

HOW TO MAKE THE "P.W." DUO-REFLEX.

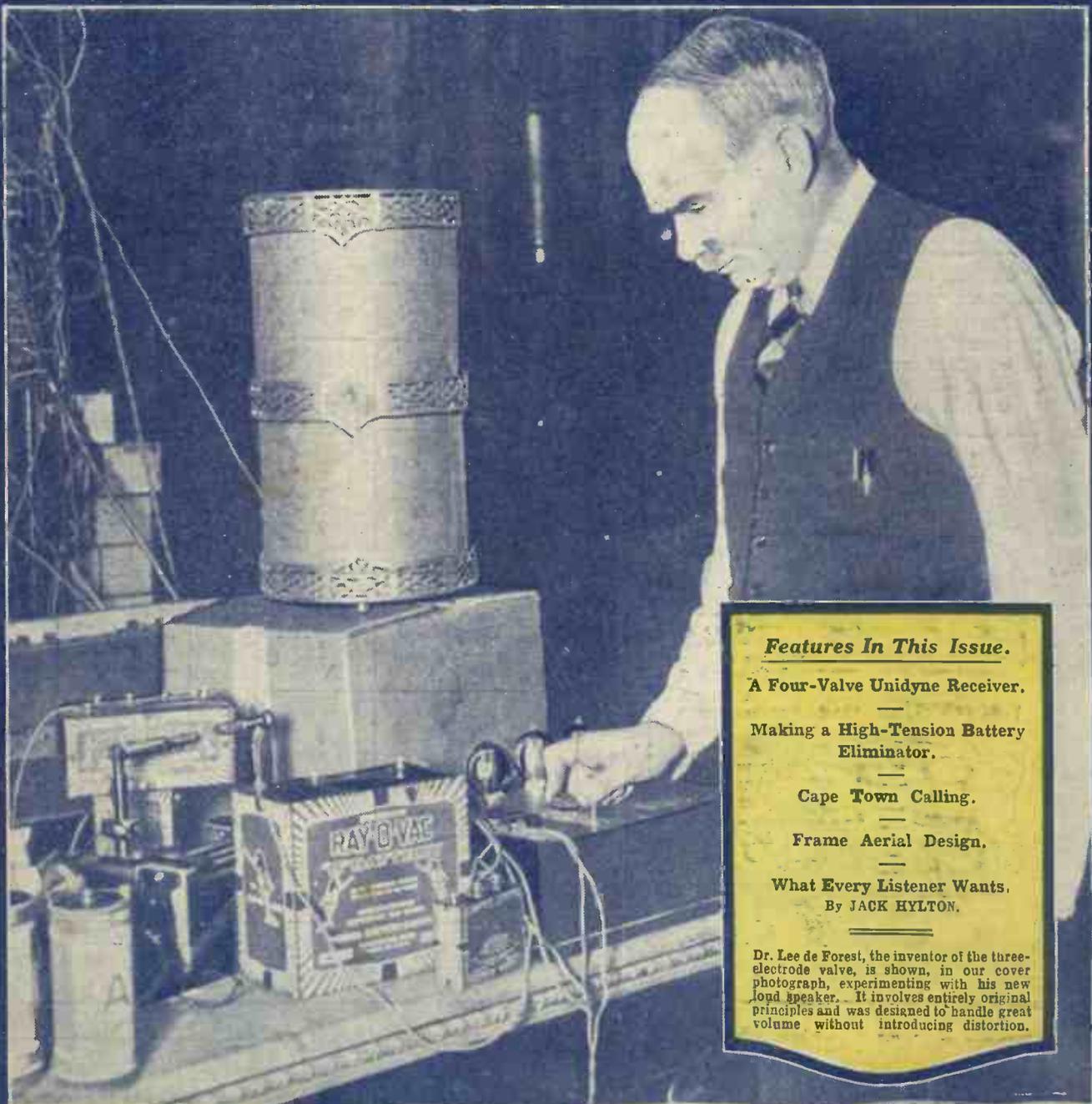
Popular Wireless

Every Thursday
PRICE
3d.

No. 197. Vol. IX.

and Wireless Review
Scientific Adviser: SIR OLIVER LODGE, F.R.S., D.Sc.

March 6th, 1926.



Features In This Issue.

A Four-Valve Unidyne Receiver.

Making a High-Tension Battery
Eliminator.

Cape Town Calling.

Frame Aerial Design.

What Every Listener Wants.
By JACK HYLTON.

Dr. Lee de Forest, the inventor of the three-electrode valve, is shown, in our cover photograph, experimenting with his new loud speaker. It involves entirely original principles and was designed to handle great volume without introducing distortion.

Marconi VALVES for 2-volt accumulators



TYPE D.E.R.

General purpose dull emitter valve which may be used with satisfaction in any position on a receiving set.

14/-

The correct type of Marconi Valve in each holder of your set will ensure the faithful rendering of broadcast music, song and speech.

Marconi Valves are supreme by repute and actual test. For power and purity of reception, economy in current consumption and for long life they are invariably chosen by discriminating radio enthusiasts everywhere.

TYPE D.E.6

Particularly suitable for use in the last stage of a L.F. amplifier using D.E.R. or D.E.2 in the initial stages.

18/6



Table, showing recommended combinations for Marconi Valves for 2-volt Accumulators

	Type	Position	Grid Bias Volts	High Tension Volts
2-Valve Set One H.F. and Detector	DER	H.F.	0	40
	DER	DET	+2	40
	DE 2 H.F.	H.F.	0	60
	DE 2 H.F.	DET	+2	60
2-Valve Set Detector and one L.F.	DER	DET	+2	40
	DER	L.F.	-3	80
	DE 2 H.F.	DET	+2	60
	DE 2 L.F.	L.F.	-4.5	80
	DER	DET	+2	40
	DE 6	L.F.	-9	120
3-Valve Set H.F. Detector and L.F.	DER	H.F.	0	40
	DER	DET	+2	40
	DER	L.F.	-3	80
	DE 2 H.F.	H.F.	0	60
3-valve Set Detector and 2 L.F.	DE 2 H.F.	DET	+2	60
	DE 6	L.F.	-9	120
	DER	DET	+2	40
	DER	1 L.F.	-4.5	120
	DE 6	2 L.F.	-9	120
	DE 2 H.F.	DET	+2	60
	DE 2 L.F.	1 L.F.	-3	80
	DE 6	2 L.F.	-6	80
	DER	DET	+2	40
	DE 6	1 L.F.	-9	120
DE 6	2 L.F.	-9	120	
DE 2 H.F.	DET	+2	60	
DE 6	1 L.F.	-9	120	
DE 6	2 L.F.	-9	120	



TYPE D.E.2

L.F. and H.F.
The Marconi D.E.2 is an important advance in the design of valves for use with 2-volt accumulators, the filament consumption is very low without detriment to its other characteristics.

15/6

For other recommended Marconi Valve Combinations, write for Publication RT 443

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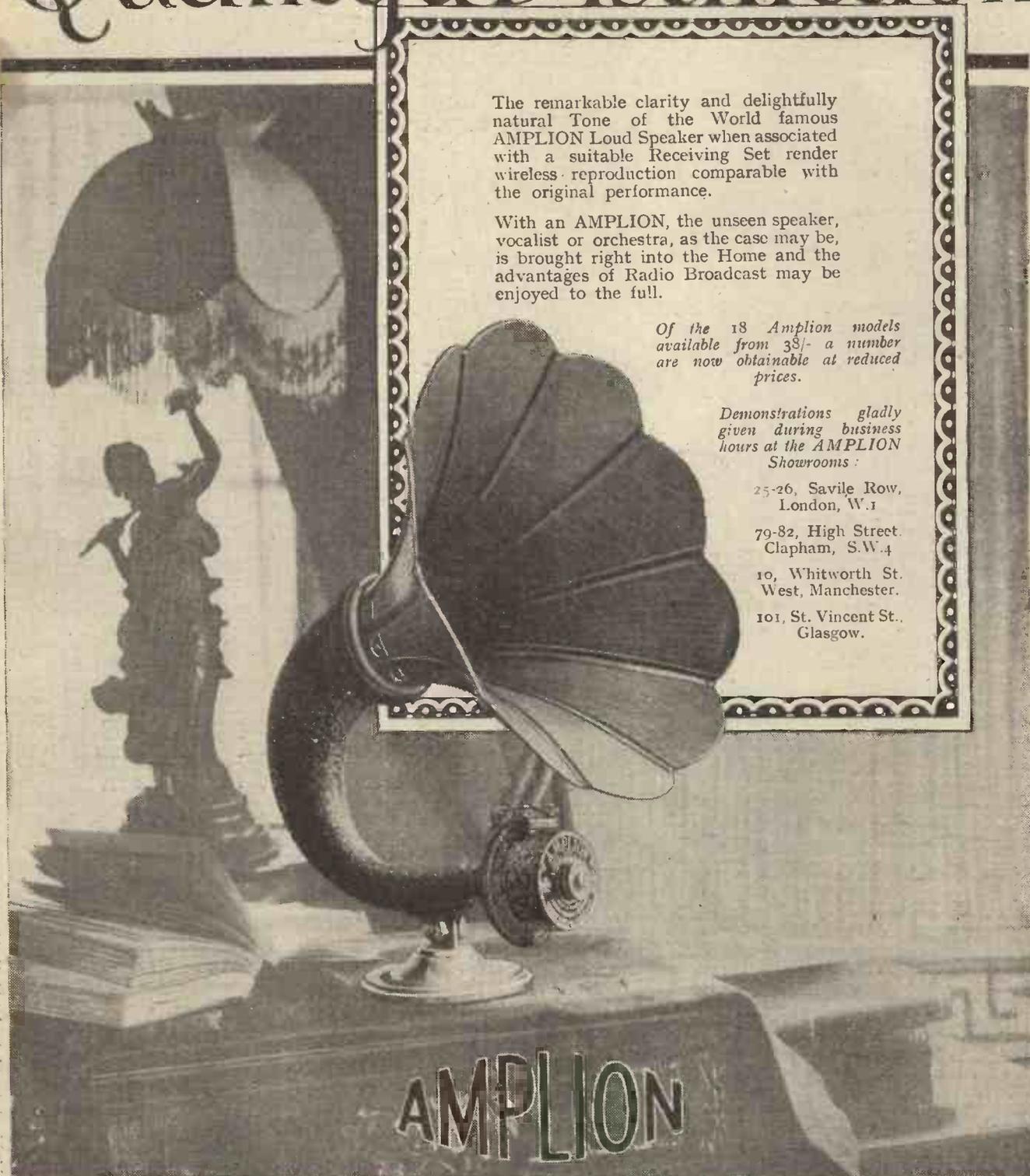
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GUIDES FOR WIRELESS CONSTRUCTORS



*The Two Latest Numbers
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This new addition to the popular "Best Way" series of Guides for the Wireless Constructor contains the latest and most authentic information on the best Crystal Sets of the Year. A special feature of the book is the clear constructional photographs illustrating the assembling of each set. All of the circuits described have been carefully tested, so that amateur constructors can be certain of good results. The Sets described are as follows:— A One-Control All-Range Set; Building a "D" Coil Receiver; The Universal Crystal Set; A Quick-Change 2 LO-5 XX Receiver; A Main Stations Ultra and The Half-Crown Crystal Set.

Three Famous VALVE SETS

This book describes and illustrates in photographic detail three absolutely reliable circuits. All have been most carefully tested under normal broadcasting conditions and will give the utmost satisfaction. The sets concerned are "A Trinaryne Two-Valver," "The 'Chitos' One-Valve Set," and "The One-Valve Unidyne Receiver," and the directions given in this book make the assembling of each set exceedingly straightforward and easy to follow.

Price **6^{D.}** each

At all Newsagents and Bookstalls.

CONSTRUCTORS USING THESE BOOKS CANNOT GO WRONG

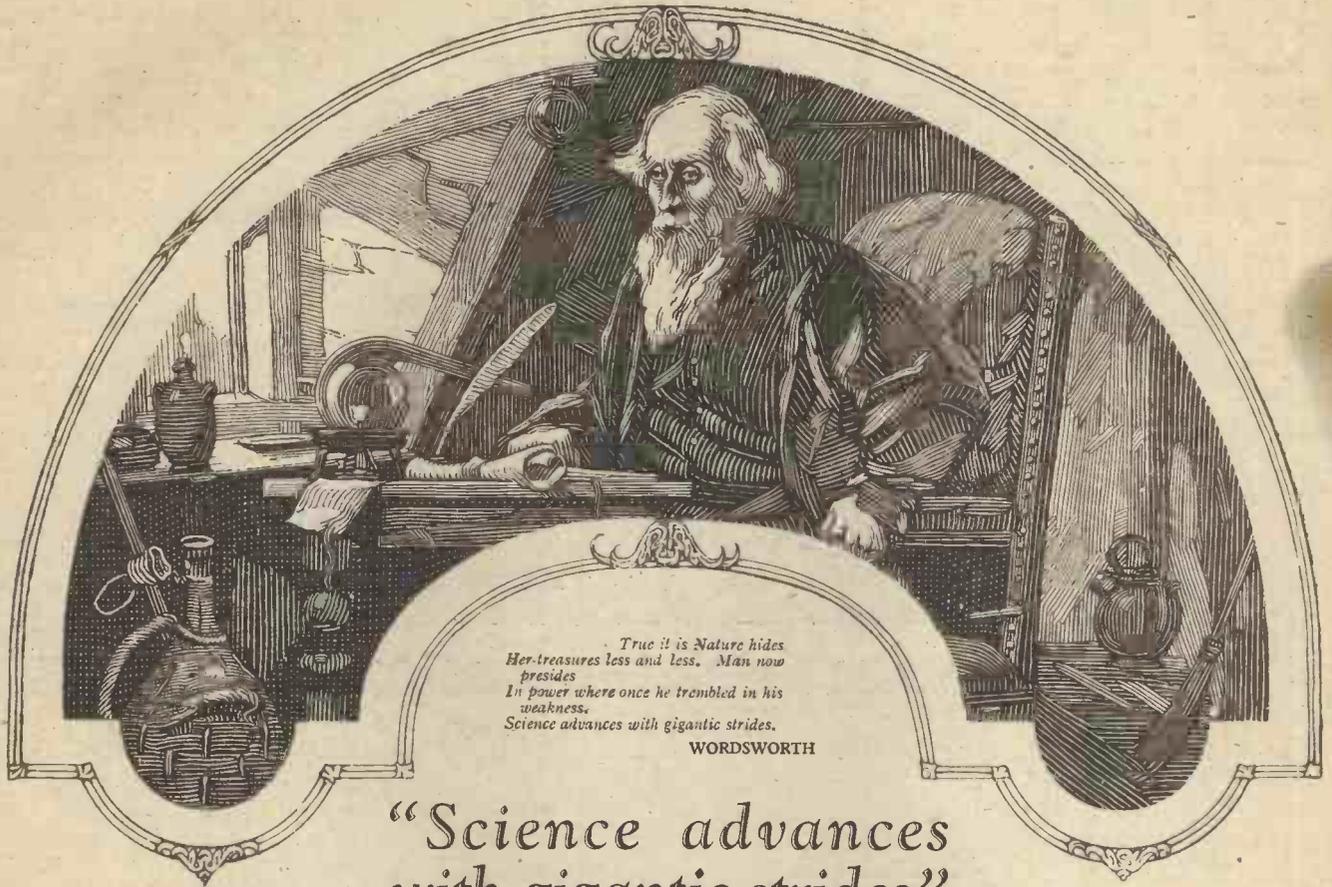
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“Science advances with gigantic strides”

THE Middle Ages present us with few more romantic figures than the Alchemist. Feared for his magic, more than one suffered the penalty of the stake as a grim reward for his reputed dealings with the Evil One. And yet to these pioneers—these persistent searchers for the Philosopher’s Stone—civilization owes much. They were the world’s first scientists.

But now, after slumbering for so many centuries, Science “advances with gigantic strides.” The fallacy of Alchemy is exposed—sensible men no longer seek the magic formula for the transmutation of base metals into gold. The Alchemist has become the Chemist.

Wireless owes much to the Chemist. It was a Chemist who reasoned that as the whole object of a heated filament is to produce electrons, why not so treat the filament that it gives off a more prolific stream at a

lower temperature? And so the idea of the dull emitter valve was born.

To the wizardry of the Chemist we owe the Wuncell—the wonderful Cossor Valve which functions with a filament glow almost invisible. It was his skill which rendered possible its triple-coated filament. Just as the first Dull Emitter was a mile-stone in the progress of Radio, so the Wuncell to-day represents the high-water mark in the evolution of the Valve.

With its electron-retaining hood-shaped Grid and Anode—made famous by Cossor—it sets a new and higher standard of performance. For sensitivity, rare mellowness of tone and lack of microphonic noises, the Wuncell is unsurpassed. Whilst, freed from the destructive influence of excessive heat, its sturdy and robust filament ensures an exceptionally long life. Couple with these facts its low maintenance costs and you’ll understand the secret of the great wave of popularity now being enjoyed by this remarkable Valve

Types and Prices:

- *W.1. For Detector and L.F. use - 14/-
Consumption: '3 amps.
 - *W.2. (With red top) for H.F. use 14/-
Consumption '3 amps.
 - W.3. The Loud Speaker Valve - 18/6
Consumption '5 amps.
- *Also in special base with resistance to suit 2-, 4- or 6-volt Accumulator 16/-*

Cossor Valves

Popular Wireless

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 Consultants:
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J. F. CORRIGAN M.Sc.
 A.I.C.
C. E. FIELD, B.Sc.



Editor: **NORMAN EDWARDS**, M.Inst.R.E., F.R.S.A., F.R.G.S.

Technical Editor:
G. V. DOWDING,
 Grad.I.E.E.
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 Editors:
K. D. ROGERS,
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RADIO NOTES AND NEWS.

Control Dials for Nothing—Concert Party for B.B.C.—An Interesting Memorial—The Best Wire to Use—Transatlantic Telephony—"P.W.'s" Broadcast from America.

Who Told You That?

TEACHER (despairingly indicating a map of Europe): "Jones Minor, have you *any* idea where Prague is?"
 Jones Minor: "Well, sir—not on the map; but" (more hopefully) "I can get him on the loud speaker with the aerial condenser at 39, sir."

Featuring John Henry.

WILL John Henry become a film-star, as well as a star radio turn? He and Blossom have been screened by Challis Sanderson for the Gaumont Film Company, and the result is hailed by the critics as being highly successful. The latest idea is to find some British talent for all-British films, and early in the search John Henry has shown signs of becoming a very promising film comedian. All listeners will wish him well in the new venture.

Control Dials for Nothing.

IT is extremely difficult to get radio apparatus into China, because the Government regards all wireless goods as contraband, and terms them "Munitions of War"! But the wily Chinese has discovered that he can get good knobs and dials for his set from ink and gum bottles! In a letter to the famous ink manufacturers, Henry C. Stephens, Ltd., a customer says: Firm I belong to uses 30 bottles of gum a year, so do not lack for knobs. We get knobs for nothing, and our radio sets are covered with knobs."

Knobby idea, isn't it?

The Ultra-Audion Unidyne.

RECOUNTING his experiences with the "Ultra-Audion Unidyne" (a descrip-

tion of which appeared in "P.W.," October 10th, 1925), an Aberdeenshire reader says:

"I have had it working here now for about three months, and the results are perfectly splendid. We receive Radio-Berne every night about as loud as our local station, and stations come in by the barrow-load."

I have often heard of a "dial-full" of stations, and of "a condenser crowded with 'em"; but I must admit that one valve bagging a "barrow-load" is new in my experience.

A London Memorial.

WRITING with reference to the "Talk on Clerk-Maxwell," by Sir Oliver Lodge, F.R.S. (published in "P.W.," February 13th), Capt. D. A. F. Needham, a Kensington reader, informs me as follows: "It may interest readers to know that a blue tablet is fixed to the front of the house at No. 16, Palace Gardens Terrace, Kensington, which bears the following inscription:—

JAMES CLERK MAXWELL
 1831—1879
PHYSICIST
 Lived here.

Tuning Coil Tests.

THE latest report upon Tuning Coils by the American Bureau of Standards is something of a bombshell. It has established several facts about the efficiency of the various kinds of coil in use, and it proves the old-fashioned solenoid coil wants a lot of beating. Another point which has been shown is that encasing a coil with a binder is not half so dreadful as the led-away-by-a-theory merchants would have us believe—in fact, the naked coils are hardly a whit better than their decently-clothed brethren.



The B.B.C.'s new Radio Dance Band, which under the leadership of Mr. Sidney Firmin, has recently been broadcasting from London.

Concert Party for B.B.C.

HAVING made a success of its own military band, symphony orchestra, revue party, and radio dance band, the B.B.C. is now engaged in forming its own concert party. The nucleus of this will be formed by the enlistment of several leading variety artistes, and I hear that a healthy competition will be introduced into their efforts by the relaying of other concert parties from the various seaside resorts.

The Best Wire to Use.

THE most interesting disclosure made in this highly important review of coils is in connection with the wire used. As our older readers will remember, Sir Oliver Lodge said long ago in "P.W." that thin wire did not necessarily mean inefficiency, and this journal has never subscribed to the widely-held fallacy that a good coil must invariably look like a cross between a spring mattress and a chair spring.

(Continued on next page.)

NOTES AND NEWS.

(Continued from previous page.)

Praise for No. 24 D.C.C.

THIS latest analysis shows that for most broadcast work No. 24 D.C.C. wire is suitable; and that large wire like 16 D.C.C. has a higher resistance than even No. 28 on the lower waves! If you look back at old "P.W.'s" you'll find we have always recommended that 24 D.C.C.—now officially recognised and blessed!

Ether Police Patrol.

IT is reported that a closed-in motor-car, fitted with a portable wireless set, frame aerial and all the latest direction-finding dodges, is being put on street patrol by the Post Office. Its purpose will be to track down oscillators in areas where interference has been specially noticeable. Good luck to it!

Please Don't Bloop.

BECAUSE the Americans were badly interfered with by howls and oscillation during the International Radio Tests, they have started an "I-won't-bloop" club. Candidates are asked: "Are you a Blooper, and if so, why?" and then they have to sign a pledge-card saying, "I pledge myself to operate my radio set to reduce radiation, or blooping." The slogan of the club is "Stop Bloops and Human Static," and the aim is the total elimination and abolition from the ether of everything in the whistle, crash, squeal, zuupp, bong, or bloop line!

Broadcasting Committee's Report.

AT the time of writing it is expected that the Government Broadcasting Committee's report will be issued early in March. Several "inspired" accounts of the recommendations likely to be made have appeared in the Press. But the source of the information is lacking, so that it is extremely doubtful if they amount to much more than guesswork.

There is a persistent rumour that the existing licence fee of 10/- per annum will not be lowered—if it isn't, public esteem of the Committee will be!

Sir Harry Lauder.

SOMETHING has gone wrong with you, your liver is out of order, or Johnny Jones has been giving you a biff on the nose," said Sir Harry Lauder to the little patients at the Cheyne Hospital for Children, when he handed over the wireless installation provided by the "Wireless for Hospitals Fund."

Then he made the interesting announcement that he himself would be broadcasting again on Saturday, March 6th, and the matron had to promise to let the children keep awake to hear him—the big ones, anyhow.

Crown Coils.

THE Standard Telephones and Cables Ltd. (formerly Western Electric Co., Ltd.) recently brought an action in the High Court, regarding the infringement of the De Forest patents by the sale and manufacture of Crown Coils. The defendants claimed that in so far as the Igranic coil (made under the patent) differed radically in structure and appearance from the Crown Coil, the latter could not be an infringement.

The learned judge thought otherwise, and granted an order for delivery of all infringing coils, and an inquiry as to damages. Defendants were ordered to pay plaintiffs' costs, up to and including judgment.

Transatlantic Telephone Tests.

A FINCHLEY (North London) reader had an interesting experience a Sunday or two ago, when experimenting with a super-het. He happened to hear Rugby testing (telephony) with America, the signals being picked up direct on his intermediate amplifier, which was tuned to about 7,000 metres. To his surprise he presently heard a reply, and was then able to listen in to America quite clearly. It was midday here, but the distant speaker was announcing that out there it was 7 a.m., and he sure wanted his breakfast after the night's successful tests!

The Rendezvous.

WHILST searching the ether with my 2-valve set (H.F., C., and L.F.), I hit a spot where four programmes appeared to meet," says an Eastbourne reader. "There was (1) Band, (2) Violin and

SHORT WAVES.

"Jazz, to my mind, represents the optimist in music"—Jack Hylton, writing in the "Radio Times."

"Wireless is practically debarred from all serious public debate of the many grave problems that perplex our age—political, social, religious and moral. That is a veto which cannot be perpetuated."—Harold Spender, writing in "The Contemporary Review."

"It does not any longer pay the B.B.C. to try to attract new subscribers, because, under the present arrangement they will not see one halfpenny of their licence fees."—A writer in the "Evening News."

orchestra, (3) Soprano, and (4) Man talking (foreign); then on the same spot a clear voice rang out, 'Dublin Calling . . .' and we had the Volga Boatmen's Song on top of the others."

If he hadn't got Selectivity, he certainly had Variety upon those two valves and the crystal!

Englishman Wins.

ONE of the leading American radio journals, "Radio News," recently held a "370-dollar Radio Play Contest" to find a good play for broadcasting. The winning item was broadcast from W R N Y (the "Radio News" own station), and of the seven winners the First Prize goes to Mr. Brian Holloway, 51, Arnold Road, Woking, England. Well done, the Old Country.

Nearly Two Millions Now.

NEARLY two million broadcast receiving licences are now in force in Great Britain, the exact number on January 31st being officially estimated at 1,841,000. This number is still increasing rapidly, and there is no doubt that the two-million mark will soon be reached. The rate of increase in the number of licences issued has risen during the past three months, due no doubt to the fact that prosecutions for the non-payment of the fees are taking place every week all over the country. The amount of the fine imposed varies according to cir-

cumstances, but in nearly every case the magistrate points out that a fine of a guinea or so is merely a warning, and subsequent cases will be dealt with more severely.

What's In a Name?

I'M interested to see that wireless receivers—like race-horses, or prize pussies—are now being christened with fancy names.

Recently there was the "Tally-Ho Two," or some such pseudonym, and now a masterpiece entitled the "Kitten," or the "Tom Cat Three," has made its appearance.

If this idea spreads, won't it be funny when queries come in, saying, "I've built your Dual Dog set, but it won't stop howling," or "I made up the Flying Horse, but it's not stable." Other names that leap to the mind are "The Rat Trap Four," "The O K 99," and the "One Over the Eight" for a nine-valve super.

Irish Long Distance Feat.

AN Irish experimenter, Mr. Frank Neill, of Whitehead, Co. Antrim, recently succeeded in getting into direct touch with Melbourne, Australia. The distance covered was approximately 12,000 miles, but to Mr. Neill's surprise the reply was not in Morse, but telephony. The Australian, Mr. Howden, of Melbourne, succeeded in transmitting clear speech for about a quarter of an hour, after which signals faded away into indistinctness.

London's Wireless Exhibition.

THIS year's Wireless Exhibition, to be promoted by the National Association of Wireless Manufacturers and Traders (N.A.R.M.A.T.), will be held in the New Hall, Olympia, from the 4th to the 18th of September, both dates inclusive.

The Exhibition will be open to the trade as a whole, so it should be a record-breaking one, thoroughly representative of the British Radio Industry.

"P.W.'s" Broadcast from the U.S.A.

WAS the Aurora Borealis to blame for the poor reception during International Radio Week? This was one of the points dealt with by Mr. Lawrence W. Corbett, "P.W.'s" special correspondent in New York—in a final speech to American and British listeners, broadcast from the "World's Playground Station, New York."

The speaker acquitted the aurora of all blame, on the testimony of Donald B. MacMillan, the explorer. This expert has stated, "When up in the Arctic we even passed through the aurora belt, and it did not trouble the radio waves in the least."

Licences for Unused Sets.

WHAT is the law regarding unused wireless receivers? According to a Press report a man at Hull was fined half a guinea, with 31s. 6d. costs, for having an unlicensed crystal receiver; and the stipendiary magistrate said that the licence must be obtained before the various parts were put together, and whether the results were good or bad.

A correspondent raises the question as to whether possession of an unlicensed, unused set invariably breaks the law? Probably it does, but a line to the Post Office would soon disclose their attitude, in cases of doubt,

ARIEL.



TWELVE years ago I was in London with less than sixpence in my pocket. I played at clubs and cinemas, and one day a famous musician remarked to me how thin English dance bands sounded in comparison with those in America. Before I knew what had happened, I had taken on a bet for considerably more money than I possessed to write better music than the Americans. I had to win that bet. It led to the formation of my band.

Rhythm is an essential part of human nature. Away back in the world's history, men and women danced to the rhythmic beats of the tom-tom. Human nature is the same to-day. But when jazz first came to Britain, there was a loud protest by many people against what they called the "invasion of barbarous music." Recently, a fresh attack has been made against our modern syncopated music; and it is surprising to find that even eminent authorities on matters musical confuse the terms "classical," "jazz," and "syncopation."

Origin of the Famous Band.

Years ago, I toured the country with various theatrical companies, during which time I was a pierrot—and many other things. I even became a member of the Queen's Hall orchestra in London! A Lancashire friend who heard that I was engaged at the Queen's Hall, and who also knew of my band venture, went to the Queen's Hall to see me.

I believe he had dined rather well, for he connected the two ideas. He strolled about until he came upon Sir Henry Wood rehearsing an orchestra of 150 strong.

"Ba goom," he whispered, "Jack's certainly got a whale of a band together!"

Jazz originated during the War. People's minds were then, so to speak, on edge. Everybody wanted noise, colour—anything to sooth their tortured nerves. There was something in that savage rhythm of jazz which haunted me; something to which my inmost nature responded.

I have studied the psychology of British people all my life, and I predicted that the jazz spirit would sweep the country. People sneered at me. Yet within six months my prophecy came true. I recognised, however, that the original jazz or nigger music, as it has been called, was lacking in harmony, an essential element without which any musical endeavour cannot succeed. Weird effects were obtained by breaking all the usual rules. These were novel and interesting the first few times you heard them. But they could not live.

Was it not possible, I pondered, to combine the colour and rhythm of jazz with

Mr. Hylton, who hails from Lancashire, is our foremost exponent of symphonic syncopation, and scored a great success with his recent broadcast. In this article he makes a vigorous defence of modern music.

that element of harmony so deeply planted in our British natures?

I gathered round me a band, a group of six ex-service men. They are still with me. And now my band consists of thirteen players, every one being an expert soloist.

The term "classical," as applied to music originally referred to the trumpeter who summoned the various classes of people to the entertainments at the Forum in ancient Rome. It is curious, therefore, that the word is now used to indicate anything that is really good, a conception, which, in my opinion, is wrong. Classical music, as generally understood, is something that is necessarily dull and not suited to the popular or people's taste. "Curiouser and curiouser," as Alice in Wonderland said, there is considerable difference of opinion, even among famous authorities, as to what music can rightly be labelled "classical." The operas of Gilbert and Sullivan, for instance, although extremely popular, are often referred to as classics of light opera. "Carmen" and "Faust" are not like the orthodox classics, yet are called classics of their kind.



Mr. Jack Hylton, the famous conductor.

What is Classical Music?

Many people say that Schumann's work is classical, yet I suppose that Dr. Coward would place him among the romantics! Then where shall we place Wagner? Some say he is the greatest classic. Other authorities maintain that his work is the very opposite to classicism. The fact is that the term "classical"

has been applied at different times to almost every kind of music. And it is conceivable, and very possible, that in the near future some of our modern symphonic syncopation will merit the name.

