

Special Christmas Number

3d

Popular Wireless



December 7th. 1929. No. 392. Vol. XVI.

Special Contributions By
 Sir OLIVER LODGE, F.R.S.
 The Rev. B. G. BOUCHIER, M.A.
 BRANSBY WILLIAMS on
 "If Dickens Had Broadcast"

And a Special Article by
 Capt. P. P. ECKERSLEY, M.I.E.E.
 "Through Your Magic Window"
 etc., etc., etc.

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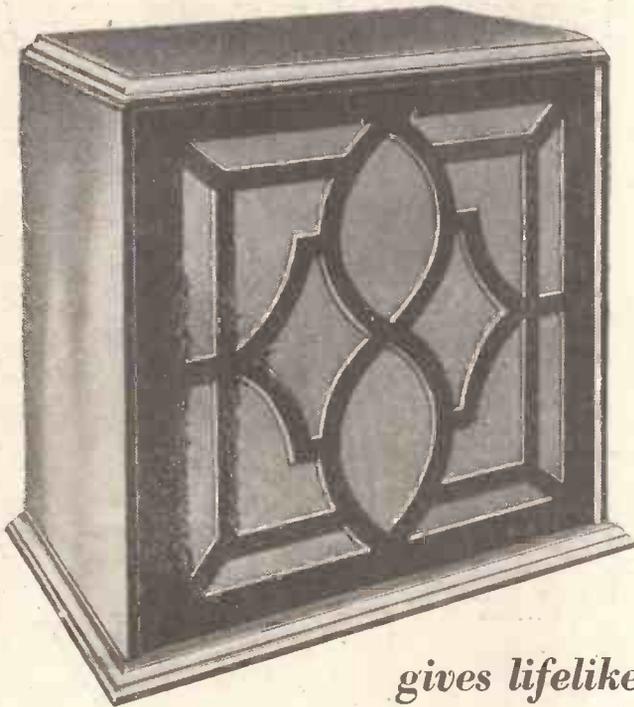
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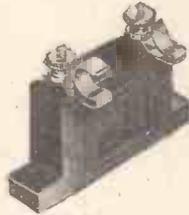
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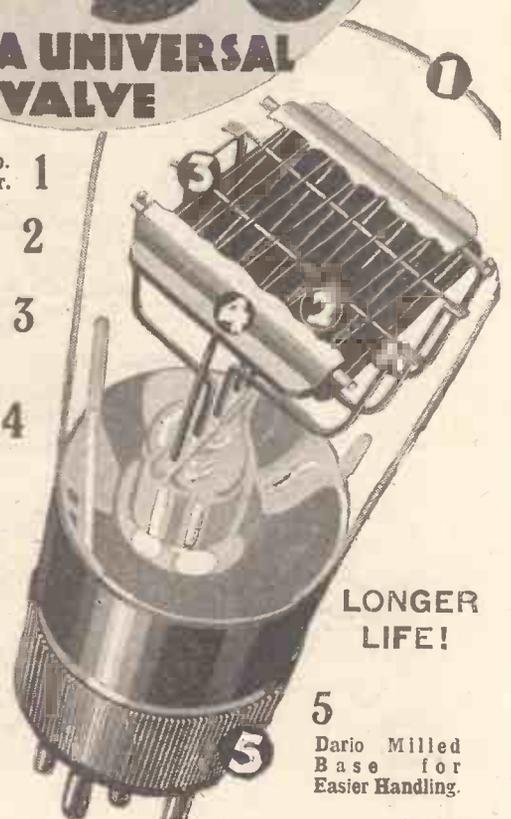
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FOUR VOLT

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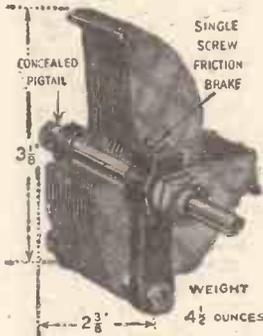
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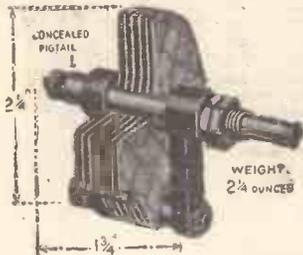
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4/6 each

*Double spacing of vanes for Ultra-Short-Wave work.

