

good all-round performance as a wireless receiver, since the subject will obviously appeal most strongly to the more advanced constructor, who will want the set to form his main broadcast equipment.

An Advanced Design.

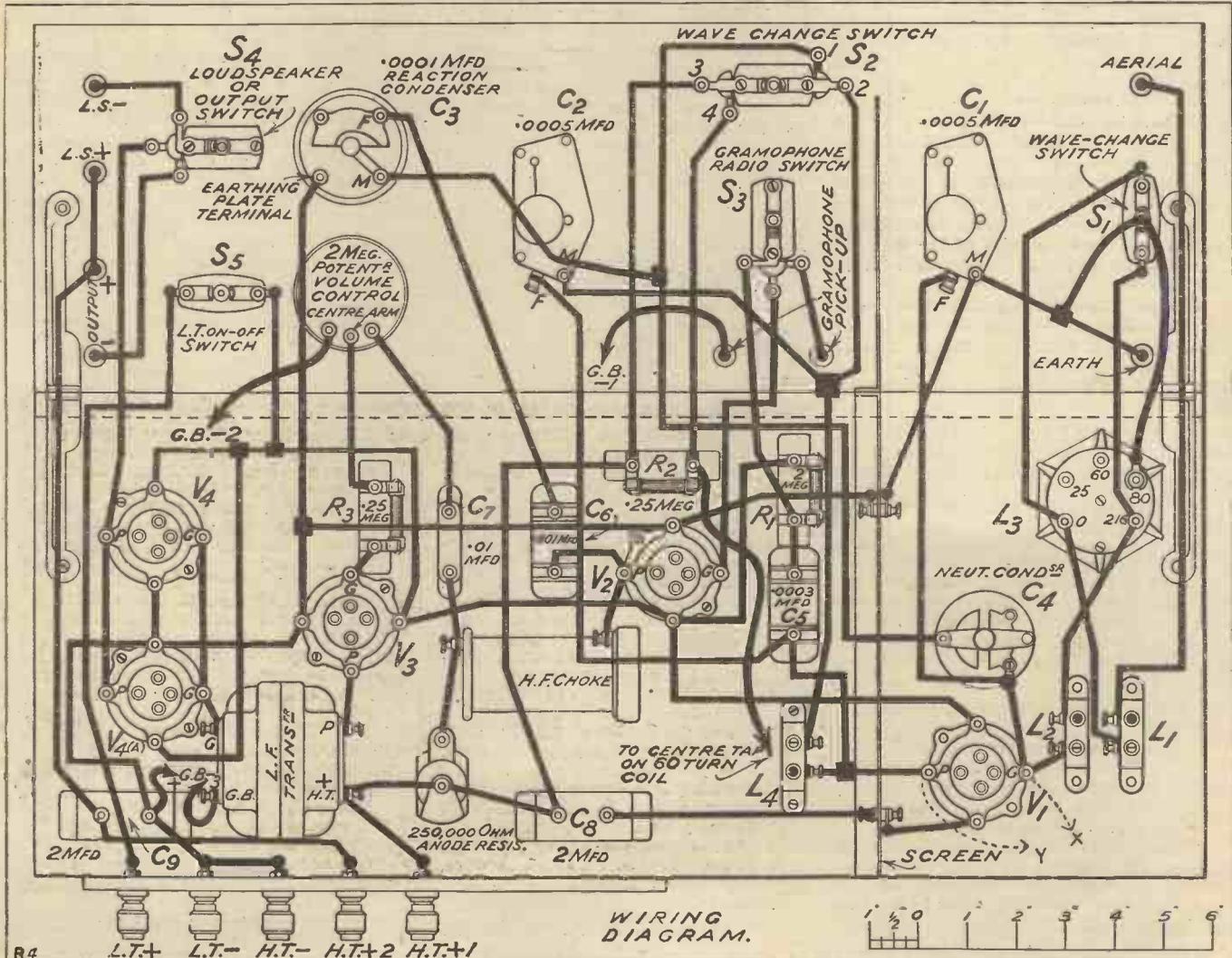
Some intensive work has been done on the question in the "P.W." Research Dept., and a design produced for a four-valver which we believe will meet the case remarkably well. It incorporates all the

(Continued on next page.)



receiver is necessary. Since, however, you will often want to listen to the local or 5 G B until the last moment before 5 X X starts its picture, a set with wave-change switching is obviously very desirable.

Again, in the further interests of a quick change from ordinary to picture reception, it will be convenient to be able to switch the output circuit of the receiver straight from the loud speaker to the picture recorder, and for this purpose it will be desirable to fit a switch in the output circuit of the last valve.



THE "P.W." "RADIO PICTURE" FOUR.

(Continued from previous page.)

special features which have been enumerated, has received the blessing of Messrs. Wireless Pictures (1928), Ltd., who have kindly examined the design, and is besides a really hot-stuff "de luxe" wireless set capable of satisfying the aspirations of the quite advanced constructor.

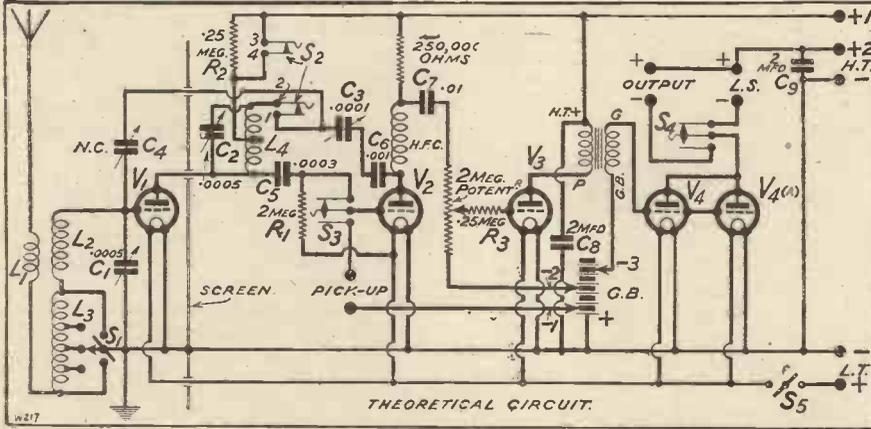
The circuit which we have chosen is of a well-tried "wave-change" type, with one H.F. valve, detector and two L.F.

The volume control is also extremely useful when the L.F. side of the set is used with a pick-up for the electrical reproduction of gramophone records, since pick-ups differ widely in sensitivity and records likewise vary greatly in loudness. To enable the set to be used conveniently for pick-up work a pair of terminals is provided on the panel to which the pick-up can be permanently wired, and brought into use as required by means of the switch S_3 . This switch enables you to change over in a moment from radio reception to gramophone and will be found much more convenient than the use of an adaptor for the detector valve. The switch operates as follows: With the knob pushed in you have radio reception, while when it is pulled out the

and is intended to enable you to switch over from the loud speaker to the picture-recording machine at the right moment.

Just in passing it may be added, while we are discussing switches, that the wave-change switches S_1 and S_2 give you long waves when their knobs are pushed in, and short waves when pulled out.

General constructional work we can dismiss very briefly, since it is a simple job of assembling ready-made components and wiring them up. There are no special parts to make, since everything required is a standard line, and the only point which seems to call for comment is the metal screen. This can be of either aluminium or copper, and it is advised that you should obtain one of the type now standardised for our sets.



stages, one resistance and one transformer-coupled. In the circuits of the H.F. valve some quite familiar switching schemes will be seen, the aerial and secondary circuit being treated in the now almost standard fashion of a switch of the on-off type and a standard loading coil.

The H.F. valve is coupled to the detector by the neutralised tuned-anode method on the ordinary broadcast wave-lengths, while for long waves the switch S_2 alters this to resistance-capacity coupling and modifies certain connections to enable reaction to be obtained on long waves. These details are exactly the same as the equivalent parts of the "Flexible" Three ("P.W." for September 8th), and if the reader desires a detailed explanation he should refer back to the description of this set. There are so many other points to be covered in the present design that space will not permit us to linger long over the quite straightforward and normal parts of the circuit.

"Desirable Refinements"

Since the aim has been to produce something of a de luxe set from a purely radio point of view we have taken care to include those special features which experience has shown to be desirable refinements in a really adequate receiver. For example, a volume control of a highly efficient type is provided on the second L.F. stage, to enable you to soften down the strength of the local station to just such an amount as your last valve will carry without being overloaded, and you will find this a great help in getting things nicely adjusted for the best possible quality; resist manfully the temptation to "turn up the wick" too far, for if you begin to overload your last stage it is good-bye to your hopes of really good reproduction.

grid of the detector valve is switched over to the pick-up terminals and you are ready to reproduce gramophone records.

Switching Over to Pictures

One other switching device calls for explanation, and then we can leave the general circuit details. You will see on the panel just above the L.T. switch another of the single-pole change-over type, marked S_4 . This serves the purpose of connecting the output of the set either to the "L.S." terminals or to those marked "Output,"

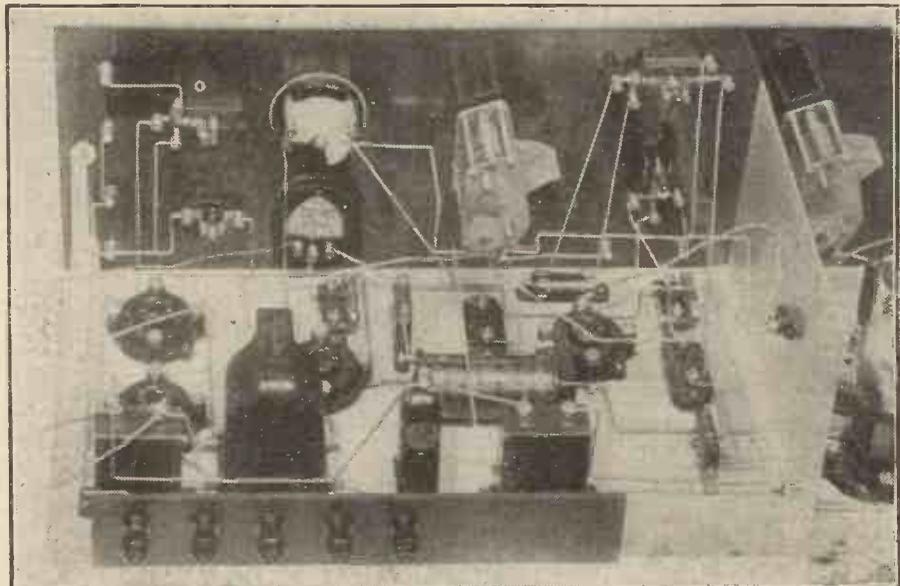
Constructional Details

These screens are obtainable cut exactly to size, have the lower edge turned over and drilled for the fixing screws, and are provided with a row of perforations right across near the bottom through which wires can be passed. The use of such a screen is, of course, a very simple matter, and adds hardly at all to the work involved in building the set. You should, by the way, be careful to use insulated wire for all leads passing through the screen.

All general constructional details you will find are quite clear on the various diagrams and photos, and we need not linger over them here, except to give a warning as to the need for care in wiring up the various switches. There are quite a few connections involved here, and you are urged to go about it carefully and without hurrying, giving yourself time to check each lead against the wiring diagram as you solder it in place. You will not find it at all difficult to follow out all the connections once you have the switches in-front of you. By the way, the numbers on S_2 are merely for reference, since they agree with those on the circuit diagram and may help you to understand how the switch works.

Now for operating matters. First of all,

(Continued on next page.)



This view of the low-frequency end of the receiver shows that great simplicity of wiring has been attained, despite the manifold activities of which the receiver is capable.

THE "P.W." RADIO PICTURE FOUR.

(Continued from previous page.)

you want some plug-in coils, the sizes being these: For the anode circuit (L_4) you require a No. 60 centre-tapped coil, for the aerial secondary (L_2) a plain No. 60, and for the aerial primary (L_1) a No. 25 or 35, according to the size of your aerial and the degree of selectivity you require. Thus if you live near to your local station and have a difficulty in cutting it out, you should use the No. 25, especially if your aerial is a large one. If the aerial is small, on the other hand, a No. 35 may be possible without producing too much flattening of the tuning, and will, of course, give you stronger signals. On a very small aerial you may even be able to use a No. 40 or 50.

Long Wave Adjustments

To go over to long waves the first thing to do, of course, is to push in the knobs of switches S_1 and S_2 , and then readjust reaction. As regards this last, you will usually find that whereas on the lower waves only quite a small setting of the condenser is required to make the set oscillate, on long waves a considerably larger one will be needed. This is quite normal, so you need not fear that something is amiss when you notice it.

Once the set has been put into service the operations just detailed are all that is needed for the change-over, assuming re-tuning on the right-hand dial to locate the desired station, of course; but when the set is first tested you will have also to attend to the question of selectivity, just as you did on the lower waves.

This is done in a very similar fashion,

by altering the aerial coupling arrangements. You will see that one of the leads to the loading coil is a flexible one, and this is attached to one or other of the tapping terminals on the coil. For medium selectivity it should be placed on the "80" terminal, while when higher selectivity is needed, as when it is desired to receive Radio Paris with as little interference from 5 X X as possible on a rather flat tuning aerial, you should try it on "60."

The P.W. "Radio Picture" Four

WHAT IT WILL DO

1. Gives you long- or short-wave programmes with an ultra-simple change-over.
2. Gives you an instantaneous change-over from loud speaker to picture reception.
3. Will give you the continental picture transmissions as well as that of the B.B.C.
4. Provides a high-quality programme from the local station, and a long list of foreign stations on the loud speaker at will.

By the way, when you are working on the longer waves you can generally leave the right-hand tuning dial set to the local station or 5 G B, just as you like, but if you are very near to the local, this may cause it to come through and interfere on long waves. In such cases simply set the dial to zero and carry on. All long-wave tuning, it must be emphasised, is done on the left-hand dial.

(To be continued next week.)

TECHNICAL TIPS

Your aerial should not run parallel to any other wires, such as 'phone wires, or your neighbour's aerial, if it can be avoided.

Sharing an earth with a neighbour is bad practice, and often gives rise to interference which would not otherwise be noticed.

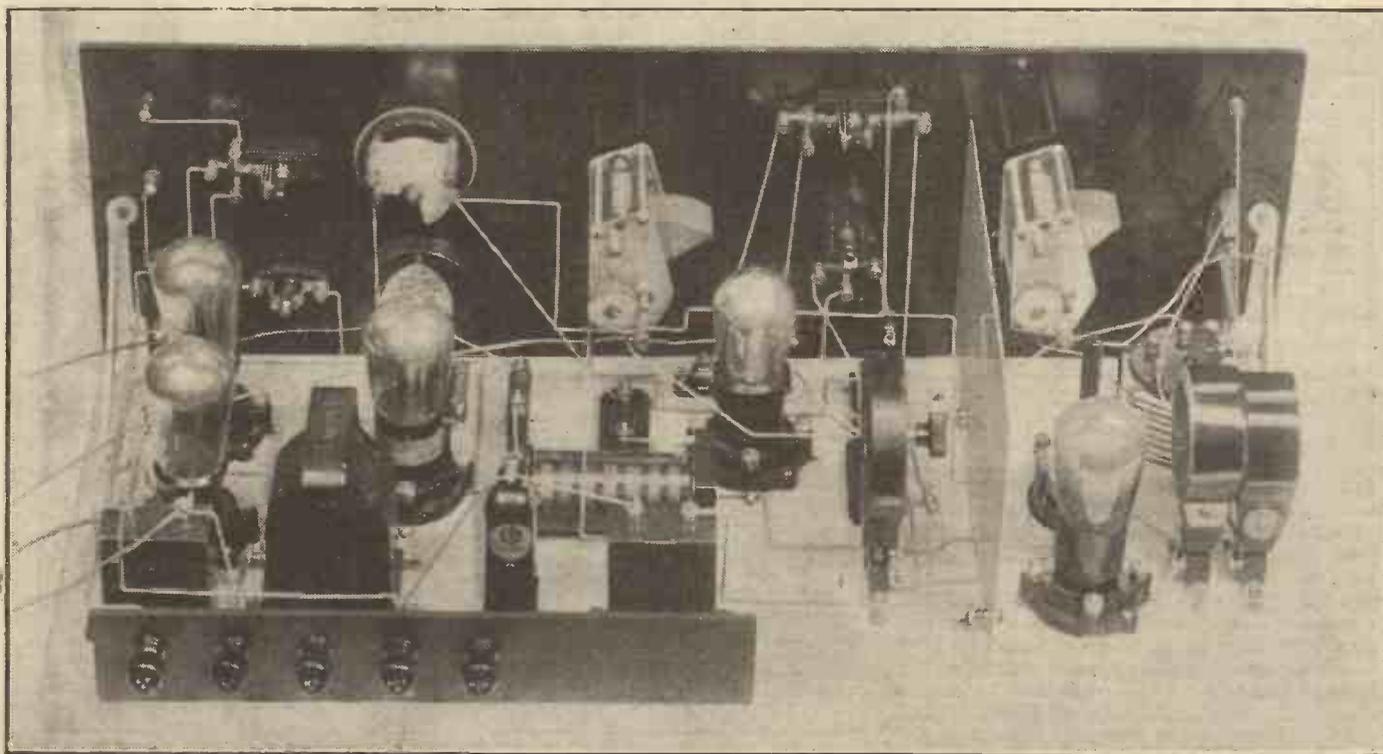
If you have plenty of signal strength in hand a long aerial often is a mistake, and you might find a shorter one would pick up much less interference and consequently improve reception.

If you allow your set to oscillate you run the risk of having your licence cancelled by the P.M.G.

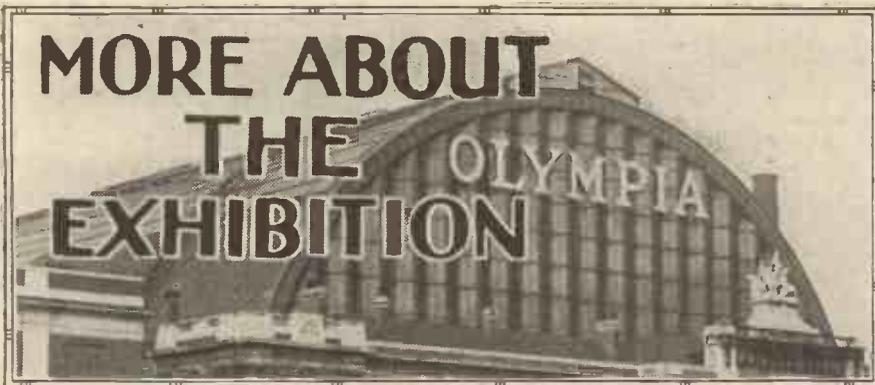
Super-heterodyne receivers should not be used on an ordinary aerial, one of the frame type being essential for this class of set.

If your H.T. battery is running down nothing you can do in the way of increasing your reaction will improve matters. (A new battery, possibly of larger capacity, must be obtained.)

Do not allow your aerial to swing against gutters, walls, etc., as this is sure to interfere with reception or produce unpleasant crackling noises.



First-class radio reproduction on high and low wave-lengths is combined in this set with arrangements for programmes from the gramophone or picture-broadcast reception, and all with very simple switching.



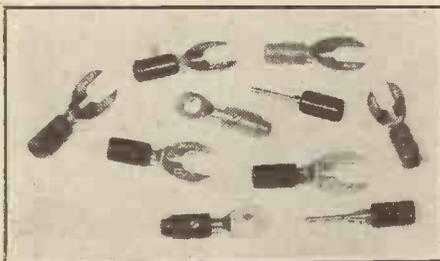
The stand-to-stand review of the exhibits is concluded this week, and details of the B.B.C. display and other interesting items are given. Readers should note that the "Show" ends on Saturday the 29th, and that the remaining two or three days represent their last chances to visit it. No radio enthusiast should fail to go to this Year's Exhibition. It is undoubtedly the finest yet held and really is brimming over with radio novelties.

MIC WIRELESS CO.
Stand No. 9.

The main items here are "Zampa" moving-coil speakers, of which there are several types available at varying prices.

M.P.A. WIRELESS, LTD.
Stands Nos. 21 and 22.

At these stands can be seen the well-known M.P.A. loud speakers. Visitors should make a point of

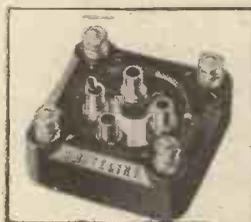


Lectro Linx, Ltd., are specialists in the manufacture of ingenious and useful connecting devices. The well-known "Clix" plugs and sockets figure in their display. Above is a representative group of their products.

examining the popular Plaque model which, selling at 28s. 6d., is an artistic and efficient little instrument. There are also some de-luxe cabinet models and sets embodying speakers designed on ornamental cabinet lines.

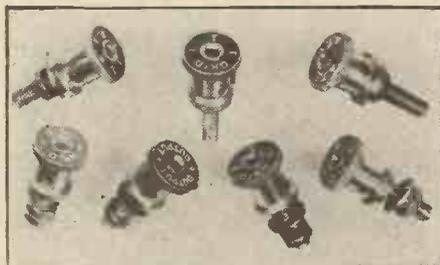
MULLARD RADIO VALVE CO. LTD.
Stands Nos. 88, 89, 90, 97, 98, 99.

Here is a remarkable range of valves for all purposes, including the screened-grid and Pentone types. But, although the range is large, every valve in it fulfills a definite purpose. Thus it is possible to make a selection for any set from one valve upwards, comprising any circuit with the knowledge that each valve will be absolutely suitable for its position.



This is the Bowyer-Lowe "Whiteline" valve holder, which is one of the new items exhibited at the "show."

Visitors should look at the P.M. loud speaker. The Mullard speaker is of unusual appearance, although undoubtedly attractive. It has a sleek, smooth, business-like air. The construction of it is most interesting, and it is certainly worth looking at closely. Photographs of it can give no indication of its unique and scientific construction.



These "Ealex" terminals will take pin or spade connectors or wandet plugs. They are displayed attractively by J. J. Eastick & Sons.

OLDHAM & SON, LTD.
Stands Nos. 125 and 126.

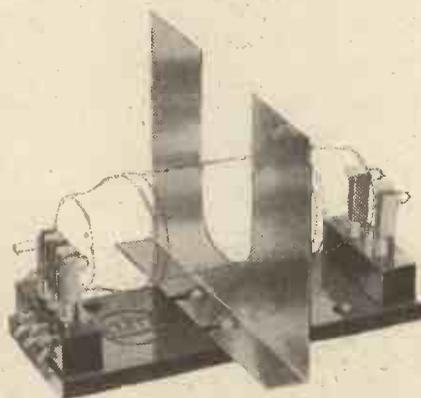
A display of accumulators for all purposes. Excellent L.T. varieties are alongside attractive and sound H.T. models, but the visitor should tarry awhile and inspect the O.V.D. L.T. cell. The special feature of this is that it has a moulded glass casing over which can be slipped in a second the special metal carrier, which is supplied free with the cell. Interesting H.T. and L.T. chargers are also shown, including one having an automatic polarity indicator.

ORMOND ENGINEERING CO., LTD.
Stands Nos. 133, 162 and 163.

A group of the famous Ormond variable condensers, noted for their velvety vernier action are displayed. There is also the special Ormond slow-motion dial to catch the eye of the constructor.

PAROUSSI, E.
Stand No. 272.

Here you will see replicas of the "P.W." standard screening box included in a big display of screens and all that appertain thereto. This firm makes all the special short and long-wave coils published in "P.W." so that "P.W." readers should make a point of visiting this stand and collecting any literature that may be available.



A holder for the S.625 type of screened-grid valve made by the General Electric Co., Ltd. The Osram S.625 was the pioneer of its type and has two pins at one end and three at the other, thus necessitating a special holder.

YOU ARE INVITED TO VISIT "P.W." AT STANDS 135-166.

PARTRIDGE & MEE, LTD.
Stand No. 147.

All varieties of transformers, chokes and eliminators, including no less than twenty-five types of transformers.

PETO & RADFORD.
Stand No. 67.

The "P. and R." accumulator embodies a patent indicating scheme so that the battery itself tells you when it is charged, half-charged, or requires recharging. This adaptation of the hydrometer principle should interest visitors.

PETO-SCOTT CO., LTD.
Stands Nos. 142 and 143.

The Peto-Scott people are large suppliers of kits of parts for sets described in "P.W." and its asso-

ciated journals. For this reason "P.W." readers should find these stands of particular interest. Here they can see the representative sets made up, and inquire about sets of parts for any of the leading designs published by us. There are also several interesting sets due to the Peto-Scott company themselves, and a range of components of a high-class and interesting character.



Among the fine array of Ediswan products is to be seen this "Home Charger." It operates on A.C. mains and is an efficient and cheap device.

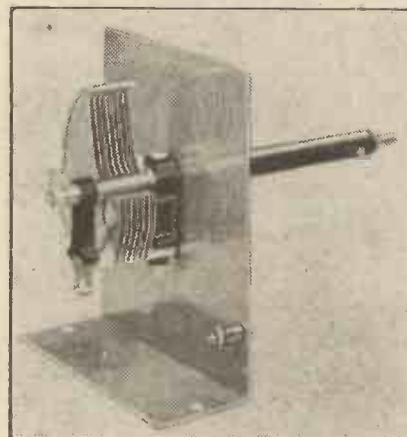
PHILIPS LAMPS, LTD.
Stands Nos. 94 and 122.

Philips Lamps, Ltd., are exhibiting a range of their new 7-cornered cone loud speakers, type 2016, which are one of the latest additions to the Philips range of products.

Visitors will also be able to see the Philips low-frequency intervalve transformer, with which most amateurs are already familiar.

Actual demonstrations of instruments are not allowed within the precincts of Olympia itself, and therefore Messrs. Philips have made arrangements whereby their full range of receiving sets, loud speakers, and other apparatus can be demonstrated. When visitors have been to the stands at Olympia they are cordially invited to proceed to No. 32, West Kensington Gardens, which is quite near. Here will be exhibited a range of Philips receivers

(Continued on next page.)



Short-wave enthusiasts should look at this useful variable condenser and screen assembly on the Formo stand. Here also are many other new and interesting radio accessories and components.

MORE ABOUT THE EXHIBITION.

(Continued from previous page.)

and all mains A.C. models for two, three, and four valves, from which excellent results have been obtained. It is here, too, that the type 3003 unit, illustrated last week, is shown.

Messrs. Philips will be pleased to demonstrate any particular model of receiving set, loud speaker, or apparatus upon request, and everybody should make a point of taking full advantage of visiting West Kensington Gardens, where they will be assured a very instructive time.

PORTABLE UTILITIES CO., LTD.
Stand No. 144.

An excellent show of the well-known "Eureka" components. A modern note is struck by the "Eureka" "Orthodyne" receivers. The "Orthodyne" Five is a



On the Pye stands is a magnificent range of transformers of all types. Above is one especially designed by this well-known Cambridge firm for use with Westinghouse rectifiers.

long-range five-valve portable set which has already a well-established reputation for excellent reception on both long and short-wave stations. The "Orthodyne" Three and Four both use the new screened-grid valve. The Four is a super-portable set, and it is stated that its range of reception is practically unlimited. On the Three, which is also a portable set, over thirty stations have been logged without aerial or earth.

PYE & CO., LTD.
Stands Nos. 87 and 100.

Transformers and chokes of all kinds suitable for all purposes are to be seen here. These, indeed, form the main exhibits, but they are attractively displayed



The Telegraph Condenser Company believes that specialisation in manufacturing makes for the production of high-class productions. Their exhibits prove they carry their ideas into practice.

and well worth looking at. There is also the Pye speaker on view for the first time. Condensers and valve holders are shown among other high-grade components.

RADI-ARC ELECTRICAL CO. (1927) LTD.
Stand No. 6.

Liberty superonic units, battery eliminators, gramophone pick-ups, gramophone amplifiers.

REDFERN'S RUBBER WORKS LTD.
Stand No. 123.

The main exhibits are Ebonart and Raven ebonite radio panels together with ebonite rods, tubes and mouldings. A novel item is the pneumatic action valve holder.

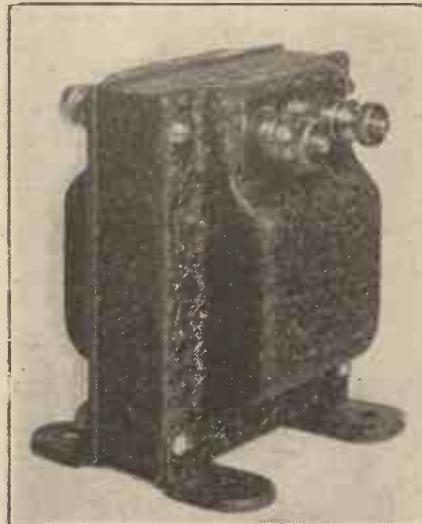
TECHNICAL EXPERTS ARE IN ATTENDANCE AT OUR STANDS 135-166 TO HELP YOU WITH YOUR RADIO PROBLEMS.

REES-MACE MFG. CO., LTD.
Stand No. 268.

A Pentode three-valve receiver and a five-valve model using a screened-grid valve and Pentode arc shown.

REGENT RADIO SUPPLY COMPANY.
Stand No. 62.

All types of mains units and chargers.



Messrs. Ward & Goldstone are showing radio apparatus of all kinds, including mains units and chargers. Above is one of their leading components, an L.F. transformer.

REID & CO. L. H.
Stand No. 214.

Gripso accessories mainly consisting of terminal appliances.

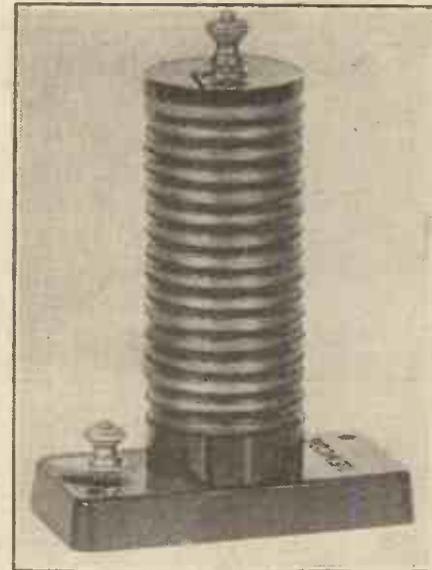
RIALTON RADIO.
Stand No. 268A.

A range of portable radio receivers in which figure screened-grid and Pentode valves.

RIPAULTS, LTD.
Stand No. 24.

The new and very greatly improved lateral action variable condenser, both in single and double forms, and ebonite sheets and panels are to be seen. Constructors who have hitherto not examined a lateral action condenser should take this opportunity of so doing for it is an interesting and refreshing departure from usual design.