One of the principal reasons, I think, why many uninformed folk declaim against jazz is that the term is used to describe what is really syncopated music. Nowadays, any band with plenty of percussion instruments is called a "Jazz" band. This, again, is wrong; and it leads even well-known musicians to decry our modern music.

Syncopation is by no means new. You can find many examples in the work of Liszt, Beethoven, and other classical giants. In essence, syncopation is a temporary alteration of accent, brought about by prolonging a sound from a normally weak place in a bar. The cross accentuation which results has a definitely stimulating effect upon a listener. But it is only now that the tremendous potentialities of syncopation are being realised fully.

Cheerful Music Required.

The old-time jazz, and all the trash associated with it, has now disappeared. The music-loving public would not stand it; but modern symphonic syncopation is beautiful music. Why is it so popular? The explanation is, I fancy, that it is the first really successful combination of those elusive elements rhythm and harmony. There are some people who love harmony and have no ear for rhythm. Others prefer rhythm but cannot appreciate harmony.

In combination represented by modern symphonic syncopation we have arrived at a form of musical expression which satisfies all the musical needs of the normal human being. It is for this reason that syncopation will live, although, of course, it will evolve continually into new forms. It will flourish in this country particularly because British dance orchestras are now the finest in the world. We have already reached a quality of expression equal to that of the best American bands, which, a few years ago, were well ahead of us.

To receive many hundreds of appreciative letters in one post is a thing to gladden any man's heart. After my recent broadcast these mountains of messages appeared, telling me that my music had made millions happy.

British musical enterprise has produced a People's Music, and there can be no doubt that it will find a larger and larger place in broadcast programmes. Our modern syncopation carries with it a message of cheer. And that is what every listener wants.



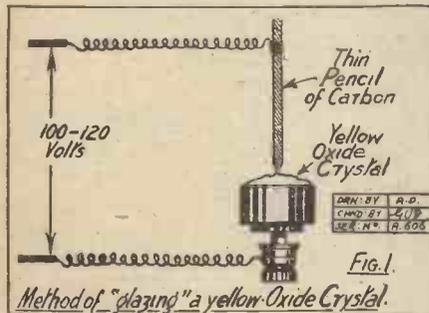
By J. F. CORRIGAN, M.Sc., A.I.C.

No. II. SYNTHETIC ZINCITE.

REALLY good and sensitive specimens of natural zincite are so comparatively scarce, and the demand for them is so great at the present time, that it is not surprising that within recent years many attempts have been made to produce an artificial substitute for zincite.

Fortunately, a considerable number of these attempts at the commercial manufacture of artificial zincite have proved to be entirely successful, and, in some instances, the artificially obtained product has even surpassed the natural mineral in many respects.

Artificial, or "synthetic," zincite is now to be obtained commercially under the



names of "Arzenite," "Ghanite," "Gilvium," "Synthetic Yellow Oxide," and so forth, all of which proprietary products comprise excellent material for both rectifying and oscillating purposes.

Preparation a Difficult Matter.

It will, of course, be readily understood that each manufacturer of synthetic zincite has his own special (and often secret) method of producing the material, but nevertheless this fact does not preclude us from gaining an insight into the nature and composition of this increasingly used mineral product.

All forms of synthetic zincites, yellow oxides, and similar materials are nothing more or less than fused zinc oxide. It may, perhaps, seem a simple matter to get hold of some zinc oxide and fuse it up until it forms one homogeneous mass; but theoretical simplicity is not always borne out in practice, and it is definitely not an easy matter for the experimenter to make a

iron tray over a fire, you will note that as soon as the oxide becomes red-hot it turns yellow and cakes together. If, now, the mass is allowed to cool down, the oxide returns to its original white colour, and the caked lumps possess no rectifying properties whatever.

Glazing the Crystal.

In order to render the oxide radio-sensitive it must be actually fused and then allowed to cool down very slowly. This operation is best carried out in an electric furnace, although doubtless small quantities of the sensitive material could be produced by heating the zinc oxide contained in an earthenware crucible in the hottest flame of a blowpipe.

In appearance, most specimens of synthetic zincite are yellow, and they have a horny look about them. Sometimes the specimens are entirely opaque; at other times the crystals may be translucent—that is to say, they may be semi-transparent.

The crystals are very hard, and they are not brittle. In this respect they possess a decided advantage over the natural zincite. Like natural zincite, yellow oxide crystals may be heated up to any temperature without any fear of harm being done to them, and thus they can be attached to their cups by means of ordinary solder, which gives a more efficient contact than that afforded by the more usual Wood's metal.

For rectifying purposes, pure and simple, a synthetic zincite crystal will give excellent results. However, if the crystal is intended to be used as an oscillator or amplifier, the results obtained from it are often enormously improved if the crystal is treated to a local fusing operation after it has been fixed in its cup.

In order to carry out this operation, a carbon point is allowed to make contact with the surface of the crystal, and a current of about 100-120 volts E.M.F. is passed through the contact. On manipulating the carbon point, a miniature arc will be struck at the point of contact, and this will effect a local fusing of the crystal surface. This operation is often known as "glazing," "filming," "smelting," and so on.

The circuit employed for the process is given in diagram at Fig. 1, and any experi-

fused zinc oxide rectifying or oscillating crystal on his own account, unless, of course, he is fortunate enough to possess some electrical or other means of obtaining a high temperature.

If you take a quantity of zinc oxide (which is a very cheap commodity, costing something like 1s. 4d. a pound) and heat it on a shovel or an

menter who is specially interested in the use of these crystals for oscillation or amplifying purposes is strongly recommended to carry out the operation for himself, and to note the improved results which will follow.

The photograph (Fig. 2) indicates the appearance of two typical specimens of synthetic zincite. They have a very close-grained structure, not unlike the shiny surface of rock sulphur.

A Stable Detector.

For rectification purposes, synthetic zincite can be employed with any contact that works with natural zincite. A tellurium-synthetic zincite crystal combination forms an excellent rectifier for all-round purposes. Although this combination has not a good distance-sensitivity (it rarely being efficient in use over a ten-mile radius from the transmitting station), it will give extremely strong signals when employed in a set situated within shorter distances than this. Moreover, the tellurium-synthetic zincite combination will work under a contact-pressure of something like one or two pounds. Thus a detector employing these rectifying elements is exceedingly stable, and it will retain its sensitive adjustment for many weeks on end.

Bornite, copper pyrites, iron pyrites, and silicon will give good results when used in conjunction with synthetic zincite. Also, a brass or copper rod which has been slightly oxidised by heating in the fire for a moment or two will very often give strong signals with an artificial zincite crystal, the contact pressure in this case, however, being critical. If the end of the copper or brass rod is dipped in molten sulphur and then gently heated in order to burn the sulphur off, the rod will be given a sulphide coating which will enable it to be used in conjunction with a synthetic zincite crystal and under a contact-pressure of at least 1 lb.

Synthetic zincite, therefore, is a new product which is greatly to be welcomed by the amateur crystal set user and the more serious experimentalist alike. An efficient rectifier, oscillator, and amplifier, artificial zincite is one of the most useful radio-sensitive minerals known, and its all-round utility is still further enhanced by the fact that it can be subjected to almost any amount of rough handling without losing any of its sensitive properties.

Some Useful Data.

Chemical Composition.—Zinc oxide. ZnO .
Appearance.—Light yellow. Horny or vitreous.

Characteristics.—Very hard. Non-brittle. Dissolved by alkalis. Extremely constant sensitivity. Works under heavy contact-pressure.

Most Suitable Contacts.—Tellurium, copper pyrites, bornite, silicon, iron pyrites. Also oxidised and sulphurised metals.

Current Price.—Varies considerably. About 3s. per oz.

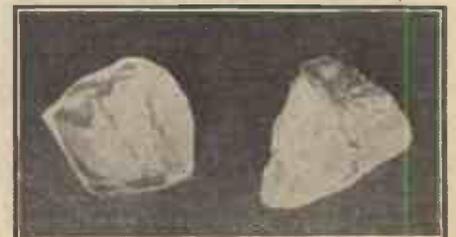
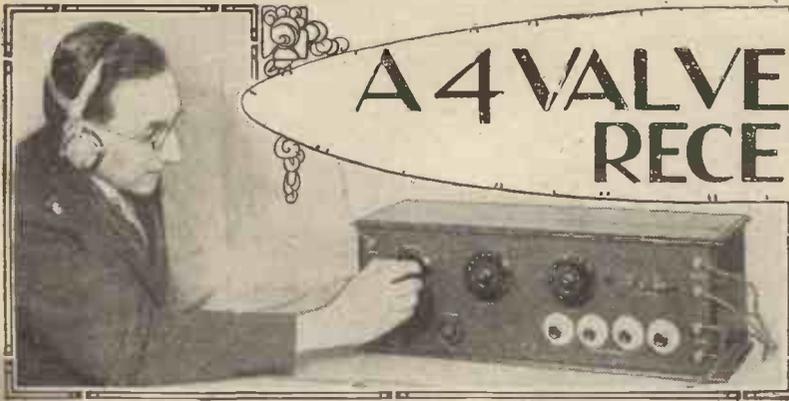


Fig. 2. Specimens of synthetic zincite.



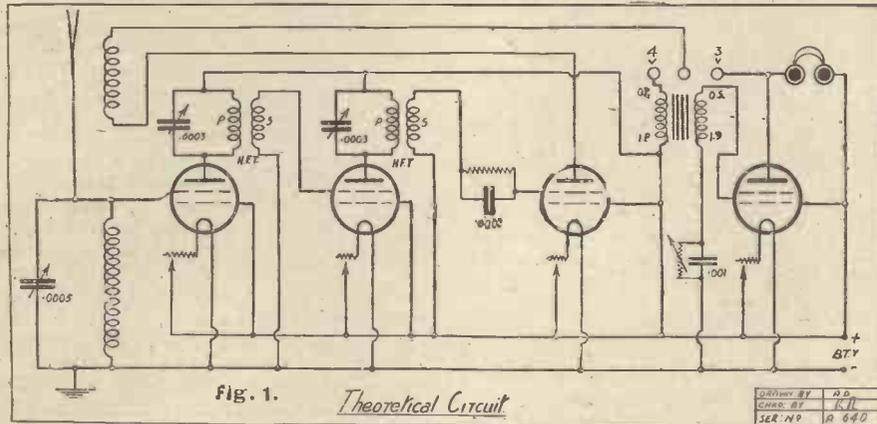
A 4 VALVE UNIDYNE RECEIVER

The Set designed, constructed and described by the "P.W." Technical Staff.

SINCE the publication of the details of the 3-valve Unidyne of December 12th we have had numerous letters asking for particulars for adding an H.F. valve to the circuit. Apparently the DX results obtained with the 3-valve set have been very gratifying, so that it has been decided, for the benefit of those interested in long-range reception, to add that extra stage of H.F. and incorporate it in a complete set.

The operation of the set is quite straightforward, although there are three tuning controls besides reaction. This being the case, a certain amount of practice will have to be obtained before the best is got out of the receiver and, in the resolving of extremely weak carrier waves, it will be found that the filament control of the first and third valves will be fairly critical and will make all the difference between good and poor reception.

and, until these three circuits are in resonance, it cannot be hoped to receive any really distant transmission. The three circuits are not abnormally sharp, so that, while the receiver is quite selective enough



A glance at Fig. 1, which is a theoretical diagram of the circuit, shows that a similar circuit to that appearing in our issue of December 12th has been employed, with the exception of the double reaction which was included in the 3-valver, and it has been found, in the case of the 4-valve set, that this double reaction, which gave exceedingly fine reaction control, is unnecessary and only adds to the multiplicity of controls.

Operation of the Set.

In the 4-valve set, therefore, the first two valves act as H.F. amplifiers, being coupled together and to the detector valve by means of plug-in H.F. transformers. Reaction is carried out by means of coupling the usual coil in the plate circuit of the detector to the aerial coil, while, for the purpose of increasing the strength of weak signals, an L.F. stage is incorporated, this latter being controlled by a switch so that it can be used or left out, as desired.

Unlike many H.T. receivers employing more than one stage of H.F. amplification, this set does not necessitate a potentiometer or other stabilising control, for it is not prone to self-oscillation. This is a great advantage when one is searching for weak transmissions.

This does not mean to say that the receiver is a tricky one to handle. All the operations required are quite normal and it is only in the matter of handling that any trouble may be encountered.

Tuning must be carried out extremely cleverly, as there are three dials to vary, each controlling a separately tuned circuit,

LIST OF COMPONENTS.

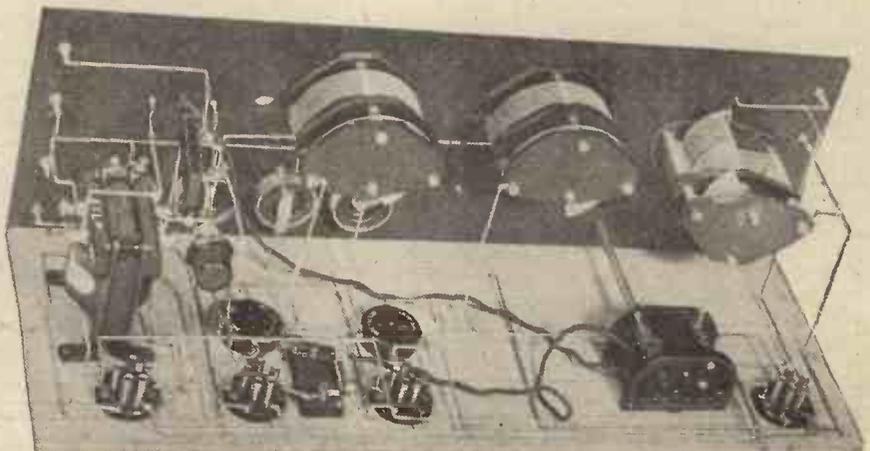
1 Panel, 21 in. x 7 in. x 1/4 in. (Peto-Scott), with cabinet and baseboard	2	5	2
1 .0005 variable condenser (Peto-Scott)	0	10	6
2 .0003 variable condensers (Peto-Scott)	0	13	6
4 5-pin valve holders, baseboard mounting (Peto-Scott)	0	6	0
2 Bretwood valve holders	0	3	6
1 Lotus 2-way coil holder (extended handle)	0	8	0
4 Precision rheostats	0	12	0
1 R.I. L.F. transformer	1	5	0
1 Bretwood variable grid leak	0	3	0
1 S.P.D.T. switch	0	1	0
1 Lissen fixed condenser, .0002	0	1	3
1 Lissen fixed condenser, .001	0	1	3
6 W.O. type terminals	0	0	9
Wire, transfers, screws, etc.	0	2	0

for all ordinary purposes, it does not need a wave-meter before the operator can pick up any very close stations.

Need for Filament Control.

When practice has been obtained in the handling of the receiver it will be found quite easy to go through the various broadcast wave-lengths and pick up one station after another, using the filament control as a final adjustment in each case. Stress is laid upon this point because it is felt that even in H.T. receivers not nearly enough use is made of the filament rheostat, which provides, in most cases—and especially in the case of Unidyne sets, where, of course, no H.T. battery is required, a very

(Continued on next page.)



This view of the set should be used in conjunction with the wiring diagram when connecting up the components.

A 4-VALVE UNIDYNE RECEIVER.

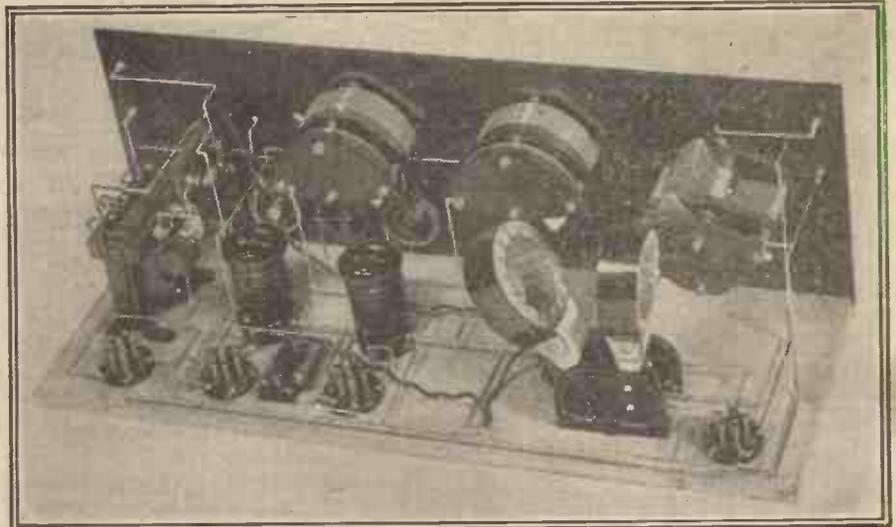
(Continued from previous page.)

fine reaction adjustment, and may make all the difference between resolving the carrier wave into intelligible speech or missing it altogether.

For the construction of the 4-valve Unidyne the components mentioned in the list are necessary, though it is not essential that the exact makes specified therein should be adhered to. It is important, however, that all components that play a vital part in the receiver should be of reliable manufacture and good design.

Silent Background.

For instance, perhaps the most important of all the components are the three variable condensers, which must be capable of even variation and which must provide really good contacts between the moving plates and the external part of the circuit. The condensers with mountings liable to become loose will be perfectly useless and will pro-



This photograph shows the interior of the set with coils and H.F. transformers in position.

set may just as well have never been built, for it will be hopeless to attempt the reception of any of the nearest stations.

The drilling of the panel is carried out in accordance with the diagram below, and this should be done with care. No difficulty should be experienced if the measurements given are adhered to.

It must, of course, be remembered that the dimensions shown only hold good for those components used in the actual set built by the Technical Staff, and if other components are employed by the constructor he may have to modify

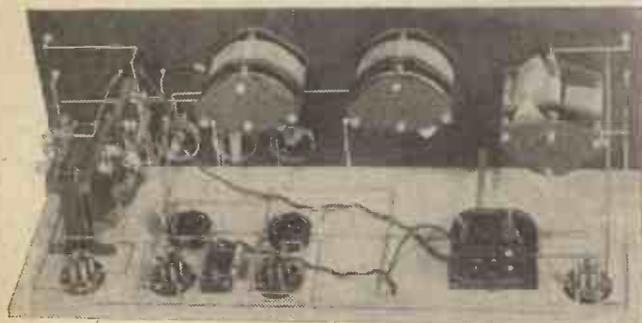
of this hole, as given in Fig. 2, is correct if a Lotus two-way coil holder with long spindle is employed. Other makes of holder may vary in height, so that, unless this particular type is to be used, the constructor would have to find the position of that hole for himself by mounting the panel on the baseboard, and actually trying the coil holder in its required position behind the panel.

Mounting the Components.

Another point that may require watching concerns the positions of the four holes for the filament rheostat. Those employed in the original set were of the precision type, and measure just over 1 1/2 in. in total width. The holes, as shown in Fig. 2, leave ample clearance at the back of the panel for the rheostat, but if larger ones, such as those made by the Burndept Company, are employed, the constructor will find that he will have to increase the distance between the holes, in order to allow space at the back of the panel for the resistances.

After the panel has been drilled and mounted in position on the baseboard, which operation is best done with the baseboard inside the cabinet, the components can be mounted, care being taken that the

(Continued on next page.)



A general view of the interior of the four-valve Unidyne.

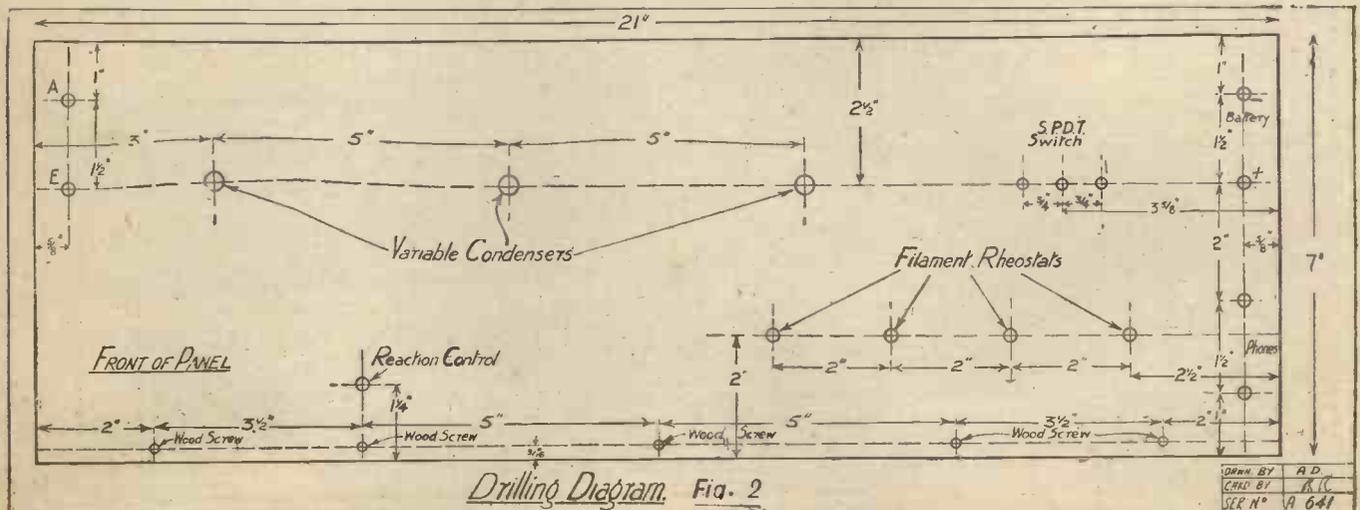
ably cause, sooner or later, complete failure to get the set to function and, in any event, will give rise to annoying scratchy noises which may defy the operator's efforts to trace them for a considerable time.

One of the greatest advantages of the Unidyne receiver is its silent background, and if this is in any way impaired by inefficient components or faulty contacts, the

those measurements to suit his own requirements.

Fixing the Coil Holder.

Especially is this the case with regard to the coil holder which is mounted on the baseboard but whose spindle protrudes through the panel near the bottom of it between the first two variable condensers. The position

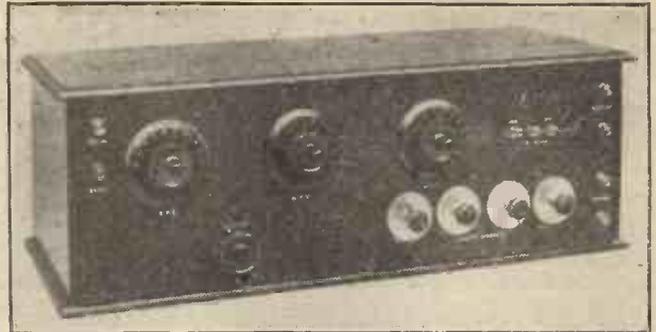


A 4-VALVE UNIDYNE RECEIVER.

(Continued from previous page.)

mounting screws of the variable condensers are not tightened up sufficiently to cause the main spindle to shift, for it may be found in some makes that this will result in the fixed and moving vanes shorting.

The next task is to mount the components on the base-board, and in this the constructor will find the photographs of great assistance. There are only two points at which the constructor may go wrong in this section of the building of the set, and those are in the positions of the coil holder and the



The accessibility of the controls is clearly seen in this photograph of the complete receiver

POINT-TO-POINT CONNECTIONS.

Aerial terminal to moving plates of .0005 variable condenser, main grid socket of first valve holder, and to plug of fixed coil holder. Earth terminal to fixed plates of .0005 variable condenser, socket of fixed coil holder and to Battery negative.

Battery negative is also connected to one filament socket of each of the valve holders. The other filament socket of each valve holder is connected to one terminal of its respective rheostat. The other rheostat terminals are connected together and taken to Battery positive.

Plate socket of first valve holder to O.P. (Filament) connection of first H.F. transformer, and fixed plates of first .0003 variable condenser. I.S. (grid) of first H.F. transformer to main grid of second valve. O.S. (plate) of 1st H.F. transformer to Battery negative, I.P. (filament) to Battery positive.

Plate socket of second valve holder to O.P. of second H.F. transformer and fixed plates of .0003 variable condenser. I.S. of second H.F. transformer to one side of grid leak and condenser, the other side of which is connected to main grid socket of 3rd valve holder. O.S. and I.P. of second H.F. transformer to Battery positive. The moving plates of both .0003 variable condensers are connected together and to Battery positive.

Plate socket of third valve holder is connected by a flex lead to plug of moving coil holder. A flex lead also connects the socket of the moving coil holder to the centre contact of the S.P.D.T. switch.

Left-hand contact of S.P.D.T. switch to O.P. of L.F. transformer, O.S. of L.F. transformer to main grid socket of fourth valve holder. Plate socket of fourth valve holder to bottom 'phone terminal and right-hand contact of S.P.D.T. switch. Top 'phone terminal to Battery positive. I.S. of L.F. transformer to one side of variable grid leak and condenser, the other side of which is connected to Battery negative. I.P. of L.F. transformer to Battery positive.

The inner grid sockets of the four valve holders are connected together and to Battery positive.

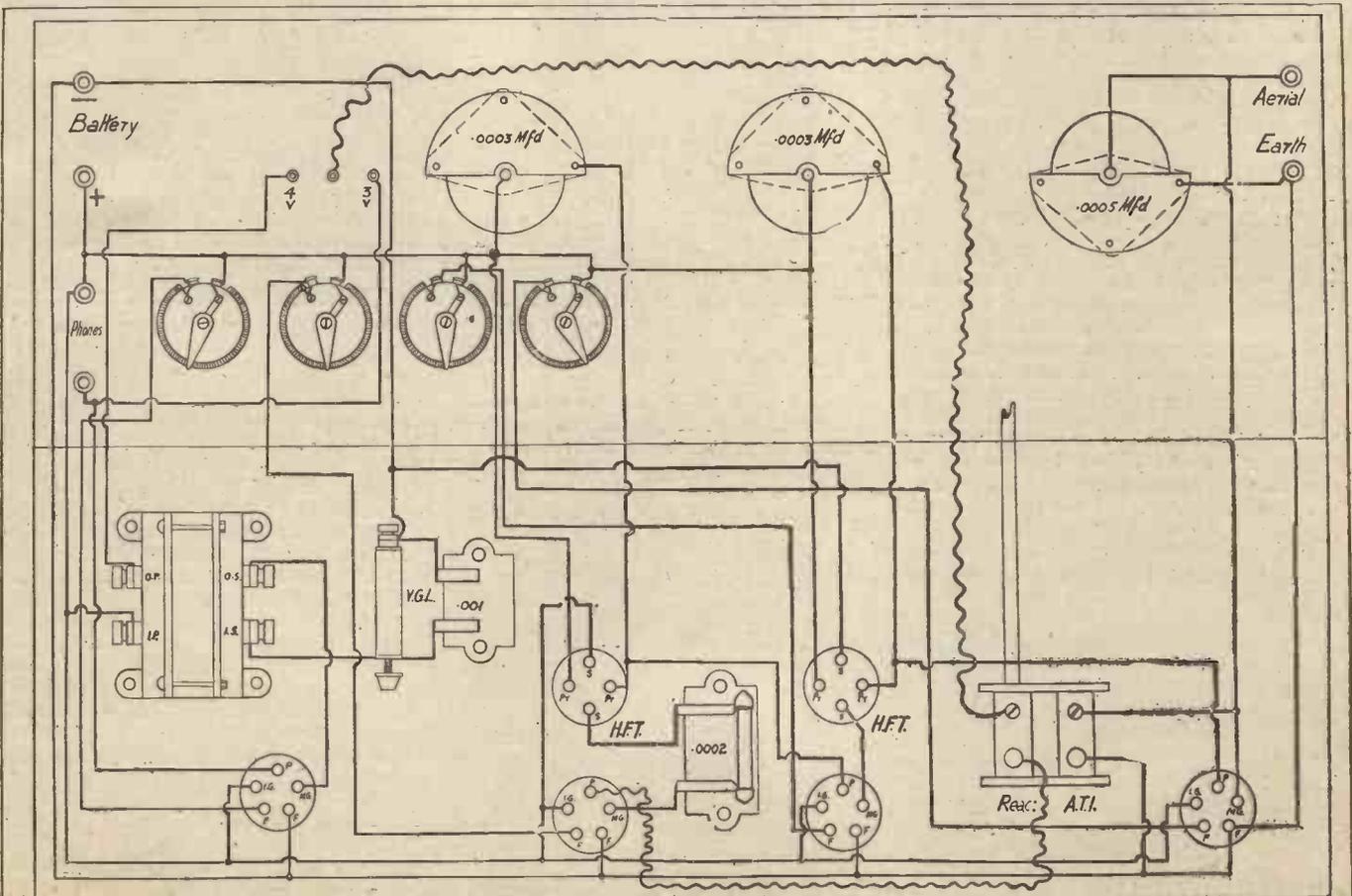
two H.F. transformers. In the first case care must be taken that the coil holder is so placed that there is ample room for the reaction coil to swing out and that both coils can be inserted without their touching either the A.T.C. or the first H.F. condenser.

Wiring Up.

With regard to the H.F. transformers these must not be placed too close together, and space must be allowed so that they can be inserted or removed without difficulty, care being taken that they are not in such a position that the moving vanes of the second H.F. condenser will touch them when the condenser approaches zero position. The L.F. transformer is placed so that its secondary side is towards the centre of the set.

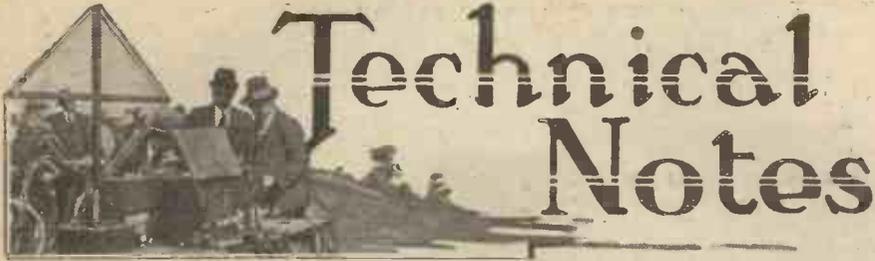
The wiring up of the components should be done according to Fig. 3 with No. 18 gauge squared tinned copper wire, and it is advisable to solder every connection except

(Continued on page 91.)



Wiring Diagram Fig. 3.

DESIGNED BY R.D.
 DRAWN BY A.L.
 SER. NO. R 642



Conducted by our Staff Consultant, J. H. T. ROBERTS, D.Sc., F.Inst.P.

Technical Notes

THERE is such a bewildering array of valves on the market at the present time that it is not surprising that the beginner, or even, for that matter, the experienced amateur, should sometimes find himself at a loss to know which valve to choose for a particular purpose. A knowledge of the more stereotyped characteristics of the valves is frequently not of very great help, since the performance of the valve depends very largely upon the idiosyncrasies, so to speak, of the circuit with which the valve is to be used. Moreover, since individual specimens of a given make or type of valve vary very considerably amongst themselves, the difficulty of prescribing a particular valve for a particular purpose with any degree of certainty is still further increased.

Of course, the primary characteristics of filament voltage and filament current are readily appreciated, for it is evident that the field for choice is at once limited by the voltage of the battery which you propose to use and by the normal current output which the battery is capable of supplying. For example, with dry cells you would in general prefer a valve with a filament voltage rating of about 1 volt or $2\frac{1}{2}$ volts (to operate from a $1\frac{1}{2}$ -volt dry cell or a 3-volt dry-cell battery), and a filament consumption rating of perhaps 0.06 or 0.08, so that the drain on the batteries should not be unduly great.

Amplification Factors.