"MIDGET" Reaction CONDENSER

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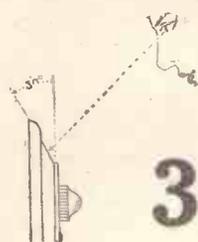
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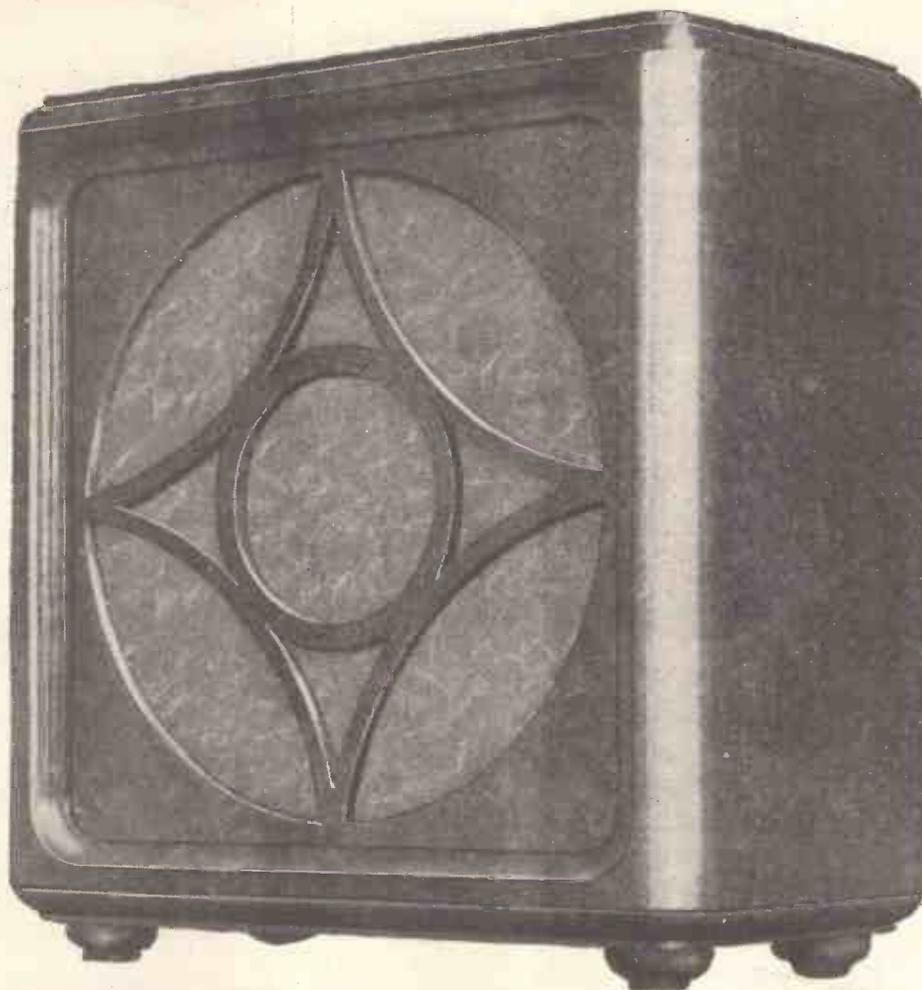
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The

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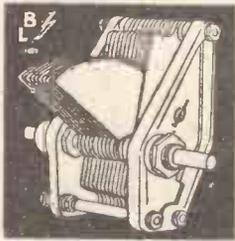
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FOSTERS ACTUALLY FINANCE THEMSELVES. 1930 NEW IMPROVED 'COSSOR' MELODY MAKER Yours for 9/9 with order.



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BY A MAN WHO SET OUT TO LOG THE WORLD

AN ACTUAL EXPERIENCE

of a wireless enthusiast whose desire it was to get world-wide reception—and failed. He then changed his transformers and fitted Telsen, and writes that the moment he began to search around the dial foreign stations came rolling in one after the other with strength and purity, many of which he had never heard before—a discovery by him—profit by it. Fit Telsen Transformers now!

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FOR WORLD-WIDE RECEPTION**



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THE CHANCE OF A LIFETIME!

THE
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THREE



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SIZE
BLUE
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VIM
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VOLUME

THE SET WITH "UNIFIED" CONTROL

BRITAIN'S BEST BROADCAST RECEIVER.