R.I. AND VARLEY, LTD.
Stands Nos. 56, 73 and 222.
Here is a magnificent display of first-class apparatus. Of especial interest are the "Anti-mobo" and R.G.C. units, and the new R.C. units incorporating "Anti-mobo" devices. A complete range of Westinghouse rectifier eliminators both for supplying H.T. and L.T., and also others giving H.T., L.T. and G.B. are shown, together with a special new power transformer.



Several additions to the famous "Lewcos" range are shown this year for the first time, including the above H.F. choke. Glaszite also figures on the stand of the London Electric Wire and Smiths Co., Ltd.

Then there is the new R.I.-Varley pick-up, a feature of which is that there is no mechanical resistance in the needle support, and that there is a plectrum suspension of a very high natural frequency hung on supports of very low frequency.

A special resistance-capacity-coupled and anti-motor-boating gramophone amplifier with volume control and combination battery plug is another "high light" in this R.I.-Varley show. All our old friends, such as the R.I.-Varley "Straight-line" transformer, a P.M. detector, and an Interdyne receiver are to be seen.

ROOKE BROS., LTD.
Stands Nos. 76 and 77.

A special feature of these stands is the new Simpler Wireless mains driven receiver, of which two models, for A.C. and D.C. mains respectively, are available. In addition there is a range of components especially designed for use in battery eliminators and mains sets.

ROTHERMEL CORPORATION, LTD.

This firm is excluded from exhibiting at the radio exhibition as the majority of the products it handles are of American origin, but in order that visitors to the Olympia show can see their products they are arranging an exhibition of their own at 24, Maddox Street, London, W.1, which is, of course, just off Regent Street.

SELECTIONS, LTD.
Stand No. 23.

Here are some interesting portable sets and a short-wave three-valve well worth looking at.

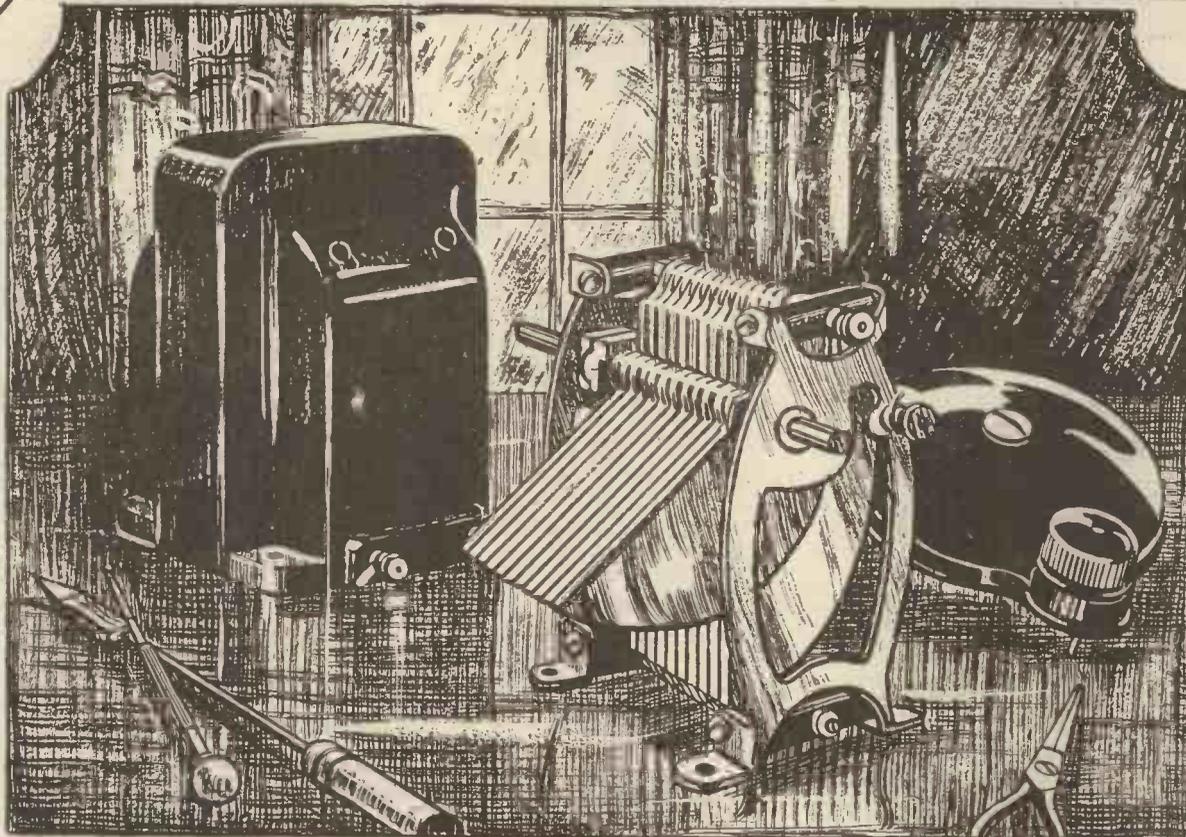
SIEMENS BROS. & CO., LTD.
Stands Nos. 164 and 165.

In addition to a full range of all types of batteries, Messrs. Siemens are exhibiting a collection of radio testing instruments. It is worth noting that a special

(Continued on page 151.)



Belling & Lee, Ltd., are showing terminals especially suitable for mains units, although they can be used with advantage throughout ordinary receivers. They are well insulated and are nicely engraved with indicating letterings.



Newcomers to the Lissen Range which will appeal to home constructors

Here are three additions to the Lissen Range of Radio Components which will be welcomed by all who in the course of experimental construction desire a complete range of balanced and interchangeable components. Each is a distinct advance on previous commercial components—each is designed to be of universal utility and to *replace any similar specified component with added efficiency* in any published circuit.

LISSEN VARIABLE CONDENSER

You can use it as a standard condenser in any circuit.

You can gang it—two or three of them together.

You can use a drum control for it instead of a dial.

You can mount it on a panel and it has feet for baseboard mounting, too.

One-hole fixing, of course.

·0001 mfd. capacity	-	5/9
·0002 " "	-	5/9
·0003 " "	-	6/-
·00035 " "	-	6/3
·0005 " "	-	6/6

LISSEN SUPER TRANSFORMER

Only now has the depth of radio technique yielded the knowledge which has made the Lissen Super Transformer possible. It represents a big saving in price to the transformer-buying public in comparison with every other high-priced transformer available. Ratio 3½ to 1. Price

19/-

LISSEN UNIVERSAL SLOW MOTION DIAL

Made in Bakelite. An attractive slow motion dial at a keen price

3/6

7 DAYS' APPROVAL

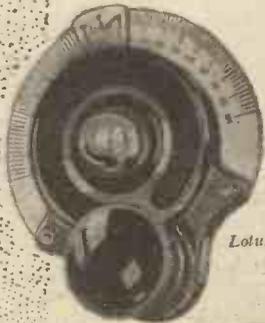
You can get the new Lissen components from practically every radio dealer.

LISSEN COMPONENTS

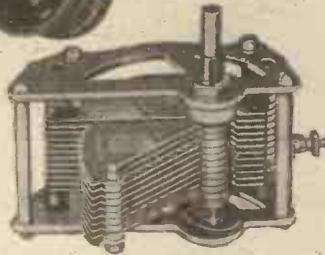
LISSEN LIMITED, Friars Lane, Richmond, Surrey

(Managing Director: THOS. N. COLE.)

Have you seen LOTUS at OLYMPIA



Lotus Dial.



Lotus Condenser.



Lotus Remote Control.

Lotus
Valve Holder.

Lotus Coil Holder.

THE new and enlarged range of Lotus components can be examined at the Lotus Stand at Olympia. If you cannot come, note these new additions: a new Lotus Miniature type Valve Holder, a new Lotus Vernier Dial, a new Lotus Condenser, two new Lotus Sets, portable and transportable.

There are also the famous Lotus Remote Control, Jacks, Switches, Plugs and Coil Holders.

Every Lotus Component is made of the best materials, with the greatest care and precision. For quality, finish and efficiency, choose Lotus components and you will be proud of your set.

LOTUS COMPONENTS

The New Lotus Portable and Transportable Sets are an entirely new type of receiver. They use the new Mullard Screened and Pentone Valves, are simple, economical, beautifully finished and trouble-free. Send a post card for a FREE BOOKLET.

GARNETT, WHITELEY & CO., LTD.,
Lotus Works, Broadgreen Road, Liverpool.

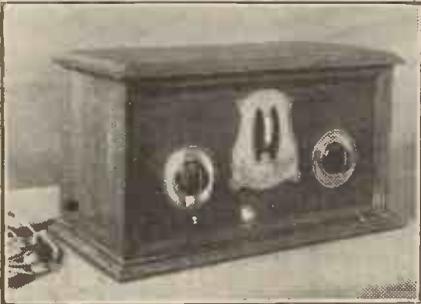
MORE ABOUT THE EXHIBITION.

(Continued from page 148.)

section of a stand is devoted to batteries for overseas use which should be of particular interest to export traders. Another interesting feature will be a display of ebonite in the form of sheets, rods and mouldings.

STANDARD WET BATTERY CO.
Stand No. 7.

Country visitors particularly should be interested in this stand, for here are shown wet H.T. and L.T.



Brandes, Ltd., have some handsome sets on show. Above is a representative "Brandeset," and it will be seen that it incorporates the convenient and effective drum type of tuning control.

batteries. The "Standard" L.T. batteries have proved successful and economical when used with sets taking up to 25 amp. current. Radio meters also figure on this stand.

STAPLETON, A. W.
Stand No. 211.

Interesting designs of potentiometers, filament resistances, and an ingenious D.C. charging adaptor device are the main exhibits here.

Also are shown on this stand several Epoch moving-coil loud speakers. These instruments are of interesting design and are sure to arouse considerable interest.

STEVENS & CO. (1914), LTD., A. J.
Stands Nos. 83 and 131.

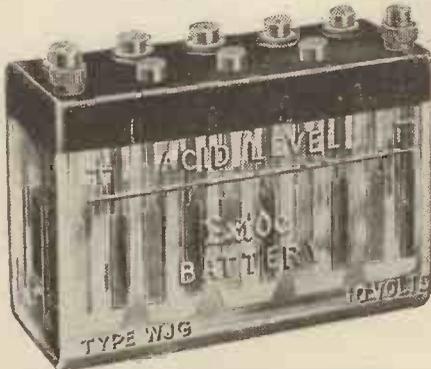
Here is a range of A.J.S. productions, including accessories and components over which visitors will be tempted to linger for some time.

STRATTON & CO., LTD.
Stand No. 34.

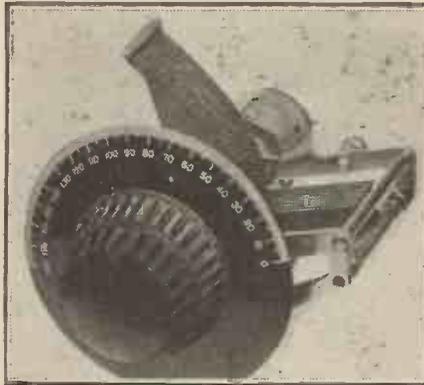
In addition to a full range of "Eddystone" components, there are some interesting new lines. These include a three-valve short-wave, screened-grid receiver, a portable three-valve set incorporating a screened-grid H.F. and Pentode valve, and kits of parts for these and other sets.

SYDNEY S. BIRD & SONS, LTD.
Stand No. 159.

No one will pass this stand who wishes to examine closely a range of really beautifully produced variable condensers. For smooth action and brilliant finish the Cydon range can hold its own against the world. And there are several new Cydon products on view which make it even more intriguing. These include "thumb-control" and other modern condenser designs.



Chloride Electrical Storage, Ltd., have an impressive range of Exide accumulators on view, together with some new Exide trickle chargers which amateurs should examine.



There are some excellent variable condensers and slow-motion dials on view on the Ormond Engineering Co.'s stands. Pioneers in the production of such devices, their components will still stand the closest comparison.

SYLVEX, LTD.

Stand No. 175.

Sylverex and Reactone crystals and a new cone material sold in envelopes.

TELEGRAPH CONDENSER CO., LTD.

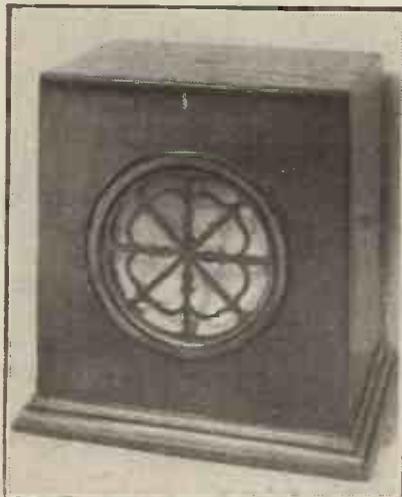
Stand No. 121.

These people specialise in the construction of fixed condensers and they have ventured the opinion, which is a good one, that specialisation makes for highest efficiency. But the T.C.C. people have a very interesting show. For instance, there are the electrolytic condensers which, although not of very great size, have capacities of thousands of mfd. Various types of transmitting condensers are exhibited including models similar to those supplied to the B.B.C. and P.O.

THE FORMO COMPANY.

Stand No. 140.

The Formo people appear to have opened their new season's campaign with active determination, and they have on view a fine range of components which are bound to attract the constructor's eye. Note, for instance, the natty and efficient variable condenser and screen assembly for short-wave work. The new de-luxe Formo variable condenser itself is worth attention, and it is interesting to note that one of its most ingenious features is completely concealed. This is the pigtail, which is contained in the spindle. There is, too, the new Formo dual-impedance unit. A very clear diagram of the connections is provided on the base of the article.



Cabinets of all kinds for all radio purposes can be inspected at the Carrington Cabinet Co.'s stand. Among others they are exhibiting the above moving coil loud-speaker cabinet.

TRELLEBORG EBONITE WORKS, LTD.

Stand No. 224.

Turned and machined components and accessories, manufactured from Trelleborg genuine ebonite, including panels, formers, bobbins, lead-in tubes, blocks, and so on.

TUDOR ACCUMULATOR CO., LTD.

Stand No. 249.

This firm makes its debut at Olympia with a very comprehensive range of low and high-tension batteries, covering no less than sixty-listed types.

TURNER & CO., LTD.

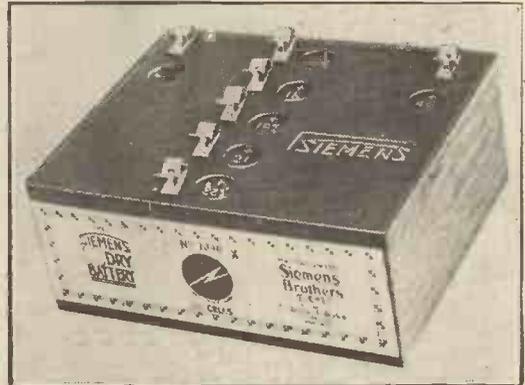
Stand No. 234.

The Tunewell plug-in coil and Tunewell six-pin coil and an H.F. choke are among the accessories figuring on this stand.

VANDERVELL & CO., LTD., C. A.

Stand No. 114.

On this stand there is a full range of batteries suitable for H.T. and L.T. batteries. The latest addition to the C.A.V. products is an H.T. accumulator having an all-moulded material case which in one piece takes the place of the wooden crates and glass jars with wooden separators. This makes it possible to produce a 60-volt unit which is no larger than the normal capacity dry battery. This is an item the amateur will view with interest. An attractive range of non-spillable batteries having novel features are also shown.



As well as a most comprehensive display of their well-known dry batteries and accumulators, Messrs. Siemens are also showing ebonite panels and various other forms.

WALKER BROS.

Stand No. 154.

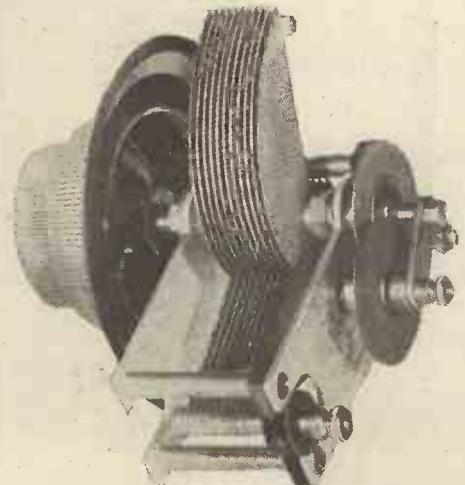
These people are woodwork specialists and are showing a fine range of cabinets. And there is a special portable cabinet with full instructions as to how to construct a thirty-pound portable for £15. Loud speakers having oak and wooden horns and cone speakers are among the other interesting items to be seen.

WATMEL WIRELESS CO., LTD.

Stand No. 157.

Of particular interest on this stand are an all-mains receiver, and an all-mains receiver complete with gramophone pick-up.

(Continued on next page.)



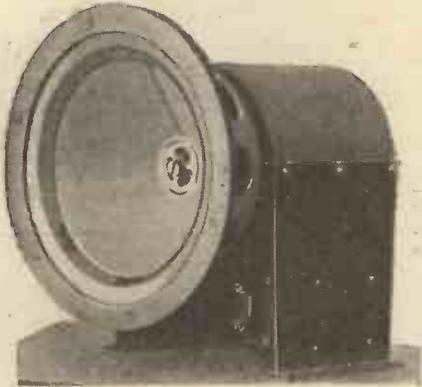
As well as their well-known variable condensers, of which the above is an excellent example, Jackson Bros. are exhibiting a new drum control of a novel and effective character.

THE
"OLYMPIA" FOUR
DESCRIBED IN "P.W." LAST
WEEK IS STILL TO BE SEEN
AT OUR STANDS 135-166.

MORE ABOUT THE EXHIBITION.
(Continued from previous page.)

WESTINGHOUSE BRAKE AND SAXBY SIGNAL CO., LTD.
Stand No. 78.

These people are, of course, the manufacturers of the famous dry rectifier which figures in so many modern mains units. They themselves are showing all types of mains units and chargers and their associated accessories and components.



One of the notable features of this year's Exhibition is the large number of moving-coil loud speakers that are shown. Above is a unit due to Partridge & Kee

WESTERN WIRELESS CO.
Stand No. 262.

Leading makes of sets and cabinets available for cash or on hire-purchase.

WHITELEY, BONEHAM & SON, LTD.
Stand No. 120.

The very well-known W.R. valve holder is one of the leading exhibits of this stand, but also on view is the new Whiteley-Boneham loud speaker, a distinguished but cheap cabinet cone instrument which is bound to attract the attention of many enthusiasts.

WILKINS AND WRIGHT, LTD.
Stand No. 152.

This firm are the manufacturers of the well-known "Utility" components. The Utility switch, for instance, allows many circuit combinations to be obtained in a simple manner. It is made in lever and knob types. Micro dials and variable condensers of sound modern design can be examined here. Among the newer lines shown are drum-controlled condensers.

WILLIAMS AND MOFFAT, LTD.
Stand No. 265.

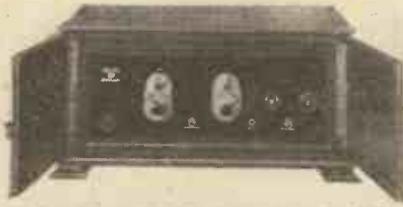
A range of "Simplicon" radio products.

WINGROVE AND ROGERS, LTD.
Stand No. 111.

Mainly "Polar" variable condensers of various types.



Portable Utilities Co., Ltd., are exhibiting a range of portable receivers. The new Euraita "Orthodyne" Five attaché-case model is shown above.



This is the "Godwin" Concert Grand receiver made and shown by J. Dyson & Co.

WRIGHT AND WEAIRE, LTD.
Stands Nos. 251 and 252.

A large display of most interesting components includes, among others, fixed condensers, plugs and jacks, a novel wire vice, and "flux guns," and an efficient anode filter unit. There is also a new type of neutralising condenser, a series of clip-in wire-wound resistances, and a high-frequency unit, suitable for connection to any standard set.

THE B.B.C. EXHIBITS.

Last, but by no means least, we come to the exhibit arranged by the British Broadcasting Corporation, whose officials have in this, as in many other ways, whole-heartedly cooperated with the Exhibition authorities to make the "show" a real success.

The chief feature of the B.B.C. section is a series of tableaux entitled "B.C. to B.B.C." This illustrates, in a most interesting manner, the kinds of entertainment prevailing from pre-historic days up to the present date. The present is, of course, broadcasting, and this is undoubtedly the chief form of entertainment in the home.

There is also a fascinating display of "Historic" apparatus, including gear employed for broadcasting the Boat Race and present types of microphones used for broadcasting.

The large B.B.C. section makes a restful contrast with the galaxy of sets, accessories and radio receiver components which forms the greater part of the



Some magnificent sets and associated equipment are to be seen at the numerous stands occupied by the Marconiphone Co., Ltd. Above, one of their sets is shown above connected to a thermopile. This enables L.T. to be derived from a gas supply. The assembly was exhibited last year.

DO NOT FORGET TO PAY US A VISIT AT STANDS 135-166.

Radio Exhibition. Visitors also will no doubt appreciate the insight afforded them of the "other end of the ether." The section occupies the whole of one side of the gallery, and it will be agreed that the space is well-merited by the excellence of the display.



A valve holder and screen combination for use with screened-grid valves is one of the new lines exhibited by the Peto-Scott Co., Ltd.

THE BAND STAND.

Readers should note that Jack Payne and his full B.B.C. Dance Orchestra are playing at the Wireless Exhibition. This popular conductor is also presenting his "Dorians," an entirely new band. With this he is introducing many novelties especially invented for the occasion. The music is being relayed by radio on occasions so that listeners unable to get to Olympia will be able effectively to share in the enjoyment provided by at least this "exhibit."

OTHER ITEMS.

A café is in operation at which visitors can obtain refreshment. The entrance to this is on the opposite side of the building to the dance floor and bandstand. There is also a cloak-room adjacent to the main entrance.

Right in the centre of the main hall is a fountain, and this and the main entrance and the large protruding Band Stand are exactly in line.

There are several stairways leading to the gallery. These are situated at the corners of the hall.

As the stands are arranged in parallels, instead of in circular form as they were last year, it is an easy matter to locate the various points on reference to the plan published last week. And the best way to see everything is to take in the exhibits in a methodical manner. For instance, on entering the building, you can turn to the left down Avenue "A" and work around the outer square. Arriving back at the starting-point, you can then enter Avenue "B" working along one side of this and then back along the other side. Then passing into Avenue "C," you can proceed to view these stands in a similar way. Polishing off all the Avenues until you get to Avenue "G," you can go up on to the gallery and work around that.

You will find it of advantage to scheme out your visit beforehand, making note of the stands you may wish to spend rather more time at than the majority of others.



Lissen, Ltd., are making a prominent feature of their L.F. transformer. This component (it is illustrated above) is one of their latest productions. They are also showing a magnificent array of sets, accessories, gramophones, etc.

JUST A REMINDER—

there is a Lissen radio component for every need in every published circuit

The Lissen range has been extended until now there is a Lissen component to fill every radio requirement. Study your blue print—then study the *Lissen List* (free from any radio dealer) and you will find a saving in cost is possible on almost every specified component by replacing with the Lissen Value-for-Money components. Remember, there is the Lissen experiences and the guarantee of the whole Lissen organisation behind Lissen components.



—AND 7 DAYS' APPROVAL, wherever you buy new LISSEN parts.

HERE ARE FOUR STANDARD LISSEN COMPONENTS

LISSEN FIXED CONDENSER
(Mica)



Capacities:
'0001 to 1/-
'001 mfd.
'002 to 1/6
'006 mfd.

They are leak-proof, they never vary. They deliver all their stored-up energy. Guaranteed accurate to within five per cent of marked capacities. Improved case permits mounting upright or flat. Grid leak clips are included free with every grid condenser. Unaffected by temperature changes.

LISSEN H.F. CHOKE



5/6

These Chokes are designed particularly for Reinartz and other capacity reactive circuits. The growing popularity of this effective method of smooth reaction control is reflected in the demand for the Lissen H.F. Chokes. Hermetically sealed.

LISSEN R.C.C. UNIT



4/-

Provides a complete Resistance Capacity Coupling Unit. Includes 2 LISSEN Fixed Resistances and one LISSEN Condenser. May be mounted upright or flat.

LISSEN L.F. TRANSFORMER



8/6

Impedance suitable for all usual circuits. May be used for first, second, or third stage. Turns ratio 3 to 1. Resistance ratio 4 to 1.

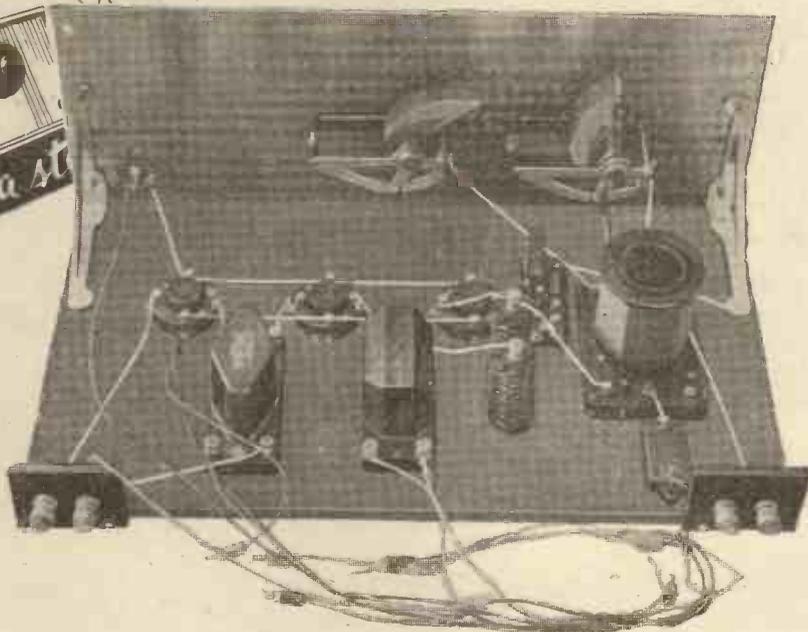
LISSEN LIMITED, FRIARS LANE, RICHMOND, SURREY

(Managing Director: Thos. N. Cole.)

7 TIMES A STAR— Mullard Master 3[★]



Build the Mullard Master 3^{*}—the most powerful 'three' ever designed. Build it in an hour and tune in station after station. Enjoy its richness of tone, its wonderful volume and its amazing range. Switch from lower to upper wave-length range without coil changing and with the assurance that there are no dead-end coil losses. Fill in and post the coupon now. You will receive full-sized plan and complete instructions for building and operating the wonderful Mullard Master 3^{*}.



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"Radio for
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Please send me FREE
complete instructions and simpli-
fied Plan of Assembly for the
Mullard Master 3^{*}, with Vol. 2 No. 4
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P.W.

Mullard MASTER · RADIO

LEADING BY 4 YEARS

Put new life
into your ex-
isting receiver
with Mullard
1929 P.M.
Radio Valves.

In 1924 Mullard invented a filament construction which is only now being attempted by other designers. This four years' lead is maintained. The 1929 Mullard P.M. Valves, which you can now buy, are virtually 1933 valves—still four years ahead.

Ask your radio dealer to-day for a set of Mullard 1929 P.M. Radio Valves for your receiver and enjoy better tone, greater volume, and more distant stations.



OLYMPIA

Stands

88, 89, 90, 97, 98, 99, 133

Mullard

THE · MASTER · VALVE



Player's "Medium" Navy Cut Cigarettes 10 for 6d. 20 for 11½d.



Pleasure realised because—

*Player's
please*



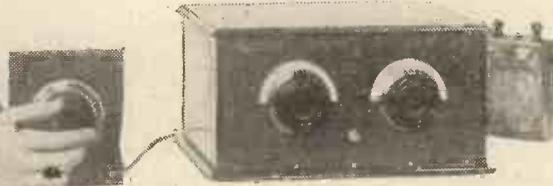
"It's the Tobacco that Counts"

Placing Your Stations



An ingenious and rapid method of finding on your tuning-dials just the station you require at any particular moment.

By A SPECIAL CORRESPONDENT.



THE warm weather and increase of atmospherics remind me that the "searching season" is now ending, and a glance through my log shows that it has been a most interesting one. The European stations logged number about a hundred, eighty being received on the loud speaker. Twenty-six American transmissions on the broadcast band were heard, nine of them being on the loud speaker, and most of them were identified.

My set is not designed for searching, being usually required to give faithful reproduction of 5 X X or other powerful stations, on a coil-driven speaker. It has two stages neutralised H.F., anode-bend detection without reaction, and two stages resistance-coupled L.F.

The output is from two P.M. 256 valves in parallel. An Ekco eliminator provides the H.T. Much interest and pleasure have been obtained from it owing to the fact that it is very accurately calibrated, so making possible the finding of almost any station desired, and the identifying of nearly every transmission heard.

Calibration System.

The system of calibration employed is similar to that described in POPULAR WIRELESS on May 12th, by Mr. E. Hanson. He forms a chart on squared paper. On the vertical lines the condenser readings are marked, and on the horizontal lines are the frequencies.

A "curve"

is formed by plotting two or three of the large and easily identified stations, and this curve enables one to identify or find any other stations. This is a splendid and easy system, but a slight modification, which I am going to describe makes it easier to use.

When calibrating a set, it is necessary to know definitely what wave-length will be represented by every degree on the dial. Using wave-length figures is confusing, because on the long waves the metres to a degree are more than as we get lower down. It is much easier to use the frequency figures, for broadcasting stations are, as a rule, separated from one another by gaps of 10,000 cycles (referred to as 10 kilocycles). Therefore, the degrees on the dial will much

more easily represent certain kilocycle divisions than metres.

You will notice that if frequency numbers are used, these numbers run up to four figures, and so are rather unwieldy on a chart. To get rid of these high numbers I have given arbitrary numbers to the stations covered by my coils.

I can comfortably tune from about 230 to 575 metres (i.e. 1,300 to 520 kilocycles), so have put 100 10-kilocycle divisions on the list. Starting with 1,500 kilocycles, Fécamp is No. 1, Jonkoping No. 2, Bradford 32, Newcastle 55, Bournemouth 59, 2 L O 63, 5 G B 90, and so on, ending with Zurich No. 100. A station such as Rome, which comes between 84 and 85, can be called 84½. This method of numbering makes it easy to see the relative position on the dial of every station.

Even now perfection has not been attained, for a chart made as described has to be on a sheet of paper about 22½ in. by 18 in., and must either be mounted on a card, or pinned to a drawing-board. Can the size be cut down?