But the filament voltage and the filament current specifications are comparatively straightforward. What are a little more difficult to interpret in relation to the conditions in which the valve is to be used are the impedances of the valve and its amplification ratio (or amplification factor, as it is sometimes called). I have referred again to this point owing to the fact that the mention which I recently made, in these notes of the method of determining the amplification factor has brought me a considerable number of letters from readers on various points connected with the matter. It may be mentioned in passing that the terms "amplification ratio" and "amplification factor" are used more or less indiscriminately, although some writers prefer to retain the term "amplification ratio" for the voltage amplifying property of the valve, and the term "amplification factor" for the overall resultant voltage amplification of the amplifier as a whole, including the subsidiary parts of the circuit.

High or Low Impedance?

The impedance of the valve would be considered to be fairly high if it ranged between 20,000 and, say, 40,000 ohms, and a high-impedance valve of this kind is, generally speaking, more particularly-suited to high-frequency amplification and to low-

frequency amplification of the resistance-coupled type. Opinions differ considerably as to the relative advantages of high impedance and low impedance valves for detecting purposes, and although any valve, if operated on the right part of its characteristic curve, will act as a detector, nevertheless it will be found, in spite of frequent statements to the contrary, that a high impedance valve will act as an excellent detector.

The low-impedance valves are more particularly suited for loud-speaker work, but it should always be borne in mind that the amplification factor should also be low. An average value for the amplification factor for a power valve would be about 6 or 7. The voltage amplification ratio or factor is the variation in the anode voltage divided by the variation in the grid voltage which produces it.

Self-Capacity.

Inter-electrode capacity in a receiving valve is always objectionable, and becomes more so the shorter the wave-lengths which are dealt with. In fact, as is well-known, for short-wave-length work it is practically essential to employ special valves in which the leads are spaced very widely apart, or brought out from opposite ends of the glass bulb. Even in ordinary receiving valves for broadcast frequencies it is very desirable to reduce the inter-electrode capacity as much as possible, and different valve manufacturers have different methods of doing this—the Cossor valve, for example, has the well-known hollow base, almost without any of the moulding composition between the pins.

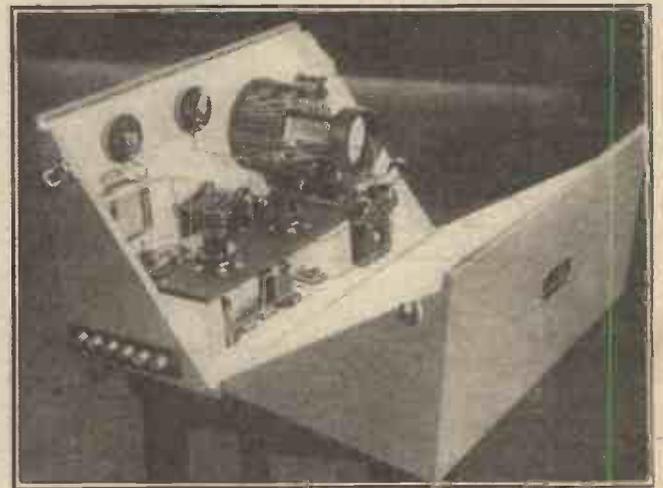
It is for reasons such as these that many constructors prefer to employ the metal valve sockets instead of the conventional ebonite or composition valve holders. This, however, necessitates the drilling of four holes in the panel in the exact spacing for the valve pins, which to the amateur constructor is sometimes rather a difficult matter. This may be overcome, however, by the use of a new valve holder in which the four exposed valve sockets are secured into a disc only. In this way, the trouble of accurately spacing the drillings in the panel is overcome and the advantages of the separate sockets are retained.

At a recent Wireless Exhibition at Cologne a number of interesting exhibits

were shown, amongst them a single valve receiver employing a 5-electrode valve, and an electrically heated thermopile for the supplying of filament current. It will be remembered that some articles were written for this journal by the present writer on the subject of the thermopile about a year ago, and it is interesting to note that although this instrument has not yet found its way on to the English market, it has now appeared on the German market. The thermopile described by me in my articles in POPULAR WIRELESS was a gas-heated instrument, and this is a very important point, for it means that the running cost for fuel is only a very small fraction of the running cost for electricity in the case of an electrically-heated thermopile. Readers will be interested to know that certain applications for patents in connection with the gas-heated thermopile have been made, and arrangements are now in progress for the placing of an instrument of this type on the English market.

A New Dull Emitter.

A somewhat new type of valve, or, at any rate, a valve employing a new type of filament, is reported from Vienna. The filament is of the thoriated type; it is not, however, of tungsten, but of another metal whose nature is not disclosed. What is



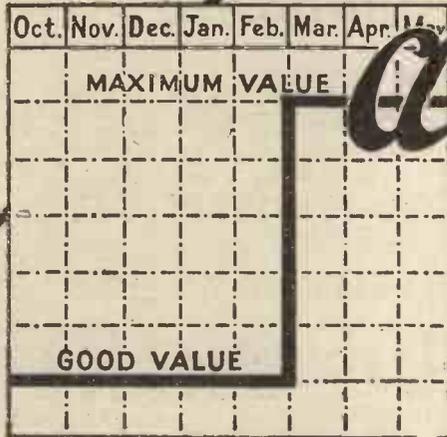
A short-wave receiver designed by Senatore Marconi's personal engineer, Mr. Mathieu.

claimed for this new metal—which, incidentally, is of much lower melting-point than tungsten—is that it is able to carry incorporated with it a much larger percentage of thorium than is the case with tungsten. The latter metal may be alloyed with thorium to the extent of about $2\frac{1}{2}$ per cent, whereas the above-mentioned metal will carry up to 10 per cent of thorium. The fact that the new metal has a much lower melting-point means that it allows the necessary diffusion of the thorium contained at a correspondingly lower filament temperature—at any rate, it is claimed that this is what actually happens—and consequently, the valves are said to maintain their useful emission for a very much longer time than the ordinary thoriated tungsten valves.

An Interesting Patent.

In this connection it is also interesting to note that a patent has recently been issued for a valve employing a filament of the

(Continued on page 92.)



Announcing A Substantial Reduction in A.J.S. Prices.

A.J.S. Receivers and the two Cabinet Loud Speakers have been reduced in price from March 1st. At the new prices the apparatus concerned represents the maximum radio value, and will therefore appeal to the enthusiast who is satisfied only with the best obtainable.



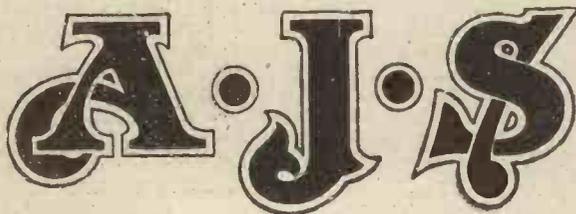
This illustration shows the T.M. 2 model, being a 4-Valve Receiver, Price £26 15 0
 This receiver may be ordered in a sloping cabinet similar to that illustrated below.
 4-Valve Standard Receiver, in sloping cabinet, £13 15 0.
 2-Valve Standard Receiver (1 H.F. and Det.) as illustrated £8 10 0

Instrument.	Old Price.		New Price.	
	£	s. d.	£	s. d.
Two-Valve Standard, complete	16	17 6	13	17 6
Two-Valve Standard, receiver only	11	10 0	8	10 0
Three-Valve Standard, complete	21	13 6	15	17 6
Three-Valve Standard, receiver only	14	17 6	9	18 6
Four-Valve Standard, complete	26	15 0	22	0 0
Four-Valve Standard, receiver only	18	10 0	13	15 0
T.M. 1, complete	35	0 0	29	17 6
T.M. 1, receiver only	25	15 0	21	12 6
T.M. 2, complete	30	10 0	26	15 0
T.M. 2, receiver only	21	5 0	18	10 0
P. 1, complete	65	0 0	52	10 0
P. 1, receiver only	55	15 0	44	5 0
P. 2, complete	52	0 0	45	0 0
P. 2, receiver only	42	15 0	38	15 0
S. 1, Console Receiver, complete	75	0 0	62	10 0
S. 1, Console Receiver, receiver only	65	15 0	54	5 0
Concert Amplifier	15	19 0	11	15 0
One-Valve Amplifier	5	2 6	4	2 6
Two-Valve Amplifier	8	2 6	6	10 0

ALL INCLUDING ROYALTIES.

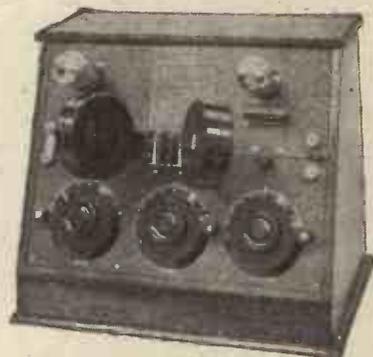
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206. L.F.	..	9/-
234. H.F.	..	9/-
234. L.F.	..	9/-
234. P.V.	..	11/-
306. H.F.	..	9/-
306. L.F.	..	9/-
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3. 1-VALVE L.F. AMPLIFIER.
4. CRYSTAL DETECTOR WITH L.F. AMPLIFIER.
5. H.F. (Tuned Anode) AND CRYSTAL, WITH REACTION.
6. H.F. AND CRYSTAL. (Transformer Coupled, Without Reaction).
7. 1-VALVE REFLEX WITH CRYSTAL DETECTOR (Tuned Anode).
8. 1-VALVE REFLEX AND CRYSTAL DETECTOR (Employing H.F. Transformer, without Reaction).
9. H.F. AND DETECTOR (Tuned Anode Coupling, with Reaction on Anode).
10. H.F. AND DETECTOR (Transformer Coupled, with Reaction).
11. DETECTOR AND L.F. (With Switch to Cut Out L.F. Valve).
12. DETECTOR AND L.F. UNIDYNE (With Switch to Cut Out L.F. Valve).
13. 2-VALVE REFLEX (Employing Valve Detector).
14. 2-VALVE L.F. AMPLIFIER (Transformer Coupled with Switch to Cut Out Last Valve).
15. 2-VALVE L.F. AMPLIFIER (Transformer-Resistance Coupled with Switch for Cutting Out Last Valve).
16. H.F. (Tuned Anode), CRYSTAL DETECTOR AND L.F. (with Switch for Last Valve).
17. CRYSTAL DETECTOR WITH TWO L.F. AMPLIFIERS (with Switching).
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19. H.F., DETECTOR AND L.F. (with Switch to Cut Out the Last Valve).
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The Shanty-man

flourished in the palmy days of the sailing ship, when the handling of capstan, windlass or sails depended on the lusty arm of the seaman. His duty it was to sing the shanty which kept the hands heaving or hauling in time, while the latter took up the refrain, and the great ships were warped to their berths or headed for the open sea to the strains of 'Away, Rio,' 'Reuben Ranzo,' 'Shenandoah,' 'The Hog-eye Man,' and many another of these curious and attractive airs. Alas! the stately Indiaman and the graceful clipper ship have vanished from the sea, and the Shanty-man sings no more.



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P.W.S.

IN the previous article on this subject, a general account was given of the purpose and operation of battery eliminators in general. The present article gives instructions for the making of a particular form of battery eliminator for providing the H.T. supply to the plate of the valve. At the same time, it will be understood that there are many variations that may be made in the circuit of this H.T. eliminator, just as there are various types of rectifier which may be used, and thus the diagrams given in this article should be taken merely as indicating representative circuits.

As already explained, an H.T. eliminator for use on the alternating-current electric-supply mains consists essentially of a rectifying device, for converting the alternating current into direct current, and then a system of choke coils and large-capacity condensers for the purpose of smoothing out the ripple which remains after the rectification of the current.

In Fig. 1, a transformer is shown connected to the electric-supply mains, this

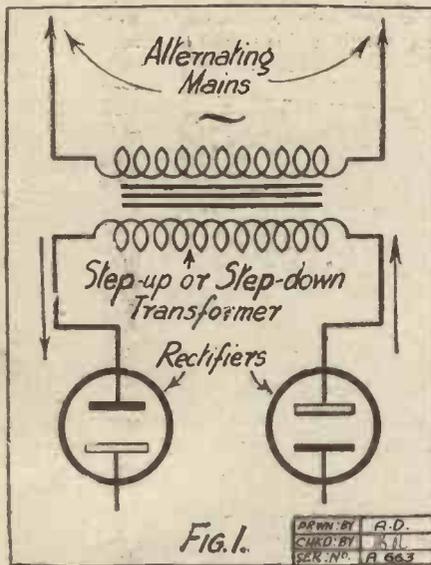


Fig. 1.

transformer being either a step-up or a step-down transformer, according to whether the H.T. voltage required is to be higher or lower than that of the mains. In any case, even if the transformer is an equal ratio transformer, it is very important to have this transformer between the mains and the eliminator circuit, as it is then possible to earth any part of the eliminator circuit as may be required, without any danger of complications.

Winding the Transformer.

The transformer is very easily made and as the current which it is required to handle is extremely small, the gauge of wire can be fairly fine—No. 30-36 gauge enamelled wire on both primary and secondary will be quite suitable. The primary winding may consist of 2,000 turns for 110-volts circuit or 4,000 turns for 200-250-volt circuit, and the secondary winding will consist of more or less than this number according as output voltage is to be higher or lower than that of the mains. Owing to the extremely small output, if the transformer is made as explained presently, the regulation should be very good and, therefore, the ratio of the voltages in the

MAKING A HIGH-TENSION BATTERY ELIMINATOR.

By
Dr. J. H. T. ROBERTS, F. Inst. P.
(Staff Consultant.)

This is the second article of a short series in which our consultant gives an interesting and informative survey of practical methods of battery elimination.

primary and secondary may fairly be assumed to be the ratio of the turns.

The transformer coils may be wound upon a spool, 2 in. long, and having a cross-sectional iron-space of about one square inch. With the number of turns mentioned and an iron core of this cross-sectional area, the transformer will be, for all practical purposes, "wattless" when no current is being drawn from the secondary. The primary should be first wound on to the spool, care being taken to introduce an occasional sheet of dry tissue paper and finally, when the primary winding is completed, it should be carefully bound over with empire tape, so that there is no possibility of the secondary coil getting into contact with it at any point. The secondary is then wound in the same way.

The Rectifier.

We now come to the question of the rectifying elements. As explained in the previous article, these usually take the form either of electrolytic rectifiers (or chemical rectifiers) or of valve rectifiers.

The simplest and most inexpensive type of rectifier is, of course, the electrolytic or chemical type. The commonest form of such rectifiers consists of a small jar or other suitable vessel, containing a solution of borax or ammonium phosphate, in which are immersed the two electrodes, one being of lead or iron and the other being of aluminium, of as great purity as possible.

The electrodes may take the form of strip or rod, and it is customary to assume that for every 30 or 40 milliamperes of current which is to be passed through the cell, a surface area of the electrode of 1 square inch should be exposed to the liquid. Thus, if the cell is to carry a maximum of, say, 20 milliamperes, it is only necessary to have an area of ½ square inch of the electrode exposed to the liquid. For the purpose of an H.T. eliminator, it is sufficient to use quite small jars or vessels for these rectifying cells, a jar 2 in. in height and 1½ in. in diameter being ample.

An Efficient Combination.

The solution is made in the usual way, simply by dissolving the borax or ammonium phosphate (the latter is preferable) in pure water (preferably rain water or distilled water) until no more can be dissolved; the solution should then be allowed to stand until all the sediment has settled, and the clear liquid should be poured off into a separate vessel and used for the rectifying cells. The making and operation of these cells, however, is probably so well known

that there is no necessity for me to go into any further details at this stage.

A much superior rectifying cell which can be made even smaller, and which has every possible advantage that an electrolytic cell can have, may be made by means of electrodes of lead and tantalum or rectalloy in a dilute sulphuric acid solution.

It will be found that if lead and aluminium electrodes are used, the cell will not rectify properly when the current is first switched on, as it takes a few hours for the aluminium plates to be properly "formed."

It is not advisable to allow more than about 30 volts of back E.M.F. to be applied against a rectifying cell of this type, and consequently it is desirable to employ several of these cells in series, the total E.M.F. being thus broken up.

Constructing the "Smoother."

Instead of using lead and aluminium electrodes in a porcelain or glass jar, a small "tin" vessel may be used, such as any of the small "tins" used for various commercial purposes. In this case, the vessel itself takes the place of the iron or lead electrode, and all that is necessary is to introduce the aluminium rod through the lid, a suitable insulating bush of ebonite, rubber, or other similar material being employed for the purpose. The exterior of the tin container is then connected to the aluminium electrode of the next cell, exactly as batteries are connected together in series.

The choke coil is the next item and this may be made in precisely the same way as the transformer. A total of 7,000 to 10,000 turns of No. 36 enamelled wire may

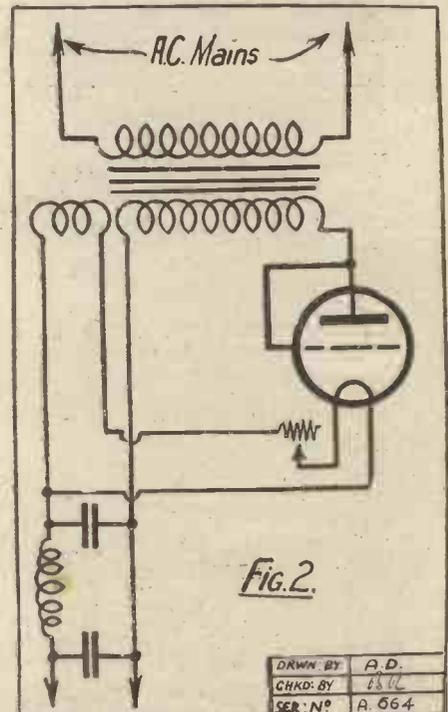


Fig. 2.

be used on the choke. There is, of course, only one winding on the choke and consequently only two terminals, as compared to the four terminals of the transformer. The main components consist of a number of large-capacity fixed condensers which are usually of the paper condenser variety. The positions of these condensers will be apparent from the circuit diagram given (Continued on next page.)

A SIMPLE NEUTRODYNE CONDENSER

By OSWALD J. RANKIN.

set the neutrodyne condenser at minimum capacity and search for signals. When a station is heard, tune to maximum strength and then turn off the filament rheostat of the H.F. valve. Signals will still be heard, owing to the presence of the inter-electrode valve capacity; they will be much weaker, and should be strengthened by retuning.

THE small stabilising condenser used in conjunction with an H.F. valve coupled on the neutrodyne principle is essentially variable, since the correct neutralising capacity is very critical, and can only be found by carefully adjusting the instrument until the H.F. stage functions efficiently. Readers who make a point of constructing

the opposite end, the terminal shank being cut off and the base of the terminal body soldered to the strip.

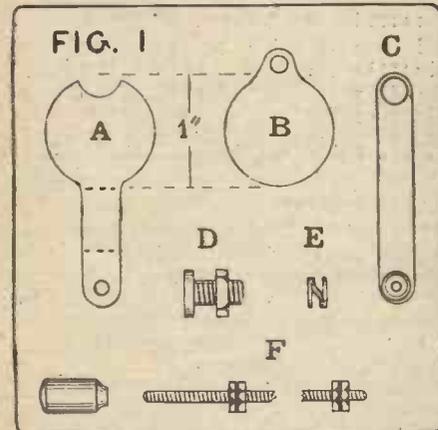
Neutrodyning a Set.

When clamped under the nut of the bush this forms the connection to the movable plate, an ordinary spring washer E keeping the spindle in good rubbing contact with the bush. The spindle F should be at least 3 in. long in order to minimise hand-capacity effects when making adjustments, and it should revolve in the bush with as little side play as possible, and with no end thrust whatever. There should be a space of $\frac{1}{16}$ in. between the fixed and moving plates.

The general arrangement of the parts is shown in Fig. 2, where the connecting strip C has been omitted for the sake of clearness. The position of this is shown in Fig. 3, which represents an end view of the condenser.

This little instrument has been used in many different experimental circuits and has always given excellent results. It was embodied in the receiver recently made up by the writer for experimental DX work and proved very satisfactory.

Readers new to this method of controlling H.F. stages may find the following hints helpful: When trying out the new circuit

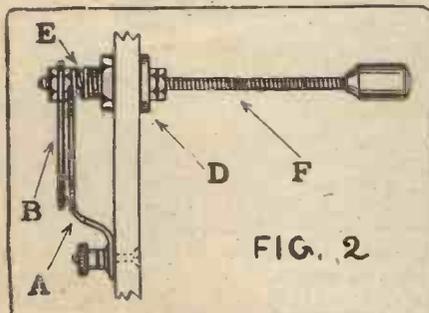


as much of their apparatus as possible will find the simple device to be described to give entire satisfaction; moreover, it is very easily made, costs practically nothing, and can be fitted to the receiver panel in a most convenient manner.

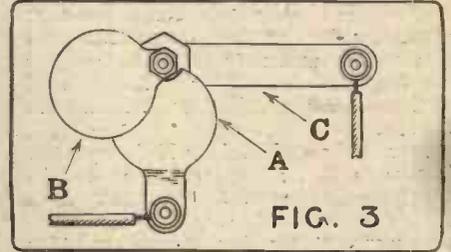
Constructional Details.

The main parts of the instrument are represented in Fig. 1. A is the fixed plate and B the moving plate, these being 1 in. in diameter and cut from thin sheet brass. The integral extension piece on the fixed plate is 1 in. long by $\frac{3}{8}$ in. wide, this being bent at the dotted lines to form a supporting bracket which is clamped to the panel, a small terminal being made to serve the double purpose of fixing bolt and connecting point.

The top portion of the plate is cut away as shown to clear the two nuts which clamp



the moving plate B to the end of the brass spindle. C is a strip of thin sheet brass, 2 in. long by $\frac{3}{8}$ in. wide, which is drilled at one end to pass over the shank of the brass bush D, and fitted with a small terminal at



After doing this carefully adjust the neutrodyne condenser until no signals are heard, or until they become as weak as possible. The inter-electrode capacity of the valve is then balanced, and when the rheostat is again turned on the valve will function as efficiently as possible, without bursting into self-oscillation every time reasonable adjustments are made to the coils and condensers.



A section of the battery room at the Durban Broadcasting Station.

MAKING A HIGH-TENSION BATTERY ELIMINATOR.

(Continued from previous page.)

in Fig. 2. As to the capacity of each of the condensers, this cannot be stated with exactness, as the purpose of the condensers is purely to help to smooth out irregularities in the current as already mentioned. Speaking generally, the greater the capacity of the condensers the better; it is not advisable to use condensers of less than about 2 microfarads capacity.

Controlling the Voltage.

The voltage at the output side may be tapped by means of a potentiometer. The resistance can be employed if desired instead, having a maximum value of 100,000 ohms.

A fuse should be introduced in the input side of the transformer, and for this purpose one of the pea-lamps used with flash-

light batteries will be found useful as a quarter-amp. fuse or, if necessary, two may be used in parallel, but if the system is working efficiently, a single pea-lamp should be ample.

The whole of the eliminator components may be mounted together upon a suitable baseboard, or preferably in a small cabinet, which may be transported by means of a handle placed at the top, danger of spilling the liquid in the rectifying cells being in this way avoided. It is not a bad plan to have the cabinet shielded, and the shield connected to earth. When using the eliminator it may be found necessary to keep it a few feet away from the receiving set in order to avoid inductive effects, but if it be properly constructed and working efficiently, there should be no appreciable trace of "hum" in the receiving set when the plates are receiving their supply from this device.

Variations on the circuit will be seen from the other diagram given herewith, and the general modifications which are necessary in using valve rectifiers will also be evident from the diagrams.

COMFORTABLY ensconced in a deep armchair in Sir Gerald du Maurier's handsome dressing-rooms at the St. James' Theatre, I could hear, at the end of the long corridor leading to the stage, the rapturous applause that greeted the end of the final act of "The Last of Mrs. Cheyney."

It was fully five minutes before Sir Gerald arrived. His admirers were not satisfied with giving him the honour of half a dozen curtain calls for what is probably one of the greatest rôles he has ever played.

Sir Gerald du Maurier, who had recently undergone an operation, never looked fitter.

He was brimming over with good spirits—those good spirits roused by a full and enthusiastic house and a wonderful part in a wonderful play.

He handed me a glass.

"Soda?" he queried.

"Please," I murmured.

So we drank our "soda" and lit cigarettes, and then he told me all about his experience of wireless.

Quite a "Fan."

"I first took up wireless," said Sir Gerald du Maurier, gazing meditatively at the glowing coals, "when the young child of a friend of mine constructed a small receiving set for a few shillings. He invited me to listen-in, and I did. I was so struck at the time by the novelty of this new kind of entertainment that I decided to have a set myself.

"Consequently I bought one, and installed it in my home at Hampstead. It cost me a hundred pounds, and I can get China as easily as Daventry.

"Within a few days I picked up everything I wanted. When I heard a band I didn't care whether it was from Peru or Pimlico. The hobby lost its novelty. Now, as a whole, it rather bores me. Sometimes, however, there are moments when the ether still has its charm.

Sir Gerald du Maurier is more interested in wireless as a science than as a hobby. He follows its developments with the greatest of interest, and when a new and important discovery has been made he is just as keen to know about it as the most ardent radio "fan."

I was about to ask a question, when there was an interruption.

"Good-bye," said Mr. Frederick Lonsdale, the famous playwright, author of "The Last of Mrs. Cheyney" and "Spring Cleaning," who had dropped in. Sir Gerald rose and they spoke together for a few seconds, while I had the opportunity of glancing around the delightful dressing-rooms.

"Well," said Sir Gerald, "I am afraid you will find me very uninteresting for the purposes of an interview. However, I will tell you what you want to know."

I asked him what he thought of the broadcasting of excerpts of plays and theatre entertainments.

Advertising Possibilities.

"Frankly, I think the broadcasting of excerpts of plays quite pointless. In my mind I do not see the value from the box-office angle. I do not regard it as a good publicity 'stunt,' and I fail to see its advertising value.

"Of course, I realise that the advertising possibilities of wireless could be tremendous.

THE LURE OF THE ETHER.

Sir Gerald du Maurier Criticises Broadcasting.

By "ARIEL."

A famous actor, in an interview with "Ariel," expresses some candid opinions which will interest every listener.

Supposing a well-known speaker, for instance, was broadcasting a talk on economics, or agriculture, or politics, or some other dry subject, and supposing that he switched off suddenly and said 'I strongly advise you to use Blank's soap' or perhaps



Sir Gerald du Maurier.

'Clean your teeth with Smith-Jones' dentifrice,' I am sure the beneficial result to these two products would be overwhelming.

Wireless Plays.

"If, again, he said 'that most wonderful play, X, which I saw 132 times,' the box-office would naturally reap the benefit. But I am firmly convinced that the broadcasting of a play does not increase its popularity or heighten its success. Nor is it, I think, particularly cared for by listeners, who would rather go to the pit and see the play in comfort.

"It is like having a play read to one. And the effect is much the same as if it were read by a very indifferent reader. I, personally, prefer to read myself undisturbed by anyone. I don't know whether everyone is the same, but I cannot bear being read to. Wireless plays seem like that to me.

"Of course, I am all in favour of musical plays and revues being broadcast. Here the cast have not to rely almost entirely on their acting to 'put over' their parts, as it happens in so many plays. They have the lively music and the tuneful songs to help them, and music is always agreeable to listen to."

Sir Gerald du Maurier went on to say that he thought at present that broadcasting programmes were far from perfect.

The Popularity of Celebrities.

"Recently I was asked to broadcast," he told me. "I was astonished. I could not visualise that anything I might say before the microphone would be of any interest. I was informed that my subject might be 'How Plays Are Produced,' but I replied that I considered this would be a very boring subject indeed, and so I refused."

He is of the opinion that more discrimination should be used in the choice of the items for broadcasting programmes. He remarked on the fact that some of the talks by famous people are so dull.

"Why they are so popular is because of the public's curiosity to hear the voice of a distinguished person: To some, what they are talking about does not really matter, so long as they can hear the great man or woman speaking.

"But there is a majority of people who would like to hear livelier talks with more humour and less dryness. Many famous people are quite incapable of humour. I, for one, could never listen to those wireless speeches."

It is the musical part of the wireless programmes that interest Sir Gerald du Maurier, who believes that the better kind of music should be concentrated upon.

Like so many others, he is of the opinion that jazz has been overdone.

"There is too much dance music in the wireless programmes of to-day," he continued, lighting another cigarette, "but I always enjoy any kind of music on the wireless, and the pianoforte playing best of all. That and the violin and the gramophone, to my mind, broadcast better than the full orchestra or more spectacular entertainment. The tone and beauty of the piece gets over better and is more enjoyable to listen to."

Unexpected Thrills.

Sir Gerald likes to listen to the impromptu part of the wireless programmes that is usually taken up by messages from the Commissioner of Police and the S O S calls.

"There I find a thrill. The unexpected in wireless is so much more fascinating than what one knows is about to happen."

At this moment Miss Gladys Cooper looked in to say au revoir. The charming unexpected.

"In conclusion, I would say that in wireless the spoken word means nothing, and the broadcasting of plays is like a blind man going to the theatre. No, I think that the future of wireless lies in the beauty of sound, and that is music.

"Kreisler playing his violin will always be more appreciated than a survey of the housing problem in Hong Kong. And as for myself, whenever I hear a voice on the loud speaker, I say 'Let's wait for the band.'"

And, with that attractive smile everyone knows so well, Sir Gerald du Maurier started to remove his make-up.

CURRENT TOPICS.

By THE EDITOR.

Captain Eckersley's Slogan—The Committee's Report—Broadcasting in the "House"—The Question of Authors' Fees—Radio in Germany.

THE time has arrived when we must have a basic slogan in broadcasting, and that slogan should be, 'Fewer stations, higher power.'

Thus Captain Eckersley at a recent lecture given in London. Captain Eckersley went on to say that the slogan represented the ideal for which the B.B.C. were working, and he stated that by combining wire and wireless it would be possible to link up national systems. "Why," he asked, "should not the King's speech on such an occasion as the opening of Wembley be heard all over the Empire?"

It is good news to hear that the Chief Engineer of the B.B.C. believes in the policy of fewer stations and higher power. We have good reasons to believe that the report of the Committee on Broadcasting, set up by the Prime Minister, will, when published, recommend the entire reorganisation of the transmitting stations of the B.B.C. It will possibly be suggested in the report that most of the stations at present working should be dismantled and a comprehensive plan will be suggested for the erection of ten or more high-powered stations in different parts of the country, as alternatives to the present B.B.C. stations.

Fewer Stations.

It is well known that this policy has been very much in the minds of the B.B.C. Executive for some time, but the scheme has been temporarily shelved until the publication of the Committee's report.

If the new stations are built they will not be erected on the town system—that is, building stations in certain towns to serve certain populous districts; but they will probably be built on the area plan, which means that the country will be divided into ten, eleven, or possibly twelve areas, with a special high-powered station serving in each area. If such a plan were adopted, each station would ensure perfectly satisfactory crystal reception throughout its entire area, and would, possibly, be capable of being received in other areas; thus giving listeners an opportunity of hearing alternative programmes.

It can be almost taken for granted that the Committee's report will recommend that broadcasting shall continue to remain in the hands of the B.B.C. for another three years, at the end of which period, if occasion demands, the whole question of the company's monopoly will again be brought up for consideration.

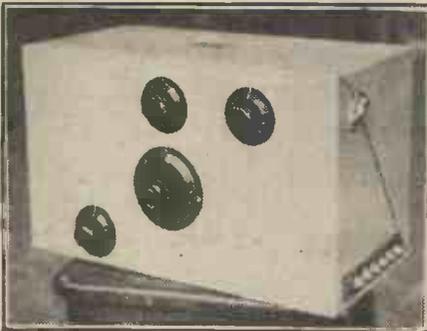
When the B.B.C. is reorganised after the publication of the Broadcasting Committee's Report, listeners will find that the Executive Board of Control will be entirely rearranged, and that representatives of the Postmaster-General, the listener, and many other classes affected by wireless broadcasting, will be represented on the Committee. There will also be sub-committees

to deal with other branches of broadcasting, such as music, education, etc., and, in fact, there will be a general tightening up of many points in the broadcasting scheme, which will react very favourably on the listener.