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SPECIAL DOUBLE CHRISTMAS NUMBER

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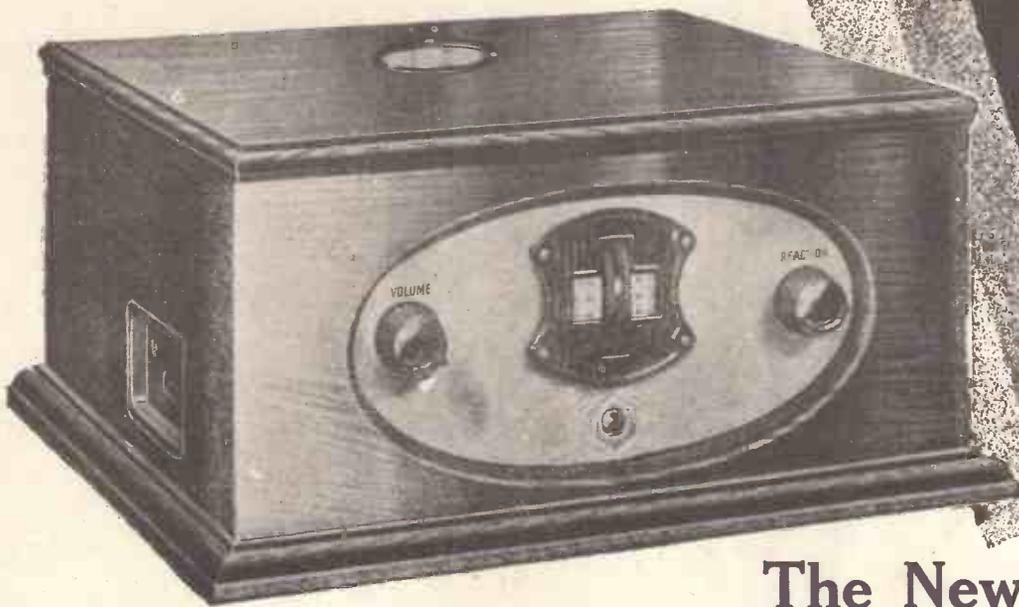
MODERN WIRELESS

PRICE 1/6

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THE SET SUCCESS OF THE YEAR



The New Lotus All-Electric Receiver —gets the best reception.

Here it is—the set that simplifies and improves radio reception. Here is radio that is really electric. Now all radio power is in your own light socket—dependable, ready all the time, radio power as constant as your house current itself.

The Lotus 3-valve S.G.P. All-Electric Receiver is entirely self-contained, comprising S.G., detector and pentode. In appearance it is neat and well finished, and can be used in any room where there is a light socket.

This set will give you a splendid range of British and Continental Stations at full loudspeaker strength. Hear this set at any wireless dealer's to-day.

*A gift that gives
pleasure throughout
the year.*

£21

Royalties paid.

LOTUS

SETS

OTHER LOTUS SETS. Ask your radio dealer to demonstrate the following sets: Lotus 3-valve S.G.P. Receiver, battery model, £13 15s. od. Lotus 3-valve S.G.P. Kit battery model for constructors, £7 12s. 6d. Lotus 3-valve All-Mains transportable. Oak, £25 4s. od.

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THE elements of the NEW Cossor Pentode are double locked in position—braced to a girder-like rigidity. This exclusive Cossor system of construction definitely prevents individual movement. Even the hardest shock cannot mar their perfect alignment, and because of their rigidity they cannot vibrate and so cause microphonic noises. For power and for long life use the NEW Cossor Pentode in your Receiver. No other Pentode Valve has this wonderful system of Interlocked Construction.

**2 volt type
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The NEW Cossor 230 P.T.
(2 volts, .3 amp) Impedance
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The NEW COSSOR PENTODE

Popular Wireless

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**XMAS CHEER.
 THE DIE-HARD.
 MORE ABOUT MUSIC.
 ARTIFICIAL X'S.**

RADIO NOTES & NEWS

**FACTS RE FIZZLY.
 VOLTS AND WHISKERS.
 "GRAMMY" ON STRIKE.
 ANCIENT LIGHTS.**

Our Christmas Number.

ALWAYS a thrill in those words, isn't there? Takes you back to the wonderful periodical literature of one's early youth, when all was holly, mistletoe, plum-pudding and turkey, especially on the cover, which was, chromatically, like unto Joseph's coat. And what contents! Such frightfully ghastly ghosts and such absolutely topping grub, and adventures in the Red Sea on Christmas Day by the gallant midshipman, said he, lapsing into "lower thirderly." And now, behold "P.W." in fancy dress and a false nose, so to speak.

"Speech."