You will see that the curve only occupies a strip in the middle of the paper, so why not get rid of the paper not required? This is done by ruling two parallel lines across the chart, one on either side of the curve, with sufficient space between them to allow us to write in station names, if so desired.

Along one of these parallel lines we then write our condenser numbers, and our station numbers along the other, and instead of an unwieldy sheet we have a neat strip about 22 in. long, and not exceeding 6 in. in width, with the rulings diagonally instead of parallel to the edges.

A Simple Operation.

Ordinary squared paper is ruled with blue lines, and it will help us if we overrule our chart with red lines from the curve to the station numbers, and black lines in the opposite direction from the curve to the condenser numbers, as this makes the chart clearer to read.

The last thing to do is to provide a rectangular card, such as a postcard or a 5 in. by 3 in. index card, to act as a guide when using the chart. By putting one corner of the card on the curve, and one edge along the line pointing to the condenser number, the other edge of the card at right angles to the first will be along the

line pointing to the station number, and it can be identified at once.

To find the setting for any station, the operation is just reversed. One edge of the card is put on the line pointing to the station (the corner being on the curve), and the other edge points to the condenser reading required.

Fig. 1 shows part of a strip chart prepared in the manner described. The curve is that made from my own set, in which Cyldon Mid-log condensers—0005—are used. The same system can be used with any other condensers, but with the old square law kind the curve will be more pronounced in the centre, thus occupying a wider space. With some coils and condensers the curve may become almost a straight line.

Weak Signals Best.

Fig. 2 shows how a suitable guide card can be marked. The system is very accurate, and a set can be calibrated as easily as a wave-meter.

When first plotting the curve it increases the accuracy if weak signals can be identified, for the tuning of these is necessarily much sharper than of a strong signal, such as that from the local station.

Before inking in the curve, it is well to plot as many stations as possible. For every set of coils the procedure is the same, a separate chart being made for each.

When using a set with more than one tuned circuit it is only necessary to calibrate one dial. The aerial tuning will vary according to the aerial in use or the tapping on the coil, but the second circuit will not vary in this way. If there are three tuned circuits, the middle one will be the best to calibrate.

Interchangeable Cards.

This system is not easy to work when moving-coil reaction control is used, as altering the reaction also alters the tuning of the coil. With capacity-controlled reaction the difficulty does not arise.

After the set has been completely calibrated, the chart can be abandoned, and an index of stations made, showing the condenser readings necessary for each. For the purpose I use one known as the "Bizada" (the makers are Carter, Parratt & Co., Victoria Street, S.W.), in which each name is on a separate slip of card, the slips fitting into a frame.

This enables the cards to be altered as stations are changed in wave-length, and new stations can be inserted in their proper order. Each frame holds 100 slips, and they can be bought in pairs bound in imitation leather.

Slips of various colours can be used to indicate different kinds of stations. For instance, large stations easily received can be on white cards, smaller ones on yellow, doubtful ones on pink, and so on.

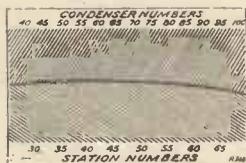


Fig. 1. This is a very small reproduction of the chart prepared by the author.

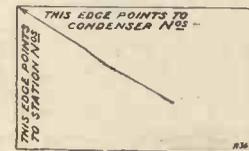


Fig. 2. The indicator used in conjunction with the rapid station-finding chart.

LATEST BROADCASTING NOTES.

NATIONAL WIRELESS WEEK.

CHILDREN'S HOUR CHANGES—
SERIES OF TALKS FOR LADY
LISTENERS — FOOTBALL: BROAD-
CASTING DELAYS—FORTHCOMING
PROGRAMME ITEMS.

National Wireless Week.

THE B.B.C. will continue this year the now established custom of putting on special programmes during the week its birthday occurs, that is in the third week of November. At the moment of writing some big surprises are in course of preparation at Savoy Hill.

The second of the B.B.C.'s Great Play series will be Maeterlinck's "Betrothal," to be given on October 8th and 10th.

Children's Hour Changes.

With past experience showing emphatically that the one portion of the programmes with which listeners will permit no interference is the "Children's Hour," the B.B.C. is evidently prepared to risk the howls of protest which will inevitably follow some far-reaching changes soon to take effect in Scotland.

It is all to do with the preparations for the Regional Scheme when Glasgow will supply the areas now covered by Edinburgh and Dundee, and the B.B.C. propose that listeners shall be introduced gradually rather than violently to the new condition of things in general.

The local Children's Hour for these relay stations will, of course, eventually disappear, or at any rate become absorbed with that of Glasgow, and a start in this direction will be made in October by relaying the Glasgow Children's Hour to Edinburgh listeners every Saturday.

The idea is so that Edinburgh children shall become accustomed to the Glasgow "aunts" and "uncles," though when the change-over takes effect on every day of the week, the present Edinburgh microphone "relatives" will be transferred to Glasgow and continue to take part in one of the most popular parts of the programmes.

By November a big Scottish Children's Hour for all stations excepting Aberdeen will have been launched, but on the other hand quite a lot may happen before then.

For Lady Listeners.

The second of six periods devoted to the broadcasting of topics of particular interest to the newly franchised armies of women will be heard on Tuesday evening, October 9th, when Miss Ellen Wilkinson, M.P., and Mr. William H. Thoday, ex-President of the London School Masters' Association, and late Treasurer of the National Association of School Masters, will give their respective answers to the question of "Should Women be Paid as Much as Men?"

Three of these special periods will be devoted to discussions while the remainder will be occupied by straightforward talks.

Football: Broadcasting Delays.

Owing to certain little difficulties still existing between the authorities of the English League and their ideas on running commentaries connected with football matches, English listeners will have to



When the Peace Pact was signed in Paris recently a movie-tone film was taken of the historic ceremony. This picture shows the valve amplifiers used for the purpose.

wait until October 24th before they hear a description of a game this season. The occasion will be the International match between England and Ireland at Goodison Park, Liverpool, which comes under the jurisdiction of the Football Association.

The commentary will be broadcast from both London and Daventry Stations. Meanwhile Scottish listeners are more fortunate, they are to have their first running commentary on Saturday, October 13th, on the match between Queen's Park and the Hibernians, which takes place at Hampden Park, and which is to be described by Mr. Campbell Bilney, the well-known Scottish referee.

Forthcoming Programme Items.

It is now announced definitely that Albert de Courville will give the first of his "hours" on October 9th. He has arranged to give a series of six "hours" at the rate of one each week. These follow on the very popular series of Charlot Hours which concluded recently.

Planquette's ever-popular comic opera, "Les Cloches de Corneville," will be broadcast to Newcastle listeners on October 3rd. The principal parts will be played by Marjory Dixon, Vivienne Chatterton, Gregory Stroud, and Henry Wendon.

The British Music Players, a new light instrumental combination, will make their first appearance before the 5 G B microphone on September 29th. The soloists are Miss Desirée MacEwan (pianoforte), and Gladys Parr (contralto).

TECHNICAL NOTES.

By Dr. J. H. T. ROBERTS F.Inst.P.

MAINS VOLTAGE VARIATIONS

CONSTANCY OF OUTPUT—THE REGULATION OF VOLTAGE—Etc., Etc.

Mains Voltage Variations.

IT is not commonly realised that the voltage of the electric-light mains may vary considerably from the normal or rated value. The departure from the normal value is much greater in some districts than in others and depends, of course, upon the efficiency or otherwise of the regulating arrangements at the generating station. Even in districts which are most free from irregular variations, it will generally be found that there is a distinct difference between the voltage in the evening and that during the daytime. This is due to the extra load which is put on the station and the throwing-in of extra machines to cope with it.

In these days of mains-supply units and critical circuits, the variations of the mains voltage may cause quite noticeable effects in the reproduction from the set, and consequently it is very desirable to have some means of compensating for such irregularities and ensuring a reasonably uniform voltage output.

Constant Output.

One obvious way to do this is to employ high-tension and low-tension accumulators which may, if desired, be left on charge whilst the set is in use. I do not recommend that accumulators, especially high-

tension accumulators, should be left on charge when the set is in use because, in the first place, unless the charging arrangement have certain necessary features, there is liable to be an alternating-current hum produced in the set, whilst in the second, and perhaps much more important place (this applies to high-tension accumulators), such an arrangement is liable to give trouble, inasmuch as the electric-light mains are—or most probably are—connected straight through to the receiver.

However, the fact remains that, apart from the undesirability of this procedure, for the reasons indicated above, it provides a means of ensuring a very considerable degree of uniformity in the voltages applied to the set.

Voltage Regulation.

What I had in mind, however, was the actual regulation of the mains voltage by a device, not of the battery type, which could be used in conjunction with an eliminator.

The United States radio papers have for some time past been emphasising the importance of bringing forward such a voltage regulator and now I see that the first of these devices is on the market. By the way, the variations of mains voltages is much more serious in the States than here.

(Continued on page 198.)



The **GECOPHONE**
REGISTERED TRADE MARK
WORLD WIDE SCREEN GRID **4**

**Station after Station—
 on the Loud Speaker
 —with ridiculous ease!**



**UTMOST SENSITIVITY
 AMAZING SELECTIVITY
 REALISTIC REPRODUCTION
 SIMPLE CONTROL**

*Suited to either
 aerial or frame*

Cat. No. B.C. 2940.

**PRICE
 including Special
 OSRAM VALVES
 AND ROYALTY
 £23 : 10 : 0**

Price complete with batteries
£28 : 0 : 0

Cat. No. B.C. 2945.

**PRICE
 including Special
 OSRAM VALVES
 AND ROYALTY
 £34 : 7 : 6**

Price complete with
 Batteries, £39 : 0 : 0

The GECOPHONE Screen Grid 4 as a handsome cabinet, beautifully made of mahogany in pleasing design, with grained front panel.

ITS simple tuning and high degree of selectivity make it equally suitable for those living within a few miles of, or hundreds of miles from, a transmitting station. Take an example. A test user, 8 miles from 2 LO, has reported a log of 25 stations ranging from Warsaw to Milan and Budapest. There are still many stations to be identified. Anybody can do it! Programmes from hundreds of miles away can be received, clearly and easily, on any type of aerial—it will also give a wonderful performance on a small frame.

WRITE for Brochure B.C. 4766 for information regarding all the new season's "GECOPHONE" Radio Receivers and Gramophone Reproducers, Loud Speakers, etc., SENT POST FREE on request.



THROUGH THE VOICE OF THE NATIONAL RADIO EXHIBITION—THE WIDE WORLD HAS ACCLAIMED THE "WORLD WIDE"! Stands Nos. 28, 29, 46, 47 and 225.

MAKE CONTACT WITH

WE ARE EXHIBITING AT



CLIX

at
STAND
No. 236
OLYMPIA

"CLIX" practical aids to perfect contact are the outcome of careful study into the causes of those annoying interferences in reception which are invariably traced to bad contact.

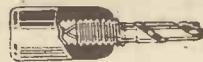
Each and every one of the eight illustrated will, if used by you, greatly increase your radio pleasure.



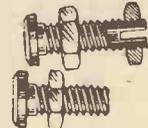
1. **CLIX PARALLEL PLUGS.** A boon to experimenters. 2d.



2. **CLIX SPADE TERMINALS.** Bury all contact troubles 2d.



3. **CLIX SPIRAL WANDER PLUGS.** Give full surface contact 2d.



4. **CLIX PARALLEL SOCKETS.** Eliminate the use of solder 1d. & 1½d.



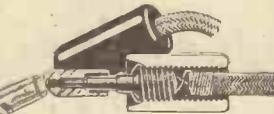
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6. **CLIX PIN TERMINALS.** The pins with many uses. 2d.



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OUR NEW CATALOGUE IS NOW READY

Ask your Dealer for a copy. It contains full details of all the above and also illustrations, including the following additional "CLIX" products.

ACCUMULATOR KNOBS, PANEL TERMINALS, CONNECTORS AND THE "CLIX" MULTI-PLUG AND SOCKET.

Look for the "CLIX" Showcase on your Dealer's counter

LECTRO LINX, LTD.,

254, Vauxhall Bridge Road, Westminster, S.W.1.



The name REGENTONE is synonymous with RELIABILITY. Since our business commenced we have aimed at QUALITY—and quality spells reliability. Our progressively increasing sales testify that our aim has been true. Full information in the form of our illustrated list will be furnished for the asking, or if you visit the Radio Exhibition at Olympia, call and see us on Stand 62 where you can examine samples of all our products.

REGENTONE PERMANENT CHARGER



Regentone Charger.

Incorporating Westinghouse Metal Rectifier, for A.C. Mains.

2, 4 or 6 volts. ½ amp. or 1 amp.

PERMANENT CHARGER

(with L.T. coupler)

½ amp. 54/-

1 amp. 70/-

PERMANENT CHARGER

(without L.T. coupler)

½ amp. 47/6

1 amp. 65/-

The Wireless Trader says:

"We can thoroughly recommend the Regentone Charger, which is efficient, well-made and reasonably priced."

REGENTONE H.T. UNITS FOR A.C. MAINS

Incorporating Westinghouse Metal Rectifier.

High Tension Model W.1a.

Output, 1 Variable 0 to 200 volts, 1 fixed 90 volts, and 1 power. Max. current, 30 m/a at 160 volts.

Price £7 2s. 6d.

Other H.T. Models and L.T. Models obtainable.

Specify mains voltages when ordering.



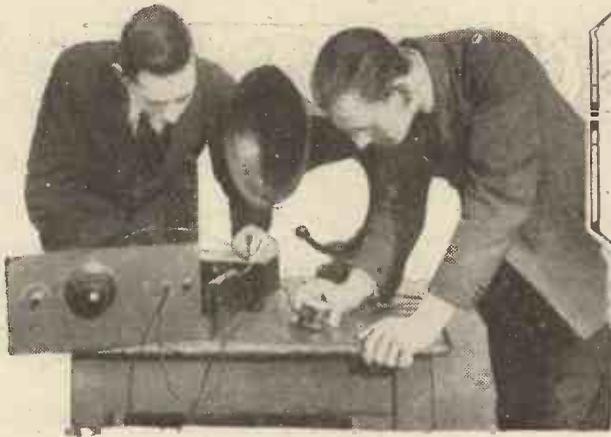
H.T. Model W.1a.

ALL REGENTONE MODELS ARE SOLD WITH A WRITTEN GUARANTEE FOR 12 MONTHS.

BRITISH THROUGHOUT.

STAND 62 OLYMPIA

THE NEWCOMER TO RADIO



In this week's article the construction of the one-valve stage is completed, and the author continues his interesting how-it-works chat. New readers could commence the building of the receiver without having to refer to the previous articles in this series, although they will find it of advantage to endeavour to obtain the preceding numbers. And to prevent the slightest chance of missing the forthcoming articles, readers are strongly advised to place orders for "P.W."

5.—BUILDING A ONE-VALVE SET.
By G. V. DOWDING, Grad.I.E.E.

positive terminal, a short stroke the negative. An H.T. battery consists of a very large number of cells, each of these having positive and negative terminals.

There is a fixed condenser, a variable condenser, and a coil, all strung together. These enable what is known as "reaction" to be obtained. Reaction, which is sometimes referred to as regeneration, is a feedback effect.

In the anode circuit of the valve is repro-

NOW we have brought our set to the point where the energy developed by the broadcasting station selected is influencing the stream of electrons passing from the filament of the valve to the plate of the valve. If we join the plate of the

You could not show all these in a diagram, so we connect one plus and one minus (positive and negative) sign, with another such pair by a series of dots, these indicating a large, but not necessarily fixed, number of cells.

Three New Components.

You will notice in this diagram another coil sign marked H.F.C. This is indeed another coil, but one of a special type, consisting of a very large number of turns of wire wound in a small space. It is a "High-Frequency Choke," and its purpose is to stop oscillating currents which rush backwards and forwards (such as those developed in tuning circuits) passing through. The H.T. battery, telephone receivers and H.F. choke complete what is known as the anode circuit of the valve, and, incidentally, we are now in a position to be able to listen to a broadcasting station, but Fig. 1 shows three further new components.

THIS WEEK'S SHOPPING LIST.

The additional items required to complete the one-valve receiver are:

- 1 Variable condenser for reaction control, .00025 mfd. capacity (.0002 or .0003 will serve also, either an ordinary variable condenser or one of the special small reaction type, such as Igranic, Cyldon, J.B., Bowyer-Lowe, Peto-Scott, etc.).
- 1 Fixed condenser, .001 mfd. capacity (Dubilier, Lissen, T.C.C., Mullard, Clarke, Igranic, etc.).
- 1 High-frequency choke (Lissen, Cosmos, R.I.-Varley, Colvern, Igranic, Dubilier, Climax, Burne-Jones, Wearite, Bowyer-Lowe, etc.).

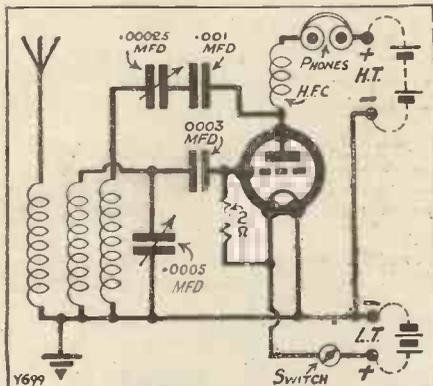


Fig. 1. The theoretical circuit of the complete one-valve receiver.

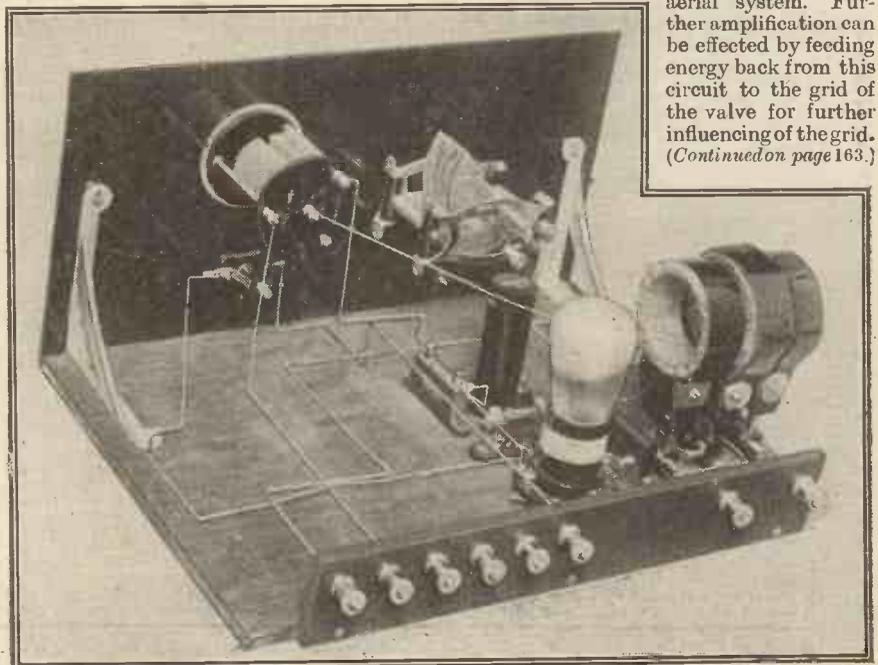
valve to a pair of telephone receivers, these instruments to an H.T. battery and this to the filament of the valve, yet one more circuit is completed. The amount of electricity which will flow through the telephone receivers from this battery will vary in accordance with the variations of that charge on the grid, and a varying current of electricity passing through a pair of telephone receivers produces sound.

How Telephone Receivers Work.

A telephone earpiece is nothing more or less than a small electro-magnet placed near to a sheet of metal, this being known as the diaphragm. A varying current of electricity through the magnet will vary its strength of pull on the diaphragm, and it is in this way that air vibrations corresponding with sound are generated. If you refer to Fig. 1 you will easily be able to trace the circuit of the telephone receivers and the new battery.

This battery is known as the H.T., which stands for High Tension. It is, electrically speaking, a large battery. Many theoretical diagrams show the H.T. points of connection only. Here I give you this as well as, in dotted lines, the theoretical sign for the battery. A long stroke indicates the

duced, in an amplified form, a varying electric current corresponding with that developed in the aerial system. Further amplification can be effected by feeding energy back from this circuit to the grid of the valve for further influencing of the grid. (Continued on page 163.)



This week the instrument resolves itself into a complete one-valve set with which you can listen with telephone receivers to many of the broadcasting stations. Keep your wiring closely to the pattern of the original set as shown above, so that the extensions can be made easily.



What "TENACIOUS COATING" is!



"TENACIOUS COATING" is a layer of pure metal, rich in electrons, which is deposited on the filament core.

By an improved and secret method of manufacture this layer is not merely painted on the outside of the filament, but actually chemically cemented.

This results in the most tenacious hold on the filament that it is possible to obtain in any valve.

Thousands have seen and have been greatly impressed with the "TENACIOUS COATING" on the filament of OSRAM VALVES at the National Radio Exhibition.

BADLY COATED FILAMENT

Reproduction from an untouched micro-photograph of part of the filament of a badly coated valve before use, showing a serious gap in the coating. A gap such as this starts the valve off in its life with a poor performance, and may bring about a further portion of the coating falling away or peeling off. The valve then prematurely fails.

CHANGE

to the latest improved

Osram Valves

and

CHANGE for the Better!

WRITE for Booklet "OSRAM WIRELESS GUIDE" giving full particulars of "TENACIOUS COATING" and full range of OSRAM VALVES for 2v. 4v. and 6v. users, and users with A.C. Electricity Supply. Also helpful wireless information of importance to every listener. Sent PJST FREE on request to THE GENERAL ELECTRIC CO., LTD., Publicity Organisation, Magnet House, Kingsway, London, W.C.2. Copies also obtainable from your local Wireless dealer.



OSRAM FILAMENT with 'TENACIOUS COATING'

This untouched reproduction shows the coating typical of all OSRAM VALVES. Notice the absolute evenness of the coating. There are no gaps, the coating clings, so that the full benefit of the coating is maintained: The secret is the startling new discovery of the scientific process of "TENACIOUS COATING."

THE NEWCOMER TO RADIO.

(Continued from page 161.)

You cannot build up energy in this way indefinitely, otherwise there develops a sort of vicious circle which sets a receiver howling and screaming, or, in other words, "oscillating." This oscillating, by the way, is the cause of much interference with broadcasting, for it turns a receiving set into a sort of miniature transmitter, and it is a condition which you must do your utmost to avoid.

The feed-back is effected by leading energy from the anode of the valve through a condenser to a coil which is coupled with the grid coil in the grid circuit of the valve. The actual transference of the energy takes

Next Week the Two-Valve Receiver is Completed.
Make sure you get your copy of "P.W."

place between these two coils, just as you will remember the energy from the aerial coil develops energy in the coil across which is connected the tuning condenser.

The amount of energy allowed to pass back in this way is controlled by the variable condenser marked .00025 in the diagram. By varying the capacity of this, you vary the easiness, as it were, of the path provided for fed-back energy. The

greater the capacity the greater the feeding back is a fact you must bear in mind.

The fixed condenser is inserted in this path merely as a precautionary measure.

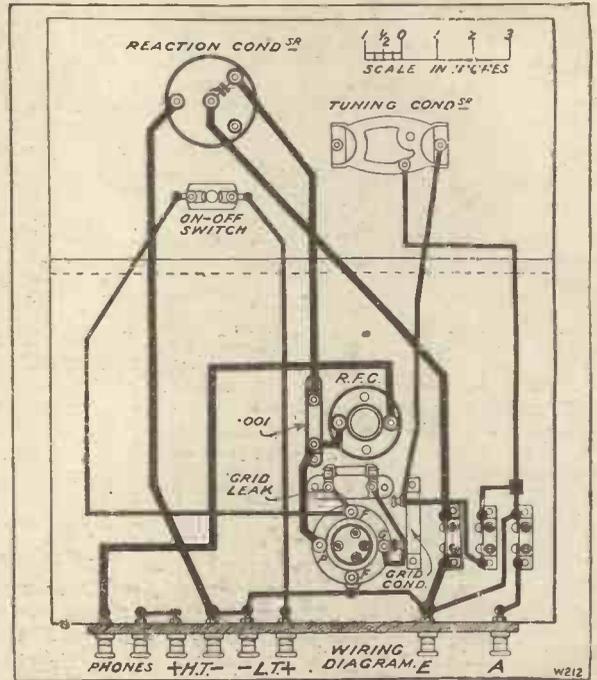
You will remember that a condenser is nothing more or less than two metal structures separated by an insulating material, such as air. If these metal structures were actually to touch or be connected together by metal, what is known as a "short circuit" occurs.

High-frequency currents, such as we have been dealing with need no such metal path for their travels. Oscillating currents or high-frequency currents, regard condensers and coil couplings as easy obstacles to surmount, but the steady flow of current which is derived from a battery needs a continuous metal path, or a path of a continuously conductive nature.

The H.F. Choke.

Current can flow from the H.T. battery, in the circuit shown in Fig. 1, only through the telephone receivers, the H.F. choke, across the valve by the electron stream, and so back to its other terminal, but you will notice that if the variable and fixed condensers were removed from the reaction path and a straight lead put in their place another path would be provided for the H.T. battery current, through the wires of the reaction coil.

By putting two condensers in that path, you double the odds against a short circuit occurring. Only one condenser is variable, and it is with this that reaction or feed-



The additional wiring is shown in heavy black lines. A few extra components figure in this week's work.

back is controlled. The new coil holder will be similar to the other two already in the set and will take its place on the baseboard in line with these. The H.F. choke and new fixed condenser are also screwed on the baseboard.

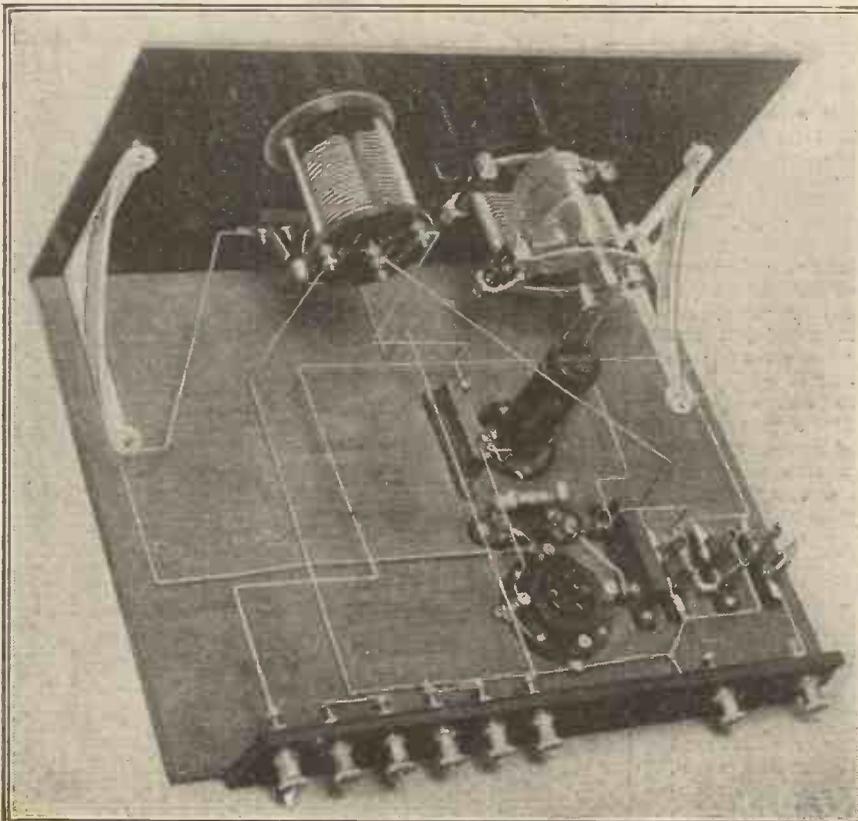
Regarding the H.F. choke, I must not forget to mention that not all makes or types will be quite suitable for this set. You will want an H.F. choke that will operate satisfactorily when any of the ordinary stations, or long wave-length stations, such as 5 X X; Daventry, are being received. There are H.F. chokes on the market which are only suitable for sets functioning on a moderately limited wave-length band.

You will notice that the reaction condenser used in my original set has three terminals. The connections to two of these terminals correspond with those shown theoretically in Fig. 1: The third terminal, the furthest one from the aerial end of the set, is connected via a certain battery lead to the earth terminal. This extra condenser terminal is not joined to either of the vanes or plates, but is connected with what is known as a screening plate.

Eliminating "Hand Capacity."

This screening plate actually takes up a position between the condenser and your hand when you are operating the dial of the component. It prevents your hand having any effect on the electrical capacity of the condenser and thereby upsetting its adjustment. In technical jargon it eliminates "hand capacity."

You should note that anything directly connected to earth is regarded as a point of greatest stability. Thus you will find that when the set is working you can touch the earth terminal with your fingers, or



Keep the new part as closely as you can to the positions shown in the above photo, as space must be left for the parts which will be needed to extend the set.

(Continued on page 183.)



OLYMPIA—YOUR LAST CHANCE.

Those of our readers who have not yet visited the Wireless Exhibition should make a point of doing so, as it ends on Saturday.

By THE EDITOR.

seded. The four-electrode screened-grid valves do their job for the high-frequency side of the receiver, and the

Pentode valves in their now highly developed state are doing for the low-frequency side as much as the four-electrode valves are for the high-frequency side of your set.

The Pentode, as our readers realise now, is in fact a practical attempt to make one new valve equivalent of two of the low-frequency valves, and as it works on a comparatively low plate voltage it will be realised it is a very good investment.

The popular mains units, whereby the amateur can take both high- and low-tension current from his house supply mains, will be found in profusion at the Exhibition; but, for the amateur who has not electric light, the benefit will be found in the shape of improved accumulators and high-tension batteries, both these components being on sale at considerably reduced prices compared with the prices charged last year.

Perhaps the most amazing reduction in price is to be found among the loud speakers. Some really first-class coil-driven loud speakers can now be bought at Olympia for a sum which, a year ago, would have been regarded as impossible.

Lower Prices.

The writer has attended every Wireless Exhibition yet held in this country, but it is undoubtedly a fact that this year's Exhibition shows more prominently than any other Exhibition yet held how prices are coming down, and manufacturers are finding it possible to place before their clients apparatus of first-class manufacture at a cost which no one can legitimately grumble at.

The organisers of the Exhibition have certainly done their job well this year, and we should like to take this opportunity of offering them our hearty congratulations and to express the sincere hope that next year's Exhibition will, like all other Exhibitions, be better than the one before it.