* * *

Broadcasting was discussed in the House of Commons the other day, and, arising out of a discussion on the Supplementary Estimates, the programmes were somewhat freely criticised. One member of Parliament, for instance, referred to the B.B.C. programmes as: "Innocuous inanities, suitable only for invalids and imbeciles." This is a euphonious, but at the same time erroneous criticism. In fact, there have been of late many exaggerated criticisms of the B.B.C. programmes, and of the methods of the B.B.C. in general.

For instance, that well-known author, Mr. A. A. Milne, has had something to say about the *raison d'être* for the low standard of the literary side of the work of the B.B.C.



A 15-100 metre short-wave receiver designed by one of Marconi's personal engineers.

Mr. Milne sums all this trouble up in a nutshell, and says that, from the author's point of view, it is due to the fact that the B.B.C. do not pay enough money. Mr. Milne relates the story of some of his experiences. He was offered two guineas to read one act of one of his own plays. On another occasion he was offered five guineas to read something in the Children's Hour, and on another occasion he was asked to write an original one-act play for the B.B.C., for which he could, possibly, have obtained a fee of £50. Mr. Milne says, "Now, what on earth do they (the B.B.C.) think Shaw has made from 'How He Lied to Her Husband'; or Barrie from 'The Twelve-Pound Look'; or for that matter, Gertrude Jennings from 'Five Birds in a Cage'—£50!"

Valuable Publicity.

Well, comparisons are always invidious. Mr. Bernard Shaw has already allowed two of his plays to be broadcast, one of which he read himself, and we happen to know that a by no means exorbitant fee was paid to this great dramatist.

Mr. Milne derides the suggestion of the value which the publicity of the broadcasting of his work might afford him. In this he makes a great mistake. In these days publicity, and especially the publicity offered by the B.B.C., offers great opportunities, and if we were in Mr. Milne's place, we should feel it well worth while paying the B.B.C. £50 to let us broadcast one of our own works.

Mr. Milne confuses the function of the B.B.C. with the function of an editor. We have explained this difference many times in "P.W.," and we do not propose wearying our readers by reiterating those differences; but we suggest that Mr. Milne, if he is such an expensive person to engage for broadcasting, might at least do the B.B.C. the justice by remembering that their fees, low as they may seem to him, are as good as they can make them, in view of the fact that listeners in this country who buy wireless licences, pay something less than ½d. per day for the entertainment which they receive.

Writing of Mr. Milne and the B.B.C., we think it will be of interest to our readers if we mention that the Society of Authors and the B.B.C. have come to an agreement with regard to the payment of minimum fees for broadcasting of literary and dramatic matter.

Broadcasting Fees.

The minimum fee will be two guineas for broadcasting a single work, per canto; 10s 6d. per performance of each 100 lines of a single poem; 10s. 6d. being the minimum for any poem. One guinea is the minimum for a single performance of excerpts, monologues, etc., not exceeding 200 lines. Excerpts from books in prose, or serial matter, at the rate of one guinea per 1,000 words.

But the whole question of B.B.C. payments to authors, poets, etc., must necessarily bristle with difficulties. The B.B.C. up to recently had no standard by which to judge what was and what was not a reasonable payment in connection with certain items of broadcasting, and we do not envy the officials their task of satisfying everybody.

Radio in Germany.

German broadcasting, says the "Daily Express," although only two years old, has already made astonishing progress. This month's statistics show that there are now in Germany 1,108,845 licensed listeners-in, the Berlin area alone accounting for half a million. Each licence costs 24s. a year, and so far the public has not grumbled at the charge.

It was found advisable in organising broadcasting to divide up the Reich into nine separate areas, corresponding to the intellectual peculiarities and different dialects of the various federal States. There are independent sending stations at Berlin, Munich, Leipzig, Frankfurt-on-the-Main, Hamburg, Muenster, Stuttgart, Breslau, and Koenigsberg. Each of these nine cities has a programme to which its own opera house and its own university contribute. This sounds almost too good to be true; yet true it is. Germany has "gone in" for broadcasting with some thoroughness; let us hope the future state of broadcasting in this country, when the "area" system is adopted, will go one better.

Applicants applying on Trade or Private printed Notepaper (Leaflets for Postcards) will be sent post free 80 page Illustrated Booklet entitled—Photography tells the Story of the

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Only I/II a volt.

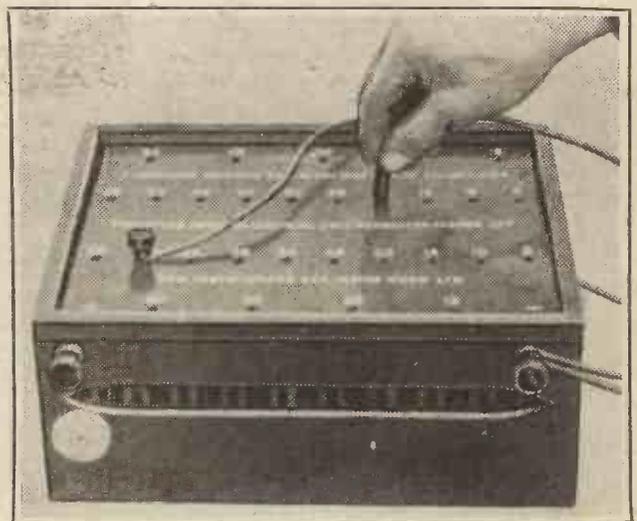
SAVES BUYING A SELECTOR SWITCH COSTING £1 17s. 6d. AND SAVES COST OF FIRST CHARGE.

OTHER MAKES of equal amperage usually sold at 3/3 per volt. Weight very excessive.

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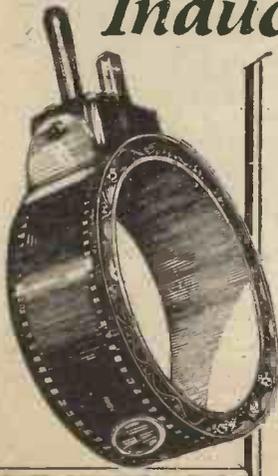


CLEAR as a bell the typical French Orchestra came through as the listener tuned in with his LEWCOS Coil. Coil after coil had been tried and discarded in an endeavour to realise that rare selectivity and fine tuning so essential to complete radio enjoyment.

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**SUPER TONE
LOUDSPEAKERS**

Cape Town Calling

FROM A SOUTH AFRICAN CORRESPONDENT.

THE Cape Town Broadcasting Station was the second installation to be erected in the Union of South Africa, the first being the well-known Johannesburg station (JB) which came into being a few months earlier. "Cape Town"—with no less abbreviated call sign—came on the air on September 15th, 1924, as a result of a bold step undertaken by the Cape Peninsula Publicity Association, who now run the concern.

Prior to that date there was much controversy in the Cape as to who were the best people to run broadcasting. Many thought it should be a municipal venture, and when a wealthy merchant of the city in the person of Sir David de Villiers Graaff came forward with a proposal to present the City Council with a complete Marconi installation, it was then the general opinion that the "city fathers" should take over the new enterprise.

Commencement of Broadcasting.

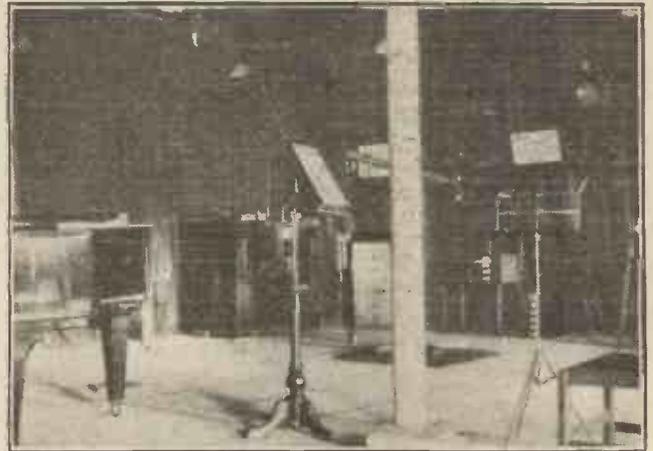
But, in spite of so generous an offer, the Council declined with thanks. Private enterprise or nothing, was their contention. Such a novel experiment in a new country should never be implicated with rates and taxes, they argued. And in the light of experience here, and more particularly in Durban,

where broadcasting is a municipal concern, it is thought our councillors were wise.

Time passed. That broadcasting must come eventually was a sure thing, but no private company appeared to be attracted by the scheme. To them there was insufficient guarantee that wireless conducted from Cape Town would be a success. "We can guarantee nothing until we have tried it out," said the experts. Suddenly there appeared on the scene the Publicity Association, and, with an eye to business, they saw scope in the radio suggestion.

The factors which prompted them ultimately to take to broadcasting may be summarised as follows:

(a) The fact that they were the guardians of the city orchestra, a choice asset for any



The studio at the Durban station is modelled on the lines of the British studios.

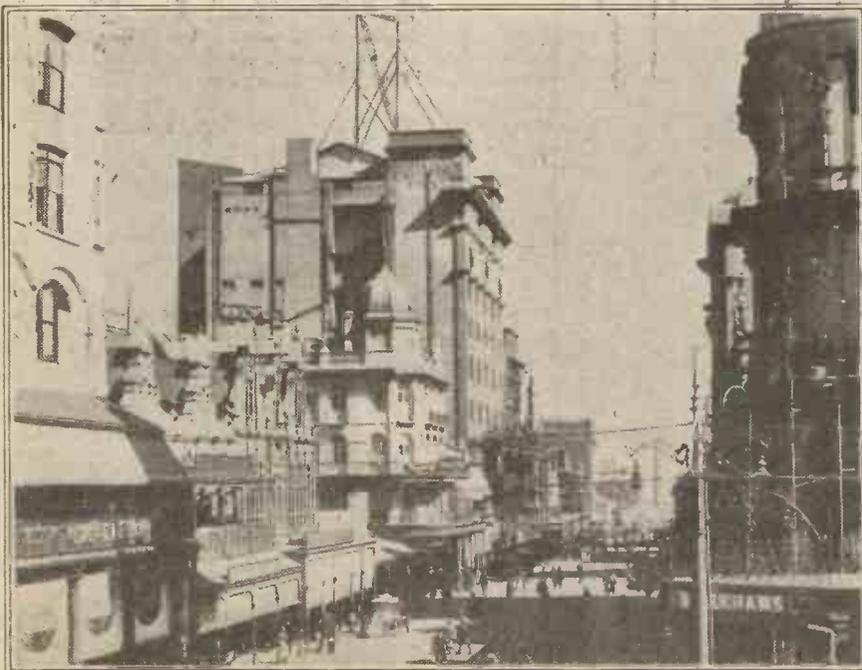
station, and particularly so in this case, where the scarcity of talent to fill programmes would be one of the greatest obstacles to success.

(b) Advertising was to be a part of the proposed undertaking, and they, as the publicity boosters of the "Glorious Cape," realised great possibilities in the mystic call-sign "Cape Town Calling." They pictured thousands answering the "call" and spending their holidays in the mother city and the peninsula—the one great object of their existence.

(c) Posing as publicity folk whose activities indirectly benefited the whole of the business life in the city, it was thought that a considerable amount of voluntary support from artistes would be forthcoming, and that people would be only too pleased to offer their services for nothing.

Artiste's Services Free.

Here it might be stated that, at a time when the Cape Town station had been operating for over a year, no remuneration had ever been made to any artiste for services rendered before the microphone. Whether this is a wise policy, and one calculated to get the best of South Africa's handful of talent, is a point of considerable controversy in this country at the moment. The listening public of South Africa are critical. South Africans we may be, but it is the peculiarity of every white man to "hark back" to his own "home" or homeland when comparisons are called for. In other words, there are Dutch and English



A photograph of the Cape Town station taken shortly after its erection.

(Continued on next page.)

CAPE TOWN CALLING.

(Continued from previous page.)

residents in the Cape Colony who, when asked, are quite prepared to admit this place to be their "home"—they love South Africa—but when it comes to entertainments or even an expression of opinion as to the abilities of a radio artiste, neither can ever be a patch on "What we used to get in London."

The South African by birth who has never left this country is forever getting the alleged inferiority of his own local civilisation pushed down his throat. British listeners who perhaps have never left their own firesides in England may find it difficult to appreciate this fact, but it is true, nevertheless.

A Sudden Start.

And so we proceed. Cape Town came on the air with a rush in September, 1924. I say "rush" because it was so, as the official opening took place some weeks before the station was in proper working order, and in some quarters the bad impression then created is still remembered.

The broadcasting installation at Cape Town may be described in a few words, for it follows after the pattern of most of the English stations. "6 kw. Type 'Q'-Marconi" conveys everything as far as the equipment itself is concerned. The lay-out of the station, however, requires more detailed explanation, for, as we all know, it is difficult to find two stations in the whole world having an identical site and functioning alike.

To explain the site of Cape Town's station one must first visualise the geographical

Lion's Head and Signal Hill on the other side doing the same thing there for suburban dwellers residing beyond. Fortunately, there is little habitation "behind" Table Mountain itself, which starts the chain of heights to the Cape of Good Hope—Cape Point.

Bad Screening.

So it will be readily seen that a broadcasting station in the city of Cape Town itself has many detrimental screening features to face. Whether the station should be on the Flats, away from the mountains, or not, was the first technical problem to be decided.

The cost of an "open" site, however, was considered far too great to warrant its consideration, so the only alternative had to be accepted, and into the city came the station, with the promoters determined to chance their arm with results, like many other centres have been forced to do.

The transmitter is accommodated at the top of a seven-storeyed building in the centre of the city's main thoroughfare—Adderley Street. Steel lattice masts of conventional design tower 70 feet above this imposing block of shop buildings and support an aerial of the well-known "inverted 'L' cage-type."

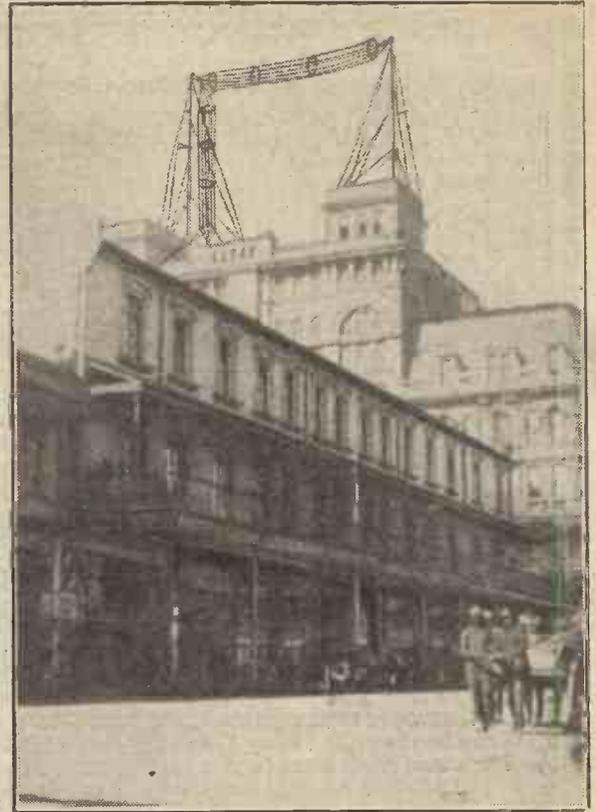
It was only natural that at such a height above ground considerable difficulty would be experienced in finding the most suitable "earth," but, after many experiments, this was at last found by resorting to the buried copper plate method. Even a counterpoise did not satisfy the engineers. Then there was the screening effect of nearby metal roofs, etc.; but these obstacles have also now been overcome by earthing, and radiation is as good to-day as ever may be expected from the station.

Scarcity of Artistes.

The studio is located some little distance away—about 500 yards—in the top storey of another tall building, and is connected to the transmitter by a

wire running over the intervening roofs.

The studio, which is suitably draped and containing the famous "Round" microphone and other up-to-date appliances familiar to British listeners, needs little description. Everything necessary for successful working is in evidence, including a number of spare microphones which have been utilised without standing success on



The position of the aerial can be seen from this photograph of the station.

numerous occasions for a variety of relay experiments. The station has explored the realm of relay novelties probably more than any B.B.C. station, for the reason that its repertoire of "straight turns" from the studio is always limited, as already mentioned, due to the scarcity of artistes.

Afrikaanse—the second official language of the country—features a great deal in the programmes, the announcer being, of course, a thoroughly bilingual man. Licence fees for private houses are £2 per annum to the broadcasters and 5s. to the P.M.G. Hotels, boarding-houses, etc., have to pay more. The wave-length of the Cape Town station is 375 metres, and in mentioning this it may be well to refer to a few of the factors which render the picking up of Cape Town in England a very difficult task.

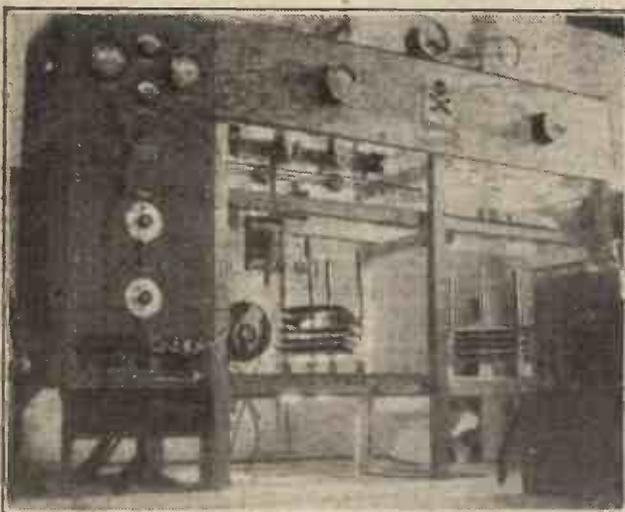
Small Chance of Hearing Cape Town.

First of all, the wave-length is practically the same as the Manchester station, so that it is difficult to conceive of any British listener tuning in Cape Town when Manchester is working.

Secondly, "When it's summer in England it's winter over here" (with apologies), and there is exactly two hours' difference in time, Cape Town being two hours ahead of Greenwich.

As programmes in the two countries are now arranged it seems that the only way to arrange a test would be for Cape Town to open up with a special transmission at midnight here—10 p.m. in England. There would be a "dark route" the whole way then, and the British stations would have closed down.

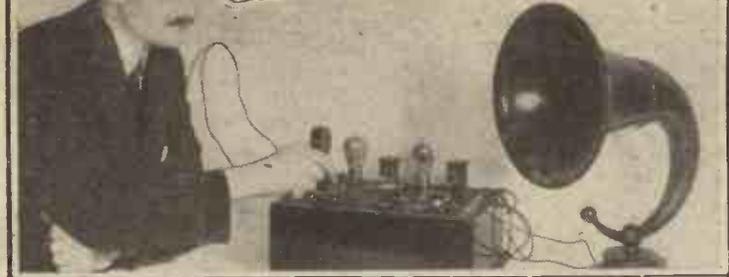
Such a test may perhaps be arranged for the next International tests though we must hope for more success than was achieved this year.



Part of the transmitter in use at the Cape Town broadcasting station.

position of the city itself, tucked away as it is at one end of a sweeping curve of coastline bordering the famous Table Bay. Frowning o'er the city, and immediately at the back of it, is the perpendicular wall front of Table Mountain, with extensions on either side—one ending in Devil's Peak, which presents a very undesirable "screen" between city and southern suburbs; and

The "P.W." Duo Reflex



This receiver designed, constructed and described by the "P.W." technical staff.

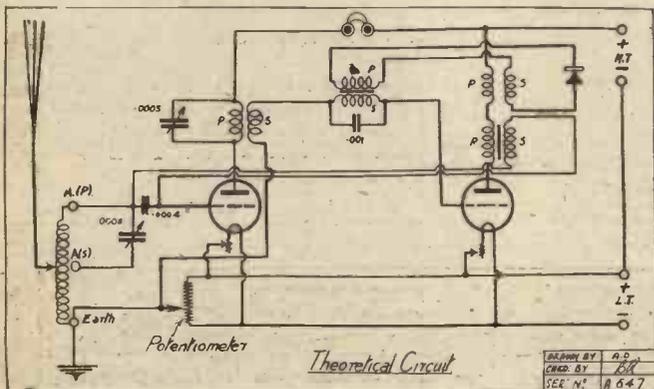
IN this receiver two valves and a crystal detector are employed, and an attempt is made to make both valves do double work by amplifying both at high and low frequencies. The set, therefore, although it uses only these two valves, should be equal to a 5-valve set, 2 H.F., Det. (crystal), 2 L.F. Actually it is not, but nevertheless the result is excellent. There are certain factors that prevent it being possible to get the full work of two valves performed by one valve, but we can reach a point approaching that ideal.

The "P.W." Duo-Reflex is a most excellent loud-speaker receiver, and provides volume

and clarity far exceeding that obtainable with any other "hook-up" employing two valves and a crystal. It is not remarkable in respect of DX qualities, nor is it very selective, but for loud-speaker work within moderate ranges of B.B.C. stations it is undoubtedly the set.

can be followed quite easily if the various operations involved are separately followed. The energy is taken from the aerial in the very first case and passed on in the form of weak H.F. impulses to the grid of the first valve. After amplification at H.F. they are transferred via the first H.F. transformer to the grid of the second valve for further H.F. amplification. Via the second H.F. transformer they then pass to the crystal detector, which, of course, rectifies them so that they can be dealt with by the L.F. transformer and passed back to the grid of the second valve for L.F. amplification in the usual reflex manner.

From the second valve through another L.F. transformer which is in the plate circuit, the signals, which have now been twice amplified at H.F., rectified and once amplified at L.F., are transferred back another step to the grid of the first valve. From the plate of this last they are finally taken to the loud speaker or telephone receivers.



Naturally, passing as they do in the foregoing described manner from point to point backwards and forwards, the signals lose a certain amount of energy that would not be lost if their path were more direct, and that is why 5-valve strength is not achieved. Distortion does not occur, however, and this will no doubt occasion surprise. Many readers will wonder how the signals accomplish their rather tortuous journey without being twisted almost out of recognition. Nevertheless they come through, when the receiver is working properly, with great volume and with almost crystal purity.

Interesting Circuit.

The circuit employed is particularly interesting. It is known technically as an inverse reflex. Both valves are employed as reflex amplifiers, but it is arranged so that each handles a fair share of energy. In many double reflex circuits the first valve first of all amplifies at H.F., passes the amplified H.F. on to the second valve, which still further amplifies these H.F. impulses. The crystal then rectifies and passes the rectified energy back to the first valve for L.F. amplification, and finally the first valve passes the energy on once more to the second valve for a concluding magnification at L.F.

The result is that the first valve handles weak H.F. and L.F., and the second valve amplified H.F. and L.F. In the circuit employed in the "P.W." duo-reflex, one

valve handles weak H.F., and amplified L.F., and the other amplified H.F. and weak L.F. and thus a much more equitable distribution of energy is obtained.

The theoretical circuit can be followed quite easily if the various operations involved are separately followed. The energy is taken from the aerial in the very first case and passed on in the form of weak H.F. impulses to the grid of the first valve. After amplification at H.F. they are transferred via the first H.F. transformer to the grid of the second valve for further H.F. amplification. Via the second H.F. transformer they then pass to the crystal detector, which, of course, rectifies them so that they can be dealt with by the L.F. transformer and passed back to the grid of the second valve for L.F. amplification in the usual reflex manner.

Reaction Control.

Reaction by means of the well-known coil coupling method is not included; the circuit is sufficiently "lively" to introduce reaction effects without, and such are controlled by the potentiometer. Were both H.F. transformers tuned the circuit would be-

come unstable, so therefore one of these components is of the aperiodic type with which no variable condenser is used.

Not a very great loss in efficiency results if both H.F. transformers are aperiodic and variable condensers eliminated altogether, with the exception of the one 0005 mfd. aerial tuning condenser.

Reliable Apparatus Essential.

It will be noticed that only two fixed condensers are employed. Others can be used at various points, but we have found that little benefit obtains—in fact, it appears that the circuit prefers not to have too many components of a "refining" nature, in which category can be included H.F.

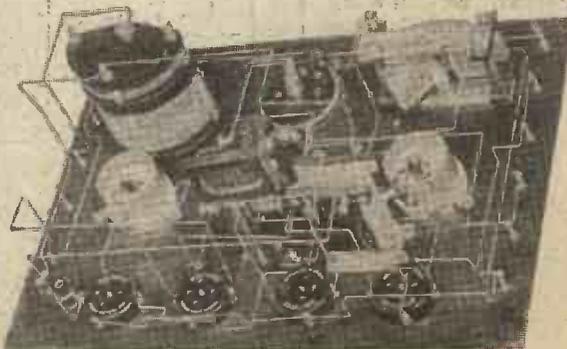
PARTS REQUIRED.

	£	s.	d.
1 Panel, 14 x 10 x 1/4 in.	..	9	0
1 Box to fit (Peto-Scott)	..	10	6
4 Valve holders (Bretwood)	..	7	0
1 Potentiometer, 500 ohms (Burndept)	..	7	6
2 Filament rheostats (for bright and dull emitters) (Cosmos)	..	10	0
1 0003 mfd. variable condenser (Bowyer-Lowe)	..	10	0
1 0003 mfd. ditto. with vernier (Wates "K")	..	10	6
1 L.F. transformer (Energio)	..	1	1 0
1 L.F. transformer, Max. Amp. (Peto-Scott) red base	..	19	6
1 Crystal detector (Burndept)	..	4	0
9 Terminals, W.O. type	..	1	1 1/2
1 0004 mfd. fixed condenser (Watmel)	..	2	0
1 001 mfd. fixed condenser (Lissen)	..	1	3
1 H.F. transformer No. 1 (300-600 m.) (Peto-Scott)	..	10	0
1 H.F. transformer (250-800 m.) aperiodic (Curtis)	..	15	0
Wires, transfers, screws, etc. about	..	3	0

chokes and the like. It seems to operate to a greater advantage with a minimum of gear—a point that will appeal to the economically minded constructor.

At this juncture it must be pointed out that although the circuit itself is really not very complicated, the fact that both H.F. and L.F. impulses pass through or across practically every component in unamplified

(Continued on next page.)



A clear idea of the "works" of the "Duo Reflex" can be obtained from this photograph.

THE "P.W." DUO-REFLEX.

(Continued from previous page.)

and amplified forms, it is necessary, if successful results are to be achieved, that everything used in the construction of the set should be electrically efficient. But then this applies to any wireless set, although to some more strongly than others, and conscientious and wise constructors will always give cheap unbranded components a miss.

A. Useful Series.

A list of the components required is given separately, and calls for little comment. Having collected all the necessary material, the panel can be marked off and drilled in accordance with the measurements given in the panel drilling diagram. In this connection readers will discover that the new series feature incorporated in "Radio-torial" under the heading "For the Constructor" will prove useful. It may as well be pointed out here that the series consists of about six or eight different items which will be repeated from time to time. They can, of course, be cut out and pasted up in a little book and will form an invaluable source of reference during the building of any "P.W." set.

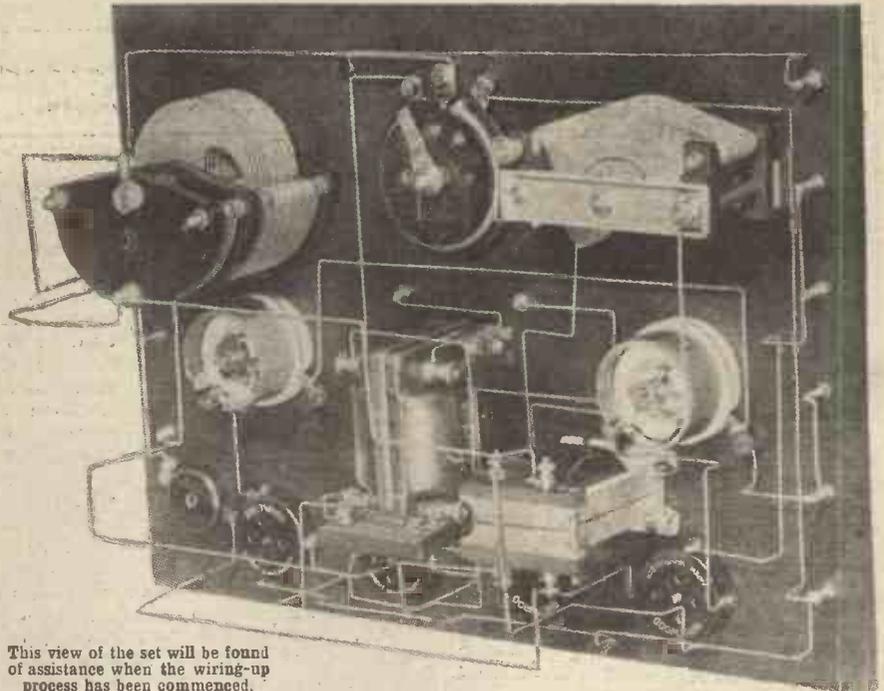
Mounting the components is quite a straightforward business, and if the lay-out given is followed, compactness compatible with sufficient spacing to prevent those bad effects which might be caused by under "crowding" will be obtained. Naturally, if components other than those actually specified are used, due allowance must be made for any modifications in the drilling of the panel that may be necessary.

It will be noticed that the fixed condensers are supported by their connecting leads, and are not actually mounted on the panel.

The Wiring.

Heavy gauge (18) tinned copper wire is used for wiring up this receiver. Square section wire is not advised owing to its larger surface and the possibility of it introducing undesired capacity. We do not wish to give the impression that we are rushing through the constructional details of this set with the object of getting to the end of the article. A double-reflex should not be tackled by a constructor who has not built at least one fairly advanced receiver, and who is not fairly well acquainted with details such as are connected with straightforward component mounting and straightforward wiring.

Also, to divert for one further moment, no con-



This view of the set will be found of assistance when the wiring-up process has been commenced.

structor should commence operations until he has thoroughly read the article from which he intends to work, otherwise he is apt to come up against more difficult propositions than a glance at diagrams and photographs would lead him to believe existed.

Testing the Set.