MR. ARIEL, rising carefully and keeping a grip on the back of his chair—"in case"—begs to assure the company that, although he is the acknowledged scapegoat, "expert"-baiter and "Aunt Sally" of the old firm, he forgives 'em all and hopes next year to do them as he would do—er—done—did—you know what I mean. Begs further, assure all assembled "P.W."-ites, Ariel-bugs, DX fans, K.C.W.'s, Valve Barts., Sceptics, that all "P.W." people jolly human fellers, 'cept technical hounds and printer, and wish everybody best of luck and perfect digestion—I mean, reception. Merry Christmas—and down with Chamber Music!

Again December.

NOTABLE month! The last of the year, the darkest, the most expensive, and, in a number of ways, the maddest and merriest. To the children it is, I believe, still a magic month although the "honk" has gone from Santa Claus' reindeer. When I think of radio in the shops just now I am reminded of the wireless department of a great London store in 1909. It contained a crystal receiver with a slider tuning inductance 18 in., long by 6 in. in diameter, and a transmitter for amateurs, warranted to ring a bell at a distance of nine feet!

Suitable Gifts.

NOW is the time to begin keeping an eye on the shops. One feature of the rationalisation of Christmas is the practice of finding out in advance what gifts would be welcome. In the late 'nineties half the essence of giving Christmas presents was secrecy and surprise; the other half was too often secret disappointment. But,

in case there remain any left-overs from the Victorian era, let us point out the cruelty of giving a boy a handsomely-bound copy of "The Life of Ezra Bones, the Kind Man of Wigan," when he is panting for the components of a "P.W." set. Give him a currency note and let him loose in the radio shop, if you want to see an exhibition of the purest enthusiasm possible for a demon, human, boy.

The Official Touch.

NOTWITHSTANDING the cheery "good-nights" the B.B.C.'s contact with the public has, in the opinion of a growing number of listeners, become dehumanised; it has all the courtesy of a

Christmas Greetings.

With this Radio Xmas Number of "P.W." we should like to wish you—one and all—a happy Christmas and a Prosperous New Year. Long may we continue to provide you with a Christmas "P.W." and long may you live to enjoy it.

On another page the leaders of radio in this country wish you seasonal greetings, and with them the staff of "P.W." joins most heartily.—The Editor.

good salesman of the modern type, frigid, forced and restrained cordiality, so to speak—but none or little of the spirit of friendliness which emanated from that gang of cheery genuises who really invented broadcasting. The announcer's chief concern nowadays seems to be not to offend the Chief Pronouncer. This lack of the "pally" touch is one of the chief points in foreign criticism of the B.B.C.

Another Die-hard.

I ONCE heard of a man who would not wash because his father had been drowned, but never before have I come across such a magnificent example of consistency as that reported in the "trade" press of a lady who refused to buy a portable because it was "hide finished." They made

a special wooden case on the principle, I suppose, that whatever the customer says is O.K. One must admire such tenacity of vegetarianism, because the lack of wool, leather and fur from the feminine wardrobe connotes a very uninteresting set of "duds."

A Chapter Closes.

IT seems incredible that Sir Walford Davies should have been giving those jolly talks of his for four years. But it is true, and now he is giving them up; thus one more cheery spot vanishes from the radio week. Lots of what he said was incomprehensible to me—"as ain't no musician"—but I fairly basked in the rays of his personality as revealed by his voice. The talks on music will be given by Dr. George Dyson, Director of Music at Winchester College, at 9.15 p.m. on Tuesdays.

More About Music.

ON December 6th, Franz von Hoesslin will conduct the B.B.C. concert at Queen's Hall. He is the conductor at the Fest Spielhaus Bayreuth, which is the Mecca of Wagnerians. I am glad to note the B.B.C.'s definite promise to relay next year's Wagner festival from Bayreuth. By the way, listen to Schumann's Pianoforte Concerto on December 5th, as played at the People's Palace by Solomon. I think that you will vote it good, honest music, fit to be applauded by middlebrows even as you and me.

My Artificial X's.

MY note about the hissing in my L.S. when trains blow off steam nearby prompts a Worthing reader to come to my aid with another explanation of how it happens. He says that when moisture in the atmospheric condenses and forms drops of water, free electrons accumulate and a negative charge is formed. The idea is that this charge then uses my aerial as a path to earth. So far, so good! But why do not the free electrons charge the aerial beforehand and not wait for the moisture?

More Facts re Fizzly—

THE large number of letters received on this subject leaves no doubt that the moisture which charges my aerial is electrified as the result of the friction between the steam and the valve orifice, and it explains why we often see a bit of
 (Continued on next page.)