HEREWITH the POPULAR WIRELESS Second Exhibition Number. By now a great many of our readers will undoubtedly have paid a visit to the Exhibition, but those who have not done so already let me urge to make the most of their opportunities for, by the time this issue is on sale, there will be barely three days left in which to see what is undoubtedly one of the most interesting and comprehensive Wireless Exhibitions ever held in this country.

Reduced Royalties.

The recent decision regarding the Marconi Royalties seems to have had a most inspiring effect upon the trade, and there is an air at Olympia of brisk business and enterprise which augurs well for the future of wireless in this country, and for a most interesting winter wireless season.

Readers will find on visiting the Exhibition that there are big reductions in the price of wireless sets and that, on the whole, the complete receiver will be found to be roughly twenty-five per cent cheaper than the corresponding set in any of its variations as shown at Olympia last year.

In some specific cases the difference in price is more than twenty-five per cent. It must be borne in mind that these reductions, which came more or less as a godsend at the last minute, to give a final boost to the Exhibition, are undoubtedly due to the recent decision regarding Marconi Royalties, and to the decision of the Radio Manufacturers Association, plus the fact that in the last twelve months the trade has done a considerable amount of development in the stabilisation of radio design and the provision of methods for mass production.

New Advancements.

Readers will find at the Exhibition three-valve sets using the new valves which give results equal to or even better than some of the best of last year's five-valve receivers. These improvements have been made practical by the great development in the new Pentode or five-electrode valve. Although last year the screened-grid four-electrode valve was considered to have effected a revolution in the high-frequency side of receiving sets, this year—an instance of the development and rapidity of progress in radio technique—there is no doubt that the Pentode has gone a step farther, and that the five-electrode valve has a very great future before it.

However, readers must not think the four-electrode valves have been super-

All readers who visit Olympia should make a point of having a look at the "P.W." stand, on which will also be found our contemporaries, "Modern Wireless" and "The Wireless Constructor." A section of the technical staff will be there every day to answer questions concerning any of our sets, or to give advice and assistance in any of the little radio problems with which you may be grappling at the moment.

Most interesting of all, perhaps, will be the original models of some of the famous sets the details of which have been published either in this journal or one of the other two mentioned.

Among these sets the "Olympia Four," described in last week's "P.W.," forms one of the most interesting, and prospective constructors of this efficient receiver will do well to choose their components during their visit to the exhibition, first of all, however, having a good look at the original receiver.

Don't Forget "P.W." Stand.

In this way a perfectly clear idea of the layout, types of components necessary, valves required, can be obtained—in fact, all facts about the set can be gathered, and you can then go home confident that you will be able to build a true replica which will give results equal to those obtained from the original.



One of the many interesting exhibits at the recent Berlin Radio Exhibition—a complete airplane transmitter and receiver.

The Story of Selenium



RADIO PICTURES.

In which are described in an interesting manner the main properties of this wonder element and the photo-electric characteristics which make it of service to the television experimenter.

By J. F. CORRIGAN, M.Sc., A.I.C.



BEFORE going into a description of the element, it may be worth our while to devote a few lines to a consideration of the present-day sources of selenium. The element exists in a number of minerals, such as Crookesite, Naumannite and Zorgite, all of which are extremely rare, and would make the large-scale production of the material an impossible matter.

Fortunately, however, selenium is present in very small quantities in other minerals. For instance, ordinary radio-sensitive galena, that material so beloved by the crystal enthusiast, in many cases contains slight traces of selenium. Iron pyrites contains appreciable percentages of the element, and it is from this mineral that the present-day supply of selenium is obtained. The pyrites is utilised in the manufacture of sulphuric acid, and the traces of selenium which exist in the mineral find their way into the acid tanks and settle down to the bottoms of the latter in the form of a brick-red sludge



Fig. 1.—On the left is some Metallic Selenium, Crystalline Selenium being shown on the right.

which is carefully collected and worked up.

There are at least six different forms of selenium, but for our purpose we need only consider two of them, to wit, crystalline selenium and "metallic" selenium. Crystalline selenium is the name given to the well-known brick-red powder of the chemist. The "fused" selenium of the television experimenter is really the "metallic" variety of the element, and it is prepared by heating up the crystalline modification of the element out of contact with air—to prevent oxidation—to a temperature of approximately 220 degrees Centigrade. Only the "metallic" form of the element is light-sensitive.

Light-Sensitive Cells.

Incidentally, this so-called "metallic" variety is not metallic in nature at all, for, in the dark, it possesses a very high electrical resistance. It is merely semi-metallic in appearance, being of a dark steel-blue shade, and showing traces of greenish coloration when viewed at certain angles.

Specimens of "metallic" and crystalline selenium will be seen in the photograph (Fig. 1), the "metallic" variety being seen on the left of the illustration. Fig. 2 shows in more detail two lumps of the "metallic" modification of the element, from which

illustration a better idea of its nature will be obtained.

There are several different forms of cells in which the light-sensitive properties of the element can be employed. The well-known "condenser" type of selenium

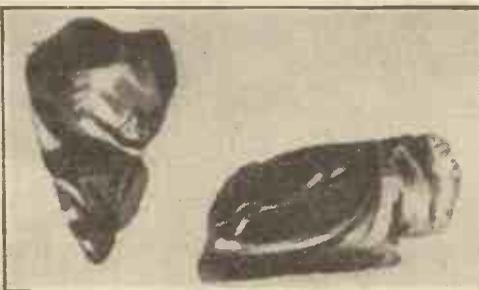


Fig. 2.—"Fused" or "Metallic" Selenium—the light-sensitive form of the element.

cell consists of a series of metal plates separated from one another by a thin insulating layer of mica, a thin layer of "metallic" selenium then being coated on to one edge of the condenser assembly.

In the "grid" type of cell, thin lines of selenium are drawn across a plate of insulating material, electrical connection being made to the selenium "grid" by means of clips.

Most Popular Type.

Possibly the "flat wire" type of selenium has been most favoured by amateurs. An illustration of this cell will be seen at Fig. 3. Cells of this nature consist essentially of a flat slab of insulating material over which two lengths of wire are wound side by side. One of the wires is enamel-



Fig. 3.—This is a "Flat Wire" type of Selenium cell.

insulated, the other being uninsulated, and slightly thicker in cross-section.

After the winding has been completed the insulation is removed from the surface of the winding, and the latter is coated with a thin and perfectly even layer of "metallic" selenium. A "close-up" illustration of the active surface of a wire-wound selenium cell, showing the selenium coating on the wire turns, will be seen at Fig. 4.

Peculiar Effects of Light.

A cell of this nature will possess a resistance in the dark of two or three megohms. On holding a 20-candle-power lamp a few inches from the cell, the latter being connected in series with a 50-volt battery, a current of a few milliamperes will flow.

A curious property of selenium is that it is not equally affected by all light rays.

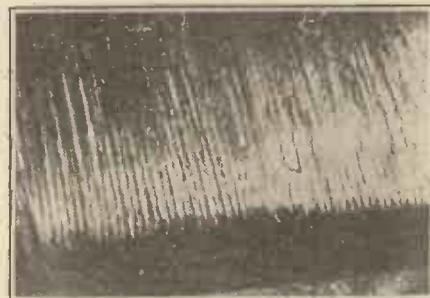


Fig. 4.—"Close-up" of the active portion of "Flat Wire" Selenium cell, showing the layer of Selenium on the turn of wire.

Blue and violet rays produce a very small change in the resistance of an ordinary selenium cell, whilst the rays at the opposite end of the spectrum—the orange and red rays—exert a maximum effect upon the material.

Selenium cells are influenced, too, by the dark infra-red rays, those rays which make no impression on the retina of the eye. Hence, a thin piece of ebonite, which is more or less transparent to invisible infra-red rays, can be interposed between a selenium cell and a source of light, and yet the cell will still show a resistance change.

Photo-Electric Cells.

Selenium cells differ from the more recent photo-electric cells in that they do not actually generate current under the influence of light. The selenium cell merely undergoes a resistance change under the light influence, whereby it is enabled to pass current from a neighbouring battery. Photo-electric cells, on the other hand, actually develop a feeble current under the action of light.

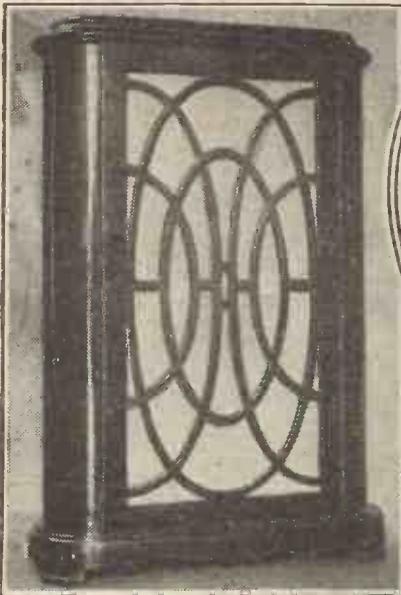
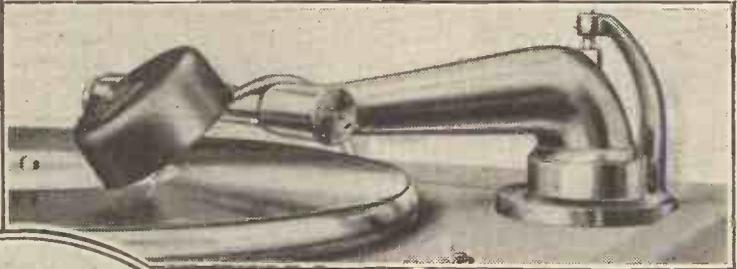
BERLIN'S RADIO SHOW.



The Radio Exhibition at Berlin is generally held just before our own at Olympia, and this year it has been a particularly interesting one.

In addition to the Television apparatus shown by Karolus & Mihaly, there was a speaking film running all the time!

Below is shown a representative selection of radio and gramophone apparatus, as shown to the German public.



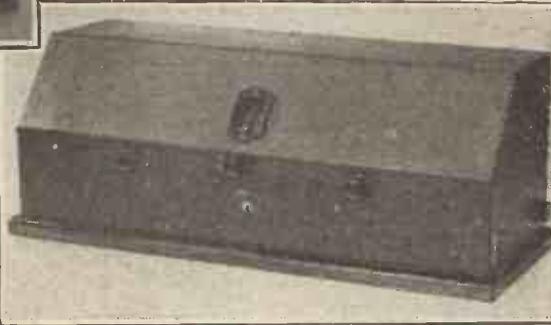
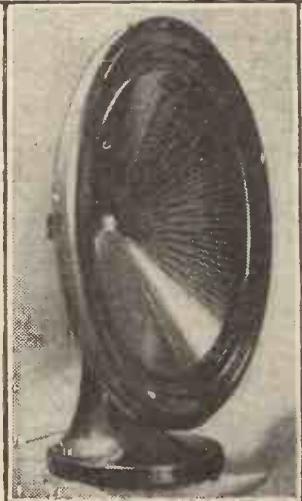
This small two-valver (Det. and L.F.) is intended for local-station work only.



Above are shown a representative "pick-up" (top) and a three-valve set for loud speaker results.

A particularly interesting feature of the pick-up is the method of affixing the needle, which is not suspended at the outer rim, like most of the British types, but instead is attached near to the centre of the unit.

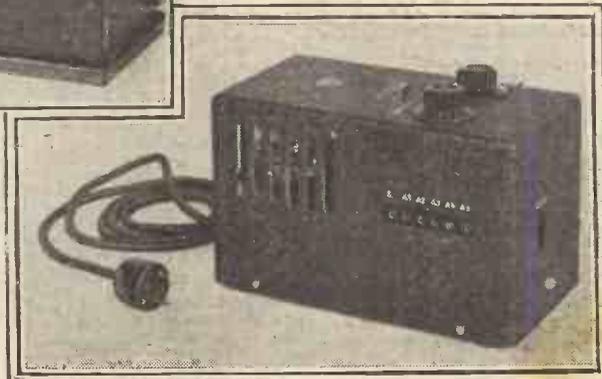
Below is a one-valve mains unit set, whilst to the left is a six-valve (screened-grid) receiver, of particularly business-like appearance.



A popular model of the hornless loud speaker is shown to the left. (Note how the centre of gravity has been placed over the base to give the instrument stability.)

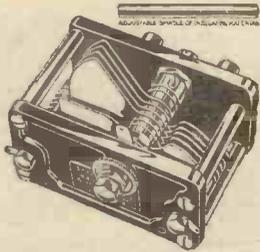
Above this is another loud speaker, which works upon an ingenious double-differential principle.

The combined gramophone and radio set shown in the top-left-hand corner is of the "mains-drive" type.



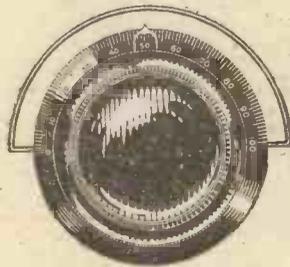
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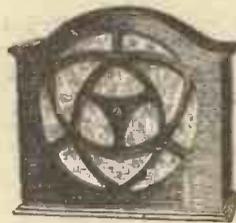
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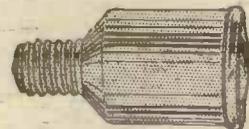


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FIXED RESISTOR

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RADIO EXHIBITION OLYMPIA



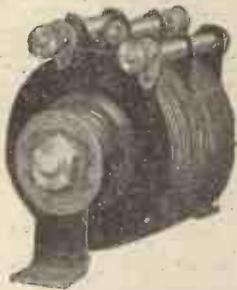
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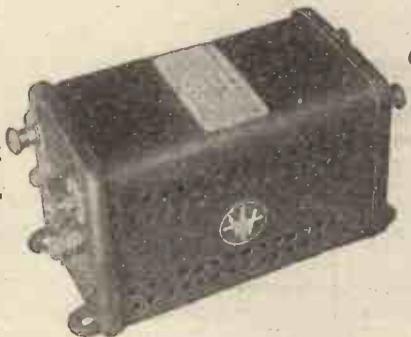


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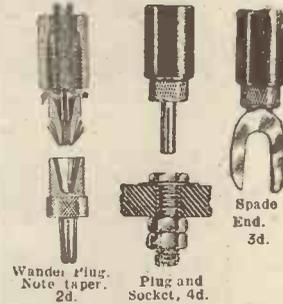
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T. W.



From the sectional illustration it will readily be noted that the flex covering is splayed over the cone and gripped by the sleeve, overcoming unsightly frayed-out, ragged ends to leads.



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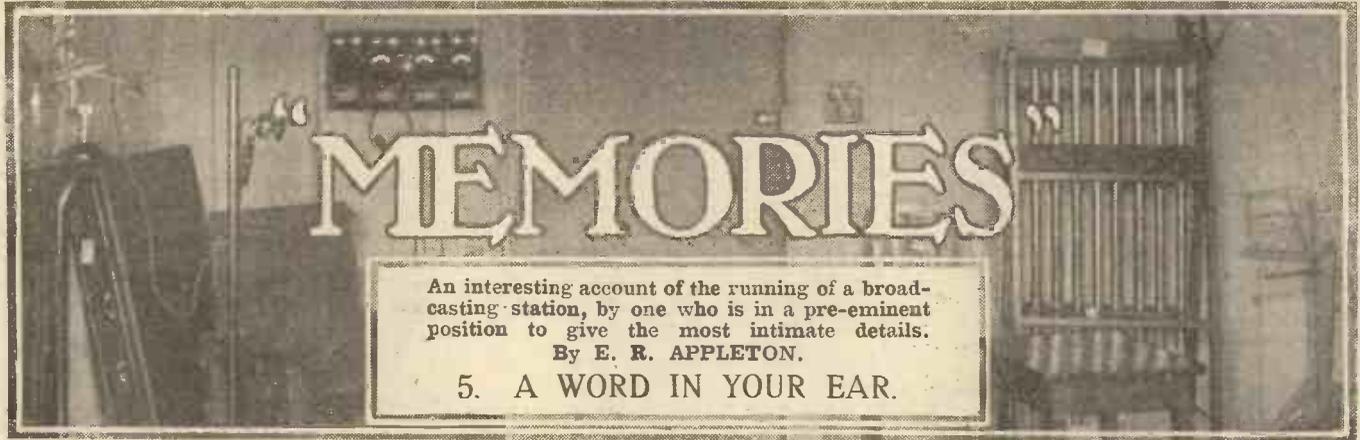
NEW LINES

UTILITY Thumb Control Condenser 0005-19/-, Thumb Control Vernier Dial 12/6, Thumb Control plain dial 13/-, **LAMPFLUGH** Panel plate tuner unit 35/-, collapsible cabinet £1/8, 2-Valve baseboard unit £1/17/6, 3-Valve B.C. ditto £1/3, 3-Valve Transformer type ditto £2/10, **PHILIPS** seven cornered speaker £2/10, **DECKO** Roller Station Logs 2/8, Radio compass 2/6, **COLVERN** Coil-former circular 4/-, Long wave ditto 4/6, **WATMEL** Double range tuner 12/8, O.V. Cone Speaker Unit 13/6, **EDISWAN** R.C. Inductance Unit 17/6, R.G. Transformer unit £1/7/6, **BRITISH GENERAL** New Tuning Unit 18/6, W. & B. Cabinet Speaker £2/10, M.P.A. De Luxe Plaque £2/7/6, **ORMOND** Turntables for portables 5/-, **JEWEL** Push Pull Switch 1/3, **LEWOS** H.F. Choke 1/6, "Q" Coil 15/-, S.P. transformer "Q" 21/-, **PILOT** Illuminated drum dial £1/2/6, **PETCO-STO** Drum Condenser drive 9/-, **Clarostat** Volume Control 4/8, **GAMRELL** Volume Control 6/2, **COLUMBIA** 1v W. & B. batteries 10/-.



WESTINGHOUSE CABINETS
for Panels 7" high, Width 10" Oak 12" 17/-, 14" 17/6, 18" 18/6, 21" 19/6, Mahogany 1/- extra.

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An interesting account of the running of a broadcasting station, by one who is in a pre-eminent position to give the most intimate details.
By E. R. APPLETON.

5. A WORD IN YOUR EAR.

If you go to see an invalid who has not been allowed to have visitors for some time or who has fallen ill in a part of the world where he has no friends, you will find that, in spite of warnings of nurses against excitement, he wants to hear you speak. You may have come with a gramophone

been a lack of human speech. He suddenly realises how lonely he is. He wants to hear someone talk about things, put things in a novel light, for he has been shut up with his own thoughts and is tired of them. He does not care overmuch what the subject is, he wants to hear someone talk.

amount of time to talks. "Occasionally," we stated, "an extra talk is taken when something of special interest is available.

"For example, yesterday Mr. Gerald Ames spoke from the Cardiff Station at 6 p.m. on 'What it feels like to be an escaped convict on the films,' and at 9.15 p.m., Mr. Percy Pitt spoke for ten minutes on the promenade concerts which start next Saturday. Otherwise, the whole amount of time given to talks is 4½ hours per week during the holiday period (July 25th to September 24th) out of a total of about 60 hours transmission per week, and 6½ hours per week for the rest of the year."



The American studios are designed upon similar lines to those in this country, as can be seen from this photo of the studio at WLBW, Oil City, Pa.

If talking were more of an art in ordinary life, it would be easier to find people who could talk well and interestingly for broadcasting, and listeners would be at once more critical and more appreciative. For no section of the B.B.C. programmes has received so much criticism as the talks.

The average listener is only interested in a few subjects, but the talks syllabus has to include all realms of thought and adventure, every subject which an expert can make interesting, and it is not easy to find experts who can present their ideas in a clear and interesting manner. A large proportion of the criticism, however, comes from people who do not read carefully the printed programmes.

Here is a copy of a letter which appeared in the "Evening Express": "Why is it that such a very large amount of time is devoted by the Cardiff Radio Station to talks? Talk—talk—talk—instructive, educational, thought provoking, and all the rest of it. Who wants to be instructed or educated or provoked to cerebration by the wireless? I don't, I'm dashed if I do."

The reply in the next day's issue was, of course, to the effect that all stations gave practically the same

Talks should be Entertaining.

I should like to point out, too, that the talks are not intended to be merely instructive, but entertaining in a special way. And it would be difficult to imagine anything, from a music-hall show to a street accident, which does not provoke thought of some kind—injurious thought, maybe, vulgar thought, thought of sleep, of gaiety, of lust, of loneliness, of sorrow or joy—but surely thought of some kind.

The word talk has come under the same cloud as the word sermon, which is very unjust, as both talks and sermons can be exceedingly entertaining as well as

(Continued on next page.)

phone for his amusement, or a pack of cards or some illustrated magazines.

The patient will probably wave these aside—their time will come—but he knows that you cannot stay long, and "Talk to me instead" he says. A difficult order for some people, for the plain fact which we are slow to realise is that many of us are so lazy in our thinking that we only use a certain number of stock expressions and exclamations.

Brevity Can be Overdone.

Brevity is the soul of wit, but not all forms of brevity. There is a form of brevity which nips every conversation in the bud. A typical example is recorded—rightly or wrongly—of President Coolidge. He is reported to have gone to church one Sunday, and when he came home his wife asked him about the service. He did not give her much information.

"What did the clergyman preach about?" she asked.

"Sin," was the answer.

But the lady was not to be rebuffed, and she asked what line was taken on the subject.

"He's against it," was the brief reply.

Now, the invalid we have been picturing has had leisure to read, leisure to think, leisure to feel. But with it all there has



Are they listening to a "talk"? As Mr. Appleton points out, talks need not be dull and unentertaining if they are chosen properly and delivered by the right people.

" MEMORIES. "

(Continued from previous page.)

instructive. But some people switch off the set the moment a talk begins. There is a certain Welsh professor, a charming man and popular through the whole of Wales, who sometimes broadcasts from the Cardiff Station.

On the day following one of his talks, he happened to be in a railway carriage with some workmen, and he could not help over-

"The word talk has come under the same cloud as the word sermon, which is very unjust, as both talks and sermons can be exceedingly entertaining as well as instructive."

hearing their conversation on wireless programmes. "Yes," said one of them, "I was listening to the wireless last night when one of them talks came through, so I clapped the 'cadphones on the kid." It was a little disconcerting to the professor, as he could not imagine the act to be one of self-sacrifice!

Adults Just Like Children.

But we have to remember that people are very much like little children. With our modern enlightened methods of education we let the child's interest precede study. Education is not a process of cramming with facts—it is "the opening of a way whence the imprisoned splendour may escape." Even so the broadcaster must know the audience he intends to hold, and he must hold it by good craftsmanship.

As a general rule, a good talk is not suitable for printing without much re-writing. Nor should anything be broadcast which can better be obtained from books. It is the bookish manner and material which make rich the caricaturist and annoy the public.

People are too much alive to be deceived by scholasticism; where the classroom atmosphere predominates they suspect a knowledge of facts and a lack of personal experience. Pedantry, with all its apparatus of examination and degrees, has for long been the curse of our educational system; gradually it is being banished from our schools; the *coup de grâce* should come from broadcasting.

School-teaching by Radio.

To-day the majority of teachers want to use the wireless lesson in their schools, but their main objection comes from that difficulty in fitting anything else into an already overcrowded curriculum. The

curriculum of secondary schools is most jealously guarded on account of the big national examinations, and thus the most promising children are unable to hear the great pioneers, artists and leaders of our race when they broadcast.

The need of the schools is for a stimulus to all round development of the children.—we all forget those studies which we do not pursue with pleasure. And broadcasting can meet one of the greatest defects of our educational system. Speech, though broadcast, gives a much closer contact than the written word, and its message can be more up to date.

Special Discussions Broadcast.

Lately the B.B.C. has extended its service to provide talks specially prepared for groups of Adult Students. We all admit in theory that we should not stop learning the moment we leave school, and we know that there is nothing like discussion to show us whether we understand a subject or not. The B.B.C. is merely providing important subjects for discussion, together with sound guidance by experts. If we can find the right experts who will avoid pedantry, we can do much to build up a prosperous A1 race. Is it not worth a little trial and error?

SHORT-WAVE HINTS

WHAT are the two greatest bugbears of short-wavers from the point of view of a complete novice who owns nothing other than a simple broadcast receiver? I should say, at once, "threshold howl" and hand-capacity effects.

A few years back it used to be a great



One of the waiting-rooms specially reserved for artistes at a famous American broadcasting station. A loud speaker supplies entertainment from the particular items that are being broadcast.

trouble to make a set oscillate below 75 metres. I remember absolutely idolising a friend who made his "standard receiver" go down to 70 metres. Whether it is the undoubted all-round improvement in components that is the secret of success to-day I cannot say, but my early short-wavers were quite sensible sets, and yet one would probably consider them the last word in inefficiency were they to be raked out of the past and put on the table once more.—N.K.

PRACTICAL POINTERS

BECAUSE your grid-bias battery will last a long time do not imagine it will last for ever. Six months is about the limit for the useful life of these.

If you get bad results from a good loud speaker either your set or the batteries may be at fault. The better the speaker the more clearly the fault shows.

If you make your set whistle or howl when you are tuning in, you are using too much reaction, and causing interference with your neighbours.

A good rough-and-ready method of testing whether noises are due to atmospheric or to the receiver, is to disconnect the aerial, when, if they continue, it may be assumed they are not "atmospheric" but trouble due in some way to the set.

It is better not to fidget with your set in the way of adjusting H.T. plugs, etc., if you live in a crowded wireless neighbourhood, because such adjustments give rise to clicks in your neighbours' receivers, when aerials are very close.

Curing Crackling.

A common cause of crackling sounds is one or more broken strands of wire in the aerial.

Whistling and howling noises may be due to bad spacing between components, or to parallel wires running too close together.

If you have an earthing switch or a lightning arrester, do not forget that this should be protected from the weather as far as possible, and may need an occasional overhaul.

Flat tuning is sometimes caused by a leak across an ebonite panel or other insulating material.

A single faulty cell in an H.T. battery may give rise to loud cracklings like that produced by a defective joint.

When testing the voltage of an H.T. battery, remember that the voltmeter should be connected when the battery is "on load," i.e. when it is supplying current to the set in the ordinary way.

Coupling Condensers.

Only mica condensers should be used for coupling between valve stages, as the slightest imperfection in the insulation will result in distortion.

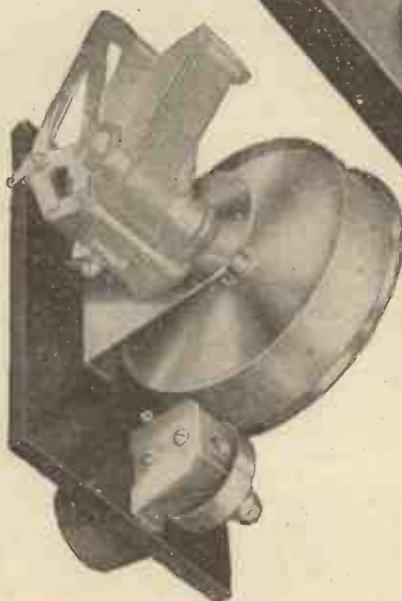
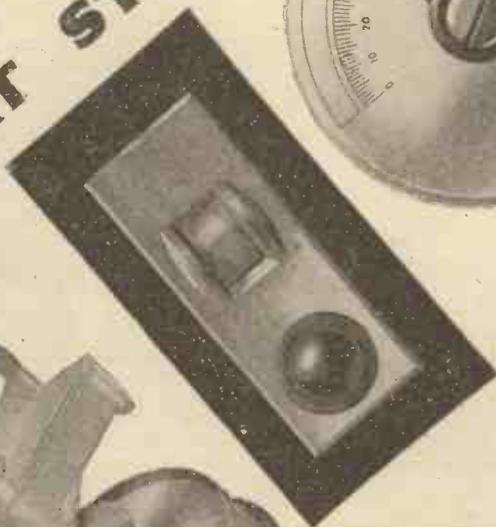
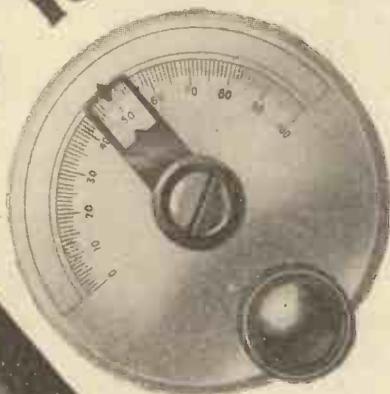
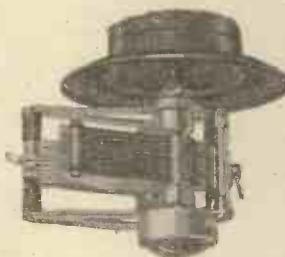
When a valve "picks up" or chokes, and can be cleared by tapping the grid socket with a damp finger, you may be pretty sure that there is a break in the grid return leads to the filament.

Strong and apparently unaccountable oscillation is sometimes due to the use of an inefficient H.F. choke.

NEW PRECISION INSTRUMENTS BY



AT STAND 105 OLYMPIA



THE new range of J.B. Precision instruments now being shown at the National Radio Exhibition enhance still further the reputation of this famous firm. Every Radio man looks keenly at any new J.B. product, knowing that here is something really good. If anything, J.B. have this season surpassed themselves in the excellence of their new lines.

Reading from left to right on this page, the instruments illustrated are, firstly, the new J.B. Vernier Drum Dial. This is an exceedingly attractive job, which marks a terrific advance in the design of this type of instrument. For example, the dial protrudes through the panel, thus obviating the necessity for illumination as the scale can be read easily. Patents are pending for this arrangement. The dial is entirely insulated from the condenser.

Space forbids the mention of other numerous advantages, but briefly the J.B. Vernier Drum Dial is a wonderful engineering job and well up to the J.B. standard. The cost, exclusive of condensers, is 10/6.

The next illustration is that of the attractive Panel Plate in bronze finish which is supplied with the Drum Dial, and which gives a most artistic and refined appearance to the panel of a receiver.

Next is the new J.B. Vernier Dial, the most attractive and efficient of its class.

The new J.B. Vernier Dial is the only dial which is completely insulated.

This is an amazing advance over all older models. The illustration shows clearly what an added attraction the J.B. Vernier Dial is to any receiver. The price is only 5/6.

Then there is the new J.B. Slow Motion Model as shown. Radio fans need no reminding of the wonderful results yielded by J.B. S.L.F. and Log. condensers. Further additions and refinements take these famous instruments even further ahead.

Lastly comes the new J.B. Midget Condenser, the smallest and best yet designed. Low minimum capacity is ensured by specially shaped vanes and the elimination of end plates. The J.B. Midget occupies less panel space than any other of its kind.