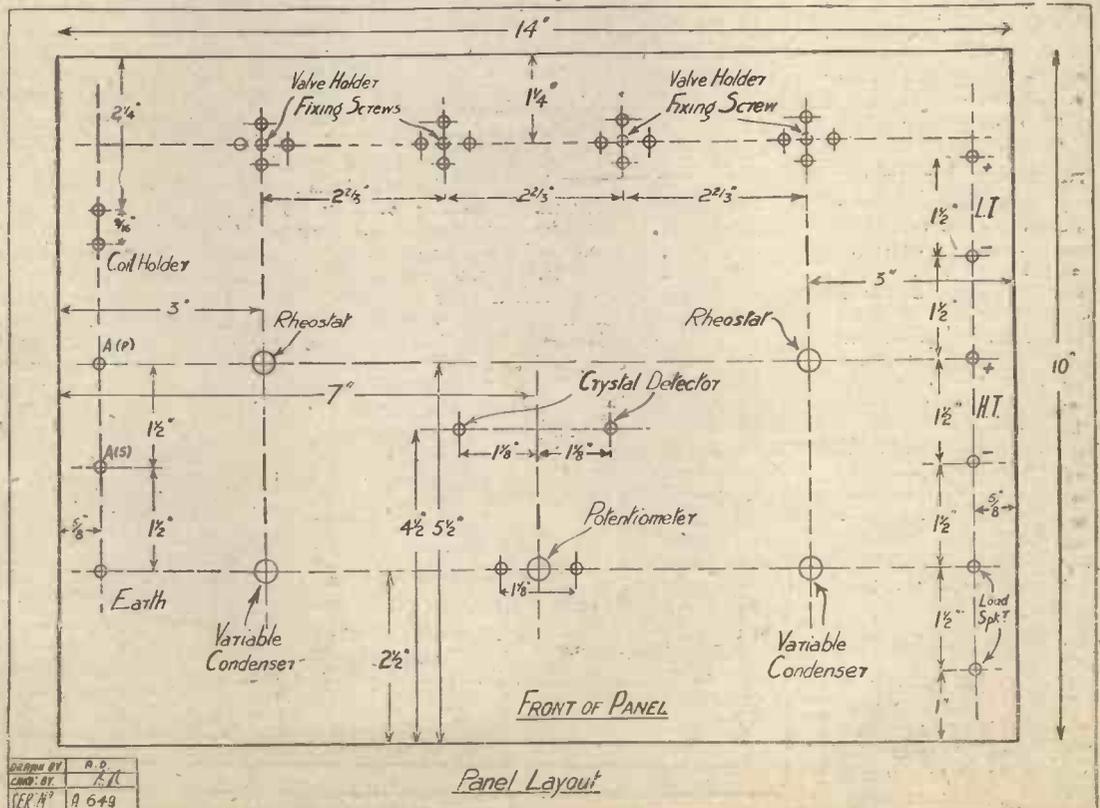
However, having reached that stage when wiring can commence, the constructor will have at his service not only photographs and diagrams, but also a check list of point-to-point connections. He, therefore, should not be dismayed at the rather large number of leads he will have to fashion. The wiring

of this receiver is not a task that can, even in the case of an expert, be polished off in an odd half an hour or so; but a few hours of interesting work—for it really is interesting if one's heart is in the job—will see its satisfactory completion.

After a clean up to remove traces of fluxite, etc., and fixing the transfers, the receiver is ready for its first test.

Now as was stated at the beginning of this article, both valves will not be able to operate with full efficiency at both H.F. and L.F. simultaneously—there is no valve made that could do so. At H.F. voltage

(Continued on next page.)



DESIGNED BY R. D. CAMPBELL, A.I.E.E. JER 47 A 649

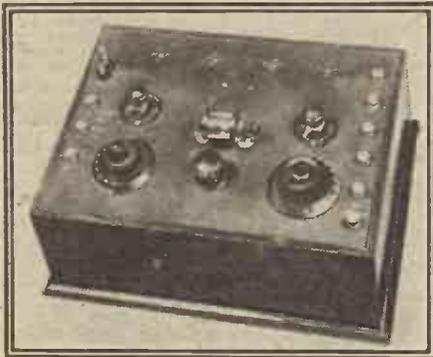
Panel Layout

THE "P.W." DUO-REFLEX.

(Continued from previous page.)

amplification is required, and at L.F. current amplification, and this makes it impossible to obtain a valve 100 per cent efficient for the work.

Now our duo-reflex is primarily a loud-speaker receiver for moderate ranges—say up to between 30 and 50 miles for a main station. Therefore purity and volume are the desired factors, so therefore we can afford to drop points on the H.F. side



A photograph of the complete receiver showing the arrangement of controls.

rather than on the L.F. The choice of valves should therefore be limited to the fairly low impedance types in the L.F. category, power valves for preference.

We have found D.E. 4's, D.E. 5's (Osram), B.T.H. B.4's and P.V.5 D.E.'s (Ediswan) to be very suitable in both positions, although with several other types, too, good results have been obtained. Fairly high H.T. voltages are required, 75 volts being almost a minimum, except in the case of B.4's, which operated well at 60 and even lower. L.T. varies in accordance with the type of valve.

Transformers and Coils.

For the first stage or position an ordinary H.F. transformer covering the range of wave-length desired is used, and for the second an aperiodic transformer of the nature of Peto-Scott's Resistor-former. With different makes it may be found that reversals of primary or secondary connections will improve results. Reversing the L.T. leads is also another thing that may better reception in individual circumstances.

The aerial coil will, of course, be chosen in accordance with the desired wave-band.

For main stations a 75-turn ordinary plug-in with series tuning and a 200, with parallel for 5 X X, are quite suitable.

Tuning will not be sharp, in fact, it will be fairly flat, and the reaction con-

POINT-TO-POINT CONNECTIONS.

One filament contact on the 1st and 3rd valve holders to one side of each respective filament rheostat.

Remaining sides of the filament rheostats joined together and connected to the + L.T. and - H.T. terminals.

Remaining filament contacts of the 1st and 3rd valve holders joined together, connected to the - L.T. terminal and to the left-hand contact on the potentiometer.

Right-hand contact on the potentiometer to the + L.T. lead.

Centre contact on potentiometer to the earth terminal, to the socket of the aerial coil holder (A.T.I.) and to one side of the 2nd valve holder (H.F. transformer).

Grid contact of the 1st valve holder to one side of the .0004 mfd. fixed condenser, and to the O.S. of the Max.-Amp. L.F. transformer.

I.S. of the same transformer to the fixed vanes of the .0005 mfd. variable condenser, to the aerial parallel terminal, aerial coil plug and to the remaining side of the .0004 mfd. fixed condenser.

Moving vanes of the .0005 mfd. variable condenser to the aerial series terminal.

Plate contact of the 1st valve holder to one primary contact of the 2nd valve holder (H.F. transformer) and to the fixed vanes of the .0003 mfd. variable condenser.

Moving vanes of the same condenser to the remaining primary contact on the 2nd valve holder and to one "phones" terminal.

Remaining "phones" terminal to the + H.T. terminal and to one primary contact of the 4th valve holder (2nd H.F. transformer).

Remaining secondary contact of the 2nd valve holder (1st H.F. transformer) to I.S. of the Energo L.F. transformer.

O.S. of the same L.F. transformer to the grid contact of the 3rd valve holder. O.P. of the Energo L.F. transformer to crystal side of the crystal detector.

Catswhisker side of the crystal detector to one secondary contact of the 4th valve holder (2nd H.F. transformer).

Plate contact of the 3rd valve holder to the O.P. of the Max. Amp. L.F. transformer.

I.P. to the remaining secondary contact on the 4th valve holder.

Remaining primary contact of the 4th valve holder to I.P. of the Energo L.F. transformer.

A .001 mfd. fixed condenser connected across the I.S. and O.S. of the Energo L.F. transformer then completes the wiring.

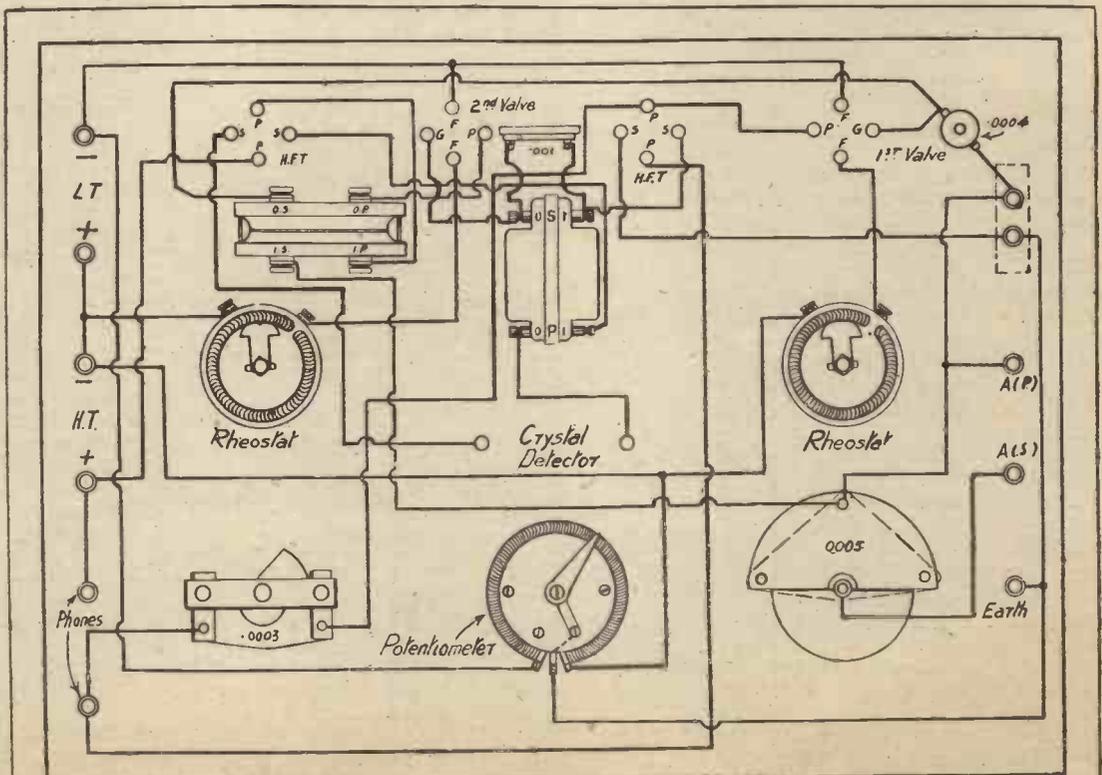
Control by the potentiometer will not be critical. The crystal adjustment follows ordinary crystal adjustment practice except that it tends to make it necessary to alter the potentiometer setting slightly at times.

Excellent Volume.

There is little in the set that can cause trouble once built, and it can be handled quite successfully by anyone who knows how valves are switched on and how crystal detectors are adjusted.

Excellent volume and exceptional purity will result if the "P.W." Duo-Reflex acts in every reader's case (as we fervently hope it will) up to the original model.

A final word about the potentiometer. This must be of good design and possess a smooth action, or trouble will be experienced when an attempt to control oscillation is made. The fault will make itself felt by either continuous or intermittent crackling of great intensity and will be traced to poor contact between the windings of the potentiometer and its slider.

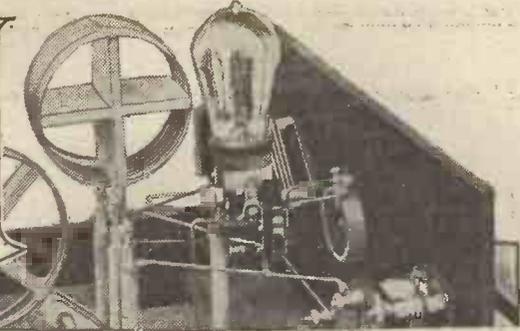


Wiring Diagram.

DRAWN BY H.D.
CHECKED BY A.S.
SER. NO. A.649

Short Wave Jottings

by 2OD



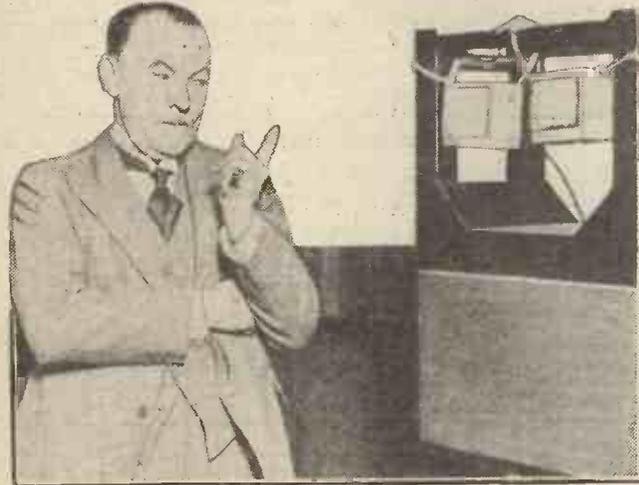
E. J. SIMMONDS, M.I.R.E., writes weekly under this heading.

THE past week has been notable for the great change in the strength of 40-metre American signals, which can be heard as early as 21.30 G.M.T. and by 22.30 G.M.T.; the strength especially of 1st and 2nd district stations is in many cases up to R.8. This is a remarkable change when the receiving conditions in evidence three weeks ago are considered, when it will be remembered all signals on

the daily contact been missed (usual time 15.90 to 16.00 G.M.T.).

Long Distance Telephony.

An interesting series of tests have also been in operation during the last week between EGEH (Egypt), operating on 35 metres, and a British amateur station working on 23 metres. Using an input of 45 watts at this end, the received telegraphy in Egypt exceeded R.9 (that is, maximum strength) and perfectly intelligible speech was transmitted, using a 30-watts input. As a check on the Egyptian reception of this telephony, difficult combinations of input powers and other readings were transmitted by speech and perfectly received in Egypt, being repeated back by the Cairo station in detail. It is of importance to note that an input of 100 watts, used at the same time on a 45-metre wave, was insufficient to render the speech intelligible in Cairo, and also that



Mr. George Graves, the famous comedian, who has broadcast from 2 LO on several occasions.

the 40-metre band from U.S.A. were weak and scarce, and even commercial stations only reached an average strength of R.6 on an ordinary two-valve set (1 Det. and L.F.).

A Remarkable Fact.

An evening representative of the fine conditions now prevailing was Saturday last, 20th inst., every U.S.A. district, except 6th and 7th, being logged by 23.50 G.M.T., some of the 3rd district stations being quite R.7 to R.8. In this connection it is of importance to note that short-wave signals from South Africa, principally on waves around 35 metres, which were so good a fortnight ago, are now entirely absent, and the writer having a special test for South Africa, spent much time on Sunday evening endeavouring to effect communication, but in vain.

One remarkable fact stands out, however, which is difficult to explain. Experimental stations situated in the Philippine Islands have been received with absolute regularity day by day since last November, particularly P I I H R (P I is the intermediate used by Philippine stations). A British experimental station has maintained a daily schedule with P I I H R for many months and seldom has

the speech from the 23-metre transmitter is quite unreadable 20 miles from the transmitting station, although very loud at distances over 1,500 miles.

Correspondence

Letters from readers discussing interesting and topical wireless events or recording unusual experiences are always welcomed, but it must be clearly understood that the publication of such does in no way indicate that we associate ourselves with the views expressed by our correspondents, and we cannot accept any responsibility for information given. —Editor.

The Editor, POPULAR WIRELESS.

CUTTING OUT NOISE.

Dear Sir,—I think many of your readers will consider you are to be heartily congratulated on the two splendid articles from the pen of B. Honri (B.B.C. Engineering Staff).

For nearly eighteen months I have religiously searched the pages of all wireless publications, weekly and monthly, for the type of information so admirably given by Mr. Honri and dealing with the subject of circuits embodying resistance-capacity am-

plification, and giving all critical values of condensers, resistances, valve impedance values and other essentials.

Articles of this description are well calculated to do a real service to the community in that they lift wireless telephony from the mere hobby stage to the realm of true music. One signal.

Yours faithfully, M. GIBSON.
91, Bideford Gardens, Monkseaton, Northumberland.

FURTHER CHITOS IMPROVEMENTS.

The Editor, POPULAR WIRELESS.

Dear Sir,—Having read with interest the letter of Mr. G. T. Mullin, 5, Cowley Road, Walton, Liverpool, re Chitos receiver, in a recent issue, I tried this improvement on the original, and I fail to find where any improvement comes in, only to find a great loss of volume. I have the Chitos working L.S. with three stages of L.F., transformer, and two resistances, and the only trouble I experienced was howling whenever I touched L.S. But I cured this trouble by earthing the casing of L.S. direct to earth. This week I tried an improvement whereby I could earth the filament instead of plate, which works well, with no loss of volume, and fully under control without any choke in circuit, only the primary of transformer. All I have done is to disconnect the '0003 condenser from earth and to earth the filament. With this change the secondary of transformer is earthed; and so the grid of second valve, which I believe accounts for so much capacity in the original Chitos.

Trusting this may be of interest to the readers of your valuable POPULAR WIRELESS.

I would finally like to add my thanks for the Trinadyne Circuit. This also works L.S. as clear as a bell.

Yours faithfully, T. MORRIS.
Gwernaffield, Mold, Flint.

LIMITATION OF DX RECEPTION.

The Editor, POPULAR WIRELESS.

Dear Sir,—The letter from Lieut.-Colonel Lang is very much to the point, and I most certainly agree. I have an 8-valve Super Het, of well-known make. On it I am able to receive just over fifty stations, but unless one is prepared to tune in another station every few minutes when Morse appears, no pleasure at all can be gained. No sooner does one commence to enjoy a foreign programme than it is ruined. Your correspondent is decidedly lucky if he can obtain ten minutes without interruption. My experience is about half this time. Personally I am greatly disappointed, and shall be far more sceptical in future when reading the claims of many of the advertisements. The one and great advantage of my set is that I can cut out the local station, which is within a mile and a half of my set, and that is in my opinion the greatest charm of the Super Het.

Yours truly, L. N. GROVER.
Waverley House, Woodthorpe, Nottingham.

SPLIT REACTION COUPLING.

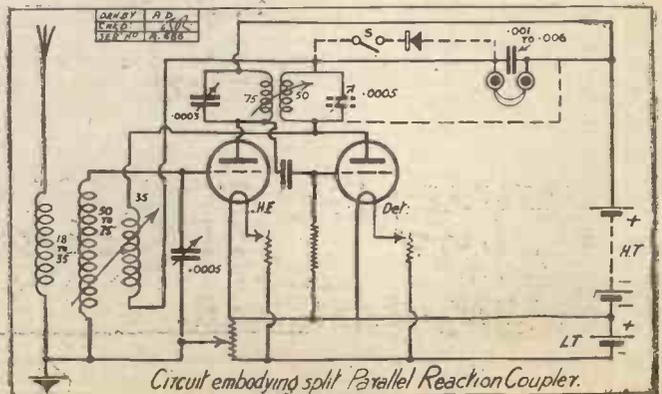
The Editor, POPULAR WIRELESS.

Dear Sir,—I enclose a circuit diagram of my own set (omitting the L.F. stages), in which, as you will see, I have made use of double reaction-in what is to me a novel arrangement. The reaction coil is split into two coils CONNECTED IN PARALLEL, each section being arranged to be variably coupled with the anode and aerial secondary coils respectively. This has the effect of considerably increasing signal strength without introducing distortion. It also acts admirably with a crystal detector, as might be expected. The reaction coil is not, of course, essentially tuned by a variable condenser, which is optional. The values of the two sectional coils are best found by experiment. I have myself found that the best results are obtained from a smaller coil in the aerial reaction circuit than that employed for the anode circuit.

I should be glad if you will kindly publish this circuit in your paper, as it may interest your readers; that is, if you think it worth publishing.

Yours faithfully,
NOEL BONAVIA HUNT,
96, Broadhurst Gardens, Hampstead,
London, N.W.6.

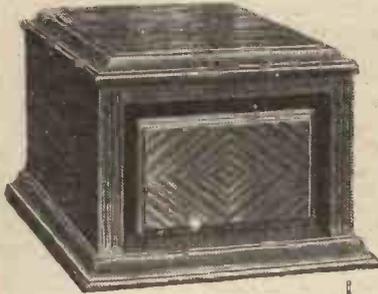
(Continued on page 90.)





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Seven different Brown Loud Speakers are available ranging from 30/- to £15 15 0. Ask your dealer for full particulars.



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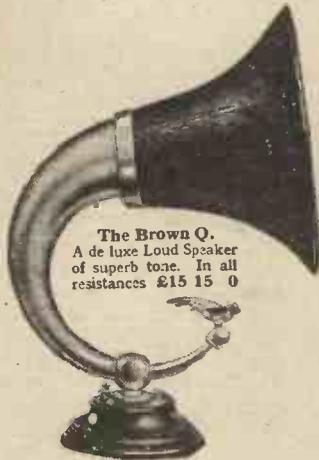
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FOR more than 15 years the name Brown has been recognised throughout the electrical industry as a name to conjure with. First the famous Brown Relay—used by Cable Companies throughout the world—then the superb A-type Headphone, setting entirely new standards for sensitiveness.

Afterwards there followed the marvellous Brown Gyro Compass—a wonderful instrument capable of pointing true North under all conditions without the aid of magnetism. And then, finally, the Brown Loud Speaker—the first British Loud Speaker ever used for Wireless. Sponsored by such supreme technical skill and daring originality, it is small wonder that Brown Loud Speakers have won for themselves in all corners of the globe a reputation for sensitiveness and mellowness of tone as yet without equal.

Time and again the insistent demand for Brown Wireless apparatus has necessitated expansions of factory space. Invariably the demand for Brown products is far ahead of available supply. But at no time has the standard of workmanship been relaxed. In spite of the ever-growing demand for Brown Loud Speakers not a hair's breadth deviation from the recognised Brown standards of performance would be tolerated.

If the Trade have difficulty in obtaining supplies they are invited to send their orders direct to Head Office.

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BROADCAST NOTES.

By O. H. M.

The Budget Speech—Search for Radio Humorists—Boundaries of Broadcasting—Programmes Being Starved—Coming Events.

I HEAR that the B.B.C. is doing all that it can, both in front and behind the scenes, to get the Budget Speech broadcast. A large body of opinion has been enlisted in support of the proposal to place a microphone on the dispatch box before Mr. Winston Churchill on April 3rd. A striking example of the universality of the goodwill in this regard is found in the fact that Mr. Philip Snowden has been induced to plead for the broadcasting of his opponent's speech. It will be interesting to see what action, if any, the Government will take. When the matter was raised last Session, Commander Kenworthy was informed that broadcasting of the proceedings of Parliament would be one of the subjects to be dealt with by Lord Crawford's Committee. The same answer may still apply but opinion is a good deal more emphatically disposed now than it was a few months ago. It might, indeed, be a good opportunity to experiment with parliamentary broadcasting.

Search for Radio Humorists.

Listeners to 5 X X are to have a special treat on March 23th, when part of the St. Matthew Passion will be broadcast from York Minster. York Minster is famous partly for this festival, which has been celebrated for nearly a thousand years with little variation.

The search for broadcast humorists continues, but without much success. Apart from irony, and mild cynicism, I believe that there is not much future for broadcast humour. John Henry's personality is the reason for his success. But personalities do not "grow on trees." In this connection I am rather looking forward to hearing Wee Georgie Wood on March 31st. It will be very interesting to observe whether Wee Georgie can "get away with" his patter without the advantage of his insignificant proportions being visible. I am inclined to think that he will get away with it.

Boundaries of Broadcasting.

I think the B.B.C. did extremely well to arrange to transmit two speeches from the ceremonial connected with the handing over of Easton Lodge by Lady Warwick to the Labour Party.

There was, of course, the usual adverse criticism from those who see the cloven hoof of red revolution in every effort or activity of His Majesty's Opposition. With the Easton Lodge broadcast on record, and with a possibility of the microphone being installed for Mr. Churchill's speech, we shall be developing the boundaries of broadcasting. We might, indeed, secure some more novel entertainment by installing a microphone at the next Liberal Party Land Conference.

Music lovers are exercised to know whether Dame Nellie Melba will be heard "on the air" before she finally retires. Some kind things she said recently about broadcasting have given rise to hopes that it may be possible either to bring her to the studio or to induce her to allow the microphone to be installed when she gives her grand farewell at the Albert Hall. From my knowledge of the financial intricacies of the concert business, I would say that it is extremely unlikely that Melba's Albert Hall farewell will be broadcast. I am confident, however, that listeners will hear the great prima donna during her operatic season at Covent Garden, which will follow her farewell.



Capt. P. P. Eckerley selling his autograph for 1/- a time. The proceeds were given to a hospital wireless fund.

It is good news that the Annual Festival of the National Union of Children's Orchestras will be broadcast from the Crystal Palace on June 19th. This was particularly good last year, and it promises to be even better this year.

This is the "open season" for "raiding," and it is only natural that a harried Chancellor of the Exchequer should cast a covetous eye on the rapidly accumulating balance of licence money in the hands of the Post Office.

My own impression is that the Broadcasting Committee itself is divided on the question of the rights and wrongs of a Treasury raid on licence money as a regular annual event. I do not expect that the Broadcasting Committee will give any clear lead on this particular issue. It will, therefore, rest with Parliament. The

basic point seems to be whether comparatively trifling assistance to the Treasury is to be allowed to cripple and bring into disrepute the whole broadcasting service.

Programmes Being Starved.

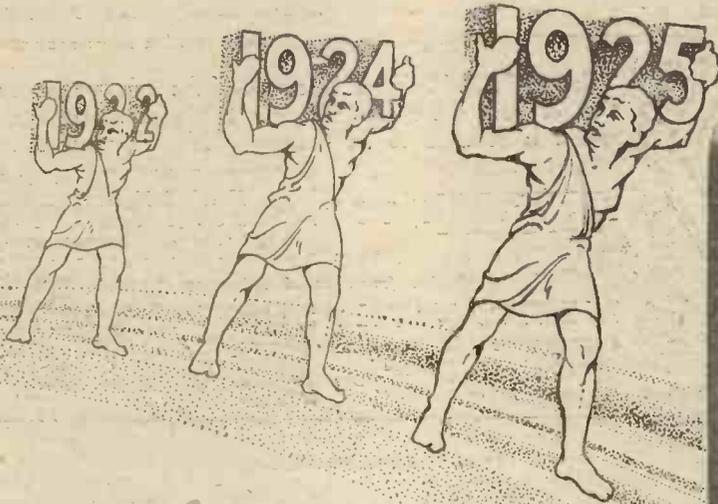
All who have made it their business to study our broadcasting affairs know full well that however excellent the present service may be in comparison with other services abroad, it is as yet merely a skeleton of what it should be when it attains to greater maturity. It is common knowledge that, even before alternate programmes are established, there is severe financial stringency, and the programmes are being starved. An adequate budget allowing for alternative programmes on the new regional scheme of distribution would require £950,000 a year. Compare this with the £500,000 that the B.B.C. is allowed this year. The wonder really is how the 56,000 hours are paid for at all!

Coming Events.

Mr. R. A. Roberts, the eminent protean actor, will emerge from retirement to do a special "Dick Turpin" show from the London Station on Saturday, April 3rd.

"Kitege," the Rimsky-Korsakov opera, which will be performed for the first time in Great Britain on March 29th, should be a feather in the cap of the B.B.C. Albert Coates will conduct and will have the same company under his baton as at Barcelona recently. The artistes are being assembled from Moscow, Belgrade, Vienna, Milan, and Paris. There has been a feeling that this year the B.B.C. has done too few outside shows. Last year music lovers generally appreciated the special international season of monthly concerts organised by the B.B.C. at Covent Garden. This year there has been nothing of the kind, largely, I gather, for reasons of economy; but next year, if only funds are released by the Post Office, the B.B.C. will be able to make ample amends for the shortcomings of last season. I have already heard of the idea of a musical festival and a big competition for young composers for next autumn.

For every valve — for every circuit



A Multi-Ratio Transformer

7 RATIOS

1926

FOR many years wireless research has been slowly evolving the perfect transformer. Much intensive experimental work, many years of apparently fruitless endeavour, have been decidedly leading to the ultimate goal; and it has fallen to R.I., Ltd., with their "infinite capacity for taking pains," to produce that instrument.

R.I. are now able to market a multi-ratio transformer which, while still retaining all the features of their original model, has a larger number of turns on the primary and secondary, and by tapping certain points in the primary and secondary, and bringing them to a terminal block, seven different ratios can be selected as desired. The impedance value covers approximately the wide range of from 6,000 to 60,000 ohms. Thus, whatever the circuit or valve in use, a winding of an impedance suitable for that particular circuit or valve can be chosen at will.

The tapping points of both windings have been selected so as to provide the best ratio for the various circuits and valves at present in use.

In addition to the seven ratios available it is possible to obtain the main one by three alternative methods, allowing a different value of impedance to be selected for the same ratio.

The self capacity of the transformer is greatly reduced by the patented system of winding the coil, giving a greater degree of amplification on the higher frequencies, up to the useful point of audibility.

This new model is totally encased with a steel shroud. The coil is treated in such a way as to render it suitable for any climate in the world, and the celluloid enamel is practically rust-proof. The terminal block is a bakelite moulding.

A year's guarantee is given with each instrument, and in addition a book of circuits showing the best method of using a transformer as a standard intervalve coupling.

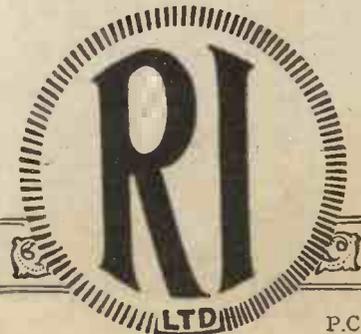
PRICE 27/6

RATIO TABLE.

Ratio	Approx. Primary Impedance in ohms.
1 — 1	60,000
1½ — 1	28,000
2 — 1	60,000
	7,000
3 — 1	28,000
	60,000
4½ — 1	28,000
6 — 1	7,000
9 — 1	7,000

Write now for special booklet P.W.

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S.P. 18 Valves consume 0.3 Amp. at from 1.6 to 1.8 volts and require only a single cell 2 volt. ACCUMULATOR. *Made in two forms.*

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Cosmos

RADIO VALVES

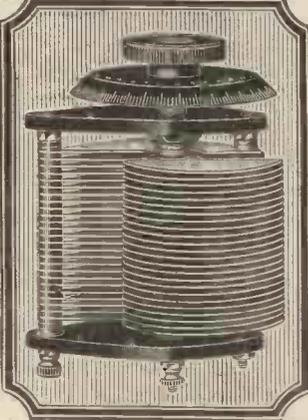
Nothing to/
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Simplicity is a distinctive feature of the J.B. There is nothing excessive, nothing to work loose or get out of adjustment—no intricate parts or complicated assembly. The J.B. Condenser is rugged, free from play and remarkably smooth in action. Further, it is positively low loss.

The utmost care has been taken in the design and construction of the J.B. Condenser. As a result, the perfecting of details has made it the nearest approach to condenser perfection. Try the J.B. in that new circuit.

JACKSON BROS.

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(First Floor)

How loud it is!

That's what everyone says when they first listen-in with a "Brownie Wireless" receiver. And it doesn't matter how long you have one—how often you use it—what other crystal receiver you compare it with—you'll never find a crystal set to give better results.

At a distance of 25-30 miles from the local station (15 miles relay stations) or 120 miles from 5X X you can't better "Brownie." The "Brownie Wireless" Model No. 2 embodies all the features of the Standard "Brownie" Receiver. It is capable of resisting extreme climatic conditions. The



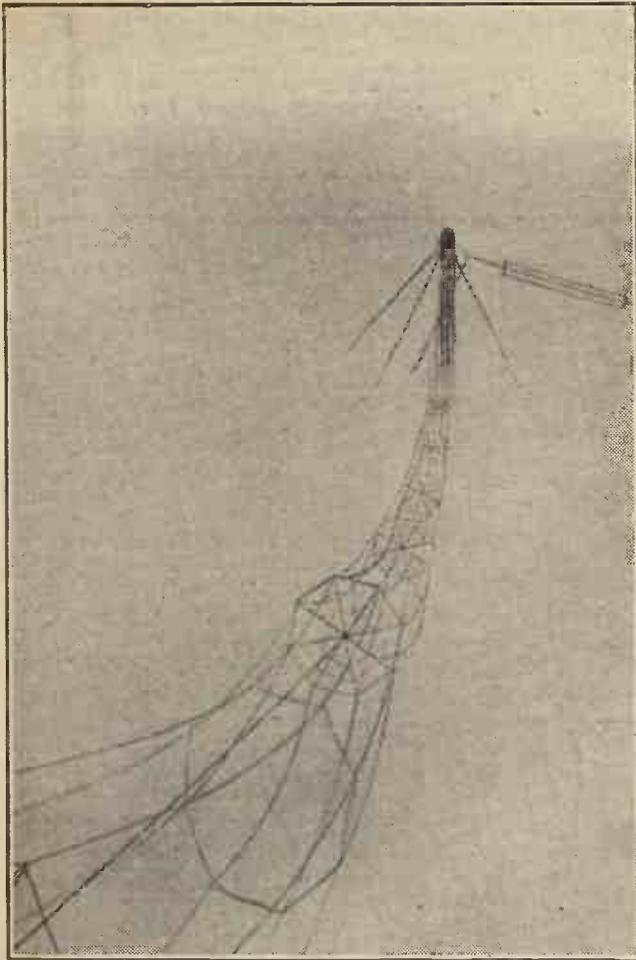
outer casing is hydraulically moulded under a pressure of 60 tons, forming a pleasing and substantially designed piece of apparatus. The receiver has a natural wave-length up to 600 metres and a standard plug and socket coil attachment is provided, which, with the aid of a special coil (price 2/9 extra) makes the set adaptable to 5XX. Complete, including the famous D.L.5 Crystal and Palladium Cathodisc.