NOTES AND NEWS

(Continued from previous page.)

dangling chain under a steam vehicle. L. G. (Richmond), thinks that there is a "snag" in the theory because railway engines are "earthed." H. L. M. (Warwick) recommends the use of an insulated wire. I should prefer these trains to move on to the next station because the noise is terrific.

Volts and Whiskers.

I AM indebted to readers for a lot of interesting facts relating to this matter. Several state that the discharge can actually be seen if the safety valve is observed in the dark, and one fellow says that he has noticed the apparent electrification of his moustache on occasions when he has stood close to the valve. And another (E. G. B., Bolton), in the spirit of the true scientist, "earthed" a steam trailer through a voltmeter, which kicked past its 120 volts limit. It is clear that the Post Office will have to close down the Southern Railway.

My "Grammy" Strikes.

MY troubles have begun already, for after working perfectly for a month my gramophone suddenly became tired and now, when the needle is lowered on to the record the added weight is enough to slow down the machinery, so that all I get is a miserable groan. Experts please advise! The local grammy man has done his best, but the symptoms are unabated. It should be noted that whilst running "no load" the speed is normal. Well, thank goodness the radio set is still playing the game!

Radio Lectures.

SECRETARIES of radio clubs may like to know that the Marconiphone Company have prepared three lectures, each illustrated with lantern slides, which are available on loan. The subjects are: (1) Screen-grid valves and circuits; (2) A.C. valves and circuits; and (3) Public speech and music amplifiers.

Each lecture is timed to last from 35 to 45 minutes. Apply to the Company, Dept. I.D., 210-212, Tottenham Court Road, London, W.1.

Morning Misery.

AGAIN I note a feeble attempt to induce the B.B.C. to broadcast music suitable to be accompanied by physical exercises. One suggestion is that this should be done at 7, 7.30 and 8 am. Until Old England harbours a race of blonde beasts filled with the spirit of body-worship the attendance at any such morning festival would be small. On paper the idea looks excellent; but—to creep down into an ice-cold sitting-room and to jerk the limbs in time with broadcast gramophone music! Ugh!

Ancient Lights.

NOT even steam destroyed the romance of olden times so much as electricity does. Dunvegan Castle is the oldest inhabited Keep in Scotland, and for a thousand years has been lit (more or less) by lamp and lantern, candle and torch. It is now wired throughout for electric lighting,

and the old housekeeper bemoans the changing times. Ever read Kipling's "Below the Mill Dam"? Same idea! Electricity, an ancient water-mill, and the rat talking it over. No doubt the Macleod of Macleod will put radio into Dunvegan—though the walls are in places 15 to 20 feet thick—and complete the dismay of the old retainer.

German Broadcasting.

THE 1928 results of the broadcasting enterprise in Germany show up well in comparison with those of Spain and others. Receipts, £1,600,000. Expenses, £1,440,000. Dividend 7½ per cent and £55,000 carried forward. The cost of programmes amounted to £610,000, and of

SHORT WAVES.

"Speech lives for ever in space," says a scientist. Some of the wireless talks certainly seem to go on and on and on.—"Daily News."

Definition of a Failure.—The strong, silent man who became a B.B.C. announcer.

A woman applicant at the Willesden Court complained of her aerial: "She says that it is the wrong wave-length and upsets her washing, making it as black as soot."

Magistrate: "Does she hang her washing on your aerial?"

Applicant: "No, sir; above it."

Magistrate: "I can do nothing."

Applicant: "The wave-length seems all right for her bad language, anyway."

Mr. and Mrs. Martin Johnson are going to try the experiment of making sound pictures of wild animals in their native haunts. The trouble is, however, that the microphone, to give good results, must be placed within twelve feet of the lion or elephant.

That's just where we'd like to place our local oscillator.

A TUNED-IN ALIBI.

Wife (hearing hubby fiddling with door-knob at 3 a.m.): "You old owl, what in the world are you doing down there at this time of night?"

Hubby: "Pshh (hic) I'm trying (hic) to tune out (hic) W O W for W O O."—"Radio News."

"It is possible there may be a partial short-circuit in the SEA," we are told by the "Sydney Sun."

We're afraid our Queries Department cannot be held responsible for that.

A THRILL TO REMEMBER!

I grouse not at the B.B.C.,
And, maybe, never will,
For recently it brought to me
A well-remembered "thrill."

A thrill of gratitude and joy
Which touched my inmost core,
And made my spirits upward buoy
For weeks—say three—or more!