If you are not at Olympia, write to us for fuller details of these new lines, enclosing your dealer's name and address.

JACKSON BROS
8, POLAND ST - OXFORD ST
LONDON - W.1. *Telephones*
SERRARD 7414

FROM THE TECHNICAL EDITOR'S NOTE BOOK



THE W.B. VALVE HOLDER.

IN the rush of new sets, components and accessories with which one is faced at this time of year it is as well that we are, now and then, reminded of our old and well-tried friends. Instance, "W.B." valve holders, products of Whiteley, Boncham and Co., Ltd., of Mansfield, Notts. A number of these recently passed through my laboratory on their way to the Construction Department, and I detached one from the box-full and spent a few minutes examining it.

It has no frills, but is a sound, well designed piece of gear evidently built for



The W.B. Antiphonic Valve Holder.

service. Its springing is excellent. Turning up a recent W.B. advertisement I found that the price of the device is 1s. 9d., with terminals, and 1s. 6d. with soldering tags only. I'd have the terminals, personally, and even at that figure the holder is undoubtedly as good value as one could discover in a warehouse of varied makes and kinds of radio accessories.

PRICE REDUCTIONS.

Readers will no doubt remember the Philips H.T. units types 3002 and 3003, with which I dealt some two or three months ago. The prices of these have been reduced from £8 10s. to £7, and £10 10s. to £8 15s. respectively.

FORMO VARIABLE CONDENSERS.

It is not so very long ago that one remembers roughly classifying variable condensers by "end plates." One having end plates of metal was reckoned to be something of a modern aristocrat. Eventually, ebonite end plates practically disappeared, and are now for the most part only to be found in very cheap, obscure varieties.

But the new Formo De Luxe Model Log Condenser strikes an even newer note in that it has no end plates at all. There is no real novelty in having stout brackets instead, but in the case of Formo these are of ebonite, and they constitute the only solid dielectric in the device.

These brackets are held together by a stout brass bar, on which are the terminals.

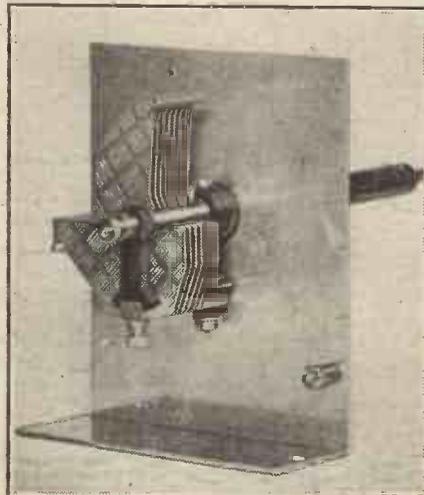
and this carries the fixed vanes. The completely original feature of this new Formo product is that its "pig-tail" passes through the centre of the spindle and is completely concealed. It cannot in any way hinder the action of the condenser, and its method of fixing makes both for permanence and neatness; indeed, the whole component is a very neat product, and it bears a stamp of careful design.

The vanes are sealed together at their extremities. A definite stop limits the travel of the moving set and completely eliminates the possibility of shorting occurring. A friction brake, operated by a single screw, enables the movement to be adjusted to an operator's individual liking, and, whether he has a fairly free action or introduces moderate resistance, the control retains its smoothness.

I did not happen to notice the price until I had closely examined the component, and I must say I was surprised to see that it was only 6s. for any of the four available capacities between .00015 and .0005.

A special short-wave assembly is obtainable. This incorporates a similar model of .00015 capacity, fitted with a metal screen, and an ebonite extension tube. The screen and variable stand back some 4 in. from the panel, and even in the most lively circuit satisfactorily deals with the hand-capacity problem.

This interesting piece of gear should be of interest to short-wave enthusiasts, more especially in that it only costs 10s. 6d. minus dial. Messrs. Arthur Preen & Co., Ltd., have certainly moved forward with the times from the day of their corrugated vane variable condenser, good though this was for its period.



The special short-wave Formo assembly mentioned above.

MULLARD P.M. LOUD SPEAKER.

The Mullard P.M. loud speaker is no new component, but it is only recently that I have had the opportunity of testing one.

The first point that struck me after a first examination was, how badly the accessory photographed. You cannot judge the Mullard loud speaker's actual appearance by the pictures of it which have been published. It is a very striking case of how valuable it would be if stereoscopic views could be printed. I had gathered the impression—probably many others have done so too—that the Mullard loud speaker was a flat, negative, rather ugly disc assembly. Looking at the actual instrument, which stands before me as

Traders and manufacturers are invited to submit radio sets, components and accessories to the "P.W." Technical Department for test. All tests are carried out, with strict impartiality, under the personal supervision of the Technical Editor, and readers are asked to note that this weekly feature is intended as a reliable and unbiased guide as to what to buy and what to avoid.

I write, I find that in reality this is far from the case. It is certainly unusual in appearance—indeed, distinctly individual—but I find it attractive. It has a sleek, glossy, businesslike air about it, which leads one confidently to anticipate operational effectiveness and realism of reproduction.



This is one of the best photographs we have seen of the Mullard Loud Speaker altho' even this fails to do justice to the instrument.

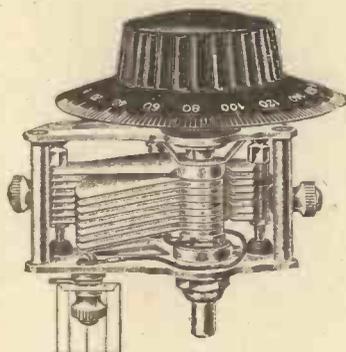
It is not adjustable, and far from this being a fault, I consider it a point in its favour. A speaker that is sensitive and yet can stand considerable inputs without distress and without reference to an adjustment device, appeals to me.

It is a pity I cannot provide views of the interior of the Mullard speaker, for it is most interesting in design.

On test the P.M. speaker gave excellent results. Its projection is most efficient, and the reproduction is clean, crisp and bright, free from audible resonance peaks and coloration. It is certainly a first-class instrument.

Readers interested in loud speakers should persuade their local radio dealers to enable them to examine and hear "P.M.'s" in operation.

ORMOND SMALL LOGARITHMIC CONDENSER



TO meet the demand for a smaller type of Condenser designed to the best modern practice for use where space is very limited, we have produced a small Logarithmic model of extremely high efficiency with such value that law will be correct under average conditions in a similar manner to our larger standard model.

The Condenser may be adapted for "One hole fixing," Baseboard mounting, or "Along panel mounting" for drum control.

An extension of main spindle is provided at the rear end, in order that these models may be "ganged" quite simply.

Complete with 3 in. Knob and Dial.

PRICE :

'0005	::	::	::	8/-	'00035	::	::	::	7/9
'00025	::	::	::	7/6	'00013	::	::	::	7/6

This condenser may be obtained with a modified type of our Friction Control, slow motion movement, with direct drive, but this model will not be suitable for "ganging" purposes. Complete with 3 in. knob and Dial with small knob.

PRICE :

'0005	::	::	::	12/-	'00035	::	::	::	11/9
'00025	::	::	::	11/6	'00013	::	::	::	11/6



The ORMOND ENGINEERING COMPANY, LIMITED
199-205, PENTONVILLE ROAD, KING'S CROSS, LONDON, N.1.

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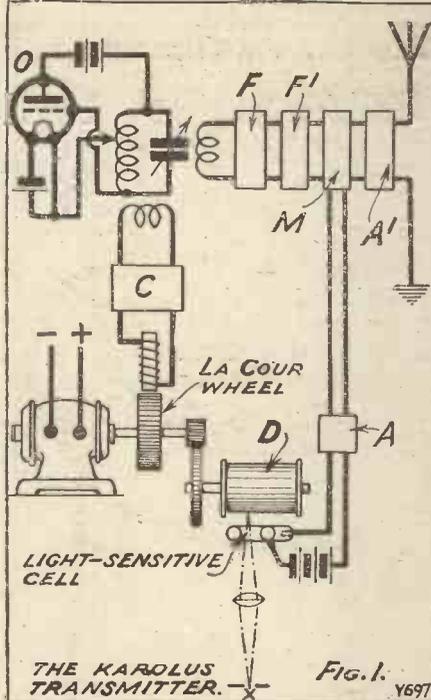
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"Phonos House," 2 & 4, Bucknall Street, New Oxford Street, London, W.C.1.

THE latest claim to a successful solution of the television problem comes from Professor August Karolus, of the Leipzig University. According to the "Vossische Zeitung," "We shall soon have in the house, alongside the radio receiver, a tele-photographic receiver which will throw the actual scenes of an opera upon a viewing-screen, simultaneously with the reproduction of song and music through the loud speaker."

According to an eye-witness of a recent demonstration given in Germany, although the Karolus apparatus was running short of full power and transmitting only eight pictures containing eight thousand light



points each second, the illusion of movement was absolute, "though indeed somewhat angular and jerky, as in the case of a slowly running kinema film." The witness adds that the pictures as a whole were clear and recognisable, the face of each separate actor being easy to identify.

It is stated that when running at full power the apparatus is capable of reproducing twelve complete pictures per second, instead of eight, with a corresponding improvement in definition and an entire absence of flicker. The price of the complete receiver is estimated at something between £50 and £75.

Free From Lag.

An essential factor to the success of the new system is the so-called Karolus cell, which, unlike selenium and other light-sensitive devices, is stated to be entirely free from "lag" or inertia effect. The action of the Karolus cell is based upon a discovery made in 1875 by Professor Kerr, and is related to a somewhat similar action previously observed by Faraday.

When a ray of light is passed through a Nicol prism, all the vibrations are orientated into one plane, so that the light is said to be polarised. By arranging a second Nicol prism behind the first it is possible to entirely block the passage of the polarised light-ray, when the second prism is set at

THE KAROLUS TELEVISION SYSTEM

Full details of the scheme which is claimed to be a successful solution of the television problem.

By J. C. JEVONS.

right angles to the first; or to pass the full ray when the second prism is set coincidentally with the first; or to vary the intensity of the light passing through the two sets of prisms to any required degree by suitably rotating the second Nicol.

Professor Kerr discovered that if a carbon-disulphide cell was interposed between the two sets of Nicols, initially arranged so as to cut off all light, then the carbon-disulphide cell under the action of a varying electrostatic force would itself act to rotate the plane of polarisation of the ray, and so control the intensity of the ray emerging from the second prism.

How It Is Done.

Professor Karolus utilises this effect in his optically-sensitive cell or "light valve." The incoming wireless signals, after amplification, are applied to the two electrodes of a cell containing nitro-benzol (the action of which is similar to that of carbon disulphide). In this way they set up either an electromagnetic or electrostatic stress across the cell, which, in turn, allows light from an arc lamp or other source to pass through the cell on to the viewing screen in strict proportion to the strength or intensity of the received signals.

The general scheme of the Karolus system of picture transmission and reception is illustrated in the accompanying diagrams, of which Fig. 1 shows the transmission end and Fig. 2 the receiving circuits.

A thermionic oscillator valve O (Fig. 1) generates a fundamental frequency which is applied directly through an amplifier C to control a synchronous motor, such as a La Cour wheel, driving the picture transmitting drum D. The fundamental frequency may be of the order of 1,500 cycles per second.

The same frequency is simultaneously supplied to frequency transformers F, F₁, which select the higher harmonics and so produce a carrier-wave of, say, 150,000 cycles, or 2,000 metres wavelength.

This carrier-wave is then modulated at M with the low-frequency or light-and-shade components derived from the drum D through the light-sensitive cell shown and an amplifier A. The modulated wave is next passed through amplifier A₁, and is finally radiated from the transmitting aerial.

At the receiving end (Fig. 2), a thermionic generator O₁ produces oscillations of slightly different frequency to the generator O at the transmitter. This is supplied directly through the amplifier C₁ to control the speed of a La Cour wheel similar to that shown in Fig. 1.

In order to secure an exact synchronism the following arrangement is used: The incoming signal waves at 150,000 cycles are amplified at RA and applied directly to a rectifying valve V. Simultaneously, the oscillations from the generator O₁ are stepped up one-hundredfold by the frequency transformers F₂, F₃, and in this form are also applied through a coupling coil T to the grid of the rectifier V.

The incoming signal frequency being slightly different to the local frequency derived from the generator O₁, the rectifying valve will detect the resultant "beat" frequency, which is then applied to a light-cell LS, causing the latter to glow intermittently and so illuminate a definite mark or line on a disc S rotating with the motor.

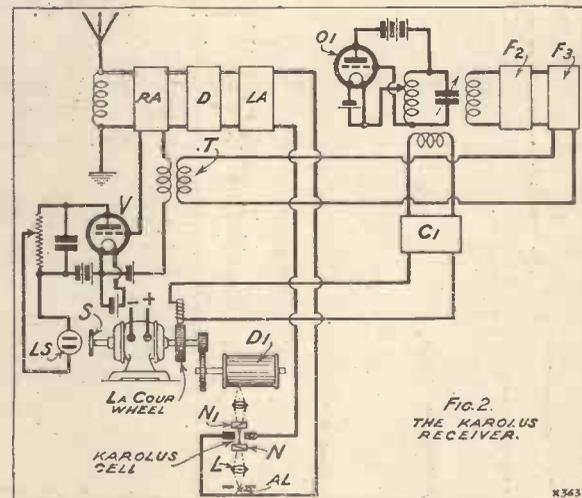
Keeping the Receiver in Step.

This forms a stroboscopic control device. So long as the mark on the disc S appears to remain stationary, the motor is running in exact synchronism. If the mark appears to move or gradually rotate, the tuning of the generator valve O₁ must be adjusted by hand until the stroboscopic indicator remains absolutely at rest.

Meanwhile, the received signals are rectified at D, and amplified by a low-frequency amplifier LA. The rectified currents from the latter are then applied across the two electrodes of a Karolus cell, as described in the opening paragraphs.

Light from an arc lamp AL is focused on to the cell through a lens L. Before reaching the cell, however, the light is first polarised by a Nicol prism N. It then passes through the Karolus cell containing nitro-benzene, and afterwards through a second Nicol N₁ and a lens, on to the recording-drum or viewing-screen D₁.

So long as no signals are being received, the second Nicol N₁ blocks out all light



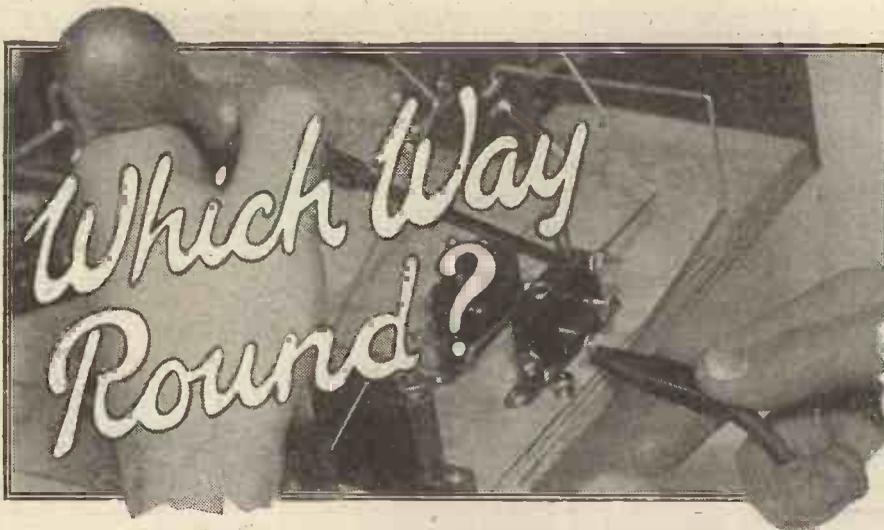
from the arc lamp AL, and nothing gets through on to the recorder D₁. However, the electrostatic field set up by the received signals amplified at LA causes the nitro-benzene in the Karolus cell to rotate the plane of polarisation of the incident light-ray, to an extent which is proportional to the strength of the incoming signals. In this way light-rays, corresponding to the light-and-shade effects at the transmitting end, are allowed by the Karolus cell to pass through from the lamp AL and to record the transmitted picture on the drum D₁.

THE GREAT ESTABLISHED



**RADIO'S
BIGGEST
SENSATION**

**COMING NEXT
WEEK**



A short article concerning correct coil connections.
By A. S. CLARK.

"If the set does not oscillate, try reversing the reaction coil." This advice was all very well in days when swinging coils and flexible wires were employed, but not so nowadays.

Considerable confusion seems to exist as to the correct way of arranging and connecting coil mounts when two or more plug-in coils are to be coupled. An endeavour is therefore made in the following

two plug-in coils together so that their fields assist one another and they become, in effect, the same as one solenoid coil, they must be connected as in Fig. 2. It will be seen that a wire is taken across from one side of one of the mounts to the opposite side of the other. The connections remain the same whatever the positions of the pins and sockets.

A Practical Example.

To come, now, to a practical example which is likely to occur quite frequently. Suppose you have a theoretical circuit in front of you such as that shown in Fig. 3, and you desire to wire it up with plug-in coils. The necessary connections to the coil mounts are shown at the side, and we will follow out how they are arrived at. First of all you will see that three coils will be required, one for the aerial and two for the other coil since the filament tap cannot be made on to an ordinary plug-in coil.

The three mounts are placed side by side in a row, and no heed need be paid to the positions of the pins and sockets. However, if desired, they may all be arranged the same way as shown in the diagram for the sake of a neat appearance.

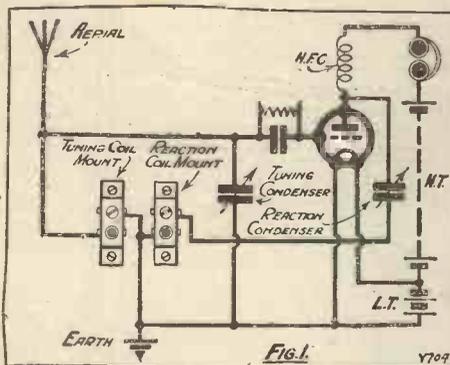
One side of the L_1 coil mount is connected to the aerial and the other to earth. The next mount is to take the tuned part of L_2 . It does not matter which way round this coil is in relation to the aerial coil since both are dealing with alternating current, and the two together merely act as an H.F. transformer. Either side of the second socket, therefore, is joined to earth, according to which suits the lay-

out better. Now, since the 2nd and 3rd coils are to act really as a single coil with a filament tap (which is joined to earth), the side of the second mount, which is connected to earth, must also go to the opposite side of the 3rd coil mount. The reason for this has already been explained. The remaining two connections, to the grid condenser and reaction condenser are obvious.

Right First Time.

In some circuits the reaction condenser is arranged so that its moving vanes are at earth potential. In this case the direction of the connections will remain the same, but two slight differences must be made. The reaction condenser has to be connected between the 2nd and 3rd sockets instead of these being joined direct, and the side of the 3rd mount which went to the reaction condenser will now go to the plate of the detector valve.

The winding of an ordinary plug-in coil cannot be considered as that of a solenoid coil, since the layers are wound back over one another. Neither can it be considered as a flat basket coil since this is really only one turn thick. It is, therefore, best to consider it as a hank coil, and if you imagine, say, a 6-turn coil of this type, you will appreciate why it is immaterial which way round the coil itself is placed.



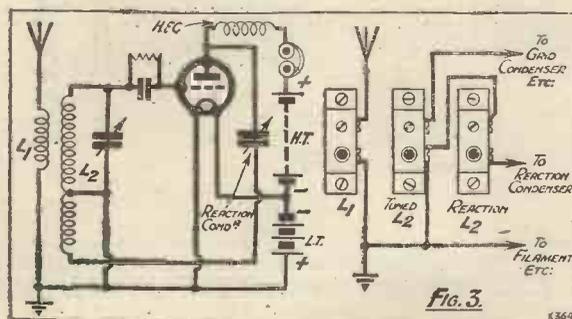
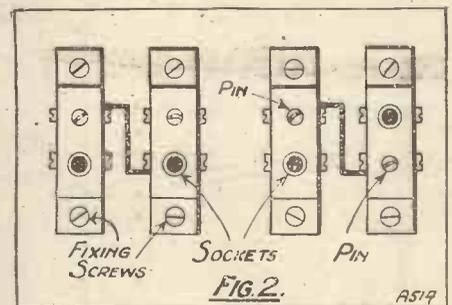
short article, to show in a clear and simple manner, the chief points to remember when wiring up coil mounts.

A Popular Fallacy.

Contrary to the ideas of many, it does not matter which way round the mounts are placed as regards their pins and sockets. This can easily be demonstrated in the following manner. Connect up a single-valve set as shown in Fig. 1, with the coil mounts in the positions shown. It will be found that reaction effects are obtained.

Now disconnect the reaction coil mount, turn it round and connect up again. It will still be possible to obtain reaction effects. What we have actually done is to reverse the reaction twice, once by turning the coil round and once by reversing the connections. It will now be appreciated that the thing to which to pay attention is the way the actual connections are taken to the mounts.

If it is desired to connect



If you work on the lines indicated you will have no difficulty in getting your reaction coil the right way round first time. Thus, you will avoid the undesirable practice of finding the correct connections by trial. Just one warning before concluding, do not forget that sometimes different makes of coils are connected in opposite directions.

AERIALS AND EARTHS

IT is quite wrong to suppose any sort of wire will do for an aerial, and although iron or steel wire may give results, high conductivity wire is really essential to efficiency.

The earth should always be as short as possible and of thickish wire (certainly not less thick than the aerial wire).

If a waterpipe earth is used, try and make your earth connection to the "rising" main, and be sure that all paint is scraped off the pipe where the joint is to be made.

It is true that aerial or earth wire twisted together may serve temporarily quite well, but there is no more certain cause of poor reception than such a joint.

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CONDENSERS



Type C.1.
PRICE
5/6

FOR HIGH TENSION SUPPLY UNITS



Type C.2.
PRICE
3/6

Condensers that were good enough for conditions a year or two ago, when 120 volts, or less, from a dry battery was the maximum H.T. in general use, are not good enough for modern requirements. For use in H.T. Supply Units, and Receivers operated by such Units, Condensers capable of withstanding at least 2x the Mains voltage are essential, if safety and satisfaction are to be assured. Inferior condensers bought to-day will have to be scrapped as conditions change, whereas a good condenser is a sound investment for all time.

FERRANTI Condensers are specially designed for H.T. Supp'y Units and Mains work; are tested at 1000 volts Alternating Current; and can be relied upon.

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SHORT-WAVER MAINS UNITS

Some valuable hints derived from practical experimental work.

By G. P. KENDALL, B.Sc.

THOSE of us who have discovered the great convenience of working our sets from mains H.T. units will naturally be anxious to secure the same benefits in our short-wave work during the coming season, but there are so many alarming rumours about as to the difficulties likely to be met with in so doing, that we may well hesitate to make a start.

In hopes of being able to help readers in this situation, I have carried out a series of tests with a typical short-waver of the usual "det. and L.F." variety, and some conventional "eliminator" circuits. Some very interesting facts came to light in the course of these experiments and much useful information was gained, which it is hoped will enable anyone to hitch his short-waver to a mains unit and get it going properly with very little trouble. Space will not permit me to go into details here of the actual experiments which I carried out, and I must confine myself rather to the practical conclusions reached.

Hum on Short Waves.

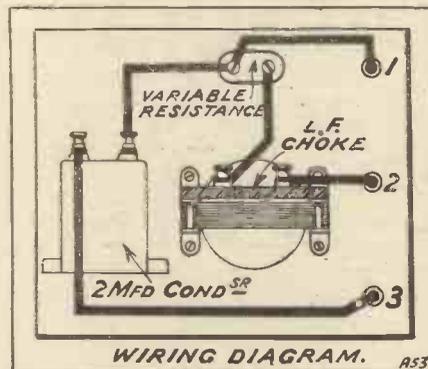
First and foremost, it must be realised that mains units are far more prone to produce a hum in short-wave reception than in work on the broadcast waves. A unit which contains ample "smoothing" for ordinary purposes may start an unbearable hum in some short-wavers, especially if the reaction control is not particularly smooth in any case. What happens is usually that the set is quiet enough when not oscillating, but directly it oscillates a bad hum starts which may be particularly troublesome when the set is brought to its most sensitive state on the verge of oscillation and a carrier wave is tuned in.

Again, it is absolutely essential for successful short-wave work to get a perfectly

smooth adjustment of reaction, and this usually means a careful adjustment of the H.T. on the detector valve, often at quite a low value, perhaps only 30 volts or thereabouts.

Separate Detector Tap Essential.

Evidently, then, we can now lay down our first general rule for successful mains work on short waves: it is absolutely necessary to have a separate positive tapping on the H.T. unit to feed the detector valve, and this *must* be continuously variable down to quite a low voltage: variations in steps, such as we get with a

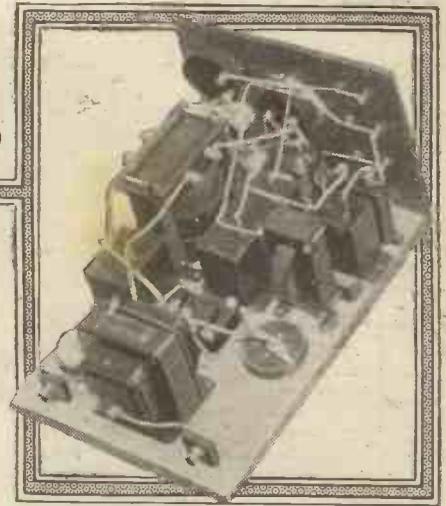


The smoothing unit described in the accompanying article.

tapped "potential divider," are rarely good enough. If the unit is not provided with such a tapping we must arrange one, by a method to be described shortly.

Now, as to hum. My experiments show that practically the whole of the trouble lies in the detector stage, and if we pay a little attention to the supply to this valve we shall solve the problem immediately. Of course, you may be lucky enough to possess a unit which has the necessary special variable tap and is so well smoothed that it will work properly right away, so it is best to try out any unit you have and find out whether there is going to be any trouble. If there is, then carry on as the following notes suggest.

The expedient which I strongly advise is to make up a little separate smoothing and voltage adjusting unit which can be inserted in series in the lead to the H.T. terminal on the set for the detector valve. For this, you will require a small wooden case with an ebonite panel for a lid, three terminals (preferably



of the insulated type), a 2-mfd. condenser, an L.F. choke of any inductance between 50 and 150 henries (the secondary of an L.F. transformer will do, since only quite a small current will be passed), and a variable high resistance with a maximum value of not less than 200,000 ohms, preferably 500,000 ohms. (A suitable one can be chosen from the "Bradley-ohm" or "Clarostat" ranges.)

Nothing Complicated Here!

Wire these up as the sketch shows, and connect it up with terminal 1 to the H.T. terminal on the set for the detector valve, terminal 2 to one of the positive tappings on the H.T. unit, and terminal 3 to negative on the H.T. unit, and I think that when you have adjusted the variable resistance you will find yourself well on the road to success.

One or two miscellaneous tips to conclude: first, remember that it is asking for trouble to put the mains unit too near to the set itself, or to the aerial or earth leads. To do so is very likely to produce a hum which no faking about will remove, so don't yield to the temptation to stand the mains unit on top of the set cabinet!

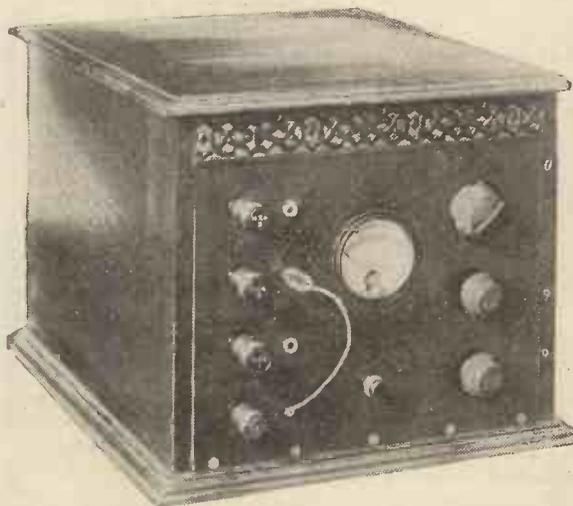
A rather curious phenomenon which I have observed is that even when all due precautions have been taken a hum may still appear on certain wave-lengths, usually fairly short ones below 45 metres. For example, on the set I have just been using a hum is heard over all waves between 18 and 25 metres, so spoiling the reception of 2 X AD (Schenectady, New York) on 21.9 metres.

Surprising!

Since this also appeared to be a bit of a "flat spot" on the aerial tuning, requiring a great deal of reaction to make the set oscillate, it occurred to me to try one of the usual flat spot remedies. Result, complete disappearance of the hum!

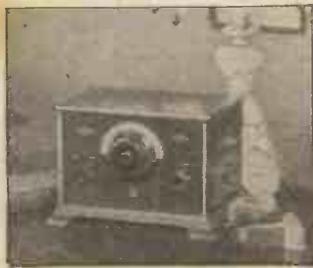
The simple cure, then, is to connect an ordinary neutralising condenser (or other very small variable) in series in the aerial lead to the set, and try this at various settings until the hum is removed, reaction control usually returning to normal at the same time.

A final point: I have not specified either A.C. or D.C. mains in the preceding notes, for the simple reason that all the points raised apply to both types.



One of the A.C. mains units with which the author carried out many useful and interesting experiments with short-wave receivers. The unit is of perfectly normal design.

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Two Special Valves. **£1:15:6**

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"LOG MINOR."

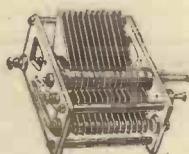
A miniature of the "Log Major" with spindle 3/16" diameter.

List No.	Mfd.	Length Behind Panel.
334.	0003	2 1/2" 7/8"
335.	004	3 7/16" 8 5/8"
336.	005	4" 9 5/8"

Supplied with ebony dielectric for portable sets.

List No.	Mfd.	Length Behind Panel.
338.	0005	1 1/2"

Made in any size for set makers.



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A new full-size logarithmic condenser with cast steel spindle 1" diameter on cone type ball bearings. One piece, pig-tail.

List No.	Mfd.	Length Behind Panel.
330.	00025	2 9/16" 12 1/2"
331.	0003	2 1/2" 12 6"
332.	00035	3" 13 1/2"
333.	0005	3 1/2" 13 3/4"

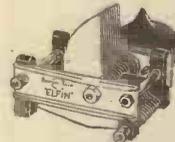
End Plate, 3 1/2 x 1 1/2".
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List No.	Mfd.	Length Behind Panel.
334.	0003	11 1/2" 16 1/2"
335.	0004	11 5/8" 17 1/2"
336.	0005	12" 18 1/2"



ELFIN CONDENSER.