PRICE
10/6
COMPLETE

"BROWNIE WIRELESS" MODEL No. 2

The Standard "Brownie." Just as good as ever, 7/6
but now complete with ebonite base 2/-
5 X X Loading Coil for the Standard 2/-

THE BROWNIE WIRELESS CO. (of Great Britain) LTD.
(Incorporating the J. W. B. Wireless Co.),
310a-312a, Euston Road, London, N.W.1.
Phone: Museum 3747



Not a frame, but a reliable outdoor aerial! Part of the huge aerial belonging to the super station now operating at Rugby.

IN consequence of the improving efficiency of nearly every type of valve circuit, and the increasing popularity of the portable valve receiving set, the frame aerial as a receiver of broadcast energy is coming into a great deal of prominence.

An efficiently designed frame aerial has very many points in its favour. In the first place, it is light and portable. Secondly, the use of a frame aerial does away with the outdoor aerial, a device which many excellent individuals who regard the development of wireless science in a very conservative manner look upon as being in the nature of a disfigurement of house property more than anything else.

Thirdly, a good frame aerial provides an extremely selective means of picking up broadcast. Its careful employment will not only result in a reduction of the amount of interference received from static disturbances, but, in nearly every instance, electrical disturbances due to neighbouring tramways, power lines, generating stations, and so forth, can be entirely cut out when the reception is obtained on a frame aerial.

Reducing Interference.

The chief point of disadvantage about the frame aerial is, of course, the considerably reduced amount of radio energy which it is capable of picking up. Even a frame aerial of the highest efficiency can only pick up about a third of the amount of energy which would be ordinarily received by a good type of outdoor aerial, and, in consequence of this fact, it is, of course, only possible efficiently to utilise the many good

properties of a frame aerial when the device is used in conjunction with a multi-valve set. Given this receiving equipment in the first place, however, a properly designed and constructed frame aerial will afford wonderfully good and pure reception, and by its use all ordinary static and neighbouring electrical interference can be at once cut out. It is not proposed in this article to enter into an explanation of the theoretical nature of the frame aerial's action, for the frame aerial constructor will be well aware of the mode of functioning of that device. There are, however, in the construction of a frame aerial, many details which affect the resulting efficiency of the aerial, and as the influence of these constructional details upon the frame's efficiency may not be so well known to the amateur, this article will concern itself entirely with a discussion of the many efficiency factors which enter into the making of these aerials.

Constructional Details.

Now, it has been shown that for reception on any particular wave-length there is a definite size of loop, or frame, and, likewise, a definite number of turns of wire which go to produce the most effective reception on that wave-length. In brief, it may be stated that for comparatively short wave-lengths, such as those upon which all British broadcast transmissions are received, large frames containing a small number of turns are the most suitable.

On the other hand, for the reception of wave-lengths above 600 metres, a smaller frame is better, and this frame should have a larger number of turns on it. Generally speaking, a three or three and a half foot frame containing six turns of wire is the most efficient of any for broadcast reception.

A three-foot frame containing half a dozen turns of wire will, other things being equal, tune from 230 to 700 metres, whilst, by increasing the size of the frame to four feet, and decreasing the number of turns of wire to 4, a frame is obtained which will tune from, approximately, 190 metres to somewhere about 600 metres.

Thus it will be seen that the actual size of the frame, and the number of turns of wire

THINGS TO CONSIDER IN FRAME AERIAL DESIGN.

By J. F. CORRIGAN, M.Sc., A.I.C.
(Staff Consultant.)

which it contains, considerably affects its tuning range.

If the spacing of the turns of wire is close, the inductance value of the frame (and consequently the upper range of wave-lengths tunable) is increased. However, if the spacing of the wire is very close, the resistance of the frame circuit is increased. Thus, under these conditions the electrical efficiency of the frame decreases. In other words, its sensitivity diminishes.

In designing a frame aerial, therefore, an endeavour should be made to reach a compromise between these two factors, and the spacing of the wire turns should be adjusted so that the inductance value of the frame reaches a maximum whilst the resistance is kept as low as possible. Generally, a spacing of $\frac{1}{4}$ or $\frac{3}{8}$ in. will effect the end in view with a frame which is only to be employed on broadcast wave-lengths.

A Common Fault.

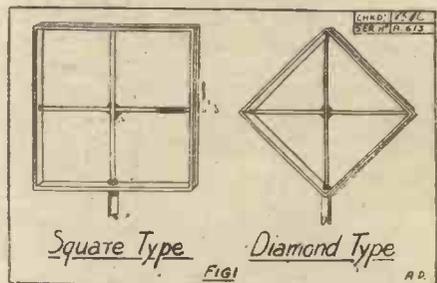
The wire used for winding the frame should of course, not be too thin, otherwise the H.F. resistance of the frame circuit would be increased. No. 20 S.W.G. wire, suitably insulated, is quite suitable for any ordinary purpose, whilst, of course, many constructors may prefer to use thin flex, which has a lower resistance and, on account of its nature, is especially suitable for use with folding frame aerials.

The most useful tuning condenser to use in parallel with a frame aerial is one which has a maximum capacity of .001 mfd.

A Common Fault.

The wire used for winding the frame should of course, not be too thin, otherwise the H.F. resistance of the frame circuit would be increased. No. 20 S.W.G. wire, suitably insulated, is quite suitable for any ordinary purpose, whilst, of course, many constructors may prefer to use thin flex, which has a lower resistance and, on account of its nature, is especially suitable for use with folding frame aerials.

The most useful tuning condenser to use in parallel with a frame aerial is one which has a maximum capacity of .001 mfd.



This gives sufficient tuning range for most purposes, but the capacity of the condenser should not exceed this value, otherwise a damping effect on the received current will be set up.

Tapped frames are all very well in their way, but for average purposes it is doubtful if their use brings any advantage. With such frames, tappings which are not included in the circuit set up dead-end losses, and these, by absorbing energy reduce the sensitivity and all-round efficiency of the frame aerial. Therefore, it is better to rely on the condenser for the tuning of the frame, and to have the frame wound with one continuous length of wire.

A common fault which frame aerial enthusiasts make is to have the frame

(Continued on next page.)

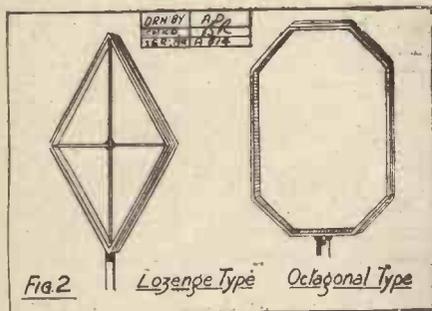
THINGS TO CONSIDER IN FRAME AERIAL DESIGN.

(Continued from previous page.)

situated close to a wall and parallel to it. This position of a frame aerial should be avoided, for the influence of neighbouring masses of matter, such as walls, causes the resistance of the frame winding to go up. If, of course, the frame is placed at right angles to a near-by wall, this effect is not evident. Nevertheless, it is always best to have the frame situated at least two feet from a wall.

Various Types of Frames.

Insulated wire is not necessary for frame aerial winding, but, of course, if it is not used, great care must be taken to effectively insulate the turns of wire at the



points where they touch the arms of the frame. For essentially portable frames, and for those of the collapsible or folding type, insulated wire should be used. In the case of folding frame aerials, it is, in fact, essential or almost so, at any rate.

In estimating the distance between the turns of wire in the frame, the distance should not be calculated from the outer insulative covering of the wires, but from the metallic surfaces themselves. Thus, in using flex wire for portable or folding frame aerials, the turns of wire may be almost touching when they are wound on the frame.

In ordinary use very little difference is to be seen between the square type of frame, the "diamond" type, and the "lozenge" frame. These types of frames are illustrated in the figs, as also is the "octagonal" frame, a type which is now being seen in large numbers. If anything, however, the diamond type of frame is to be slightly more preferred on account of the lessened chances of its sides being placed in a position parallel to any closely neighbouring wall or other large object.

Constructional Data.

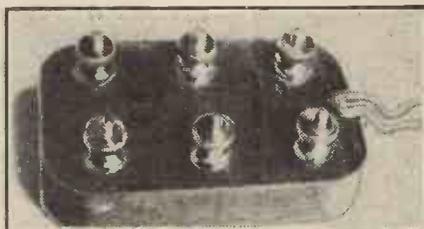
A table giving data of frame aerials of 3, 4, and 6-foot side length will be seen below. This will be of interest to the frame aerial constructor. The "fundamental wave-length" is, of course, the wave-length to which the frame will tune without a condenser being employed in conjunction with it. This fundamental wave-length of the frame is the same for any particular length of wire, and provided that the inductance value of the frame is not increased by excessively close-spacing

of the turns, the fundamental wave-length for any definite length of wire will be independent of the size of the frame on which it is wound. Some interesting data can be gathered by testing a receiver on various frames, and it will be found that the care taken in constructing a really efficient aerial is fully repaid.

Length of Side of Frame (feet.)	No. of Turns.	Spacing (inches).	Inductance (micro-henries).	Capacity (micro-farads).	Fundamental Wave-length (metres)
4	6	$\frac{1}{2}$	150	55	175
6	4	$\frac{1}{2}$	124	66	170
8	3	$\frac{1}{2}$	96	75	160

A SERVICEABLE TELEPHONE TERMINAL BOARD.

THE telephone terminal board here described may not, perhaps, be to the liking of every amateur, especially the more fastidious person; but, nevertheless, this little instrument is an extremely efficient and serviceable one. It is sturdy, and it can be knocked about to almost any extent without any injury being done to it. The construction of the terminal board is of the simplest nature. The actual



The completed telephone board may be seen above.

dimensions, of course, will be dependent upon the number of terminals which it is desired to include on the board. Generally speaking, however, three pairs of terminals are sufficient for the average needs of most amateurs, and, therefore, the measurements given in this description apply to a board equipped with three sets of 'phone terminals.

Hard Wood.

In order to construct the board, obtain a small piece of wood—the harder and the more thoroughly seasoned, the better—about four inches long, two and a half inches wide, and approximately one inch thick. Plane, or otherwise trim all the surfaces of the wood, and finally sand-paper off so as to impart a smooth surface to the object.

Now mark out on the upper surface of the board the positions for the terminals, and then cut away the underside of the board to a depth of half an inch, leaving a border of uncut wood all round to a width of about a quarter of an inch.

This constructional work will be made plainer by a study of the diagram Fig. 1, which represents the underside of the terminal-board, the inner portion being the

wood which has been cut away to a depth of half an inch.

Attach the terminals to the upper side of the board, and screw them well down, cutting off any projecting shafts of the terminals if they protrude too far below the under surface of the wood.

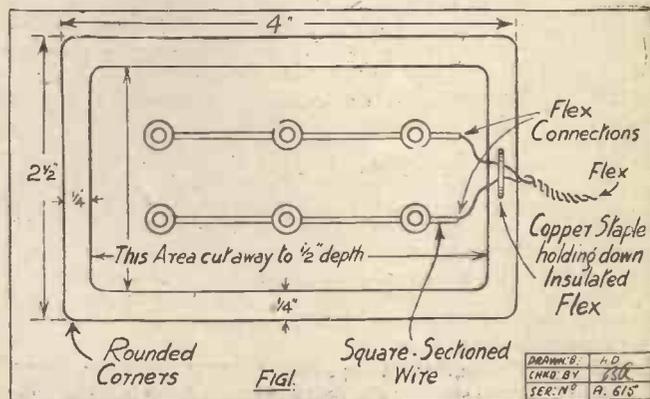
Next, solder strips of square-sectioned wire to the undersides of the terminals in the manner shown in Fig. 1, and to the ends of the wire connecting the rows of terminals, carefully solder the leads of a length of twin flex. Having done this, take a small staple, and fasten the covered flex down to the wood, as shown in the diagram.

Filling in the Base.

Finally, having made sure that all connections are perfect, fill up the cavity in the base of the terminal board with molten paraffin wax, and then allow the instrument to remain undisturbed for half an hour in order that the wax may become thoroughly hard.

If, subsequently, the surface of the wax is found to be a little uneven, thin shavings of wax may be taken off by means of a sharp knife.

The telephone terminal board will now be ready for use. At least twelve feet of flex should be attached to it, for, by having a good length of this material, the receiving set may be allowed to remain in one permanent situation in the room, whilst the terminal board may be placed on the floor, table, or in any other convenient position, the telephone leads, of course, being taken from it.

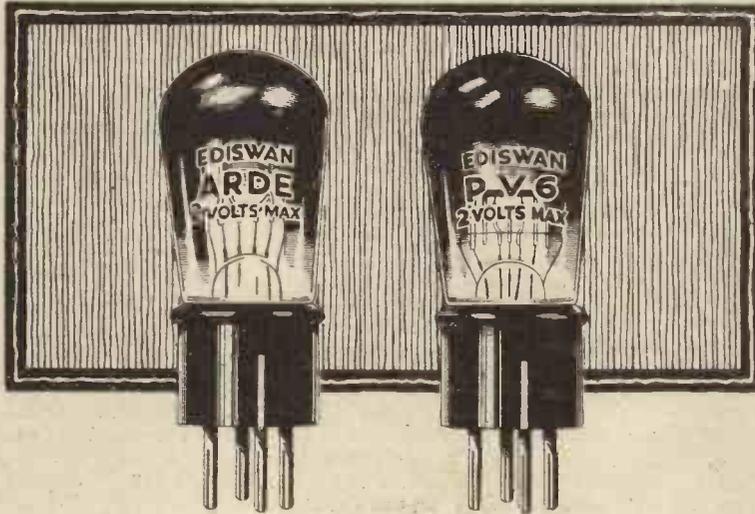


The finished terminal board is shown in the photograph. It will be noticed from the diagram, Fig. 1, that the terminals are connected in parallel. Therefore, the 'phone connections must be made to any opposite pair of terminals on the board.

Other types of boards can easily be constructed on similar lines. These can have arrangements for either series or parallel connections and can contain a larger number of terminals if desired.

EDISWAN VALVES ARE ENTIRELY BRITISH MADE.

THE PERFECT PAIR—



USE them *together*. It is the only way to get the real Edison quality of reproduction. Individually, Edison Valves are always better—very robust; very long in life; very reliable in service. But it is in co-operation that Edison Valves give the most remarkable results. You can test this on your own set.

Ediswan A.R.D.E. is made to function as a H.F. amplifier (red line), or as a L.F. amplifier or detector (green line). P.V.6.D.E. is specially designed for use when A.R.D.E. is used in the preliminary stages, when ample and undistorted volume is required.

The following table indicates the combinations of Edison Valves that give the best results:—

Receiving.	Accumulator or Battery Volts.	Power.
AR	6	PV3
ARDE	2	PV6
AR'05	3	PV8

With these groups and Edison H.T. and L.T. Accumulators the ideal is attained.

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EDISWAN VALVES

The PIONEER VALVE

FOREIGN RADIO NEWS.

FROM OUR OWN CORRESPONDENTS

A Radio Conference at Geneva.

INVITATIONS have been issued to all broadcasting concerns in Europe to attend an International Conference in Geneva beginning on March 25th. The organising body is the Office International de Radiophonie.

The main question to be settled is the definite repartition of wave-lengths among European stations.

Esperanto Lessons.

So far, 82 broadcasting stations belonging to 22 different countries are broadcasting talks or courses in Esperanto. Pride of place is taken by Great Britain with 16 stations; then come the United States with 13, Germany with 11, France with 5, Canada and Soviet Russia with 4 apiece, Denmark, Switzerland, Holland and Australia with 3 each, Mexico and Austria with 2, Brazil, Finland, Italy, Norway, Rumania, Uruguay, Hungary and Czechoslovakia with one apiece.

Radio Stimulates Reading.

The association of librarians of France, in the course of its report for 1925, states that radio broadcasting has a very distinct stimulating effect on reading. It has been noticed that the opening of a broadcasting station in a particular district is followed within a few weeks by an increased demand

for books alluded to or recommended in the course of broadcast talks.

Apart from this direct answer to radio appeal, there is also a noticeable increase in the reading of books dealing with music and the history of music. People are developing an interest in music beyond the mere pleasure of listening to it, and are eager to know something about the composers and the different styles of musical composition.

Wireless in a Mine.

In the great salt mine at Kaliez, a receiving set and a loud speaker have been installed in the deepest gallery of the workings, and the men are thus able to listen to Vienna, Prague, and other stations while working nearly a mile under the earth's surface.

Russian Radio Developments.

The Commissary for Posts and Telegraphs announces the conclusion of an agreement with the Electric State Combine for the erection of a number of radio stations throughout the far-lying parts of the Soviet dominions, in extension of the system which has covered European Russia with a well-organised group of stations.

At Peter-Paul, on the Island of Kamtschatka, in the Far East, a new station provided with Professor Wolodin's latest

apparatus will be installed. It will use 25 kilowatts and have an effective transmission radius of about 1,800 miles. This station is intended as a connecting link between Novó Nikolaiew, in Siberia, and the American stations.

At Jenissei, in Siberia, a 4-kilowatt station will be erected, with a relay station at the mouth of the Jenissei River at Turuschank.

Swerdlowsk will have a 10-kilowatt station, and Orenburg, in the Ural Mountains, one of 4 kilowatts.

It is further planned to set up a station at Chiva, in Turkestan, with a relay station at Tashkend. These will be the first outposts of radio in Central Asia.

New Austrian Station.

The new station at Bruenn, in Austria, after its preliminary tests, has now started regular broadcasting, using 2.4 kilowatts and a wave-length of 521 metres.

The main musical programme will be broadcast from 8 to 9 p.m., Central European time.

French Chamber Rejects Radio Tax.

The French Chamber, after a heated debate, rejected the proposal to inflict a flat-rate tax on all receiving sets in France. The tax was condemned as undemocratic.

A Tax Reduction.

The Czechoslovak Minister of Posts and Telegraphs announced in connection with the opening of the new Prague station that, beginning on April 1st, the yearly tax payable on all receiving sets used in the country would be reduced from 15 to 10 crowns.

EDISON BELL RADIO

BUY BRITISH GOODS

THE EDISON BELL "MUSICALLY PERFECT" SPEAKER

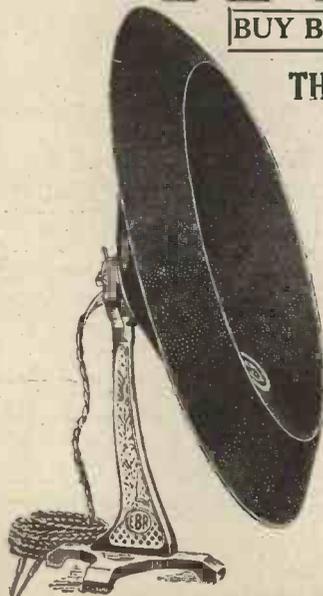
NO METAL HORN
NO
METAL DIAPHRAGM
NO METALLIC NOISE
JUST MUSIC

PRICE 42/-

Stocked by all "Live" Dealers. If unable to obtain, write direct—

J. E. HOUGH, Ltd., Edison Bell Works,
LONDON, S.E.15, and HUNTINGDON.

TESTED 500 VOLTS
FLAT TYPE



TESTED 500 VOLTS
UPRIGHT TYPE



INSIST ON EDISON BELL CONDENSERS

THEY ARE BRITISH MADE AND GUARANTEED BY A NAME WITH 30 YEARS REPUTATION BEHIND IT



"It's the Valves that make the difference"

"Don't claim to be much of an expert, old boy, but I'll tell you this: you can pay 50 guineas for a nickel-plated, low-loss, super-super set, and if you aren't using the right valves you aren't getting half the pleasure out of wireless. It's like looking at the lights o' London when there's a fog on, or being in charming company when you've got the ear-ache.



"Now MY set isn't much to look at; *junk*, you'd call it. But I have three NEUTRON Valves, and I'll back it against the best. Get everything that's going, and my loud-speaker reproduction is as clear as a bell.

"Red Spot Neutron for H.F.- and Detector; Green Spot for L.F. And they're as good as any

BRIGHT Valves—and that's saying a lot when you're speaking of Dull-Emitters."

NEUTRON VALVE

H.F.—Red Spot. L.F.—Green Spot.

In both 4-volt and 2-volt types.

Sold by Radio dealers everywhere. In case of difficulty send P.O. 12/6 for sample valve, post free. Address "Valve Dept. A," Neutron

Distributors, Sentinel House, London, W.C.1.

British made and guaranteed by Neutron, Ltd.

Point-O-Six for 12/6



MATCHED TONE HEADPHONES

IF you're fond of sitting up in the wee sma' hours to stretch a hand across the world, "Matched Tone" are extremely able confederates. With radio you span continents and with "Matched Tone" it becomes easier, "comfier" and much more efficacious. Distant signals stand out clearly; "Matched Tone" grope in the ether with unfailing accuracy. The specially matched receivers make them super-sensitive and tone perfect. You are logging a new call-sign every day with "Matched Tone."

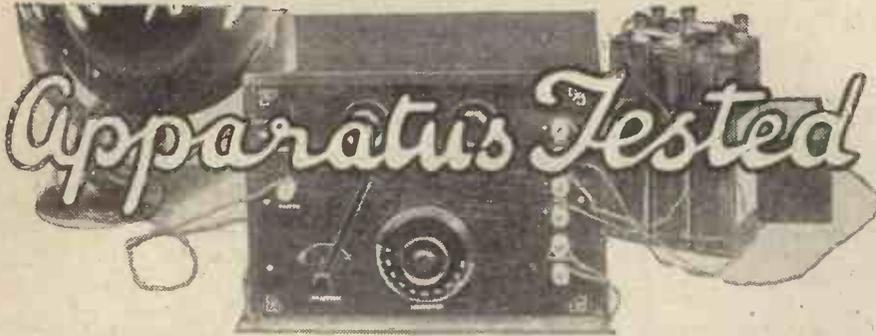
20/-

Table-Talker	Brandola	Audio Transformer
30/-	90/-	17/6

Brandes

Brandes Limited, 296, Regent Street, W.1

From any good Dealer



Traders and manufacturers are invited to submit wireless sets and component parts to the "P.W." Technical Dept. for test. All tests are carried out with strict impartiality in the "P.W." Test Room under the supervision of the Technical Editor, and the general reader is asked to note that this weekly article is also intended to provide a reliable and unbiased guide as to what to buy and what to avoid.—EDITOR.

HITHERTO, "low-loss" condensers of modern design have been rather expensive, and amateurs with not-too-deep pockets have been debarred from their use owing to high initial outlay. In order to meet a popular demand, P. Sherman, of 12, River Street, London, E.C.1, has produced a series of good instruments of this nature at very reasonable prices. For instance, a Sherman Low-loss Square Law Variable Condenser with vernier, of .0005 mfd. maximum capacity, costs but 8s. 6d. This is a decidedly attractive price, the more so as the component is well made and of a high order of electrical efficiency.

Solid brass end strips "earthing" the moving vanes, minimum insulation consistent with strength and an absence of friction or spring washers are commendable features in the design. The action is smooth

and free from anything but an excellent even resistance. A low minimum capacity and a maximum, as stated, are given. We can recommend this variable condenser to the attention of our readers.

We have received some samples of the new Radion inductance tubes which the American Hard Rubber people are producing. These tubes are made in 6-in. lengths, and are 3 in. in diameter. The special feature, is, however, that they are ribbed so that the wire does not touch the whole surface, but is held away by moulded projections. Therefore the former is particularly suitable for winding short-wave coils on.

Radion products are always of an extremely high standard, and they are always "clean" and "finished" in appearance, so these tubes are not dear at 3s. 6d. each.

The arrangements entered into between the Igranite people and Patents of America are rapidly having an effect on the output of the former. This is all to the good, for Igranics now have access to the designs and the use of the patents covering some of the leading U.S. components, and, with British labour producing them, are able to offer them to constructors in this country at reasonable prices.

An excellent example is the Igranite-Patent True-straight-Line-Frequency variable condenser. There has been nothing like it on the English market before, although it is well known to the U.S. fan. It is made of hard brass practically throughout, and only two small pieces of insulating material are used. Both fixed and moving vanes are riveted together. It is compact, although the vanes being long the area covered by them in movement is rather large.

In addition to single-hole fixing three holes and the necessary screws are provided for those who prefer multiple point mounting. A special dust-proof bearing permits a smooth, silky movement. In fact, it is a "low-loss" component very modern in design and construction and, of course, very "American" in appearance. Two values are available, .00035 mfd. at 14s. 6d. and .0005 mfd. at 18s. 6d., without dials. Readers should note, however, that there are circuits popular in this country, the Chitos is one, with which it would be inadvisable to employ this variable, for the simple reason that one of its end stops (maximum) is metal and shorts moving to fixed vanes. This, of course,

(Continued on page 84.)



FILAMENT RHEOSTATS and POTENTIOMETERS

With the windings carried on a porcelain bobbin and having the contact arm moving on its inner side, the "Cosmos" Filament Rheostat takes up remarkably little space, is strong in construction and has a very smooth and reliable movement. It is fixed by ONE HOLE and is provided with a handsome knob and dial. Made in four types, two of which are double wound for Dull OR Bright Valves and one a Potentiometer. Prices and particulars are given in an adjacent panel.

METRO-VICK SUPPLIES, LTD.
(Proprietors: Metropolitan-Vickers Electrical Co., Ltd.),
4, Central Buildings, Westminster, LONDON.

Description	Ohms	Current Carrying	PRICE
Single Wound	6'0	1'0 amp	4/6
Double "	18+2	4'1'5	5/0
Double "	30+4	2'1'0	5/0
Potentiometer	300	—	6/0

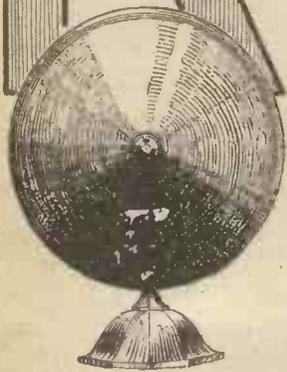
Cosmos

RADIO COMPONENTS

The KONE

RADIO SPEAKER

Unequaled for Tone



KONE SPEAKER.
PRICE £6 - 6 - 0

UNLESS you have heard the Kone Loud Speaker you cannot realise the wonderful advance that has been achieved in Loud Speaker production.

The tone is quite different to the older type, in fact it cannot be realised that a Loud Speaker is being used and you might actually be listening to organ recitals, Grand Operas, etc., given by great artistes in your own home.

The Kone Loud Speaker will operate successfully on any amplifier having an output impedance of 2,000 to 5,000 ohms. The ideal output impedance is 2,000 ohms as in the "Kone" Amplifier.



KONE CABINET AMPLIFIER.

Standard Telephones and Cables Limited
(Formerly Western Electric)

Connaught House, Aldwych, London, W.C.2.

Phone: Central 7345 (10 Lines).

Works: NORTH WOOLWICH, NEW SOUTHGATE, AND HENDON.
Branches: Glasgow, Leeds, Birmingham, Manchester, Newcastle, Cardiff, Southampton, Liverpool and Dublin.

Figures to Remember



CHARLEY'S AUNT

The remembrance of sheer enjoyment.

Sheer enjoyment for the wireless enthusiast is born of perfect reception. You can be sure of perfect reception and know that each and every evening will be full of real pleasure if you use Six Sixty Valves.

Our new range embodying the latest improvements of modern research marks a real advance in scientific Valve design. We have studied the needs of every section of the Radio Public, and the most exacting wireless enthusiast can get a Six Sixty Valve to suit his own special requirements.

Here's one particular type—the S.S.7, a wonderful Dull Emitter Power Amplifier capable of handling output sufficient to work the largest Loud Speaker without distortion. The design of this Valve is such that prolific emission is obtained at temperatures so low that the filament does not glow when operating under its rated conditions; in short, practically a "cold" valve. Just consider for a moment what this means. The destroying influence of high temperature and the alternate expansion and contraction of the filament are almost eliminated, with the result that the life of the valve is proportionately increased. Remember, too, this valve is entirely non-microphonic, and owing to the low filament current consumption can be satisfactorily operated from dry cells or a 4-volt accumulator.

For long life, good service and perfect tone insist on 660 Valves.

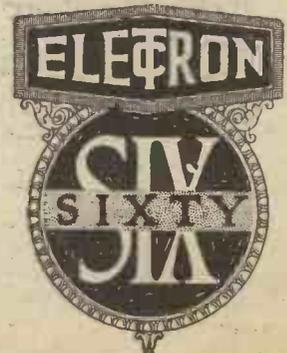


S.S.7.

Voltage 3.7 volts.
Consumption .1 amps.

PRICE 22/6

Ask your Dealer for Leaflet S.S.1.7 for full particulars of complete range.



BETTER BY SIX TIMES SIXTY

The Electron Co., Ltd., Triumph House, 189, Regent Street, London, W.1

APPARATUS TESTED.

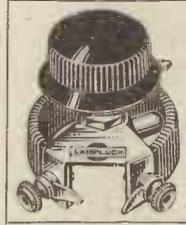
(Continued from page 82.)

would cause trouble in cases where H.T. is led round to aerial and isolated from grid or filament by means of a tuning variable. In most cases it would merely cause very loud noises, but it might be worth Messrs. Igranics' while to consider whether an insulated end stop would not be better, even although such might absorb an odd electron or so now and then.

A very interesting new line due to Messrs. Igranics is the "XLLOS" coil. It is an "extra low-loss," to quote from the leaflet before us, that can be used as an ordinary plug-in coil. A special arrangement permits either one socket and one plug to be used or two plugs or two sockets, spaced in standard manner or widely separated. The coil is completely enclosed in moulded bakelite, although very little of this material trespasses in the all-important "field." The whole structure is very rigid. The coils couple well, and give sharp tuning as proof of their low H.F. resistance and low self capacity. They are sure to prove popular among both amateurs and experimenters owing to their adaptability. We believe Messrs. Igranics are going to produce a low-loss coil holder especially to take "XLLOS" coils, although it must again be pointed out, they can be used with any standard type of coil holder. Prices of the XLLOS's are very reasonable, ranging from 5s. 2d. for the 50 upwards.

Another Igranic component well worth mentioning is the grid leak. As an example of forethought it is 100 per cent. "the goods." It is sold at 2s. 3d. complete with various attachments, screws, etc., which permit it to be mounted on or to anything or connected in any possible manner. Electrically it is as efficient as it is mechanically adaptable. Messrs. Igranics evidently know the way to make themselves popular among "fans" and constructor amateurs. They deserve the reward of the big sales we are sure they command.