And how? Sweet music it relayed,
And I became aware
It hadn't in three hours played
That Londonderry Air!
"Daily Herald."

power, £240,000. In spite of 1914-1918 my pre-war admiration for German efficiency keeps on trying to break out—which is not to imply any disregard of our own virtues, please.

Another Nuisance "Scotched."

G. B. B. (Wakefield), tells me that about eighteen months ago he was annoyed by a ticking on the broadcast wave-band, which he thought was caused by an automatic telephone sub-station 100 yards distant. The telephone people roundly denied their guilt, but G. B. B. is a "notic-

ing-sort of feller," and whilst in the sub-station he saw some cams at work. These he timed and found that one made contact 43 times per minute, exactly the period of the disturbing ticking. This coincidence did not reverse the denials of the official but, strange to relate, the ticking stopped shortly afterwards. Another coincidence, no doubt.

"Programmes."

THE B.B.C. Year Book for 1930 contains a reply to criticisms of the programmes broadcast, including a statement of the B.B.C.'s aims with which, as a whole, no reasonable person will quarrel. One sentence stands out boldly, "Every listener should be his own programme builder."

By this the B.B.C. means that we should choose thoughtfully from the items offered, and while that, too, is a sound idea it tempts one to let off a mild joke about the difficulty of building one's "soul a lordly pleasure house" with bricks of mud and marble.

Australia and the B.B.C.

I HAVE been reading an excellent article on the B.B.C. by Mr. J. Benson, written for "Wireless Weekly," an Australian paper, and one or two phrases may interest you. For instance, he says that the B.B.C. is "free from the dictates of everything but its own conscience." It is, almost. But the conscience of a bureaucratic institution is apt to become sluggish. Again, "it instructs because it is its duty to instruct—it amuses because it must make some compromise with the flesh."

Doesn't that just hit the nail on the head, in indicating how the B.B.C. highbrows stoop occasionally—against their wills—in order "to amuse the children" as a relief from "lessons."

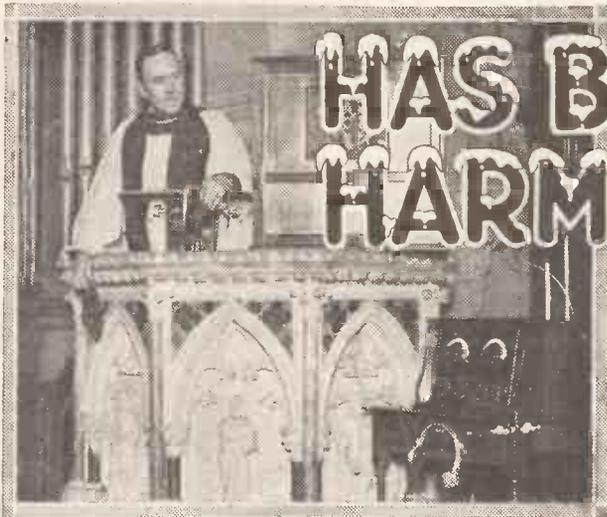
Under The Microscope.

SOMETIMES a reader sticks a pin through me and settles down to watch me wriggle; he is quite entitled to this under the rules and I never resent it, especially when it is done by a sportsman like H. W. P. (Bristol) who first writes to help me about that electrified steam business and then proceeds to quarrel with my definition of "ampere" as "Rate of flow of current." (See "Notes and News," November 9th.) He states that it should be "Rate of flow of Electricity not rate of flow of current. (A current is a flow.)" Let's get this right!

Off the Pin.

IT appears from this that one ought to say "the water flows swiftly," not "the current flows swiftly"; but is not the latter correct? The sailor will speak of a sea current of so many knots. A knot is a "miles per hour" rate. An electrician refers to a current of so many amperes. An ampere is a "coulomb per second" rate, a coulomb being an electrical unit of quantity. Hence an ampere represents a rate of flow of electricity, as H. W. P. says; but the electricity, being moving, constitutes a "current" and so it is a matter of choice in this instance whether you say "electricity" or "current." Although I think it was unintentional, H. W. P. seems to have been guilty of a quibble,

ARIEL.



HAS BROADCASTING HARMED the CHURCH?

by
The Rev. B.G. BOURCHIER M.A.

In this special article a well-known vicar challenges the critics who say that broadcasting has killed religion, and that the Church is dead.

ANY estate agent, when extolling the virtues of the house he hopes to sell you, will not forget to add that there is h. and c. laid on. He serves a useful purpose if only in reminding us that to have gas and light and water laid on, to the humblest dwelling is one of the sunny sides of civilisation.