The smallest logarithmic condenser made. A precision instrument especially suited for sets where space is at a premium.

List No.	Mfd.	Length Behind Panel.
311.	0001	5/8" 6 5/8"
312.	00015	6 1/2"
313.	0002	6 3/4"
314.	00025	6 6/8"

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RADIOTORIAL

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QUESTIONS AND ANSWERS.

THE USE OF A HYDROMETER.

S. M. (Acton, London, W.)—"How is the voltage of an accumulator tested by a hydrometer?"

It is not!
The voltage of an accumulator is tested by a voltmeter. The hydrometer, although it is an instrument for testing an accumulator, does not measure the voltage of the accumulator at all. The use of the hydrometer is simply the measurement of the "density" or "strength" of the accumulator's acid. The condition of the acid

(or, to give it its proper name, the electrolyte) alters according to the condition of the accumulator in very much the same way as the voltage rises when the accumulator is "fresh," and falls when it is discharged.

As testing the voltage across the terminals will indicate whether the cell is fully charged or is run down, so will the strength of the acid indicate whether it has been charged recently or whether it is in need of recharging. When an accumulator which is in ordinary good condition has been recently recharged, the "density," or, again, to give a right name, the "specific gravity" of the acid is 1.2.

After the battery has been in use and is run down (with its voltage down to about 1.85) the specific gravity will be down to 1.17. The fall in the specific gravity from 1.2 to 1.17 is a gradual one, which keeps pace exactly with the condition of the accumulator.

With the hydrometer test we merely find out how much lower than normal is the density of the liquid in the cell. In fact, the hydrometer tests the electro-

lyte of each cell (thus giving a reliable indication of the condition of the cell), but it is in no way concerned with the voltage.

HOW LONG SHOULD AN ACCUMULATOR'S CHARGE LAST?

G. R. E. (Bordon, Hants).—"I am enclosing full particulars of the valves I propose to use in my four-valve set, and I should like to know what sort of an accumulator I should have to get in order to last this set for a fortnight without recharging. I particularly do not wish to change the accumulator except once every fortnight, so what I want is one large enough to supply current to this set without running down for fourteen days.

"I know that this will depend partly on how much the set is used, and I should like you to allow for an average period of four hours every day, including Sundays.

"Although some days it might be used a little more than four hours, on others it might be correspondingly less, and I think this is a good average to allow if you can work out from that what kind of battery I require."

To cover your requirements you should possess an accumulator having a rated capacity of 30 actual ampere hours. This is not a very large accumulator, but it should be quite sufficient for your purpose, as the valves you propose to use require only a small amount of current.

As a matter of interest the method of finding out which size accumulator is required is given in detail below. The first thing to ascertain is the total consumption of the set.

A glance at the maker's figures shows the filament current of each valve, and these must be added together in order to get the total current consumption. In the case of the valves specified by you, the H.F. valve has a filament current of 1 ampere, the detector valve has a current of 1 ampere, the first L.F. valve has 1 ampere, and the power valve has a current of 15 ampere.

As stated, these must be added together and the total current consumption of the set will then be found to be 45 ampere. The ability of an accumulator to supply current is reckoned in ampere hours. By adding up the current consumption, of each

(Continued on page 182.)

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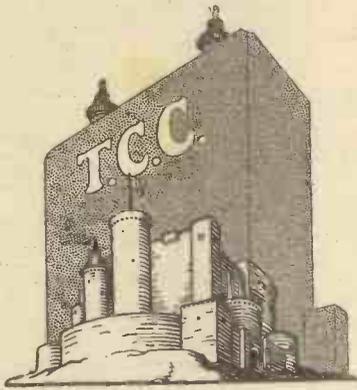
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THE letters "T.C.C." on a condenser are a hall-mark. For nearly a quarter of a century "T.C.C." has been synonymous with accuracy, durability and dependability.

"T.C.C." Condensers are guaranteed. Everyone is individually tested before leaving the factory. You have never known a faulty "T.C.C." because such cannot pass the test-bench.

Look for "T.C.C." on the next condenser you buy. It is your safeguard.

Specified for the Cossor "Melody Maker"



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Extract from letter 1/8/28.

"I should like to express my high appreciation of your Batteries, especially with regard to their long life. Your Batteries are so unlike others I have had. They are good till they are done and give very little warning. Other makes I have had have crackled for weeks."

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SIEMENS BROTHERS & CO., LTD., WOOLWICH, S.E.13.

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 180.)

valve in the set, you have found out the number of amperes—i.e. '45. The next thing to find out is the number of hours. In your case, if the set is to be used for four hours per day for a fortnight, you can reckon the total number of hours for each two weeks will be about sixty.

If this figure (sixty) is multiplied by the figure of the total amperes taken by the set—i.e. '45—you will get the required number of ampere hours.

Multiplication of 60 by '45 gives an answer of 27. This, then, is the number of ampere hours which you will take out every fortnight, and although there is not an accumulator which gives exactly 27 ampere hours, there is a size "30 actual ampere hours" made by practically every accumulator manufacturer.

As it is advisable to always have a little in hand, this is the size of accumulator you require, and if you instal a "30 actual" accumulator and work it as stated with the valves mentioned you will find that it will keep the filament current supply up properly for the whole period, and then will require recharging.

Be sure, however, to note that you purchase an accumulator rated at 30 actual ampere-hours, as the 30 "ignition" rating has a capacity of only about half this figure, and, consequently, would only last your set about a week.

CONDENSER CONSTRUCTION.

P. F. R. (Exeter).—"Why is it that whereas the old-fashioned condensers were really sound, solid jobs, heavily built, the new ones seem to be designed with the idea of saving metal, and are of skeleton form? What is the reason for this?"

Of recent years, and especially in connection with short-wave reception, the variable condenser has been found to give rise to certain losses, and it has been proved that unnecessary metal in the vicinity of the active area of its plates gives rise to very much the same effect as shielding when placed too close to a tuning coil. That is to say, unnecessary metal exercises a damping effect, and it is for this reason that the light skeleton method of strength without unnecessary substance has been employed instead of the more robust construction favoured a few years ago.

SWITCHING OUT AN R.C. VALVE.

D. G. F. (Cheltenham).—"Is it possible, by means of a double-pole switch, to cut out an unwanted stage of R.C. at the same time altering the grid bias suitably? The set will

It is not possible to do all that you require by means of a double-pole double-throw switch, but this can be accomplished by a triple-pole double-throw switch. This has three centre contacts, and will throw over either in an "up" or "down" position.

If you mark the down position "Three L.F." and the "Up" position "2 L.F.," the connections for this switch will be as follows:

The left-hand centre switch-arm on the switch carries the + filament lead of the valve which it is desired to switch out or in. When in the three-valve position, this switch-arm connects with one of the outer studs of the switch, so that this contact must be taken to the resistor for this 2nd L.F. valve, the other side of this resistor going to the L.T. plus in the ordinary way.

When in the two-valve position, this same (left) arm of the switch will be connected with the opposite stud of the switch which can be left unconnected so as to break the filament circuit.

The centre arm of the switch should carry the G.B. lead from the R.C.C. unit (which is inserted in the plate of the first amplifying valve)—i.e. the lead from the terminal marked "G.B. negative."

Each of the switch studs to which this centre pole will be thrown and will make connection should be provided with a flexible lead going to the grid-bias battery; in the case of the three-valve position, the flexible lead can be plugged in at the negative grid bias appropriate to the second L.F. amplifying valve which will then be in circuit.

In the case of the "two-valve" position of the switch, the stud which makes contact with the centre arm of the switch should be joined to the appropriate flexible lead which should go to the maximum grid bias necessary for the operation of the output stage.

The third lever on the switch varies the connection to the grids of the two output valves which are joined in parallel, so the connection from these two grids is taken to the centre contact of the remaining pole of the switch. When in the "three-valve" position, this must make contact with the stud which should be connected to the junction between the grid leak of the power valve stage and the coupling condenser which separates this from its anode resistance.

Finally, when the switch is thrown over to the two-valve position, this centre contact will make connection to that contact, which should be joined to the grid socket of the second amplifying valve (which is already joined to the terminal marked G on that R.C.C. unit that is placed in the plate circuit of the first amplifying valve).

(Continued on page 184.)

"P.W." TECHNICAL QUERY DEPARTMENT

Is your Set "Going Good"?

Perhaps some mysterious noise has appeared and is spoiling your radio reception?—Or one of the batteries seems to run down much faster than formerly?—Or you want a Blue Print?

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A postcard will do: On receipt of this an Application Form will be sent to you free and post free, immediately. This application will place you under no obligation whatever, but having the form you will know exactly what information we require to have before us in order to solve your problems.

have power valves in parallel as an output stage, and will be preceded by two L.F. amplifying stages, but I should like to be able to switch out one of these, if possible."

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Grid Leaks and
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R.C.C. Unit

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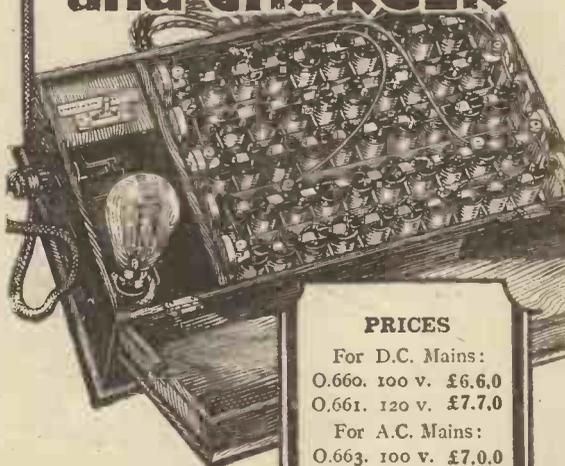
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Simple and trouble-free—combining the advantages of all H.T. supply systems with none of their disadvantages. As easy to install as a dry battery, and requires no technical knowledge. By means of a simple throw-over switch, automatic connection is made to the electric mains for charging, or to the set.

The "GEEKO" Unit needs charging about once a fortnight. You just switch on to the mains before retiring to bed, and the unit is ready for use again in the morning. The charger gives off no fumes, and remains perfectly cool. No sediment forms, and no attention required.

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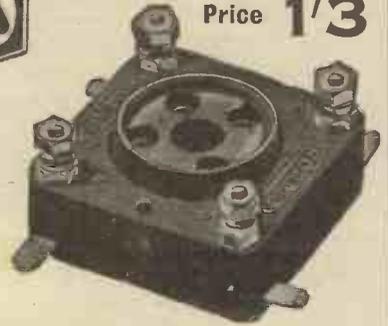
Running costs vary from 2/2 a year for a two-valve set to 6/- a year for a seven-valve set.
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**ANTI-MICROPHONIC
SHOCK ABSORBING**

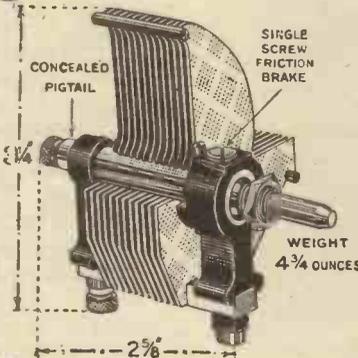
BAKELITE through-out, including BASE-PLATE. Practically DUSTPROOF.



Price 1/3

Price 1/3 each.

"DE LUXE" Model CONDENSER



This Condenser has an ingenious NOISELESS "PIG-TAIL" incorporated in a manner unobtainable in any other Condenser.

IN FOUR CAPACITIES.

Capacity.	PRICE
'0005	6/- EACH
'00035	
'00025	
'00015	

Send for full Catalogue and Booklet, "L.F. AMPLIFICATION," post free.

Ref.	Max.	to Min.	Price
A	'00003	'000003	2/-
B	'00025	'00003	2/-
C	'0005	'00015	2/-
D	'001	'0005	2/6
E	'002	'001	3/-

FORMO-DENSOR

FOR USE AS
Neutralising Condenser
Aerial Condenser
Grid Condenser
Reaction Condenser
Phasing Condenser
Tone Control Condenser, etc.



FROM
2/-

6-PIN TWO- RANGE TUNER

(Reinartz)

PRICE
10/6

Base 2/-



FROM HIGH TO
LOW WAVE WITH-
OUT CHANGE OF
COIL

A very neat and efficient Aerial Coupler with 6 pins in standard position, this can be used with any standard 6-pin base.

The change over from High to Low is effected by means of a push-pull switch on panel.

Visit **STAND 140, OLYMPIA, Sept. 22-29**

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 182.)

"TOO MUCH FOR MY MONEY."

N. S. (Swansea).—"I suppose really I want too much for my money, but the position is this.

"I can only afford a two-valve set, and consequently I want to listen-in as much as possible to as many stations as I can. I should like to use a loud speaker that I have on hand at present, so that it wants to be a fairly powerful set to work that, and I should also like to use my L.F. transformer, which is a good one.

"In addition I have a very big range of plug-in coils, so I should like the set to employ these; and in addition to valve holders, grid-bias battery, switches, etc., I have two variable condensers on hand which I should like to employ (.0005 and .0001 mfd.).

"Both these are in good condition, and what I should really like to do is to build a set which I can use on short and long waves as well. By short waves I not only mean the Swansea and ordinary broadcasting stations, but actually the very high-frequency stations, such as 2 X A D, the American, etc. In fact, I am afraid I want too much, but if you know of a set which is easy to switch over and control, and built into a neat little cabinet which is not too expensive, I should very much like to have details as to where it was described and where I can get particulars."

Evidently you have not been taking in your "P.W." regularly! (We don't want to rub it in, for we know only too well that money is scarce nowadays; but for the man who has not too much to spend, "P.W." is more of an investment than an expenditure, a foremost part of the policy of this journal being to provide high efficiency sets at low cost.)

Quite recently the Technical Editor arranged for the Research and Construction Department to design

Have YOU Been to the "P.W."

STANDS 135 and 166

at

OLYMPIA

?

If not make sure that you come along and have a chat with us about your radio troubles.

DON'T FORGET

—135 and 166—

a set of the very type you mention, in which ordinary plug-in coils can be used, and strong enough to tune in several stations on the loud speaker. Although an efficient set was required it was of paramount importance that it should be *inexpensive and easy to build.*

Not only were these qualities incorporated in the model eventually described in "P.W." but both on the long waves, ordinary waves, and the short waves, reception could be carried out and the change from long waves to ordinary wave broadcasting could be effected without coil changing, simply by means of a switch.

We advise you to get full particulars of this set before they are out of print, if possible. It was described in "P.W." No. 323, August 11th issue, under the title of "The Tune-Easy Two."

Back numbers of "P.W." when not obtainable locally, can be ordered from The Amalgamated Press, Ltd., Back Number Dept., Bear Alley, Farringdon Street, London, E.C.4. The price is 4d. per copy, post free.

BACK-CHAT FROM THE ACCUMULATOR.

F. D. (Dovercourt).—"It seems a funny thing to say, but I seem to have been getting a lot of back-chat from my accumulator lately. I have the accumulator from a service agency, which renews it every week, and although this is generally perfectly satisfactory, there are occasions when I can hardly hear the set, and once or twice the valve has not lit up even though the accumulator has been connected!

"The last time it was very weak, and I must admit I lost my temper, and after a lot of messing about with it I finally got absolutely fed up, and with my fist gave the accumulator a good thump as I was closing the cabinet! (I won't tell you what I said.)

"To my astonishment this thump seemed to do it no end of good and the programme came on quite O.K. Since then, whenever I have back-chat from my L.T. I give it a knock-about, or shake it, and I find it does it no end of good. Why is that?"

Although it does seem surprising, it is merely a matter of contact at the ends of the accumulator leads, or on its connecting bars. Very often, although

(Continued on page 186.)

The Original Moving-Coil Speaker

The R.K. was the first of the moving-coil speakers. It is still the first in quality, for there is no other instrument capable of giving such faithful reproduction.

Similar to the R.K. Senior (the original model) is the R.K. Junior—an instrument which gives *perfect* reproduction over the whole range of audible frequencies. Supplied for operation direct from A.C. or D.C. electric light mains.

If you prefer to build your own equipment, ask your dealer for a copy of the new B.T.H. Booklet "Sound Reproducing Devices."

Here is the R.K. Unit—the actual sound reproducing portion of the R.K. Speaker. Supplied complete with special output transformer & cone diaphragm.

Price £8:5:0
Filter Unit £1:5:0

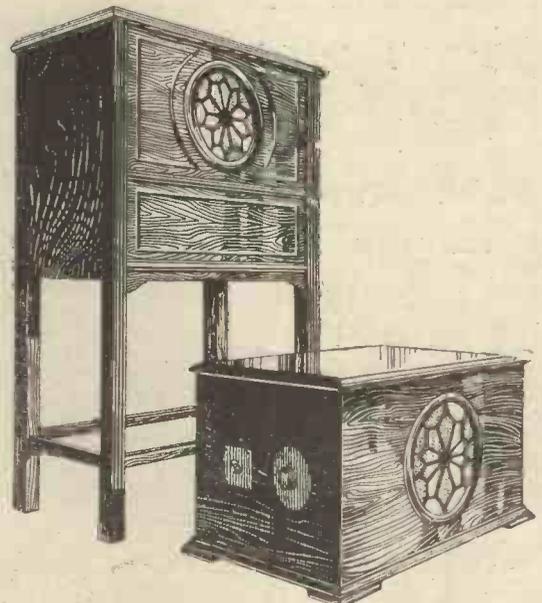
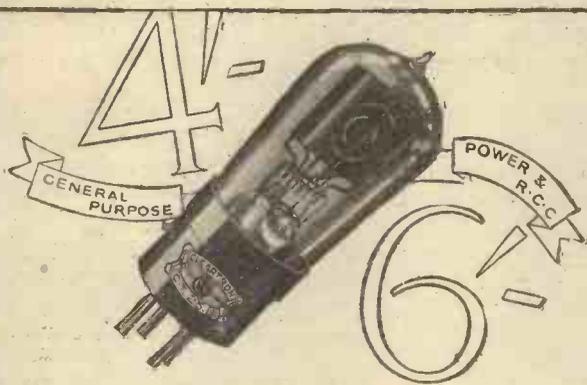


Table Grand Junior R.K. ...	A.C.	£34	15	0
	D.C.	£30	5	0
De Luxe Junior R.K.	A.C.	£40	0	0
	D.C.	£36	5	0



R.K. SPEAKERS



Will any Valve do more?

It's up to you to see that you get full value from the money you spend on valves.

A few days ago a Cleartron user wrote to us to say that he had three of these valves in regular use for over four years. They had outlasted three accumulators and given excellent reception all the time.

We're not surprised. We know that Cleartrons are made with skill and care on the finest machinery money can buy. Thousands of letters testify to their worth.

They are inexpensive because nowadays there is no good reason for valves to be dear.

Have you discovered that yet? If not, buy your first set of Cleartrons. Two-, four- and six-volt types are made for every purpose in radio. Power types, 6/-, General purpose types, 4/-

If your dealer cannot supply, order direct, or send the coupon for illustrated brochure, and give us your dealer's name.

CLEARTRON

ALL-BRITISH VALVES

CLEARTRON (1927), LTD., 21, Cumberland St., BIRMINGHAM.

London Office and Stores: 54/55, Fetter Lane, E.C.4.
Phone: Central 8062.

FREE POST THIS COUPON

CLEARTRON (1927) LTD.
(Sales Dept. 12), 21, Cumberland St., Birmingham.

Please send me your new brochure describing the characteristics of all types of Cleartron Valves.

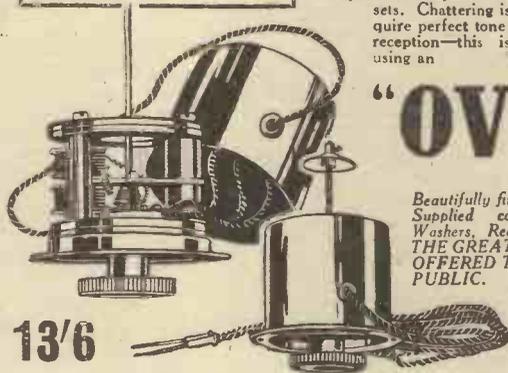
Name.....

Address.....

Wonderful Volume and Glorious Tone even with LOW Power Sets

- FOUR LARGE MAGNETS
- LAMINATED POLES
- ARMATURE BALANCE
- LARGE BOBBINS
- 2000 OHMS RESISTANCE
- DUST COVER

Even on a 2-Valve receiver, the richness and volume of the reception you get with this unit will surprise you. It will operate perfectly without distortion on the most powerful set, but its amazing capabilities are never seen to greater advantage than when you try it on a set which has hitherto given poor reception—then you realise just what it CAN do. The new principle of balance on the design of the "OV" Unit ensures clear, sharp, distortionless reception of majestic volume on all types of sets. Chattering is impossible. You require perfect tone and nearest to natural reception—this is only obtained by using an



"OV" CONE UNIT

Beautifully finished and everlasting. Supplied complete with Cone Washers, Reed and 5 foot Lead. THE GREATEST VALUE EVER OFFERED TO THE WIRELESS PUBLIC.

Nothing to equal it at twice the price.

13/6

"OV" CONE UNIT

FIT THE RIDGED CONE —and HEAR the difference.



3/-

Postage 6d. extra.

The scientific construction of the "OV" Ridged Cone results in wonderful tone and volume when it is attached to any make of Unit unobtainable by any other type of cone. You can hear the difference at once—and the improvement in strength and purity of reception will delight you. The cone is fixed without cutting or sticking, and gives equally pleasing results on large or small sets. Handsome Metallic Finish, Gold, Silver or Bronze. Height of Peak 4 ins., Diameter 1 1/2 ins. See that you get the genuine "OV" Cone and make a first-class loud speaker at a fraction of the usual cost.

SEAMLESS RIDGED "OV" FABRIC CONE

NO MUFFLED TONE WITH THE "OV" CONE.

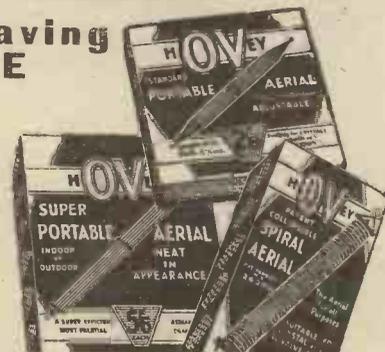
Be sure of having the GENUINE

"OV" PORTABLE AERIALS

"OV" AERIALS IMPROVE YOUR RECEPTION AND LESSEN YOUR TROUBLES.

See the New "OV" Collapsible Spiral Aerial—Completely portable, erected anywhere in a moment, instantly closes into small compass for travelling. Ideal for Crystal and Valve Sets.

SEE THE BOX BEFORE YOU BUY.



RIDGED CONE CO., LTD.,
York House, Southampton Row, London, W.C.1.
Tel.: Chancery 8136. (Corner of Theobald's Road.)

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 184.)

a fairly large surface appears to be exposed to the spade tags generally used for terminating accumulator leads, the contact is a poor one owing to the action of the accumulator acid, etc.

Consequently, even though tightly screwed down, the cells are badly joined together or to the set, and a slight shift in position may improve or worsen the contact. This is why "a good thump" may be beneficial, though "shaking" is generally unwise.

GRID LEAK OR ANODE BEND?

"THREE VALVE" (Lyme Regis).—"Which is the best kind of detector to employ—anode bend or grid leak?"

This largely depends upon the class of receiver to be used, and the purpose for which it is intended, i.e. for superlative quality, or for good quality combined with long-distance-getting qualities.

Undoubtedly the anode-bend method of detection enables the greatest purity of reproduction to be obtained, but a fairly careful choice of valves and a moderately skilful adjustment of conditions are needed in order to obtain this superior quality. None of these complications occur in leaky-grid rectification, and unless the constructor uses a moving-coil loud speaker and first-class gear throughout, he is not going to benefit very much in point of quality by adopting the anode-bend method as against the leaky-grid method of detection.

On the other hand, it is probable that he would lose considerably in point of sensitivity. As very few people can afford to ignore the factor of sensitivity, in which "leaky-grid" detection excels, this method is more commonly employed.

HOW MANY VALVES?

SAILOR (G.P.O., London).—"So as soon as I settle down I am going in for a good wireless set. I do not want to bother with 'phones, so it must be a good loud-speaker set. Sailing all over the sea for so many years, and seeing and hearing so many Dagos, Philipinos, Chinks, Japs, Bolshies, Arabs, Hawaiians, Eskimos, Malays and Goanese (to say nothing

of thousands of plain gol-darn Yanks), I certainly do not want to hear any foreign stations! But I want the British ones, and I want them good and loud, so what I want to know is what is the fewest valves I could use to get really good loud-speaker reproduction?"

This question is one which is very much easier to ask than to answer. The ability to give really good loud-speaker programmes depends not only upon the set, but very largely upon the locality in which you are going to reside.

Obviously if you are going to be situated quite close to a powerful broadcasting station, you will not need such expensive apparatus as if you were to be buried out in the wilds of Scotland. This question of the distance of your house from the nearest broadcasting station is probably the most important factor apart from the set itself, but another very important point is the kind of aerial you would use.

If you are placed like most listeners, and can erect a fairly good outdoor aerial, your requirements in the number of valves would be very different from the man who lives the same distance away from the

broadcasting station, but who has to make do with a wire stretched across his room indoors, or who uses a frame aerial.

Finally, there is a very great difference in what different people mean by "good loud-speaker reception." If you are a bit of a musician and you want to hear the wireless band playing so that you can recognise every instrument in it, including the drums, just as clearly and sweetly as though you were actually listening to the performance in the studio, you will require a more powerful and efficient set than the man who is content with a set which is perfectly clear but which hardly resembles a realistic band performance.

As the B.B.C. officials are often asked to estimate the number of valves required they have drawn up the following figures of what may be expected of various numbers of valves, assuming an ordinary standard type of circuit is used. The figures in this estimate are based on the assumption that the best possible reproduction is desired.

Many listeners may not wish to purchase as elaborate receivers as are indicated, but if reception is carried on at considerably greater distance than those shown the listener must not be disappointed if he finds his reproduction is indifferent.

Daventry 5 X X.—Over 150 miles—five valves (two stages H.F., det., 2 L.F.); over 100 and less than 150—four valves (H.F., det. and 2 L.F.); from 80 to 100 miles—three valves (probably four in towns); up to thirty miles—two valves.

Note.—The B.B.C. incidentally point out that satisfactory reception is concerned more with aerials in the case of 5 X X than with other stations: For this reason, you cannot have too big an aerial for 5 X X.

Daventry 5 G B.—50 to 100 miles—four valves (H.F. det. 2 L.F.); 20 to 50 miles—three valves; up to 20 miles—two valves.

Main B.B.C. Stations.—Over 50 miles—four valves minimum; 50 to 15 miles—three valves minimum; up to 5 miles—two valves minimum.

Relay Stations.—The range of a relay station is only three miles. All the above figures are based on aerials 100-ft. long with an average height of not less than 25 ft.

A CORRECTION.

The advertisement of Burndett Wireless (1928) Limited on page 22 of our issue of September 15th, inaccurately described the "Ethopower" H.T. Eliminator as an instrument which supplied both H.T. and L.T. current from A.C. mains.

Actually, this unit gives H.T. current and grid bias only, tappings are provided to give correct H.T. voltages for detector, amplifier or screened-grid valves up to 150 volts, grid bias automatically adjusting itself as required.

THE WOULD-BE WIRELESS CONSTRUCTOR

was told by

THE WISE WIRELESS CONSTRUCTOR

that every set-builder who
aspired to become

THE PERFECT WIRELESS CONSTRUCTOR

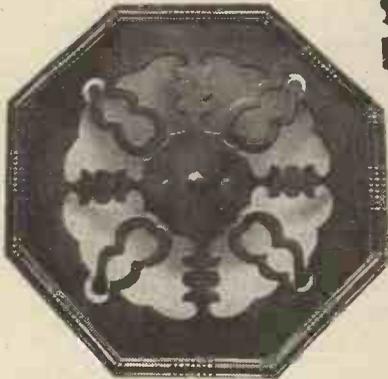
Should read

THE WIRELESS CONSTRUCTOR

October Issue Now On Sale Price 6d.

★ HEARING THAT IS ALMOST SEEING! ★ TWO WONDERFUL M.P.A. SPEAKERS

SETTING NEW STANDARDS IN EFFICIENCY & VALUE



THE POPULAR PLAQUE

This is the cone speaker which has caused an upheaval in the wireless world. Never before has anything like its value been offered. And... it has recently been fitted with a new and improved centre adjusting movement. Such volume, such delicacy, such clarity of reproduction you would only expect from a model costing five times as much. Hear it! See it! Both its performance and appearance will make you desire it.

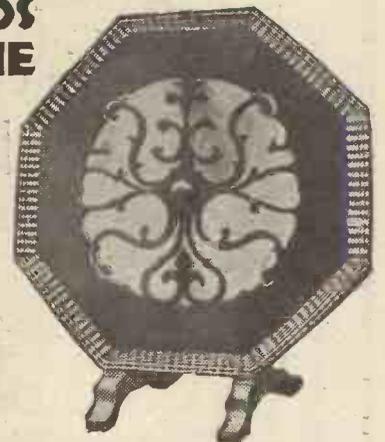
Dark Mahogany or Oak - Price 29/6

M.P.A. WIRELESS

ASK YOUR DEALER TO DEMONSTRATE



SEE ME AT THE RADIO EXHIBITION STANDS 21 & 22



THE DE LUXE MODEL

Two inches larger than the Popular Model, the de Luxe Plaque has a "matched impedance" fret, is fitted with the new patented M.P.A. logarithmic cone, and has a wood base. It not only gives astonishingly excellent results, but is unobtrusively handsome in appearance and will harmonise with any decorative scheme.

Dark Mahogany or Oak - Price 47/6

★ M.P.A. WIRELESS LTD., 62, CONDUIT ST., LONDON, W.1. TEL. GERRARD 6844 ★

"CLARKE'S" "ATLAS"

BATTERY ELIMINATORS

TOP THEM ALL

You will not hesitate to substitute your H.T. Batteries with an "Atlas" Eliminator when you appreciate the difference an "Atlas" Eliminator means. Clarke's "Atlas" Eliminators are British to the last screw and each one is covered by the "Atlas" Guarantee.



Model A.C. 56, for Alternating Current. 200/250 Volts 30/120 Cycles, suitable for one to seven-valve sets. Has NO VALVES TO BURN OUT. NEVER RUNS DRY. ALWAYS DRY RUNNING. NO LIQUIDS. Maximum output 50 mA. Price £8. 15. 0. Including Royalty.