Messrs. S. A. Lamplugh, Ltd., King's Road, Tyseley, Birmingham, recently sent us several of their new 6-ohm filament rheostats. The components are designed for single-hole mounting; and are provided with pleasing black and white dials. Their design is rather out of the ordinary, as the accompanying illustration shows, but it is none the less effective. The contact is a sprung buffer which moves around the inner side of the resistance element. A smooth, even movement is thus assured. Two stout terminals with soldering tags are provided. On test the Lamplugh Filament Rheostat gave excellent results. One used as a master control on an eight-valve Super Hot., taking about 2½ amps., showed no sign of heating up, and gave regular, positive adjustments. Well designed and



The Lamplugh Filament Rheostat.

well made, they should meet with the most critical amateur's approval.

Some few weeks ago we received an H.T. accumulator battery for test from the Cattley Accumulator Co., of Llandaff, Cardiff. Its special feature is its compactness. For its A.H. capacity it is unusually small. The cells, which are tubular in shape, are contained in a polished cabinet. On the front are situated a five-point switch and two sockets for plugging in purposes. A neat handle on the top of the case enables one to carry the battery in one hand quite easily.

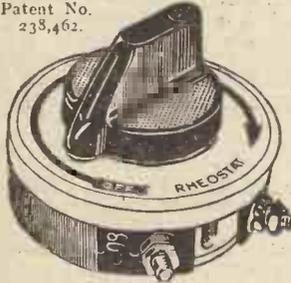
After having given the battery a "refresher" charge, we first of all tested its capacity. It delivered 5 milliamps. through a calibrated resistance element for a period of 200 hours without showing an appreciable drop in voltage, and it was not until 300 hours was reached that it began to show signs of tiring. At 430 it gave indications that recharging was necessary, although after a day or two's rest it again registered nearly full voltage. It can safely be stated that its capacity exceeds 2 ampere hours, although 1-6 is all that is claimed for it by the makers.

A short-circuiting test followed by a week or so of idleness in a more or less completely discharged state did not appear to harm the battery, for a further charge brought it up again into an apparently perfect condition.

We understand that the Battery High Tension Accumulator is sold at a price equalling 1s. per volt, and that it can be supplied in various voltages from 60 upwards in steps of 20.

This Igranic-Pacent Rheostat

Patent No. 233,462.



—sells at
2/6!

But is a precision instrument in every way.

Its special construction greatly facilitates mounting and preserves the original accuracy of adjustment. A porcelain base is used, and the wire is widely wound to give maximum cooling effect. It is suitable for two-hole mounting, for which purpose the dial acts as drilling template, and the mounting holes are elongated to allow spacing of from 1 in. to 1½ in. It gives an ideal finish to the panel, having a moulded knob and gold or silver finished dial, as desired. Supplied with 6, 10, 20, 30, or 50 ohms resistance, or as a Potentiometer with 400 ohms at the same price—2s. 6d. each. Ask your dealer.

The range of Igranic-Pacent Radio Essentials consists of: The Super "Audio-former," Porcelain and Bakelite Rheostats and Potentiometers, The True Straight Line Frequency Variable Condenser, The Elegant Microvern Dial, The Balcon, the most complete line of Plugs, Jacks and Switches in the world, Jack Nameplates, The Radiodye The Radiofile, etc.

Write for the Igranic Pacent List P 50

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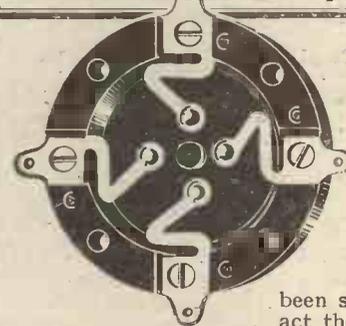


PACENT
Radio
Essentials

149, Queen Victoria St.,
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Works: Elstow Road,
Bedford.

Absorbs shock - protects the valves



You know it's
good because of
the name 'LOTUS'

Don't have your valves spoiled by shock. The Lotus Valve Holder has been specially designed to counteract the microphonic elements that are so injurious to the delicate valve filaments.

The unique and original springs of the Lotus Valve Holder absorb any shock and eliminate all microphonic noises. Protect YOUR valves by fitting the Lotus Holder.

Valve sockets and springs are locked together by a mechanical process, making a definite and permanent connection. Bakelite mouldings, nickel silver springs and phosphor bronze valve sockets. Nickel plated.



From all Reliable Radio Dealers.
GARNETT, WHITELEY & Co. Ltd.,
Broadgreen Road, Liverpool.
Makers of the famous LOTUS Coil Holder.

2/3
With
Terminals 2/0

SCRAP YOUR H.T. BATTERY!



If your Electric Supply is by DIRECT CURRENT obtain H.T. through the

"EKCO"
H.T. UNIT (Prov. Pat.)

by just attaching adaptor to lamp-holder or wall-plug.

ENSURES PERFECT RECEPTION.
LASTS A LIFETIME.

RUNNING EXPENSES NEGLIGIBLE.
SAVES COST IN A FEW MONTHS.

USERS' OPINIONS:

- "The 'Ekco' No. 3 Unit works very well, and has considerably improved reception."
Sir T. W. E., St., Flite.
- "Unit to hand, and I am very pleased with same. It justifies all you claim and is ideal for loud speaker work."
C. W., Bury.
- "The Unit we had for you is very satisfactory. It is quite as silent as the H.T. Batteries were."
G. W. & Sons (Electricians), King's Lynn.
- "I tested Unit and have pleasure in stating that it works very satisfactorily. I was especially pleased at the complete absence of 'sing' from the Mains."
H. G., Prescot.
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The Editor desires to direct the attention of his readers to the fact that, as much of the information given in the columns of this paper is of a technical nature and concerns the most recent developments in the Radio world, some of the arrangements and specialities described may be the subject of Letters Patent, and the amateur and trader would be well advised to obtain permission of the patentees to use the patents before doing so.

PATENT ADVICE FOR READERS.

The Editor will be very pleased to recommend readers of POPULAR WIRELESS who have any wireless invention to patent, or who desire advice on patent questions, to our patent agent. Letters dealing with patent questions, if sent to the Editor, will be forwarded to our own patent advisers, where every facility and help will be afforded to readers.

TECHNICAL QUERIES.

Letters should be addressed to :
Technical Query Dept.,
"Popular Wireless,"
The Fleetway House,
Farringdon Street,
London, E.C.4.

They should be written on one side of the paper only, and MUST be accompanied by a stamped addressed envelope.

Queries should be asked in the form of the numbered questions : (1), (2), (3), etc., but may be accompanied by a short letter giving any necessary additional particulars as briefly as possible.

For every question asked a fee of 6d. should be enclosed. A copy of the numbered questions should be kept, so that the replies may be given under the numbers. (It is not possible to reproduce the question in the answer.)

IMPORTANT.—If a wiring diagram, panel lay-out or list of point-to-point wiring is required, an additional fee of 1/- must be enclosed.

Wiring diagrams of commercial apparatus, such as sets of any particular manufacture, etc., cannot be supplied. (Such particulars can only be obtained from the makers.)

Readers may submit their own diagrams, etc., for correction or for criticism. The fee is 1/- per diagram, and these should be large, and as clear as possible.

No questions can be answered by 'phone. Remittances should be in the form of Postal Orders.

Questions and Answers

IRON MAST FOR AERIAL.

F. S. (London, W).—Is there a loss of efficiency by using an iron mast to support an aerial, instead of a wooden pole ?

Iron is quite as efficient as wood, provided that the aerial is well insulated, and it possesses the advantage of durability. Although dry wood is a fair insulator the average mast has no insulating properties.

SIZES OF WIRES.

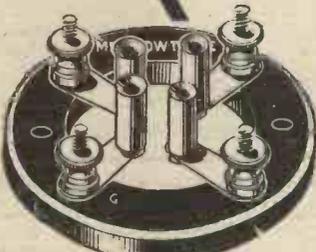
T. M. I. (Barnstaple).—How many turns to the inch are there of the following wires : Enamelled insulation—38, 44, 46, 48 S.W.G. ?

There are 143 turns of 38 enamelled to the inch, 253 of 44, 371 of 46, 509 of 48 (approx.)

MATTING EBONITE.

"CONSTRUCTOR" (St. Helen's, Lancs).—What are the advantages of a "matt" surface (Continued on page 83.)

HERE is a NEW
"MELLOWTONE"
PRODUCT
—A real Low Loss
Valve Holder



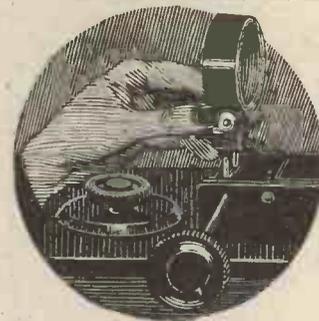
THIS is a scientifically designed component that meets a real need and is far superior to any other. The base is made from turned pure grade "A" Post Office quality ebonite—TERMINALS are fixed as standard—its self capacity is negligible—the dielectric losses are virtually zero—ensures perfect contact without any necessity for soldering—and is absolutely vibrationless.

Fit this Holder—it is guaranteed to give entire SATISFACTION. Obtainable from all reputable dealers.

Write for illustrated list of this and other "Mellowtone" specialities.

PRICE
3/3

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MIDLAND RADIOTELEPHONE MFRS. LTD.
BRETTLE LANE WORKS
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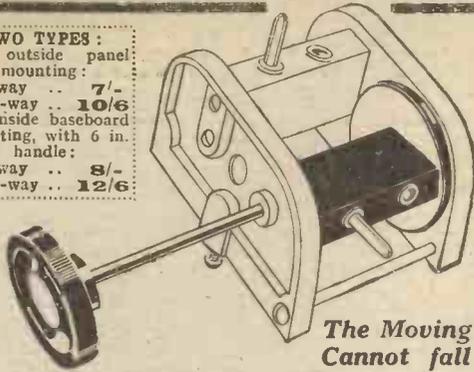
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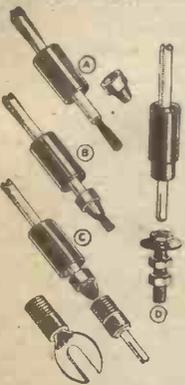
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Soldering the FLUXITE way is so simple—a minute's practice and you are an expert.

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FLUXITE SOLDERING SET

It is perfectly simple to use, and will last for years in constant use. It contains a special "small space" Soldering Iron with non-heating metal handle, a pocket Blow-lamp. FLUXITE, solder, etc., and full instructions. Price 7/6. Write to us should you be unable to obtain it.

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All Hardware and Ironmongery Stores sell FLUXITE in tins, price 8d., 1/4, & 2/3.

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The Hall Mark of "Quality" Ebonite

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It is Ebonite not a substitute.

Registered Trade Mark.

Do not be put off with imitations—look for the Brand.

THE BRITISH EBONITE Co. Ltd., Hanwell, LONDON, W.7.

RADIOTORIAL QUESTIONS AND ANSWERS.

(Continued from page 86.)

Liberty

PERMANENT DETECTOR

*The Original One-Hole Fixing Detector
Stops Fiddling with Catwhisker-*

Every Liberty tested on actual broadcasting and is fully guaranteed. Testodand Unanimously recommended by the Wireless Press.

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PRICE 3/6

50% More Efficiency
50% Lower Price

The 100% DETECTOR

Refuse inferior imitations. Insist on seeing name "LIBERTY".

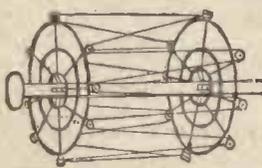
Fixing in panel (1-hole fixing) brackets or to existing detector terminals by 2 pieces copper wire

THE "Liberty" Detector gives more sensitive reception permanently than a catwhisker gives temporarily. No hunting for that special spot lost by the slightest vibration. The "Liberty" is entirely unaffected by vibration, sensitive all over, and that loud spot cannot be lost. RADI-ARC Electrical Co., Ltd., Bennett Street London, W.4.

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2-VALVE RECEIVING SET

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MODEL "R" WIRELESS CABINET 44 ins. high No. 1 CABINET 20 " wide 8 " deep

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Top compartment inside measure 15 ins high, 18 1/2 ins. wide, 8 ins. deep, enclosed with two doors. Under divisions 8 ins and 12 ins. high. Made of choice timber, stained light, medium or dark-oak. Keeps your set and all accessories together

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23" wide 35/- 23" wide 40/- Two doors to 4/6 10" deep 13" deep bottom shelves, extra

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Largest valve-repairing firm in the world. List Free.

on an ebonite panel, as compared with a glossy surface?

"Matting" removes all trace of tinfoil or other metals (used by some manufacturers) which impair the insulation of the ebonite.

LARGE CELLS FOR H.T.

R. N. E. (Wanstead, E.).—Is it an advantage to employ fairly large cells for the H.T. battery, instead of using small dry cells?

Theoretically, a large cell is preferable, but in practice the small cell is very satisfactory, and its cheapness and convenience have led to its general adoption.

AUTOMATIC EARTH SWITCH.

"NERVOUS" (Preston).—What is an "automatic earth-switch" or "earth-arrester"?

An arrangement of metal plates connected to aerial and earth, but separated by a very small air-gap. It is placed at the point where the aerial enters the house, and the earth wire goes straight from it to the ground. If the aerial became charged during a thunderstorm the electricity would spark directly across the small gap to earth, instead of passing through the receiving instruments in the ordinary way.

GRID CONDENSERS.

"A NEW READER" (London, S.W.7).—What is the difference between a grid condenser and a fixed condenser?

A fixed condenser means one that is permanently made up or sealed, and has its capacity fixed at a certain value. It can be employed in any part of a circuit where the capacity need not be varied. A grid condenser is the one that is connected next to the grid of a valve in order to assist the rectifying action, or to stop the grid from receiving an unwanted potential which is present in the other parts of the circuit. Small fixed condensers are quite suitable for the purpose, and they are then called "grid" condensers.

TAKING OFF THE EARTH-LEAD.

T. P. (Cardiff).—I have just built a two-valve set from diagram enclosed (it is a straight Det., L.F. with reaction—TECH. ED.) and although I can hear 5 WA quite well I can only do so with the earth connection removed. I cannot hear any other station. Why is this?

There is little doubt but that your trouble is merely due to tuning. You have an aerial-tuning condenser in parallel with the aerial coil. Try a slightly larger coil, say 50 or 75 instead of the 35 you are using, with series-condenser tuning. You could try the effect of a .0002 mfd. fixed condenser in series with the earth terminal and earth lead, leaving the variable condenser in parallel. In this case, however, it is probable that a No. 50 coil will be required. It is impossible to give definite values, as a great deal depends upon the inductance and capacity of your aerial, which, in the circumstances, would appear to be rather on the large side. We do not expect you will hear many other stations, as you are so close to 5 WA and the circuit you are employing is not particularly selective.

CRACKLING NOISES.

J. L. N. (Cranbrook Park, Ilford).—I have purchased a four-valve set, employing Cosson bright emitter valves and a 6-volt accumulator. At first the set went fairly well, but it soon developed a loud crackling sound, which rapidly grew worse, and finally drowned all broadcasting in a sort of continuous roar. A friend tells me I ought to have separate H.T. to the last valve. How can this be done?

The set employs two R.I. low-frequency transformers, and has two terminals on the front of the panel which are marked G.B., but are shorted together. Even when going at its best signals were slightly harsh, but now the crackling noise has drowned everything. What is likely to be the cause of the trouble?

The continuous roar is probably due to a burnt-out winding in one of the transformers. To test this, try placing a pair of 'phones in circuit in place of the second primary. If no crackling is apparent the trouble lies in the second transformer, but if the set

is still noisy, try the 'phones in place of the first primary.

Probably an improvement would be effected by using a low-ratio transformer for the second stage, the usual ratio for the purpose being between 2 1/2 and 1 to 1.

When the crackling is cured, remove the shorting bar between the G.B. terminals, and try connecting there a grid bias battery (9 or 4 1/2 volts, tapped for 1 1/2 volts). This will probably clarify the reception.

One or two separate H.T.'s to the different valves would undoubtedly be an improvement. If you send in another Query, enclosing a sketch of the back of panel wiring and marking the various components, the necessary alteration can be sketched for you, for a fee of 1/-.

ADDING A VALVE TO CRYSTAL SET.

S. J. A. (Brentwood, Essex).—I am thinking of adding a valve to my crystal set, but do not know the difference between an H.F. valve and an L.F. valve. What distinguishes them, and which is the better method?

You should consider carefully whether it is range or loudness of signals that is required, for there are two distinctly different methods of amplification.

The received signals can be amplified before they are passed to the crystal set for detecting purposes, or they can be amplified after they have been detected by the crystal set. The former is known as H.F. amplification and the latter as L.F. amplification (or magnification).

L.F. amplification will not appreciably increase range of reception. That is, should it be desired to receive signals from a station which is entirely inaudible on the crystal set alone, then L.F. amplification would be useless.

On the other hand, should it be desired to work a loud speaker by amplifying the signals of a near-by broadcasting station whose signals are comfortably audible on a crystal set, then H.F. amplification would be useless, and L.F. magnification or amplification (either word can be used) is the method to adopt.

H.F. for range and L.F. for loudness are therefore the two alternatives in the use of valves. Both, of course, can be employed, if necessary.

GROWTH ON ACCUMULATOR PLATES.

"PUZZLED" (Daventry).—I have discovered and removed a kind of growth on one of the negative plates of my accumulator. Was this caused by defective material used in the manufacture?

It was probably only a piece of the positive plate setting up a local action.

When the cell is charged, a flake of this kind becomes spongy, and increases in size when the cell is active, finally short-circuiting the plates.

TUNING A FRAME AERIAL.

P. E. J. (Petersfield, Hants).—Is a tuning inductance necessary with a frame aerial?

Not when a limited wave-length is to be covered. The frame aerial can be wound to within a close value of the total required inductance, and a variable condenser of, say, .0005 mfd. value, placed in parallel for purposes of tuning. When it is required to increase the wave-length range of a frame aerial a loading inductance can be placed in series for the purpose. Sometimes in order to provide facilities for reaction the frame aerial is wound with less turns than are actually required, and a loading inductance is employed, and to this the reaction coil is coupled.

For the Constructor

No. 8.—WORKING EBONITE.

- (a) Don't use pencil to mark a panel. Unless thoroughly cleaned off with a slightly oily cloth, there is a tendency for leaks to occur along the pencil-marks.
- (b) When the marking has been done a light tap with a centre-punch will ensure that the drill starts properly.
- (c) Ebonite can be cut perfectly square if a tenon saw is employed.
- (d) If a hacksaw or (for big panels) a rip-saw is used, the "cut" should not be along the line marked, but just outside it. Otherwise the panel will be too small.
- (e) Use a coarse file to trim panel edges. Fine files become choked.
- (f) "Metal-working" drills should be chosen, and only a light pressure employed.
- (g) Keep the bench clear whilst working, or the panel will be disfigured by scratches.
- (h) When "breaking through" with the drill, relax the pressure, or the panel surface may chip.
- (i) When withdrawing the drill, do not reverse, but continue turning slowly.
- (j) Ebonite melts under heat, so terminals will need tightening after they have been soldered.



Where there's a child there should be cocoa

CHILDREN are brain-workers and manual workers too, and many overgrow their strength at school and play. Now Cocoa is food, and gives the children extra strength to keep pace with their growing bodies. It is the children's idea of a really delicious drink for breakfast and supper.

"Keep fit on cocoa"

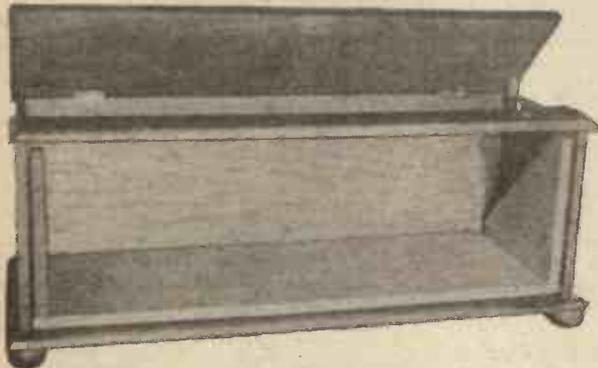
BOURNVILLE

By test the best

See the name "Cadbury" on every piece of chocolate

CAXTON 4-VALVE CABINET

Made for Editor of Wireless Magazine for Set "As good as money can buy" described in issue February, 1925.



Cash with Order. Fumed Oak ... £1 5 0
or Real Mahogany polished ... £1 14 0

With detachable recess fitted Base Board to mount 21 in. by 7 in. panel to slide out of Cabinet front. Extra 10/- with two beaded front doors totally enclosing fitted panel. Cabinet overall length 22½ ins. Width 8½ ins. Height 9 ins. Polished with the new enamel that gives a glass hard surface that cannot be soiled or scratched. SENT FREE.—Catalogue of standard Wireless Cabinets in various sizes and woods. Special Cabinets made to customer's orders.

PACKED AND DELIVERED FREE IN U.K.

CAXTON WOOD TURNERY CO., Market Harborough



They cost less now!

Watmel—the better fixed condensers are now sold at reduced prices, made possible by the great demand. Wherever a fixed condenser is needed you should specify Watmel and make sure of trouble-free results. Mica sheets securely clamped between the plates render it impossible for the capacity to vary. No wax whatsoever is used in their construction. One hole fixing is provided, and remember that every Watmel is guaranteed to be correct within 5% of its marked capacity.

NOTE THE NEW PRICES.

0005 to '002	2/-	Combined grid leak and condenser	2/6
reduced from 2/6.		reduced from 3/-.	
0025 to '006	2/6	Combined variable Grid Leak and Condenser, New Model	3/6
reduced from 3/6.			

Size '006 is the ideal condenser with choke & resistance coupling.

Other Watmel products worth buying:

Grid Leak (Black Knob) 5 to 5 megohms	2/6
Anode Resistance (Red Knob) 50,000 to 100,000 ohms	3/6

THE

Watmel

WIRELESS CO. LTD.,
332a, Goswell Rd., London. E.C.1.

Telephone: 7990 Clerkenwell.

Lancashire and Cheshire Representative:—Mr. J. B. Lovel, 23, Hartley Street, Levenshulme, Manchester.

The INVENTION of 1926



Clearer reception, guaranteed stability, unaffected by vibration; exceptionally selective. No holes to be drilled, no crystals to replace. SECURE YOURS NOW!

Of all Dealers and from:—

TUNGSTALITE LTD.,
47, Farringdon Rd., E.C.1.
and 41, OALL LANE, LEEDS.

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TUNGSTALITE AUTOMATIC DETECTOR

VALCO

Valve repairs

BRIGHT
DULL

EMITTERS

(except Weco, Low-Capacity, and 4-Electrode Types)
Minimum D.E. current 0.15 amps, when repaired.
**ALL TYPES OF BRIGHT & DULL EMITTERS.
HALF THE PUBLISHED LIST PRICE OF THE VALVE WHEN NEW MINIMUM 5/-**

Valves repaired by a patent process incorporating best material and skilled workmanship
TRANSMITTING VALVES REPAIRED
Up to 3 valves. Cheapest method is by letter post. Remittance should be enclosed with valves.

VALCO LTD. Dept. P.W., Tabor Grove, Wimbledon
Phone Wimbledon 851, London, S.W. 1
(Contractors to H.M. Government.)

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The FAMOUS GENERAL RADIOPHONES.
YOURS for 6⁰ DEPOSIT

Latest Standard Model General Radiophones (made by the well-known General Radio Co., Ltd.) Super Sensitive and Highly Efficient. Receivers matched in tone. Magnets of highly expensive Cobalt steel. Diaphragms triple tested. Beautifully comfortable, highly finished, weight 7 ozs. Fully guaranteed. Sent on receipt of 6d. deposit. If satisfied, send 2/6 on receipt and balance by instalments of 3/- monthly until only 2/- is left. Price: full cash with order (or within 7 days of receipt), £1.
SIMPSON'S (BRIGHTON) LTD.
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HEADPHONES REPAIRED
Re-wound & re-magnetised 5/- per pair, Loud Speakers repaired 5/-. Transformers re-wound 5/- each. All work guaranteed and tested before delivery.
Write for Trade Prices. Phone: Clerk. 1795.
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SPINK'S GENUINE EBONITE

Passed severe tests. No leakage.
7 x 5, 1/4 7 x 6, 1/6 10 x 8, 2/8 10 x 9, 2/11
11 x 9, 3/3 12 x 10, 3/10 14 x 12, 5/3 8 x 5, 1/5
9 x 6, 1/9 11 x 8, 2/10 12 x 8, 3/2 14 x 10, 4/4
16 x 9, 4/6 8 x 5, 2/2 8 x 7, 1/10 12 x 9, 3/7
Any size cut. Above panels are made of best pure Ebonite, 3/16" thick; if 1" is wanted, add 1d. for every sq. inch. State if blasted or polished is required. Send stamp for sample, all post free from Makers, **Jacobean Factory, Somerton, Som.** Vernier and geared coil holders and headphones, and all ebonite rods. Solid oak cabinets from 3/6 each. Stamps taken for orders up to 2/-. On all orders of 10/- or more we allow 2/- in £ discount. Also—

SPINK'S Transformers 7/6 net.
Shrouded, 1-3 and 1-5, post free. You can have one on seven days' free trial. Money back if not satisfied. The finest finished transformer offered at double the price. Write us for free advice and information. Made-up sets cheapest on the market. **Jacobean Factory, Somerton, SOMERSET.**

H.T. Accumulators
60 Volts
3 Actual Amp-hour **37/6**



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RADIO-MICRO. Special D.E. VALVES 8/9
4 volt. 0.6 amps
RADIO-MICRO. POWER VALVES 12/6
4 volt. POSTAGE 6d.
PAULL'S Wireless Stores, 43, Caroline St., CARDIFF.

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Reduction in price of the superb **ECONOMIST D.E. 4-ELECTRODE** .06. Still the best that money can buy, 4-pin or 5-pin fitting 15/-.
OTHER 4-ELECTRODE TYPES:
Thorpe K4, 10/6. Mullard, 16/6. U.C.S. 10/6. U.O.4, 10/6.
Repair to B.E. 7/6; D.E., 10/6.
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36, CAMOMILE STREET, LONDON, E.C.3.

MAP
SMALL PARTS TO THE TRADE.
MAP Co., 246, Gt. Lister St., Birmingham.

CORRESPONDENCE.

(Continued from page 72.)

WINDING HONEYCOMB COILS.

The Editor, POPULAR WIRELESS.

Dear Sir,—In "P.W." No. 180 was an article on "Winding Coils," in which the writer stated that, "The familiar honeycomb type coil is made upon a former carrying a double row of spokes, but its construction is too complicated to be described here."

In view of this I should like to point out that I have made a set—25, 35, 50, 75, 120, 200—which act extremely well.

Hoping it will be useful to other readers, I enclose description of making same.

Obtain two "Easi-wind" coil formers (10d. each), also a piece of wood about 2 in. or 2½ in. in diameter and about 1 in. thick. Screw one of the formers to one side of wood and the other on the opposite side so that the legs are staggered.

Wind from first spoke to fifth on opposite side, and so on; this makes seven turns to a layer. Using 28 D.C.C. wire a 200-turn coil comes about 1 in. thick. Reflex coil mounts I find are best.

Hoping shortly to see a Readers' Hint Page.

I remain, yours faithfully,
H. C. STEER.

419, Seaside, Eastbourne.

THE "P.W." 2-VALVE SET.

The Editor, POPULAR WIRELESS.

Dear Sir,—It may interest you to know of the results I have obtained from the "P.W." 2-valve set Det. and L.F., as described by Messrs. P. R. Bird and K. D. Rogers in "P.W." No. 178. I do not know whether they might be classified as good, but they certainly seem to be so to me judging by many reports of 2-valve reception I have heard. In order of wave-length I have received the following stations:

Radio-Paris, loud on 'phones; Daventry, loud on Ampion A.R.19 loud speaker; Hilversum, fair to loud on 'phones; Swansea, weak to fair; Birmingham, local station, loud on loud speaker; Belfast, fair on 'phones; Toulouse (Rad' du Midi), loud; Newcastle, fair; Hamburg, loud; Bournemouth, loud; Oslo, fair; Manchester, very loud; Madrid (Union Radio), fair; London, very loud; Cardiff, loud; Marseilles, weak; San Sebastian, loud; Hull, weak; Dundee, weak; Edinburgh, weak; Nottingham, loud; Leeds, fair; Liverpool, weak; Stoke, very loud on 'phones—speech can be heard outside the room on the loud speaker with the door closed; Sheffield, weak; Hanover, fair; Bremen, fair; Brussels, fair.

Many other stations not identified have been heard, including German relays 300-200 metres. These results are not exaggerated, and can be verified by a member of the family. I might mention that by far the best results are obtained by using an Ediswan P.V.6 D.E. as Det. valve.

Yours truly,
W. G. JOHNSON.

Parkholm, Park Road,
West Smethwick.

DISTORTIONLESS RECEPTION.

The Editor, POPULAR WIRELESS.

Dear Sir,—I read the article entitled "Distortionless Reception" in the November 21st issue of your paper with great interest, and I feel sure that your readers feel grateful to Mr. J. English for his valuable contribution.

For eight months I have been in quest of good loud-speaker reception, and I find that my conclusions are closely allied to those of Mr. English. I enclose a diagram of my circuit. Should you consider this of value and interest to your readers I trust you will make use of it at your own discretion.

Yours faithfully,
C. W. ALEXANDER.

"Rhodanthe," Cobham Road, Rochester.

[Mr. Alexander's Circuit is reproduced below.—ED.]

THE ONE-VALVE L.S. CIRCUIT.

(The following is a copy of a letter addressed to one of our Contributors concerning his popular circuit.)

Dear Mr. Gaillard,—I have been very interested in your article on your "one-valve loud speaker" circuit, published in POPULAR WIRELESS No. 187, Dec. 26th, 1925, and have made up—roughly—a set from diagram No. 3; that is, with crystal resistance in plate circuit.

I find, however, that I cannot get the set to oscillate without placing a .0003 fixed condenser between H.T. + or L.T. + and earth, though according to diagram No. 1 it should do so without.

However, I find that the set is the best "one valve" I have yet made—and I have made three others. I have during this week tuned in on 'phones: Dublin, Manchester (loud), Belfast, Bournemouth, London, Newcastle, Aberdeen (fair strength). This is also the only set I have had which will tune in Cardiff when London is working.

Of foreign stations, I have heard telephony from San Sebastian, Madrid, Toulon, Prague, Hamburg and three others not recognised.

I presume a variable anode resistance with condenser would be an improvement and no doubt I can improve on the choke coil, which I have only wound solenoid style with 32 S.W.G. enamelled wire on a 1½-inch primer.

Perhaps you would kindly tell me which is the best type of choke coil to use for this set, also what size of coils for Daventry. My aerial is the full 100 feet.

I may say that I have been unable to obtain the back No. 154 of "P.W." in which the set was first published.

I enclose a stamped addressed envelope and should be very grateful of any reply you may find time to send me.

Thanking you for much pleasure derived from this circuit,

Yours faithfully,
C. C. MORELAND.

Summary of reply to Mr. C. C. Moreland.

My own made-up set acts differently on each of several aerials it has been tried on. In some cases a .0001 fixed condenser is needed in the aerial lead to make the set oscillate.

Fig. 1 (see article in No. 187, "P.W.") was my original circuit, but I consider Fig. 3 a distinct improvement.

The adjustment of the crystal has a very great effect on the oscillation of the set, and the variable condenser (.0005) between the L.T. and the earth gives a fine control of the reaction.

The coils I use are "Quality Coils," made by the Goswell Engineering Co.

	L1.	L2.	L3. (choke)
For Low Wave-lengths ..	50	100	150
For Daventry ..	200	150	175

Honeycomb coils will work, but basket coils are better.

F. GAILLARD.

"P.W." ONE-VALVE REFLEX.