And now, at trifling cost, a man can have his religion laid on, too. With a home-made wireless set he can tune in on Sunday to any of the stations from which a service and a sermon are being broadcast. What easier way of taking the devotional pill than that it should be swallowed by the fireside in slippers ease—particularly on a cheerless winter night!

An Unforeseen Factor.

That is a development which could never have occurred to the religious leaders of an earlier day. It is also a development which by no means has the full approval of all religious leaders of the present day. A number of worthy folk are asking themselves in desperate apprehension whether this broadcasting business is not a wolf disguised. Frankly, they fear that it is doing the Church irreparable harm at a time when that body needs all the support it can get.

I can quite see the force of their arguments. It is all very well for the aged and infirm to stay at home and listen to a service through the earphones, but it is a habit which is likely to spread to the hale and hearty.

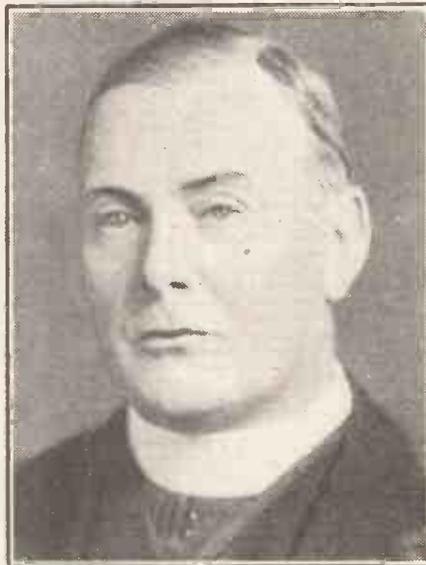
Of the hale and hearty God expects, at any rate, the weekly pilgrimage which is the journey to the nearest church. Moreover, he expects corporate attendance at His house. Knowing what we do of the weakness of human nature, it is not outrageous to assume that the average man will compromise between his inborn laziness—or call it love of comfort—and the promptings of his conscience with timely microphonic aid.

Armchair Worship.

Yes, I see quite well that danger. I admit that it exists, and, to go farther, I believe that when once a man stoops to bargain with his conscience the day is not far distant when he crosses it off his visiting list for good. In other words, directly the erstwhile ardent churchgoer contents himself with armchair worship he is in danger of dispensing with worship altogether.

But there are points about this broadcasting which far outweigh those possibilities. There are points which give radio the chance of bringing about the nearest approach to a revival which modern times could witness. If materialism has grown to the proportions of a monster dragon, radio looks remarkably like a steed to bear St. George.

One of the greatest difficulties which confront the spiritually ambitious clergyman is that he must, perforce, preach to the converted. Or, at any rate, to those who, by their presence in his church, advertise their outward allegiance to the faith.



The Rev. B. G. Bourchier, M.A.

Believe me, many an earnest preacher aches to reach the multitude outside. He can't because they will not come. He is tired of expounding the Gospel to those whose academic acquaintance with the Word is probably equal to his own.

He wants to talk to the people who never go inside a church except to marry, or bury their dead. He wants to explain away many of the fallacies about religion; to relieve it of the stultifying Victorian tradition of "goody-goodyism."

Christ, you remember, was not satisfied with ninety-nine sheep within the fold; he spent His whole energies in a quest for

the hundredth which remained outside. Why? Because those outside matter, in a sense; far more than those within.

Radio can reach the Great Outside. There must be many a man who listens in to a sermon for the simple reason that there is nothing else for him to do. He may come to laugh and stop to listen. Once he listens, the day will dawn when he heeds as well.

That point can hardly be denied. Your preacher measures the amount of good he hopes to do by the number of upturned faces which confront him when he mounts the pulpit. A church is like a theatre in that the larger the congregation the greater the inspiration to the one whose business it is to speak.

The All-Penetrating Message.

Before the microphone one's chances are unlimited. Brick walls crumble and distance disappears. Wireless waves are all-penetrating, and it is a magnificent thought that the message with which they are charged possesses that quality, too. He would be a poor man, indeed, who, in those circumstances, did not give of his best.

I do not pretend that a cloak of piety will settle on the nation because a service is broadcast every week, or even every day. Not every man can reach the hearts of other men, however hard he hammers. But there are men in this country—and I have listened to some of them—whose divine talent for doing so languishes almost to the point of death within four narrow walls. Transport them to the microphone and I am as certain that their words will bear fruit.

An Open Door.