Model D.C. 18, for Direct Current. 200/250 Volt mains. Guaranteed to work any 3-valve and most 4-valve sets. Maximum output 15 mA. Price £1. 17. 6.

Model D.C. 10, for Direct Current. 200/250 Volt mains. A popular and more refined model. Maximum output 20 mA. Price £3. 15. 0.

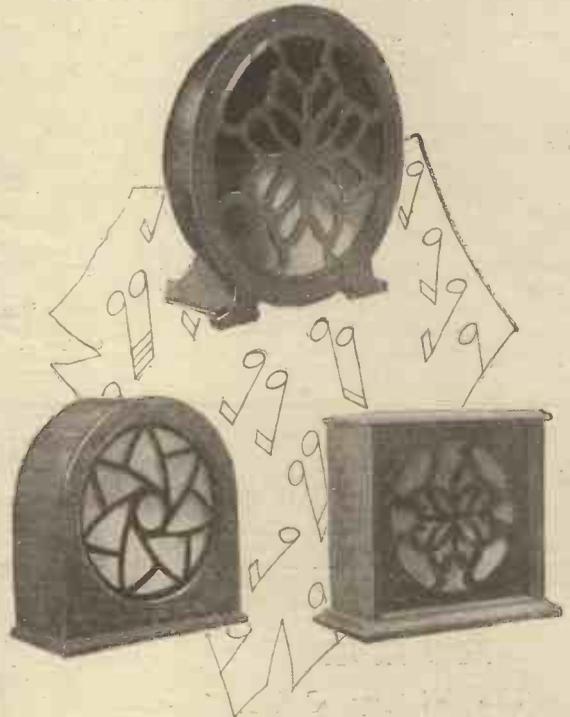


See them at the National Radio Exhibition, Olympia, September 22 - 29, STAND No. 161

Ask or write for beautifully illustrated Brochure No. 32, which gives details of full range of "Atlas" Eliminators.

H. CLARKE & CO. (M/CR) LTD.
ATLAS WORKS, OLD TRAFFORD, MANCHESTER.

See the famous WHITELEY-BONEHAM Range at Stand 120



That's all we ask you to do. As you pass through the exhibition, stop for a few moments at Stand 120 and examine the Whiteley-Boneham Speakers. Your good judgment will do the rest.

Your new Season's speaker will be a Whiteley-Boneham.

Whiteley-Boneham Loud-speakers satisfy all the demands of the hypercritical listener. . . . attractive in appearance moderate in price and crystal clear in reproduction.

This perfect reproduction is made possible by the wonderful Whiteley-Boneham Cone unit with which every Speaker is equipped. The design of this unit is such that distortion and rattle are non-existent.

The famous W.-B. Antiphonic Valveholder, now reduced in price to 1/6 with terminals and 1/3 without terminals, will also be exhibited.

Whiteley-Boneham—Stand 120

If you are not at the exhibition ask your dealer, or write us for full particulars.

Whiteley, Boneham & Co., Ltd.
Nottingham Rd., Mansfield, Notts.

THE NEWCOMER TO RADIO.

(Continued from page 163.)

anything connected to this point directly by means of one of the leads, without there being any effect on the operation of the receiver.

When you touch certain other points, such as a terminal of the grid condenser, the set will stop working, or squeals result. Such points will be at what are known as High Potentials. You can use a variable condenser (of the capacity indicated) for the reaction control, which has only two terminals like the variable condenser used for tuning. Nothing will be needed to replace that third lead, and, although the set will work just as well, it is possible that you will find adjustments cannot be made quite as expeditiously. The condenser I used necessitated one or two extra panel holes, but full instructions for mounting it are enclosed in its packing box.

You have now a complete one-valve receiver, and when you have fitted it with the necessary accessories, you can proceed to tune in some concerts. It will not operate a loud speaker unless you are very close to a broadcasting station (within a mile or so), and even then the volume will not be great. If you definitely aspire to a loud speaker, you will, perhaps, want to wait until we have added a valve or two and not worry about telephone reception.

I must say that telephone receivers are handy instruments even for loud-speaker enthusiasts. They bring within reach many distant stations that it would otherwise be impossible to receive, and, taking every-

thing into consideration, I am inclined to urge you to buy a pair. Quite a good pair can be purchased for a sum within the region of 10s.

Ordinary Plug-in Coils.

A set of six ordinary plug-in coils will fit you up for the reception of the majority of ordinary broadcasting stations as well as long-wavers of the calibre of 5 X X. In the first coil holder, the aerial position, you will need a coil of 25 turns for the normal wave-band and a 100 for Daventry. In the second holder, the sizes will be respectively 60 turns and 250 turns. Suitable sizes for the third holder, reaction position, are 50 and 150.

Plug-in coils are standardised, and whatever the make, if you ask for a number, 25 for instance, you will get a coil having 25 turns and suitable for a definite band of wave-lengths.

A suitable valve for this "one-stage" set will be a "detector," "H.F." or "general-purpose" type, according to the make. If you ask your radio dealer to supply you with a valve suitable for an

ordinary detector one-valver, he will fix you up with a suitable variety.

There are three main classes of valves, known as the 2-volt, 4-volt and 6-volt types. These are designed to operate from 2-, 4- and 6-volt accumulators. You must now make up your mind what class you are going to confine yourself to throughout the set.

The 6-volters will give you a bit more power, although they require a 6-volt accumulator, which is three times more expensive than a 2-volter to buy and somewhat more expensive to maintain—i.e. get charged.

The 2-volters are more economical and fall very little short in performance of the 6-volters, in sets of this type, and have much to commend them to the average listener.

The H.T. Battery.

If you are stopping at one valve, using it for telephone reception, an H.T. battery of 60 volts size will be big enough, but if you are going forward, then you should purchase one of at least 108 volts.

I am going to deal with the operating of this set in my next article, for the tuning controls will be the same for the one-, two- and three-valvers.

If you like, you can proceed to put the one-valve set into operation immediately, and without waiting for further instructions, but be careful with that reaction control. Remember that minimum settings of reaction condenser mean minimum reaction, and keep away from all points which cause squealing, for this means interference with other listeners.

NEXT WEEK.

A CRITIQUE OF THE RADIO EXHIBITION

will appear in "P.W."

ORDER YOUR COPY NOW!

A FEW OF THE LATEST LINES THAT CAN BE SEEN ON

STAND
248

WIRELESS EXHIBITION :: SEPT. 22 - 29.

The Victory G.E.C. 3-Valve Set, including L.T. Accumulator, H.T. Battery, Grid Battery, Connecting Cord and 3 Valves - - £8. 10. 0 including Royalties.

The MOGEN H.T. GENERATOR 400 v.—200 m/a Output, from £22.

The Polar All Brass variable condenser, 0003 - 5/6 0005 - 5/9

Full range of Ferranti Meters, Celestion Speakers, Trickle Chargers, etc.

Write for our comprehensive catalogue. Postage 6d. FREE to callers.

WILL DAY LTD.

(The Best in the West)

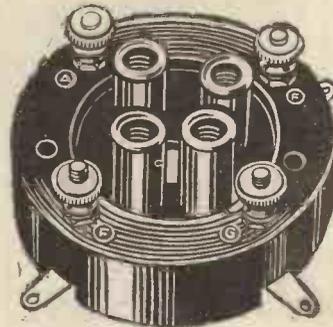
19, Lisle St., Leicester Sq., London, W.C.2.

Phone: Regent 0921-0922. Grams: Titles Westrand London.

Most things move in circles
—Even the world itself.
Circular Motion is the
Secret of this wonderful new

CASON

Anti-Microphonic VALVE-HOLDER 1/6 ONLY.



NO matter how much you may jar your set, the circular motion of vibration of the NEW CASON ANTI-MICROPHONIC VALVE-HOLDER guarantees safety to your valves. They will not swing sharply to and fro, but will rotate smoothly and without the least strain.

Guaranteed to be made of only the highest grade mouldings, insulated parts and springs.

Ask your dealer, or write for particulars NOW!

CASON MOULDINGS, CHISWICK ROAD, LONDON, N.9.



The "Wireless World" says:—
"We hope that other dry battery makers will follow Messrs. Ripaults' lead and come out into the open with details of the average life which may be expected from their cells."
—See page 47B, May 2nd issue.

RIPAULTS SELF-REGENERATIVE H.T. DRY BATTERIES

Give 50 per cent. Longer Life.

STANDARD Capacity	DOUBLE Capacity	TRIPLE Capacity
60-Volt .. 10/6	60-Volt .. 15/6	60-Volt .. 19/6
99-Volt .. 16/6	90-Volt .. 22/6	90-Volt .. 29/6

RIPAULTS LEAD IN LIFE, EFFICIENCY AND VALUE

LIGHT ON THE H.T. BATTERY

We have always made a practice of giving to the Public the fullest information possible, so that they can independently judge the merits of the goods they buy. For the above reason we have spared no expense in producing a 24-page booklet which has been specially written for us by one of the best-known contributors to Radio publications who is recognised as an expert on H.T. Dry Batteries. This Booklet, which is extremely interesting and an easily understood treatise on H.T. Batteries, is chock-full of sound advice on the correct choice of batteries for all types of receivers.

All requesting a copy of this 6d. Booklet, mentioning Popular Wireless and sending a 2d. stamp, will have one sent them Post Free.

STAND 236 OLYMPIA

STAND 236 OLYMPIA

1, KING'S ROAD, LONDON, N.W.1

NOW ON SALE

WIRELESS CONSTRUCTOR ENVELOPES

Envelope No. 1.—THE "RADIANO" THREE. (Recently reprinted). A famous loud-speaker set which you can build in an hour or two—no soldering and a wide range of components to choose from.

Envelope No. 2.—THE "CONCERT" FOUR. Made of standard parts, all easily obtainable, this is a highly-sensitive long-distance set, giving powerful reproduction of wonderful quality on 3 or 4 valves.

In these envelopes you will find every detail of the set simply explained, photographic reproductions and diagrams are included as well as a full-size Blue Print.

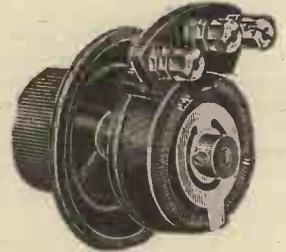
AT ALL BOOKSTALLS Price 1/6

By post, 1/9, from Wireless Constructor Envelopes, the Amalgamated Press, Ltd., Bear Alley, Farringdon Street, London, E.C.4.

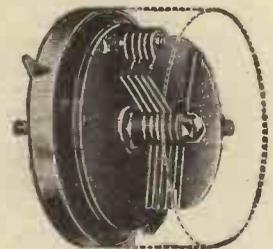
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The new Igranitic components excel even Igranitic's previous standards. Look at these few examples—a new Wire-Wound Variable Resistance giving 8 different values. For use as Anode resistance, tapped series resistance, or volume control—an entirely new form of intervalve coupling giving hitherto unobtainable constancy of amplification—a high value variable resistance that is the most efficient volume control ever invented, and a screened condenser specially made for reaction that eliminates hand-capacity effects. Replace your old components with these and you will be surprised by the vastly improved results you will get.

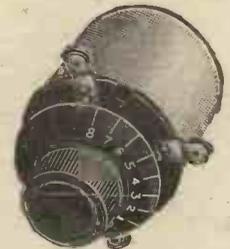
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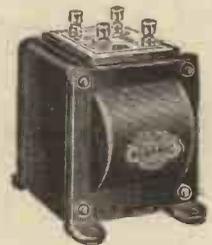
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CONSTRUCTING A RADIO SET.

By G. V. COLLE.

WIRING which is taken direct from point-to-point is not only quicker to do, but is often more efficient than that bent in right angles, while the appearance of the finished set is not displeasing provided the point-to-point wiring is done systematically and does not project unduly above surrounding components.

Many have referred to the importance of marking positions for holes by a scribe and not by pencil, since it has been contended that a pencil line causes a high resistance leak across the panel.

This may be quite true, but great scratches across the back of panel are not pretty. Pencil lines, if done with a fairly soft pencil, can be removed from matt finished panels by an application of oil on a rag, the panel then being wiped over with another clean rag, to remove the surplus oil.

Cleaning the Panel.

This not only allows one to mark the front of panel, which makes panel working easier, but also leaves it free from marks after treatment. Polished panels can be treated similarly, except that they can be restored to their former brightness merely by breathing on the polished surface and then rubbing it over briskly with a soft duster.

When arranging the components on the panel (assuming the set is to be home-designed) always keep in mind the circuit. If the set includes two L.F. stages or more, try and keep the tuning condensers to the left hand portion of the panel and certainly not more than two-thirds to the right, as it is important that the leads to the condensers

Popular Wireless

IS THE

Best Radio Weekly

do not become involved with those, say, which go to the L.F. transformer.

The arrangement of other panel components need not be discussed, as their positions will be dependent largely on the particular circuit used. In any case, it is usual to forgo a slight percentage of efficiency to obtain symmetry, so that it will be sufficient if the prospective designer notes the points raised and leaves the rest of the design to his own judgment.

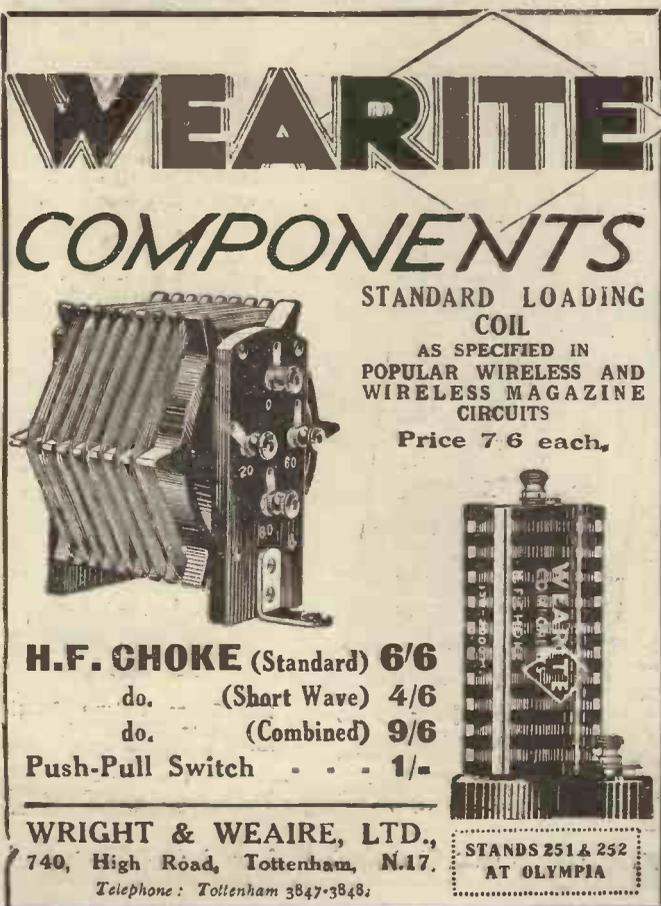
It would not, perhaps, be incorrect to state that on the baseboard lay-out depends a great deal of the success of the receiver, as it is usual to mount nearly seven-eighths of the components on one plane, and if these are badly arranged, complicated wiring may result to the detriment of stability and possibly quality of reproduction.

Arranging Lay-out.

The usual practice is first to mount the panel components, screw the panel to the baseboard and then arrange the baseboard components to "harmonise" with those on the panel. Our next consideration is to see that no long grid leads result from the lay-out and then remember to keep the plate leads short. Should it so happen that both problems arise (although this can often be overcome by clever juggling with the components) then the grid leads must be the first consideration. With no panel switching other than the L.T. switch, a good compromise can be effected by keeping the valve holders somewhat to the centre of the baseboard and arranging the remainder of the parts around them. If short grid, plate and filament leads can be achieved, so much the better, but, unfortunately, it is more often the case than not that one set of leads have to be made rather long, and these should be the filament wires.

Do not be frightened at turning any particular valve holder to a peculiar angle, as long as short leads result, because the point often arises when circuit changing switches are incorporated sometimes culminating in impossible wiring, which can

(Continued on page 192.)



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are a marvel of ingenuity, and are at least a valve ahead of other makes. Our ALL-WAVE TUNER dispenses with the usual horde of expensive and troublesome interchangeable coils. Up-to-date in every way, there are no fewer than eight different sets, including the All-wave model, which covers EVERY WAVE-LENGTH BETWEEN 150 and 2,000 metres simply by the turn of a switch. Valves are mounted on antimicrobial high-tension battery compartment. ONE phonic valve-holders, and the cabinet has a high-tension battery compartment. ONE DIAL TUNING ONLY, which assures the absolute beginner of the finest results, and many another unique feature.

2-VALVE MODEL, absolutely complete. Royalty paid, 11/9 with order and 11/9 monthly. Cash price, £8 2s. 6d. Loud speaker ranges with ordinary B.B.C. stations, 25-30 miles; on Daventry, 100-120 miles.

3-VALVE MODEL, also absolutely complete. Royalty paid, 18/6 with order and 18/6 monthly. Cash price, £10 12/6. Range on loud speaker with ordinary B.B.C. stations, 45-50 miles; on Daventry, 160-180 miles.

Further details with pleasure

SCRAP THOSE TROUBLESOME H.T. BATTERIES AND USE A DUNHAM ELIMINATOR

10/- secures

If you have electric light in your home your high-tension battery troubles are ended. A Dunham Eliminator gives you perfect reception on your wireless set.

OUTSTANDING FEATURES.
Absolutely silent. Uses least from main. Internal fuse.

Beautifully finished enamelled-iron screening cases giving complete protection from fire and inductive interferences.
Made under I.E.E. regulations and incorporating isolating transformer. No troublesome, messy chemicals with periodical electrodes to replace.

Senior model, output 150 volts 20 milliamps, £5 18s. 6d. Royalty paid: Or 10/- with order and 10/- monthly.

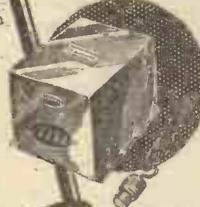
De-luxe model, output 180 volts 40 milliamps, £7 7s. Royalty paid. Or 12/6 with order and 12/6 mthly.

Free fully descriptive leaflet on request.

40 STATIONS ON LOUD SPEAKER WITH THREE VALVES ONLY

This is what our clients TELL US. 35/6 secures complete outfit. NOW FITTED WITH SCREENED GRID VALVE.

Our Long-Range Three-Valve Cabinet Set is indeed the receiver de-luxe, and gives results on three valves only that the average five-valve set cannot ordinarily receive. This set really cannot be adequately described in this small space. Our comprehensive catalogue, with other 'comprehensively giving proof of results obtained, is free; and those including sixpence in stamps will be presented with a Full-size BLUEPRINT with Full-size POINT-TO-POINT CONNECTIONS with EVERY POSSIBLE CONNECTION and A HOST OF OTHER VALUABLE INFORMATION OF OUR ALL WAVE VALVE SET, enabling you, if you like to construct your own set, to fully efficient receiver in a single night.



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Charge your accumulator off electric light at fractional cost. Our charger incorporates under licence the Westinghouse Metal Rectifier. 10/- deposit and 4/6 a month. Descriptive leaflet on request.

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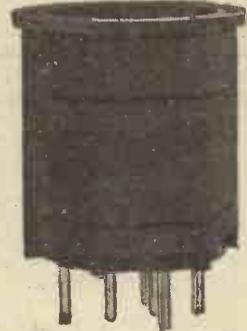
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PANEL SIZE 12x7 1/2



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SIX PIN COILS

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Only 2/3 and 3/6.

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CONSTRUCTING A RADIO SET.

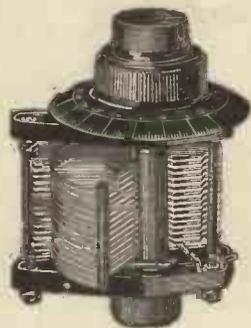
(Continued from page 190.)



The MULLARD MASTER FIVE

is the ideal portable for the home constructor. Build it with the specified Pye Components and you are sure of success. Insist on Pye Anti-Microphonic Valve Holders.

Type 94CT .. Price 2/- each



PYE Logarithmic Condenser

One-hole fixing, geared 40 to 1, gives equal percentage change of capacity for angular

displacement. High insulation. Sharp clean tuning.

No. 916 '0005 Mfd. .. 12/-

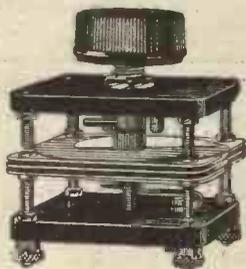
'0003 Mfd. (12/-) and '00075 Mfd. (15/-) also available.

PYE Differential Condenser

One-hole fixing. For reaction in anode of detector gives even frequency response for all degrees of angular displacement.

Type No. 921/MS./100 Mfd. with knob.

Price 5/-



PYE, CAMBRIDGE

only be overcome by drastic rearrangements of associated components. The point to remember is that by keeping the leads short the chance of interaction between adjacent wires is removed.

A very different problem is set by the tuning coils in the receiver since these should be kept as far apart as our limited space will allow.

Screening Problems.

No rules can be laid down as the exact method of mounting the coils, each particular case and set of coils being judged on their merits. Where special fieldless coils are employed the problem is not very difficult, but in other cases where it is known the field around the coils is rather great and the distance between them cannot also be made great, it is a good plan to interpose a sheet of copper or aluminium and earth it.

In such cases do not place the coils too near the metal sheet, unless they are astatically wound. And the distance of the coils from their associated variable condensers must not be less than half the diameter of the coils, if not more, according to space available.

A small point, but quite an interesting one from the writer's point of view, is how most constructors arrange the terminal strips on their sets. These are invariably made up and screwed to the baseboard long before the lay-out is visualised! On slight reflection, it must be admitted this policy is to be deplored, as the resulting arrangement is often the least desirable.

USING GRAMOPHONE PICK-UPS

THE gramophone pick-up has more or less revolutionised the reproduction of gramophone records, from the point of view of quality at any rate. It has enabled full rich tone hitherto unobtainable, except by the most expensive instruments, to be within the reach of the average man, while to the noise fiend it has given full scope for his activities.

But the pick-up has to be used properly if results better than those obtained from quite an ordinary gramophone are to be the order of the day.

Pick-Ups Vary.

It is easy enough to fit one of these little "electrical sound-boxes" to a gramophone tone arm and to hook it up to a wireless set, and get "results," but unless the various factors that make for good reproduction are considered, those results will not be worthy of the name of music.

Pick-ups vary a great deal in their operation, some being much more sensitive

than others, while the loud quality also differs from one instrument to the next.

The first step towards the goal of pure reproduction is to make sure that the amplifier part of the set is beyond reproach and entirely satisfactory as regards the quality of its output and then to make certain that the loud speaker will do justice to the output from the set.

If these two important items are satisfactory then it is not likely that results will

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is the leading radio magazine, it doesn't mean to say that YOU wouldn't understand and enjoy the articles.

It's because so many people do, that

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be inferior unless the pick-up is a poor one, or overloading of the amplifier occurs.

The pick-up itself should be carefully chosen and it is advisable for no one to purchase any particular pick-up without either having a strong recommendation from a person who has tried it, or else, better still, without hearing it in operation oneself.

Test It Yourself.

Because a pick-up is advertised as sensitive, without "chatter" etc., etc., it does not necessarily follow that it is perfect. It may have too much damping and thus cause excessive wear to the records, and make the reproduction heavy and without brightness.

If it is too sensitive it is more than likely to overload the first valve in the amplifier, especially if that valve be of the resistance-capacity type. Overloading here will naturally cause serious distortion, as the fault will be amplified from stage to stage until it assumes serious proportions.

To prevent the overloading and yet to make it possible to use the pick-up to its best advantage it is advisable to employ a volume control of the high-resistance potentiometer type. This is connected across the pick-up with the slider arm taken to the grid of the valve (the first amplifier) and one end of the pick-up and potentiometer also connected to a grid-bias negative tapping.

Grid bias is almost an essential on the first valve, as well as on the succeeding stages if purity of reproduction is to be obtained.

Finally do not use fibre needles, they will not assist in obtaining good tone, and will cause no end of trouble by splitting, besides tending to make the records "lifeless" instead of bright and crisp, as should especially be the case where band or dance music is being played.



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There is Money in Spare Time!

Here is a really genuine chance for making money in your spare hours which you must not miss. It is quite dissimilar to all other money-making schemes. Seriously and genuinely, a Golden Opportunity is now knocking at your door. The Coupon below is the latchkey which will open the door for you. Use it to-day.

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Sirs,—Please send me at once, and FREE, full details as to how I can Make Money at Home in my spare time. I enclose 2d. stamp for postage. Print your name and address boldly in capital letters on a plain sheet of paper and pin this Coupon to it.

Popular Wireless, 29/9/28.

THIS IS THE UNIT!

THE GOODMAN P. G. 3
A Double-Acting Reed Unit—four pole, adjustable, ultra sensitive, yet handles huge volume and gives remarkably pure and undistorted reproduction.

Price complete 27/6

Come and see our latest range of Moving Coil Speaker Parts at the National Radio Exhibition.

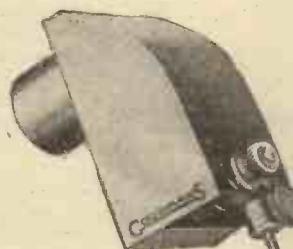


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Will put new life into your gramophone. Re-creates every tone and harmonic exactly as delivered to the recorder.

Although the price is only 18/6, it will bear comparison with any other on the market, regardless of cost.

Beautifully finished in nickel case—light in weight—light on record. Remarkably faithful reproduction of both high and low frequencies. Extremely sensitive. Adjustable for volume on the instrument. In fact good enough to bear GOODMAN'S name.



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New Type Log Condenser.



No. 335 '003 £/8
No. 333 '003 6/3

CONDENSERS

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Nothing before has ever approached the amazing precision of this new condenser. Clear cut—razor sharp—station after station can be lifted out, with wonderful clarity. The Condenser that surprised the experts.

- One hole mounting adjustable bearings.
- Movable spindle giving overhang for ganging or left or right hand drum dial.
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- U-shaped frame—rigid construction—exceptionally light.
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Full particulars from your dealer or (Dept. P.W.)
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DON'T SPEND



MEND WITH FLUXITE

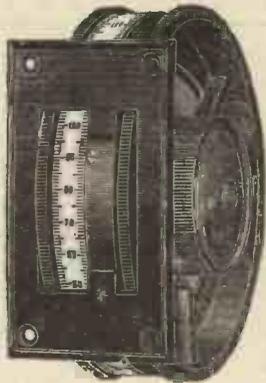
-simplifies all soldering

FLUXITE SOLDERING SET—complete 7/6 or LAMP only 2/6

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The Advantages of Thumb Control Tuning

THE engraved movable scale of this new "Utility" Micro-dial, together with the thumb control, have made the most minute tunings easily possible. In addition correct maximum and minimum positions can readily be ascertained. The dial mechanism is the smooth, free-from-backlash design that has been easily first right from the time it was originally marketed.

The diameters of the bakelite mouldings are 4" and we supply this new and very handsome dial with or without Vernier.

It can be fitted to any make of Condenser.

PRICES:

- W.194 Thumb Control Vernier Dial **12/6**
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- W.196 Bakelite Finger Plate only **2/-**

Ask your local wireless dealer to show you the "Utility" Components. They include Condensers and Switches for all requirements. A complete "Utility" Catalogue may be had by writing us direct.

THE RADIO EXHIBITION
Olympia—last day Sept. 29th.

Stand **152** Number

Utility

GUARANTEED
COMPONENTS

Made by
WILKINS & WRIGHT LTD.
"Utility" Works, Holyhead Rd.
BIRMINGHAM

VALVES IN PARALLEL.

By A. JOHNSON-RANDALL.

A WELL-KNOWN method of increasing the power in the output (loud speaker) circuit of a set is to place two valves in parallel.

There is nothing very mysterious about this. All circuits have at least one output valve. This is simply the last valve in the set, and of course the loud speaker is always connected either directly or indirectly via a choke-filter arrangement, in the anode circuit of this valve.

Hence to increase the power the obvious thing to do is to connect a similar valve in parallel with the last one.

The parallel connections are perfectly straightforward.

The anode of one valve is joined to the anode of the other, and so forth for the remaining three connections.

Impedance Decreased.

Now when you use paralleled valves in the last stage you do two things. First you lower the impedance of the output circuit, which is naturally an advantage from the point of view of quality. Secondly you

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In other words its

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You want

Every Month. Price 1/-

improve the volume because you increase the power in the loud-speaker circuit. The more advanced reader may take exception to the "sloppiness" of my explanation, but I am using the various technical terms rather broadly to make this article understandable to the less experienced listener.

What I really want to get at is this. With very many circuits, placing a valve in parallel makes little difference to signals. Instead of the anticipated step up in volume there is perhaps just a perceptible increase. In some cases there is practically none.

What Happens.

Let us think what happens when two valves are connected in parallel. Obviously the filament current is doubled, assuming the valves to be of similar type. This, however, will make no difference to the results, provided the L.T. battery can supply the extra current.

Theoretically the anode current is also doubled, because two valves of the same type, working from the same H.T. tapping, must take twice the current that one does.

This is the snag. In the plate circuit of these paralleled valves there is connected a

(Continued on page 196.)

The LASSOPHONE TRIANGLE DOUBLE REED FORK CONE LOUD SPEAKER

A further addition to the Lassman range is this wonderful Double Reed Cone Unit that equals the tonal qualities of Moving Coil Speakers, yet without consuming any extra current and at the exceptionally low price of 17/6. Compared with any Moving Coil Units its reproduction of the "S" sound—the greatest test of any speaker—is considerably better. British Made. Enclose P.O., or write for full details to:

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(Dept. P.W.),
BRITISH The East Ham Wireless Supplies.
MADE. 423, Barking Road, East Ham, E.6. M.B.

THE LITTLE CELLS THAT SATISFY.

Eton Primary H.T. Battery P.I. Porous Pot Cells, S.1 and S.2 Sac Cells. All complete.

	1-cell	6-cell	12-cell	30-cell
P.1	6½d.	3/3	5/9	14/-
S.1	6d.	3/-	5/3	12/-
S.2	4½d.	2/6	3/10	9/6

Send 1½d. stamp for booklet giving full particulars to:—
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Patent Applied For. Postage refunded. Mention your dealer.

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Super Bakelite Board.