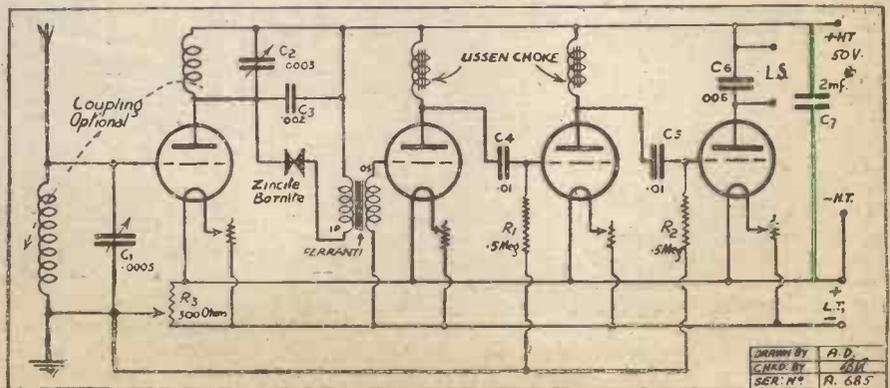
The Editor, POPULAR WIRELESS.

Dear Sir,—Having recently made up the "One-Valve" Reflex, described in "P.W.," Oct. 3rd, 1925, I cannot help letting you know what splendid results I have obtained. I have had practically no trouble with it, although I find it necessary to keep the H.T. between 48-60, using an Ediswan A.R. valve. I have an outdoor T twin aerial, 38 ft. in length, with an average height of 28 ft.

The following stations have been received at good 'phone strength: Nottingham, Birmingham, Stoke-on-Trent, London and Bournemouth, with 100 in reaction and 75 in the aerial; Daventry coming in very loud with 200 and 150. One feature of the set is its very fine tuning, but this makes it more selective. Wishing your paper and staff every success in the future.

Yours faithfully,
LEONARD SCOTT.

101, Empress Road,
Derby.



DRAWN BY A.D.
CHD. BY J.M.
SER. NO. R. 685

A 4-VALVE UNIDYNE RECEIVER.

(Continued from page 55.)

where special fixing screws (such as are provided on the rheostats) can be employed. The whole operation of the receiver depends upon the efficiency of its connections, and dirty connections, dry joints, etc., can only spell failure.

When the wiring is completed it should be checked over both by the diagram in Fig. 3, which shows the actual positions of the leads, and by means of the point-to-point list. The photographs can also be pressed into service for this purpose, so that there should be no cause for any error.

The set should now be given a final overhauling to see that everything is O.K.—condensers working smoothly, etc., and especially that all screws, nuts and terminals are tight, while it need hardly be said that no traces of flux or loose beads of solder should remain. This latter can quite easily be prevented in the first place if the constructor makes a point of going over each joint with a clean rag immediately after it is soldered. Whilst the metal is hot the flux can be removed easily, though it is a much more difficult task if this operation is left until the flux is cooled.

Low-capacity Coils.

When finished the set can be connected up to a 6-volt accumulator and is ready for use. As regards tuning coils, it is essential that these be of efficient construction with the low self-capacity, those shown in the photographs being of Atlas make, though Lissen and Tangent coils have been found to be suitable. If the constructor desires to make his own coils he should keep to the basket type.

The H.F. transformers must also be of good manufacture, those successfully tried in the 4-valve receiver being of Bowyer-Lowe, McMichael, Magnum and Peto-Scott make.

There are only two types of valves suitable for this receiver, those being the Thorpe K.4 and the U.C.5, which have five pin bases, for which the sockets employed in the receiver have been specially designed. It will be noted that these valves have two grids, these being connected to the two legs which in the ordinary type of H.T. valve would correspond to the filament legs, and it is important that the external connections should be correctly made, otherwise the positions of these grids in the circuit may be reversed, when the set will fail to function.

The L.F. "Leak."

Finally, a word must be said concerning the variable resistance and condenser placed in series with the secondary of the L.F. transformer. This has been found to be essential for distortionless and efficient amplification, and the condenser should be of the value stated. The variable resistance must be adjusted while the set is in operation with the L.F. valve switched on, it being left set at the position in which maximum amplification is obtained. It must be remembered that the switch controlling the last valve has nothing to do with its filament circuit, so that when this valve is switched off the fourth rheostat must also be turned off, otherwise signals may be diminished and, in any case, filament "juice" will be wasted.

RECOGNISED WEST END DISTRIBUTOR of the manufacture of Edison Bell, Jackson's (J.B.), Polar, Igranite, Peerless, Eureka, Magnum, Burndepp, Lotus, Dubilier, Marconi, Dorwood, Sterling, Success, B.T.H., McMichael, Lissen, Woodhall, Utility, R.L., Bowyer-Lowe, Amphion, Formo, Brunet, Ormond, Newey, P. and M., and everything that is worth stocking. Every endeavour will be made to obtain goods not listed.

IMPORTANT. Retail customers spending £10 on goods give 37/6 loud speaker free. If spending £5, a pair of Nesper, Brunet, or N. & K. phones. If spending 30/-, can buy a 12/6 pair of phones for 4/-.

TESTIMONIAL. 78, Copenhagen Road, Gillingham, KENT. 19/2/26.

Messrs. Raymond.—Whilst in town a short time ago, I purchased 3 of your Low-Loss Straight Line etc., condensers viz. 0003, 0005 and 0005 with vernier. I did not have an opportunity for testing these until Wednesday evening last, when I banked up a straight one-valve, incorporating the 0005 without vernier. The results were absolutely astonishing, because I got a station with almost every degree of the dial.

(Signed) A. BOWER.

VALVES.—Cleartron 0-08 of 0-15, 12/6. Power, 0.25, 15/-. Cosmos, S.P.18, Red or Green, 12/6. Neutron .06, H.F. or L.F., 12/6; Ditto, 2v., 12/6. Al Mullard, Ediswan, Osram, Marconi, Cassor stocked, Bright, D.E. and Power, 3/-. 14/-. 15/6. 16/6. 18/6. 22/6. 24/6. 30/-. £2. Mullard P.M.4, 22/6; Do. P.M.3, 16/6. 1 burnt-out valve taken in part exchange for any of above. Usable valves bought or exchanged.

LOUD SPEAKERS.—All makes. A.J.S.'s, the wonder speaker. Brown finish, large size, 37/6. Amphions, all models, 25/- up. Brown's latest, 30/-, 60/-, 120/-. N. and K. solid mahogany dome centre, £4. Brandes' Table Talker, 30/-. Sterling Mellowox, 48/-. Telefunken Model, usually 35/-; low only at 18/11. Foch, 11/11. Nesper Model, 12/6. Your old speaker accepted in part exchange for any other goods. Post customers write first please.

HEADPHONES.—All 4,000 ohms. Eriesson E.V. Continental, 10/-. Dr. Nesper new lightweight adjustable, 2/11. Eriesson ditto, 14/11. Brunet, 12/6 and 14/11 (De-Luxe). The new N. & K. lightweight, a perfectly wonderful phone, 12/- pair. (Name in full on back of cases). British Sterling, 2/9. E.T.H., 20/-. Brandes' Matched, 20/-. W.E., 20/-. Brown's adjustable reel, 30/-. Featherweight, 20/-. N. & K. "Standard Pattern", 4,000 ohms, extra value, 8/11 per pair.

SUNDRIES.—Newey 2-way geared coil stand, 6/6. 4-point condenser, 17/6. H.F. Newey type aerial tuner, 39/6. Gambrell Neurovernia, 5/6. Seamark Connode, 19/6. U.S. Super L.F., 13/6. Voltmeters, 4/die rds., 7/11. H.F. Transformers, all wave-lengths: Magnum, 7/-; Stradia, 6/6. Bowyer-Lowe, 7/6. McMichael, 10/-. (A.7. 12/6). Var. Grid Leaks: Bretwood, 3/-. Watal, 2/6. Anodes B. 3/-. W., 3/6. Woodhall L.F., 23/6. Valve Holder, 2/6. Chokes, RL 10/-; Success, 10/-; Lissen H.F. or L.F., 10/-; Geared Ebonite, Felicitas, Vernier, latest type, 6/-. Combino, 5/6. Mann bridge TCC, 2 mid., 4/7; 1 mid., 3/10; -25, 3/-; -5, 3/-; -01, 2/-; -02, 2/-.

POLAR.—Complete Detector, 3/6; Junior Variable, .0003, .0005 5/6 each; Coil Unit, R.H.; R.C.O. Unit, 15/-; Neurodyne Condenser, 5/6; 2-way Cam Vernier, 6/-; 3-way, 9/6.

RADION PANELS.—1d. 6d. inch; postage 6d. piece.

COIL STANDS.—Lotus 2-way, 7/-; 3-way, 10/6 (extension handles extra). Polar 2-way, 6/-; 3-way, 9/6. Sterling, Triple, 21/-. Kay Ray geared 2-way, 3/11. Back of panel, with knob and dial, 2/11. Panel 2-way, 2/-. Goswell 3/-. Standard, 2/9. All makes stocked. Ebonite coil plugs, shaped brass sides, 6 for 3/6. Standard, 4/6 for 2/-. New Low Loss type, 2 for 2/-.
LISSEN PARTS.—Anode or Variable Grid Leak, 2/6 each; L.F. or H.F. Choke, 10/-; Switches, D.P.E.T., 5 cent. Resistor, 4/- each; 2-way series pair, 2/9 each; Di. Minor, 3/6; Major, 7/6; 11/6; 10/6. Potentiometer or Wire Rheostat, 4/- each. Neurodyne Condenser, 4/6.

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BE SURE IT'S RAYMOND'S WONDERFUL LOW LOSS STRAIGHT LINE FREQUENCY CONDENSERS



Supreme SELECTIVITY Each station has a CLEAR TUNING SPACE CROWDING entirely ELIMINATED. PERFECT tuning. DISTINCT and DEFINITE Radio reception. PRECISION workmanship. HEAVY BRASS VANES. BRITISH MADE. Pictorial connection to rotor gives silent working. Special Spring top Bush gives a firm but easy movement.

Including knob and dial as sketch. With vernier. 0003 .. 7/11 0005 .. 8/6 0005 .. 5/11 0005 .. 6/6 POST 6d. PER SET

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ACCUMULATORS.—2v., 40, 7/11; 2v., 60, 9/6; 2v., 80, 12/6; 2v., 100, 14/6; 4v., 40, 13/11; 4v., 60, 17/11; 4v., 80, 23/6; 6v., 60, 26/6; 6v., 80, 35/6. A.K.S.O. another, good make 1/6 extra on each of above.

TERMINALS, SPECIAL PRICES.—Nickel W.O. or Phone, with nut and washer, good quality, 3 for 4d. Brass, 1d. each. No rubbish sold.

AMERICAN type boxes, covered LEATHER-CLOTH, with lid and base-board.—12 x 8 x 8, 7/11; 16 x 8 x 8, 10/11; 18 x 8 x 8, 11/9. Open boxes, 1/6 upwards. Polished from 2/4. **H.T. BATTERIES.**—ADICO, 60w., 6/1; 100w., 12/6. B.B.C. necrosis size, 80w., 8/11; 36w., 5/3. 1.5 D.B.C. 2/3. Grid Bias, 9v., Tapped every 1lv. various makes, 1/9, 2/-, 2/3.

EVER-READY D.E., 12/6; 108v., 21/-; L.T.3, for 6V. Valves, 7/6. **SEEMENS** H.T., 60w., 6/6. **SEEMENS** 60w., 14/6. Variable 1.5 D.B.C. Batteries, 1/- to 2.6. ZAZA 6V.H.T. tested 5/9. **EBONITE.**—"Grade A," cut while you wait, 3/16 at halfpenny per sq. inch. 1 inch at three farthings. Scrap ebonite on sale.

NEUTRON Flash Lamp Batteries.—4, 5, 1d. each; 2 for 5.

DETECTOR VALVES from 2/9. Hart valves from 2/10. **PHILLIPS** genuine "R" type, 4v., 3/9. **PHILLIPS** .06 D.E., 7/6. **FAMA** .06, 7/6. **FAMA** Power, 3/-; D.E. Power, 7/6.

Switch Spade Terminals for H.T., L.T., etc., 1/6 pr. Spade tags, 5/1d. Spade screws, 2 for 14d. Red or Black, 3d. pr. Ins. staples, 5 a d. Ormond screws and nuts, 2 a d. Switch arms and studs, 1/- Nickel, 1/4. Wander plugs, 2d. 3d., 4d. pr. Plug and socket, red and black, 3d. to 1/- pr. Twin Flex, red and black, 12 yds., 1/6. Miniature silk, 6 yds., 6d. Ins. hooks or egg insulators, 2 for 14d. Aerial wire, 7/22, 100 ft., 1/11. Extra heavy weight, 2/3. Stranded wire, 100 feet (69 strands), 1/2. "Wonder" aerial multiple strands phosphor bronze, 110 feet, 2/11.

D.C.C. wire per lb., reel 20 g., 9d.; 22 g., 10d.; 24 g., 11d.; 26 g., 1/3; 28 g., 1/4. Finned copper, 1/16 sq. Bar Band, 12 feet, 6d. Empire tape, 12 yds., 6d. Earth Tubes, Copper, good value, 2/8. Climax, 2/3, 5/-. Sets of 5 Coils (Dickenson Patent), air spaced, 25/30/50/75/100, 1/9 set. Mounted Coils, very efficient, all makes lowest prices.

COIL PLUGS. Ebonite shaped, brass sides, 6d. ea. 6 for 2/9. Low Loss ditto, Nickel, 9d. Plain coil plugs, 6d.; with fibre, 7d. Lead-in Tubes, good quality, 6 in., 8d.; 9 in., 9d.; 12 in., 1/1; 18 in., 1/6. Ebonite 2-way coil stands, geared, 2/11, 3/11, 5-way, 4/11, 5/11. 2-way, with extension handles, 1/11 and 2/6 on base.

VALVE HOLDERS.—Standard turned ebonite, 1/-; Ebonite, 2-way, 1/6. Apex, 1/6. **LOTUS BUOYANT**, 2/3. H.T.C., 1/6 and 1/9. Various at 9d., 10d., 1/-; All makes stocked.

PANET BRACKETS, 6 in., 10d. pair, Magnum 2/-.

RADIO MICRO SPECIAL LOW SPEAKER VALVE, 12/6. .06 SPECIAL, 8/6.

HEADPHONES (all 4,000 ohms).—The latest Model N. & K. absolutely genuine (not pattern or imitation). Beautifully finished, very comfortable to wear, at the simply absurd price of 11/6 pair.

DR. NESPER ADJUSTABLE.—Genuine new lightweight model. The perfect "phone". Per pair, 12/11. **ERICSSON (E.V.)** Continental, excellent tone, pair 10/-; N. & K. Standard pattern, comfortable, leather headbands, 8/11 pair.

VARIOMETERS.—Ebonite Ball Rotor Ebonite former wound D.S., full wave-length, 3/11. Model No. 8., excellent tone, Ebonite wound 2/3. 2/11. Duplex (Series Parallel) for 5XX and B.B.C. No coils required, 6/11. Fapped Coupler, 200/800 metres, 7/11. B.B.C. Also for B.B.C. and 5XX 10/11.

CRYSTAL DETECTORS (10/11).—High class, 9d., 1/-, 1/3; 1/6; 1/9. **MICROMETER**, Nickel, 1/9. Permanent, 2/6. Mic-Met. 4/6. All well-known makes stocked. Crystals, STAW'S GENUINE HERTZITE in a sealed box with signature, 8d.

SPECIAL PRICES given over the counter for sets of parts for various circuits (usable for bought or taken in exchange for new ones. Any parts you have no use for entertained in exchange or purchased. Goods may be bought without obligation either side. If you purchase new British valves I will buy a burnt-out one for each valve you take. Right reserved to cancel this list without notice.

L.F. TRANSFORMERS.—Perant A.F.3, 25/-; A.F.4, 17/6; Eureka Concert, 25/-; 2nd Stage, 21/-; Baby 1st or 2nd, 15/-; Royal, 15/-; Ormond shrouded, 10/6; Success (Black), 21/-; Royal, 20/-; Ormond newest model, 15/6; Wates' Supra, 10/6. Croix (newest model), 5/11; Marconi "Ideal", all stages, 30/- each. C.A.V., 15/-; Pye, 22/6; Gambrell 2 stages, 25/6; Ideal Junior, 20/-; Lissen T3, 12/6. T2, 15/-; T1, 21/-.

EBONITE VARIOMETERS.—Ball Rotor, 4/8. Standard, 3/11. Duplex for 5XX and B.B.C., 7/8. Tapped Variable Coupler, 200/800 metres, fine instrument, 8/11. Marconi series-parallel, 16/-; Edison Ball, 10/6.

MOUNTED COILS: STAR.—25, 1/3; 35, 1/6; 50, 1/9; 75, 2/-; 100, 2/3; 150, 2/6; 175, 2/9; 250, 3/-; 300, 3/6. **GRAM** (Patent), 25/6, air spaced, mounted, 25/6. 25, 1/3; 50, 1/8; 75, 1/11; 100, 2/3; 150, 2/6; 200, 2/11; 250, 3/3; 300, 3/8; 400, 3/9.

IGRANIC (Honeycomb)—25, 35, 3/5; 40, 4/10; 100, 6/3; 150, 7/7; 200, 8/-; 250, 8/6; 300, 9/-; 400, 10/-; 500, 10/3; 600, 11/-; 750, 12/6; 1,250, 15/6; 1,500, 17/6. **LISSEN.**—25, 35, 4/10; 50, 5/-; 60, 7/5; 5/4; 100, 6/8; 150, 7/-; 200, 8/5. **LISSEN X.**—50, 6/-; 60, 6/4; 75, 6/5; 250, 9/9. **FINSTON.**—25, 35, 1/6; 50, 1/9; 75, 2/0; 100, 2/6; 150, 2/9; 200, 3/6; 250, 3/9; 300, 4/1.

VALVE HOLDERS.—BENJAMIN, 2/9; Lotus, 2/3; Apex, 1/6; Excelsior, 1/3; Sterling Non Pong, 4/3; Eureka, 5/6; Magnum, 5/6; 2/6; Bowyer-Lowe, 3/-; Athol, 1/3; H.T.C., 1/6; 1/9; Aeromonic, 1/3; Breitwood, 1/9.

FIXED CONDENSERS.—Dubilier .0001, 2, 3, 4, 5 each 2/11. .001, 2, 3, 4, 5, 6, each 3/-; Grid Leak, 2/6. Edison Bell, .001, .0001, 2, 3, 4, 5, 1/-; .002, 3, 5, 6, 1/6. .000 and grid leak, De Luxe, 1/6. Theoria, 1/6 and 2/6 each. Dorwood .0003 with grid leak clip, 2/6. McMichael with clips, .0001 to .0005, 2/6 each; .001 to .006, 3/- each.

VARIABLE CONDENSERS.—Polar Standard, 10/6; Junior, 5/6 each. Bowyer-Lowe Popular, 10/6. Igranite, 24/-, 21/-; Collinson, 10/6. Low Loss, 21/-, 20/-; Utility, 8/6. 10/9; Vernier, 2/6 extra. Utility Low Loss, stocked .0003 and .0005. J.B. (Jackson Bros.), Square Law, .001, 9/6; .0005, 8/-; .0003, 7/-; with vernier 4/- each extra. Geared .0005, 15/-; .0003, 13/-; Low Loss, 10/6, 9/6; Ormond new geared friction drive, .0005, 15/-; .0003, 13/6. Low Loss, .0005, 8/-; .0003, 7/6; with vernier, 1/6 each extra. Ebonite ends, same price. Newey 4 point, 15/-, 17/6.

FILAMENT RHEOSTATS.—Ormond 6 or 30 ohms, 2/6. Finston, 5 ohms, 2/3; 30 ohms, 2/6. Wates' Microstat, 2/9. Lissen Wire, 35 ohms 4/-, 10/-; Potentiometer, 4/6; Burndepp, 4/6 to 7/6. McMichael, 4/6 to 7/6. Peerless, 6 or 30 ohms, 2/6. Peerless Dual, 3/9.

SETS OF PARTS (well-known circuits).—ST.100, 84/-; Twin-valve, loud speaker, 80/-; P.O.V.2, 30/-; One valve Reflex, 41/-; Ebonite valve set, 30/-; All Concert D. Minor, 3/6; Major, 7/6; 11/6; 10/6. Leas Box Panel and Valves. Lissenola Loudspeaker Unit, 13/6. Pleated paper, reeds, etc., all stocked.

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TRADE MARK

7" x 5", 1/-	8" x 5", 1/2
7" x 6", 1/3	9" x 6", 1/7
10" x 8", 2/1	11" x 8", 2/3
10" x 9", 2/4	12" x 8", 2/6
11" x 9", 2/7	12" x 9", 2/10
12" x 10", 3/-	14" x 10", 3/5
14" x 12", 4/-	3" thick Post Free.

Money back guarantee that each and all Panels are free from surface leakage, Megger test Infinity Callers, cut any size, & quote by post, or Phone Clerk-cenwell 7853. Sample & Prices, post free to the Trade.

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REPAIRS SETS PHONES TRANSFORMERS
Officially Approved by Radio Association.
ALL WORK GUARANTEED LOWEST RATES - 24 HOUR SERVICE
JOHN W. MILLER, 68, Farringdon St., E.C.4.
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WIRELESS WAREHOUSE

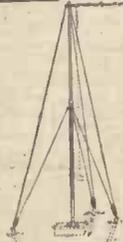
THE SMALL ADVERTISEMENT WITH A WONDERFUL SERVICE.

Write for Free List.

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THE BROWN 'A' at 22/6 or 'A2' at 15/-
are the best for use with the P.W. Paper Diaphragm, Loudspeaker, Frames, etc. Stamp for List.
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H & H Patent Tubular Galvanized Steel Telescope WIRELESS MAST
35 ft. HIGH.



Complete with base plate, ground pegs, stay wires, straining screws, pulley and cleat.
Price Complete £3:2:6 Carriage Forward
25 ft. Rigid Masts, 20/-

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06 DE'S 10/6



Our Valves are admitted to be the best British made valves on the market. 3 Volt '06 L.F. or H.F. only 10/6. 2 Volt '34 only 10/6. Power Valves from 12/6. Write at once for our FREE BOOK and get full particulars. If your dealer is "tied" we supply direct. RADIONS LTD. Radion Works, BOLLING GTON. Macclesfield, England.

CRYSTAL SETS COMPLETE £1
Including 1 pair 15/- phones, 7/6 set, and full aerial and earth equipment. Best British 'phones 10/- and 12/6 pair. Square Law Condensers: 0005 7/6; 0003 7/-; Ebonite ends, knob, and dial. All post free. Agent for Breton Accumulators. List on request.
E. D. PIMBLE, 18, West St., Penkhull, Stoke-on-Trent.

THE 'PHONE REPAIR SERVICE
Phones Rewound and Remagnetized ... 4/6
Phones Remagnetized and Readjusted ... 2/-
Loud Speakers and Transformers Rewound.
Earcaps, Leads, Diaphragms. Postage extra.
The H.R.P. Co., 46, St. Mary's Road, Leyton, E.10

ADVERTISEMENTS.

As far as possible all advertisements appearing in "P.W." are subjected to careful scrutiny before publication, but should any reader experience delay or difficulty in getting orders fulfilled, or should the goods supplied not be as advertised, information should be sent to the Advertisement Manager, "Popular Wireless," 4, Ludgate Circus, London, E.C.4.

TECHNICAL NOTES.

(Continued from page 56.)

metal beryllium, which is claimed to give a large emission at very low temperatures. The melting-point of beryllium is about 1,280 to 1,300 degrees centigrade, which is much higher than the melting-point of certain other dull-emitter metals, and consequently the filament can be raised to a comparatively high temperature. The beryllium, moreover, is ductile, and can easily be drawn into a wire of the required diameter, such a filament requiring no oxide coating.

New Four-Electrode Valve Circuit.

An interesting recent patent in connection with a receiving circuit is No. 223,580, in which a single valve is used; this valve is of the four-electrode type. An ordinary aerial system is employed, and this is inductively-coupled to a tuned circuit which is connected between the centre point of the filament battery and the second grid (that is, the one nearest the anode). The first grid (the one nearest the filament) is connected through a reaction coil to the headphones and then to the plate of the valve, the connection being carried on from the plate to the H.T. battery.

Uses for Neon Lamps.

The well-known Neon lamps (such as are used for advertising purposes) have, in their smaller "night-light" edition, many useful purposes in connection with wireless. They refuse to carry any appreciable current until a certain critical voltage is reached, when a flash-over occurs, and this property obviously makes them of value as lightning arresters in connection with the aerial circuit.

Although the Neon lamp will not flash over before the critical voltage is reached, the arc or discharge will continue when the voltage across the electrodes is reduced considerably below the critical flash-over voltage. In other words, the tube has a negative resistance characteristic similar to that of the arc. By supplying the tube with direct current (through a choke coil) and by connecting it into an oscillatory circuit the lamp may be used as an oscillation generator, and by suitable adjustments of the circuit may be made to generate oscillations of a comparatively low frequency.

Economical Accumulator H.T.

Apropos some remarks I made in these notes recently on the subject of Edison-type accumulators for low-tension and high-tension work, I have had an interesting letter from one of my correspondents, Mr. G. W. Hall (G 6 L F), which may be of interest to other readers. He says: "It may interest you to know that I have been using these accumulators for high tension for over two years, and have found them remarkably efficient, giving an absolutely silent background in reception with no crackling noises or mush of any kind. It is surprising that they are not better known in this country, as they deserve to be, and I personally would not be without them. They may be made up from genuine Edison plates complete with test tubes and racks at about 6d. per volt, which includes payment for time spent in construction."

A Novel Coil.

Something more or less novel in the way of H.F. coils is the new "Bodine twin eight," manufactured by the Bodine Electric Co., 2260 W. Ohio Street, Chicago, Ill. This is a double type of coil wound in the shape of a figure 8 with the support in the centre, the two coils being otherwise entirely self-supporting. The method of winding is a little difficult to explain without the aid of an illustration, but the results are claimed to be extremely good. It is claimed that this is the first radio frequency transformer that combines a very limited magnetic field with exceedingly high amplification. It has also very low resistance, due to the almost complete absence of dielectric in the field of the coil. The price of the coils is \$9 per set of three matched coils, or \$3 each, and fuller information may be obtained, by those interested, from the address given above.

Worth Knowing.

I am frequently asked by readers for the address of suppliers of various kinds of rather out-of-the-way apparatus and materials, such as alkaline earth metals, photo-sensitive apparatus, neon-filled tubes, pyrex or quartz, etc., etc. For the benefit of any experimenters who may have difficulty in obtaining anything very special of this kind, if difficulty is experienced in obtaining the same in this country, it is worth while trying the Radio Electrical Works, Research Division, 23, Union Square, New York, U.S.A.

A "Dry" Rectifier.

A remarkable discovery has been made by a well-known American physicist, Samuel Ruben, in connection with electrolytic rectifiers. As this subject is one of great importance, and as it happens to be one in which I personally am greatly interested, I propose to give an account of this new discovery in more detail at an early date. In the meantime, however, I may say that it is known as a "dry" rectifier.

It is claimed that it does not employ any liquids, that it does not discharge any corrosive gases or vapours, and that it is consequently eminently adapted for use in self-contained wireless cabinets.

Ingenious "Lead-in" Tube.

I notice a new type of lead-in tube which has many points in its favour. It consists essentially of an ebonite tube, within which is mounted axially a brass rod, the latter being supported within collars at the two ends of the ebonite tube so that, for the major part of its length, the brass rod is not in contact with the ebonite tube at all: this makes for the reduction of losses.

At the two ends of the tube are provided brass sockets, so that connection may be made to the lead-in by means of spring pins. An additional advantage is that a flexible connection from the earth lead may be brought up to the lead-in and provided with a spring contact pin, so that by withdrawing the "set" connection and inserting the earth connection in its place in the lead-in tube, the aerial may be connected directly to earth.

WHEN replying to advertisements please mention "Popular Wireless and Wireless Review" to ensure prompt attention.
THANKS!
E/B

Too economical even to glow



THE wonderful "N" filament valves are so economical that no sign of glow can be discerned. They require only ONE-TENTH AMPERE from a 4-volt accumulator (or 3 dry cells). This means SEVEN TIMES THE LIFE of each accumulator charge; a distinct saving of your time and money.

ASK FOR THE P.M.3 - - 16/6

The general purpose Valve, suitable for every circuit. Gives clear strong signals free from microphonic disturbance.

ASK FOR THE P.M.4 - - 22/6

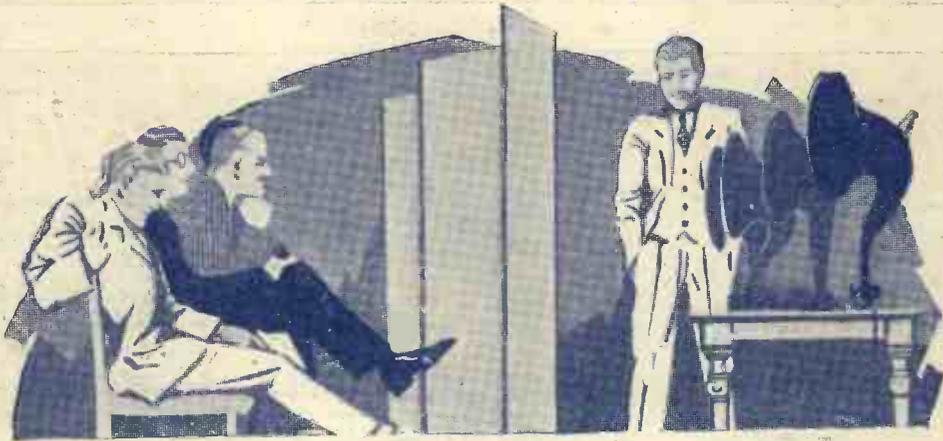
A power valve for majestic Loud Speaker volume. The finest Loud Speaker Valve ever produced.

GET THEM FROM YOUR RADIO DEALER



These Valves only require the same H.T. current as for equivalent types.

Mullard
THE · MASTER · VALVE



A CONVINCING TEST

—now build your own loud speaker

When we first offered the public a full-powered loud speaking unit for 13/6 people were frankly incredulous. "No doubt it's excellent value for the money," they said, "but you can't expect it to equal an instrument costing several pounds."

So we invited four entirely disinterested judges to sit behind a screen while we carried out a simple test. We put on a well-known and expensive loud speaker and carefully noted the quality and volume of reproduction. Then the horn was removed from it and attached to the "Lissenola" and the result again carefully noted. This was repeated with half-a-dozen popular makes of loud speakers. *It was found impossible to say which gave the better result—the original loud speaker bases or the "Lissenola."*

The result of our test has, of course, been confirmed since by thousands of "Lissenola" converts—for the sales of the "Lissenola" have broken all records in the wireless trade.

Briefly, the "Lissenola" is the essential loud speaking base that only needs the addition of a horn to yield results equal to an instrument many times the price. And for a few pence you can make a really efficient horn yourself from the very simple directions and full-sized exact patterns given with every instrument. The "Lissenola" can also be attached to the tone arm of any gramophone, turning the gramophone into a radio loud speaker.



There is also the Lissen Reed (1/- extra) which adapts the Lissenola to take a cone or any other diaphragm working on the reed principle.

We challenge comparison. Before buying go to your dealer and make the same test yourself.

The "Lissenola" is obtainable from all Wireless Dealers throughout the country—or in case of difficulty by sending remittance direct to the makers.

Price 13/6. Post Free.

BUY THE LISSENOLA

and build your own Loud Speaker

Lissen Limited, 8-16, Friars Lane, Richmond, Surrey

Phone: Richmond 2285 (4 lines).

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L.20