		Nat.	Col.
UNBREAKABLE	7x14	4/10	5/8
UNFADEABLE	7x18	6/1	7/1
Made in the following colours—natural brown, blackwalnut and mahogany. Natural brown 4d per sq. in. Other surfaces 1d. per sq. in. Send postal order to:	7x21	7/1	8/4
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The
**FAMOUS
2 VOLT
RANGE**

General Purpose
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T10-2 VOLT, 0.2 AMPS.
3/11

**General Purpose
Dark Emitter**
TYPE TD2
2 VOLT, 0.05 AMPS.
The most marvellous achievement of radio technique **6/-**

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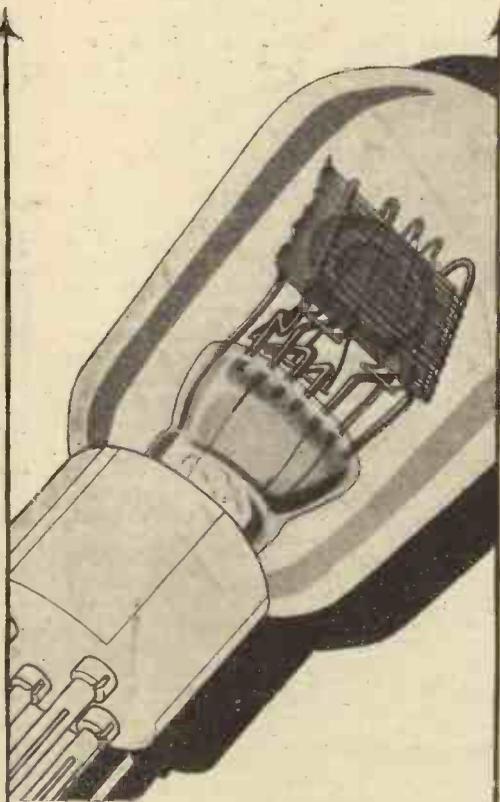
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TYPE ZD2. 2 Volt 0.1 Amps. **7/6**
SUPER POWER

TYPE UD2. 2 Volt 0.2 Amps. **7/9**

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THE emission of the Triotron Dark Emitter filament is seven times greater than in any other Valve and is the only filament which gives good loud-speaker reception on 2 Volts.



The
**4 VOLT
RANGE**

ON 2 Volts there are no comparative results—either the valves function efficiently as with Triotron, or they don't. On 4 Volts, however, it is possible to obtain some sort of result even from inferior valves. But once you have used Triotron valves you will never change; for they are the final word in valve efficiency.

**General Purpose
Dark Emitters**

TYPE AD4. 4 Volt 0.05 Amps. **5/6**
(Det. H.F.)

TYPE RD4. 4 Volt 0.05 Amps. **5/6**
(L.F., H.F., Inter F.)

TYPE SD4
4 Volt 0.1 Amps.

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TYPE WD4. 4 Volt 0.07 Amps. **6/-**
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TYPE ZD4. 4 Volt 0.15 Amps. **6/6**

TYPE UD4. 4 Volt 0.1 Amps. **6/6**
SUPER POWER

TYPE XD4. 4 Volt 0.15 Amps. **6/9**

VALVES IN PARALLEL.

(Continued from page 194.)

winding which has a certain direct-current resistance. In a modern circuit it is probable that this winding will be an output choke. One would not attempt to parallel valves in a circuit arrangement which had the loud-speaker winding connected directly in series with the anodes.

The average loud speaker has a resistance in the neighbourhood of 2,000 ohms, and this value is too high to be used even with a single super-power valve.

Even the so-called low-resistance speaker windings have too high a resistance for use with paralleled valves. The reason for this will be seen later.

Effect on the Choke.

Let us assume that a choke-filter output is employed. The winding will have a certain D.C. resistance. The better the choke the lower will be this value in all probability. A good choke may have a resistance of 300 ohms. Now by Ohm's Law there will be a drop in voltage across the winding when current is flowing. The drop is equal to the current multiplied by the resistance—the current being milliamperes divided by a thousand to keep the units right. The drop in volts is equivalent to so many volts wasted, and should be subtracted from the H.T. voltage to obtain the true anode volts.

With 30 milliamperes flowing there would be a drop of 9 volts. Now if we attempt to use a parallel arrangement by inserting a second valve in the additional holder there will be an increase in the anode current.

Suppose this current increases to 50 milliamperes. The drop in volts will now become 15, and consequently the volts actually applied to the anodes of the valves will have decreased by 6 as compared with the previous figure. It will therefore be seen that as we increase the current by paralleling the valves, so the anode voltage decreases owing to the resistance of the choke. These figures are for a really good choke, and in many cases the drop may be very considerable when the winding has a resistance of, say, 600 to 700 ohms.

This is a reason why the anticipated step-up in volume does not always take place.

It will be clear that the current for two valves will not be twice that of one valve, unless a choke of low D.C. resistance is used and the H.T. voltage is increased accordingly to make up for the voltage drop.

Disappointing Results?

There are other factors which must be taken into consideration.

The inductance of the choke will tend to decrease as the anode current is increased. This will have an effect on the volume. Also, if an eliminator is in use, the drop in volts across the smoothing chokes may come into play and produce a decrease in the voltage at the H.T. terminals.

So you will see that if your circuit arrangement is not designed for heavy anode currents, paralleling the output valves is rather apt to be disappointing.

On the other hand, if you take care to choose suitable components and increase your H.T. when you insert the second valve, there is no reason why you should not improve your results, particularly if you are a moving-coil or cone enthusiast.



IT STANDS OUT

THE "PEERLESS" VARISTOR

This useful component is a baseboard Rheostat made in seven types, viz., 3, 6, 10, 15, 20, 30, or 60 ohms. It is suitable for controlling all makes of valve. Each type is wound with best resistance wire and is fitted with phosphor-bronze adjustable arm. Terminals are fitted in a convenient position for wiring.

Price all types, 1s. 3d. each.

"PEERLESS" MASTER SWITCH

As is well known, when using a battery eliminator a very high potential is placed across the condenser when the current is broken suddenly. Gradual current control is therefore essential and the master switch has been designed to fulfil this purpose. It cuts off both high and low tension.

Price 2s. 9d.

"PEERLESS" FIBRE COIL FORMER

Supplied in a small package containing the necessary parts: these can be assembled in less than a minute as it is only necessary to insert the narrow strips of insulating material in their correct slots cut in the end pieces. Quite rigid and will not buckle.

Sizes:

2 in. x 1 1/2 in., 3 1/4 in. x 2 1/4 in., 2 in. x 2 1/2 in., 3 1/2 in. x 1 1/2 in.

Price 1s. 4d.

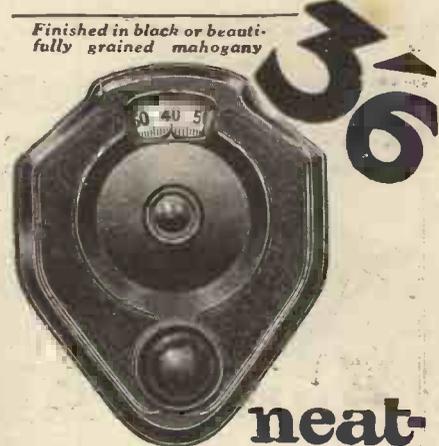
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LONDON 21, Bartlett's Bldgs., E.C.4. GLASGOW 113, St. Vincent St., C.2.



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Watch for Brownie's latest triumph in artistic moulded components—"The Dominion Vernier Dial." Special non back lash slow motion drive gives very accurate turning, while the action will fit any condenser and the new design of the dial will enhance the appearance of every set. Do not fail to see this attractive new Brownie production at the Radio Exhibition.

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"DOMINION" VERNIER DIAL
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Your Melody Maker is considerably improved in tone, selectivity and volume by fitting a RUTTER H.F. CHOKE, specially designed for the Melody R. CHESTER, 495, Cambridge Road, London, E.2. Maker. Post free, 5/-, with Blue Print. Chokes and Transformers supplied for all purposes.

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90v. for 2-Valve Sets ... 21/3
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No Extras. Carriage Paid.

Small cap. SACS 1/4 ZINCS 8d. doz.
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OAK CABINETS.—Melody Maker, 15/-; Master 3, 15/-; H.F. Unit for Cossor, 11/6; Baseboards included. Loud Speaker Cabinets from 18/6. Hand made and French Polished. Rubber feet. Crated and Carriage paid. Send for list. **GILBERT, Cabinet Maker, SWINDON**

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"P.W." TEST REPORT
MAY 12th.—"On test we found this unit covered the wave-length range claimed—i.e., 180-2,000 metres—reaction control being quite satisfactory throughout. It is nicely made, more robust than the majority, and can only be regarded as an economical proposition."

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The Leading Radio Magazine

The October issue, which is now on sale, is a

SPECIAL EXHIBITION NUMBER

Besides dealing fully with the great

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AT OLYMPIA,**

this issue contains many special features.

For the would-be set-builder there are full details of

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THE "THOMAS" SHORT-WAVER
THE HIGH-BIAS ONE and
THE JAMES H.T. UNIT
etc., etc., etc.**

In addition there is a special supplement for the music-lover, dealing with

RADIO AND THE GRAMOPHONE

**DON'T MISS IT!
MODERN WIRELESS**

Price 1/- only.

OCTOBER ISSUE: NOW ON SALE.

ACCUMULATOR NOTES

MANY listeners are still apt to regard their accumulators for L.T. and H.T. use rather suspiciously. This suspicion presumably arises from a lack of understanding of how the cell works and how it should be treated. Certain it is that if an accumulator battery is mishandled, whether unintentionally or not, it will cause a great deal of trouble both mechanically and electrically.

The average battery contains lead plates and diluted sulphuric acid. There are a number of positive and negative plates in each cell.

Composition of the Plates.

The positive plates are made chiefly of lead peroxide; this is the active material. The negative plates are composed of spongy metallic lead. The former plate is reddish brown in colour when charged, while the negative plate is light grey.

When a conductor is connected between the two terminals, e.g. a valve filament or suitable resistance, current flows from the

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STANDS
135 and 166**

positive to the negative pole outside the battery. The lead peroxide of the positive plate and the active material of the negative plate is gradually changed to lead sulphate, which slowly covers the surface of the plates.

As the pores of the plates become clogged-up, the current slowly falls off, the accumulator becoming discharged.

It is then necessary to reverse the action by a current flowing in the opposite direction, to clear the plates of the sulphate.

Recharging the Battery.

The charger drives the acid off the plates, allowing the pores to open and the acid to circulate freely.

During the charging action the acid returns to its full strength, so that obviously in the whole process no acid is lost and consequently none should be added. The only way the acid may be lost is by actually spilling it or allowing it to leak away.

The acid does not evaporate, but the water with which it is diluted does, and so, pure water is the only necessary addition.

When the cell is first charged, pure distilled water should be added to pure sulphuric acid until the specific gravity of the solution, as shown by a reliable hydrometer, is as stated by the makers of the cell.

Henceforward, unless the acid is spilt or leaks out, distilled water only should be added to allow for evaporation.

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**BURNDIPT BATTERY CHARGER 49/6.
All Burndipt parts now stocked.**

**MULLARD MASTER 3
STAR** (Sept., 1928.)

This wonderful set will appeal to everybody interested in wireless. All parts available as Mullard's list:
3 Valve Holders (Lotus) at 1/3; Combined Coil (Colvern), 17/6; Mullard Permacore, L.F., 25/-; Climax "L.E.A." Transformer, 25/-; Climax H.P. Choke, 7/6; Best Battery Switch, 1/3; O.B. Log. 0005, 11/6; 00035, 10/6; Mullard Special 0003, 2-meg. Leak and Holder, 8/-; 0001, 2/6; 3 Plugs and 2 Spades, 1/6; Burne-Jones' Brackets, 2/6; 4 Terminals, 2/-; Joint Links, 1/-.

Total £5:19:6

If you send us £6:4:6 we will

Pay the carriage, include 2 handsome S.M. Dials, Baseboard Twin Flex, 9-volt Grid Bias, and a splendid Aluminium Panel, 18" x 7".
Any further particulars free.

Valves, all latest stocked.
D. L.F., H.F., P., 10/6.
12/6 each; D.U.10, 15/-.
Mullard P.M.4.D., 12/6.
Cossor, Mullard, Ediswan,
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**M.W. and P.W. 7/6
Loading Coils, 7/6
PAROUSSI SCREENING
BOXES STOCKED.**

**THE ORIGINAL
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SPECIAL PRICE £4:4:0** Specified parts

2 Ormond 0005; 2 Do. S.M. Dials; 6 T.C.C. Condensers; 2 E.B. Clips; B.B. Rheostat; 3 Dubilier Leaks; 3 Lotus V.H.; Ferranti A.F.3; 2 Switches; 1 Cossor Wound Coil; Terminals, Celazite, Grid Bias.
Handsome Oak Cabinet, 12/6.
With baseboard, Carr. 2/-.
Also Cabinets at 15/11, 18/11, and Mahogany Polished, at 20/-. Carriage 2/-.
**COSSOR VALVES 2, 4, or 6-Volt for above. L.F. D., R.C., or H.F., 10/6 each. Power, 12/6.
COSSOR AND MARCONI SCREENED-GRID VALVES 22/6.**

FREE with parts
Drilled High-grade 21 x 7 Polished Panel and Strip. Wood Screws. Carriage 1/-.
D. R.C., or H.F., 10/6 each. Power, 12/6.

LEWCOS PRODUCTS
O.T. Coils, 40, 50, 60, 75, 3/6 each. 100, 150, 200, 5/3 each. Gizzle, 10d. 10 ft. Litz Wire, 9/38. 4/- 50 yds. 9/38. All silk. 5/6 50 yds. Also in 20-yard reels, Litz, 27/12, 11/6 50 yds. Frame Aerial Wire, 3/6 100 ft. Battery Leads, 4-way, 5/6; 5-way, 6/6; 6-way, 7/6; 7-way, 8/6. All Binocular Coils.
"Q" Coils, 21/- Aerial, 15/- In stock.

LISSEN AERIAL
Valve Holders, 1/-; Fixed Con., 1/-; 1/6; Leaks, 1/-; Switches, 1/6; 2/6; Latest 2-way Cam Vernier, 4/6; Rheostats, 2/6; B.B., 1/6; Lissenola, 13/6; L.F. Transformers, 3/6; Coils, 60 X 3/4; 25 X 9/9; 60-v. H.P., 7/11; 100-v. 12/11; Super 60-v., 13/6; Grid Bias, 1/6; 4-5, 5d.

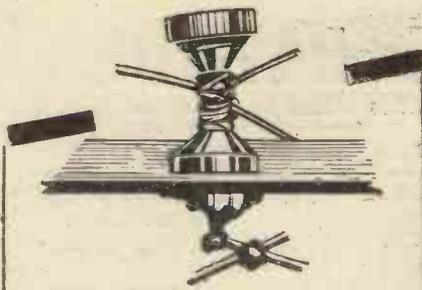
OCTRON BRITISH VALVES, 2, 4 & 6 volts. L.F., R.C., H.F., 5/-.
Power, 6/9.
Full Guarantee Chart Free.

EBONITE cut while you wait at 1d. square inch, also 1/4 in. at 1d. Only the best supplied. No cheap rubbish.

Send your orders, wire, phone or write (plainly please). Personal attention to your requirements. Parts for most "Popular Wireless," "Modern Wireless" and "Wireless Constructor" Sets.

TECHNICAL NOTES.

(Continued from page 158.)



THE CENTRE OF LOSSES IN YOUR SET ARE OFTEN IN THE TERMINAL CONNECTIONS

Loose joints, flux and too much solder, are the little things in radio that make the difference between mediocre and excellent reception.

Write for this free Booklet—



and learn about the Eelex gnomes of efficiency that make terminals the centre of industry in your set and ensure improved reception

By using



TREBLE DUTY TERMINALS

the possibility of a wrong or accidental connection is practically eliminated.

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CHISWELL STREET, E.C.1

Automatic Action.

The line-voltage regulator in question is made by the Acme Apparatus Company, and is automatic in its action. This device was tested on input voltages varying above and below a standard value of 110 volts, the actual voltages being 96, 100, 110, 120 and 126 volts, representing percentage overloads of -12.8, -9.1, 0.0, 9.1, and 14.6. It was found that with an 18-watt load the output voltage from the voltage regulator was 110 volts in all the above-mentioned cases, which was an excellent performance, particularly in view of the fact that the percentage variations in the input voltage which were tried in the test were considerably greater than those likely to be encountered in practice.

Effect of Load.

The efficiency of the device as a voltage regulator depends, as one would expect, upon the load which is imposed upon it, and with a 75-watt load and tests at 94, 109 and 123 volts input, the output voltages were 108, 109 and 110 volts respectively. It should also be mentioned that the device is not intended to operate with a load above 60 watts, which is quite sufficient for all ordinary A.C. receivers taking the filament and plate supply from the electric-light mains.

A Common Aerial.

Readers often ask whether it is possible to operate two receivers satisfactorily from one aerial, and also whether this has any advantages over operating two or more loud speakers from one receiver.

The operation of two loud speakers in different parts of the house from one receiver is, of course, extremely simple, and merely means connecting the two loud speakers in parallel to the output of the set.

As regards working two sets from one aerial, this in the ordinary way is a disadvantageous arrangement as compared with the above since, of course, it means the capital cost of two sets to do the work of one. In certain special cases, however, the arrangement is useful as, for instance, where different parties requiring two receivers have not the necessary space or other facilities for erecting separate aerials and desire to make use of a common aerial.

Special Precautions.

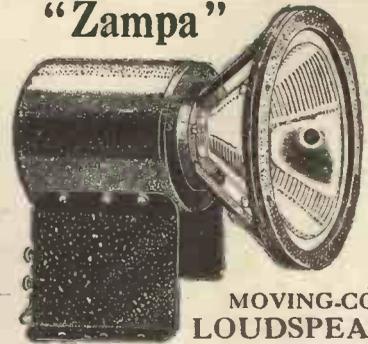
It will generally be found desirable to introduce a radio-frequency choke in the lead-in of one of the sets, the lead-in to the other set being a direct connection. The size of the radio-frequency choke is not critical, but it should have a low distributed capacity, and a correspondent informs me that he has made a suitable choke by taking a former 1 in. in diameter and winding it for about 4 in. with No. 26 D.C.C. wire. Both sets should, of course, be of the non-oscillating type and a common earth connection may be used.

A Better Method.

Another and preferable method is to introduce into each leading-in wire a fixed condenser of, say .00025 mfd., using again a common earth connection.

(Continued on next page.)

"Zampa"



MOVING-COIL LOUDSPEAKER

The "Zampa" is an entirely British instrument, scientifically and soundly constructed, unequalled in its quality of reproduction.

Most economical to use as it only consumes .5 amp. at 6 volts. The moving coil is wound to 1,500 ohms.

Remember the "Zampa" is a complete assembled unit. It gives absolutely natural, clean and crisp reproduction and yet is sold at the following low price:

To work off 6-volt accumulator or Trickle Charger from A.C. Mains, including Step-down Transformer **£5 17 6**

Permanent-magnet type including Step-down Transformer **£9 10 0**

The Permanent-magnet type can be worked direct off any standard set.

THE ZAMPA REGENERATIVE AERIAL TUNER. This excellent tuner has been designed to meet the requirements of the Home Constructor. The method of reaction ensures perfect balance and control over the 250-2000 metres range.

PRICE 13/6

Obtainable through all Dealers.
MIC WIRELESS CO.,

White Horse Place, Market Street,
WELLINGBOROUGH.

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Terms to Trade

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Also made to accommodate any Popular Set. Quotations for Specials by return. Illustrated Lists Free.

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Mount Pleasant Road, London, N.15
Phone: WALTHAMSTOW 1626

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TECHNICAL NOTES.

(Continued from previous page.)

A third method which, however, is not as good as the last-mentioned one, is to run the aerial lead-in straight to one of the sets, then connect a wire from the earth terminal of that set to the aerial terminal of the second set, the earth terminal of the second set being then connected to earth; in this way the aerial coils of the two sets are put in series.

The second of the three methods above does not differentiate between the two sets, and is therefore applicable to more than two sets.

Extra Amplification.

Naturally it is to be remembered that the energy input into the aerial is limited, and inasmuch as this energy is divided between two or more receivers it will probably be found that more amplification is necessary to produce a given result than if the set had the undivided input from the aerial.

Curing Noises.

Once noises have developed in a receiver, an attempt may be made sometimes successfully to clean up the suspected parts,

The Best Modern Sets
are to be found in
MODERN WIRELESS
Every Month. Price 1/-

especially cracks adjacent to soldered connections. The terminals in the region immediately around should be cleaned with an alkali such as household ammonia, applied by means of a tiny wad of cotton wool on the end of a large needle. This, in turn, is removed by the application of water in the same way, the cleaning being completed by a fairly generous application of methylated spirits.

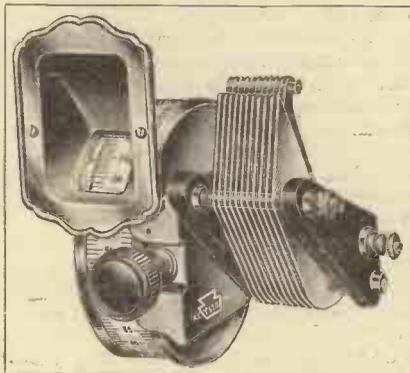
Strength of a Joint.

Whilst on the subject of soldering I may say that many constructors fall into the rather bad practice of relying upon a soldered joint, not only for satisfactory electrical connection but also for mechanical strength. There are certain cases where it is perhaps inconvenient to make a mechanical joint independent of the aid of solder, but wherever possible this should be done.

With busbar, especially if of fairly heavy gauge, it is perhaps awkward, but with round wire and with a conductor of a fairly light gauge it is generally possible to make a twisted connection which will have all the necessary mechanical strength and "dependability" without any soldered joint.

(Continued on next page.)

Keystone
COMPONENTS
ARE THE
ACME OF PERFECTION



KEYSTONE DRUM DRIVE

Designed to fit all standard condensers, which can be mounted on either left or right of the drive. A delightfully smooth slow-motion drive gives a reduction of 9-1. Accurate tuning with a minimum of trouble is ensured. **PRICE 9/-**

SPECIAL ANNOUNCEMENT

IN view of the increasing popularity of the "CONSTANT THREE" receiver, described in the September, 1928, issue of "Modern Wireless," and the equal interest shown in the KEYSTONE DRUM DRIVE, specified for inclusion in this set, we are making the following offer:

Keystone Drum Drive, complete with Keystone Double Gang Universal Log Condenser .0005 **£2/2/0** mfd. and ready drilled Copper screen

The above assembly fitted to Panel and Base-board, including Angle Brackets and **£2/17/6** Push-Pull Switch

THE high quality of KEYSTONE Components is reflected in every well-built set. Only the finest materials obtainable are used, and every article is stringently tested before leaving our works. We invite you to compare KEYSTONE Components with similar articles on the market, and we know you will find that we are supreme in quality and price. Write for list No. 23, which gives particulars of the full range of KEYSTONE quality components.

PETO-SCOTT Co., Ltd.

77, CITY ROAD, LONDON, E.C.1.
62, HIGH HOLBORN, LONDON, W.C.1.

5944

EBONITE BUSHES FOR MOUNTING ON METAL OR WOOD
PERFECT INSULATION
Two required for each hole.

NUMBER	0	1	2	3	4	5	6
Hole in Bush	6BA	4BA	2BA	1 1/2"	5/16"	3/8"	7/16"

Price each: 1d. 1d. 1d. 1d. 2d. 2d. 2d.
(Complete List of sizes free on application.)
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Waldram Rd., Forest Hill, London, S.E.23.
TRADE SUPPLIED.

HEADPHONES REPAIRED 4/-
Transformers 5/- Loudspeakers 4/- All repairs remagnetised free. Tested, guaranteed and ready for delivery in 24 hours.
Discount for Trade. Clerkenwell 1795.
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Largest manufacturers require agents; free sample book; delightful novelties. Calendars, Real Feather Bird, New Feature in Cut-out Velour designs; Black Cats and Dogs with glass eyes; detachable sprays of flowers; Notepapers, Celluloid Pocket Calendars, Blotter; Greeting Cards for every taste. Most extraordinary book ever published. Enormous profits. Prizes for all. Write—
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EASY PAYMENTS
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Send a list of the parts you are requiring, and we will send you a quotation on monthly payments.
H. W. HOLMES, 29, FOLEY STREET, Phone: Museum 1414. Qt. Portland St., W.1.

LARGE OAK CABINETS 10/-
24" x 15" x 10", complete with Ebonex Panel. 23" x 8", and B.B. Plenty room for batteries Double door solid Oak Cabinets. 36" x 18" by 3" high. 36". Usually 25. *Illus. List, stamp.*
J. TEAGLE, WOBURN, BLETCHLEY.

WET H.T. BATTERIES
Solve all H.T. troubles.
SELF-CHARGING, SILENT, ECONOMICAL.
JARS (waxed) 2 1/2" x 1 1/2" sq. 1/3 doz. ZINCS. new type 1 1/2 doz. SACS 1/2 doz. Sample doz. (18 volts), complete with bands and electrolyte 4/3 post 9d Sample unit, 6d. *Illus. bookies free*
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AMPLIFIERS 30/- 7-VALVE SET £-
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No. 16217 "Daimon" Battery 60 volt with Grid Bias 7/3 each
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From all good dealers.



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are the Best Bargain ever offered to Radio users. £10 worth of precision, Multi-range Mirror scale, Jewelled knife-edge Instrument for - - **55/-**



NEW A.C. MODEL "One-meters." Ready Jan. 1st. Ask for A.C. Leaflet.

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CABINET gives wonderful reproduction over the complete tonal range. Beautifully polished mahogany. Price, complete with Viola producer and cord, 25/-.

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MICROPHONE BUTTONS, as used in the Service, solid back inset type, 10d. each. Genuine Skinderviken in original boxes, 2/- each. The wonderful little units are used in the "A.W." system for amplifying without valves, speech magnification, sound detection, and Micro Stethoscope fitting, 5/-.

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TECHNICAL NOTES.

(Continued from previous page.)

at all. The application of a touch of solder at the joint then simply ensures a perfect and permanent electrical connection; this, of course, would not be the case if the joint were left exposed, so that corrosion might creep in between the conductors.

Electrical Connections.

A joint made in the above manner should be perfectly satisfactory, but it should always be borne in mind that soft solder, especially when present only in very small quantities, is not really mechanically strong at all and frequently quite a considerable tension may develop across a joint, due to slight movements of the components, quite sufficient to break apart a joint which is not reinforced and which depends entirely upon the solder—for example, a soldered "butt" joint. What is perhaps even worse is for the joint to come almost apart, so that the two parts make intermittent contact. This will give rise to the most troublesome noises in the set, and if the parts do not separate to a visible extent the trouble may prove most difficult to locate.

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In short, although at first sight it may appear rather unnecessary, it is always worth while making connections mechanically sound, independent of solder, and then using a touch of solder purely for the purpose of making permanent metallic contact.

Adding Power Stages.

An additional stage of power amplification may be added to practically any set without touching the wiring of the set itself. A resistance-coupled power stage is assembled externally to the receiver and is connected to the latter either by plugging to the output jack or wiring to the output terminals, as the case may be. Extra connections are, of course, made to the high-tension, low-tension, and grid-bias batteries, whilst the loud speaker is connected to the output of the power amplifier.

The last valve may be left in the receiver or a power valve substituted for it, and the bias changed accordingly. The ordinary power-valve or super-power valve arrangement is used in the added stage.

Other Circuits.

The adding of a stage of power amplification is not, of course, limited to resistance coupling, but may be used with transformer, impedance, and push-pull circuits.

Where a set already employs three stages of low-frequency an external additional stage of amplification is not practicable, and in any case such a powerful receiver needs careful design throughout.



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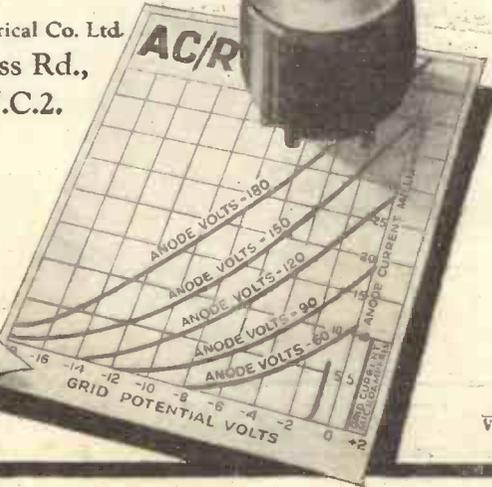
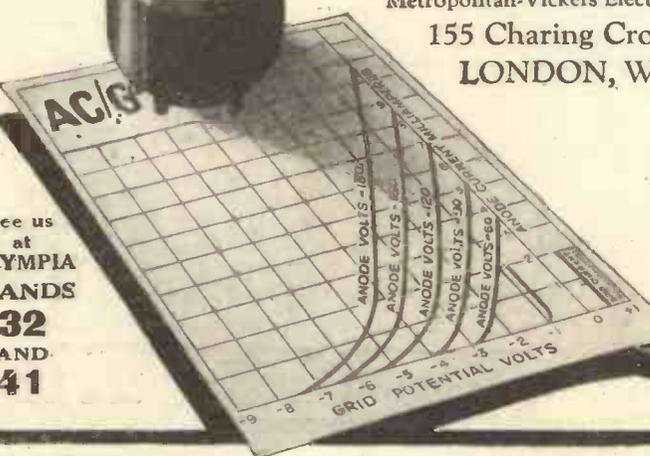
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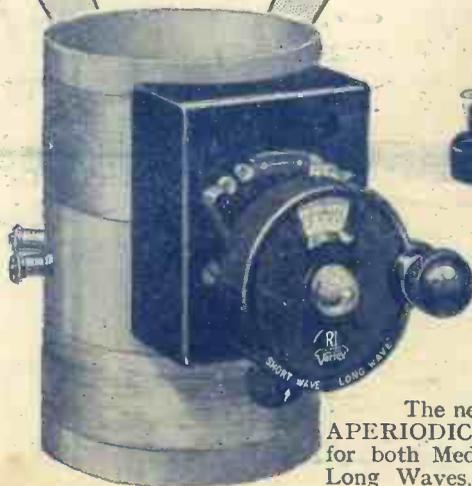
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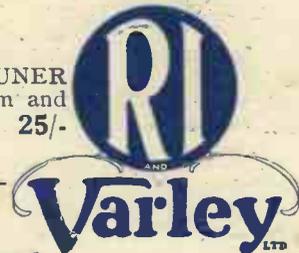
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