People have been crying out for the last fifty years or more that the Church must be brought up to date. The fact that it lags behind the times has been responsible, they say, for dwindling congregations and the decaying state of national spirituality.

Very well! The Church must be brought up to date, and wireless on its present scale is about the most recent development which Science can show. By means of it thousands will have an opportunity they never had before.

Broadcasting has *not* harmed the Church. It has widened its scope beyond the ardent reformer's most fantastic dreams. It has thrown open a door that has been sealed to Calvary; the door to the ears, if not the hearts, of those who never see the Cross.

THE B.B.C. AND "CRITICAL DICTATORSHIP."

Some further developments of a very interesting situation.

By THE EDITOR.

AS we forecast some weeks ago, the question of B.B.C. dramatic criticism is by no means shelved because of the compromise reached by the Theatre Managers and Sir John Reith.

The controversy received fresh impetus a few days ago, when Mr. John Galsworthy, the famous novelist and playwright, published a letter in "The Times" expressing the view that a single dramatic critic for broadcasting constitutes "a departure wholly vicious," and likely to lead to undesirable forms of artistic dictatorship.

A Simple Solution.

In the course of his letter Mr. Galsworthy expressed the opinion that—

"I should have imagined that authors, managers, and all the rest of the critics would have objected with one voice to such great power being put into the hands of a single critic however able he may be.

"Considering how prone the public is (and very naturally) to take the easiest way of finding out what to go to, it will soon be possible for this single person, without departing in the least from 'the integrity of criticism,' to make or mar any play.

"To my thinking this is wholly wrong. From this particular dictatorship there is but a step to B.B.C. dictatorships of literary, musical, and artistic taste."

Mr. Galsworthy's letter certainly raises a very important problem—but it is one which is easily capable of solution. The B.B.C. should invite the leading newspaper dramatic critics to take it in turn to broadcast their views about current theatrical productions.

This would not only eliminate the rank of a "critic dictator," but would explode once and for all the fallacy that any single dramatic critic is a reliable guide to the theatre.

Those of our readers who are keen playgoers, and who make a practice of studying the dramatic criticisms in the newspapers, will know how rare it is for the critics to agree. One critic will write that such and such a play is very poor stuff, while another critic, in another paper, will be quite enthusiastic about it.

Now the B.B.C., besides meeting Mr. Galsworthy's point about dramatic dictators, could afford listeners a good deal of light amusement if they invited a different critic to broadcast his views each week.

"Brighter Broadcasting."

By comparison, the views expressed by the various critics at the end of, say, a couple of months, would be most amusing, most contradictory, and most efficacious in killing that old idea that a critic can make or mar a play.

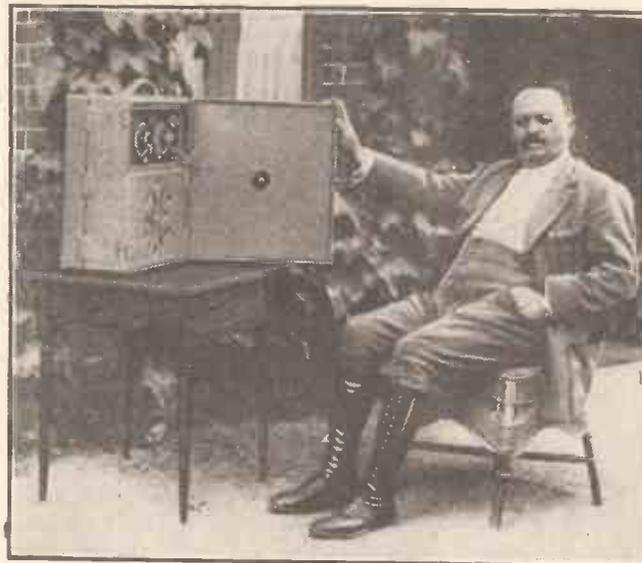
However, broadcast criticism is very different from newspaper criticism and

there is undoubtedly some ground for Mr. Galsworthy's fear that one B.B.C. critic might exercise a big influence on the play-going public—especially that section of the public which prefers to be guided by someone else in its choice of a theatre to visit.

Mr. George Bernard Shaw, in an interview, pointed out that if, for instance, the opinion of Mr. Hannen Swaffer had been the only view of his play "The Apple Cart" given to the large listening-in public it would have been a very serious matter for Sir Barry Jackson and himself.

It is a difficult question, but Mr. Shaw thinks the best way out would be for the

RADIO'S MUSSOLINI.



M. Victor Rivet, Mayor of a tiny French village, has attained overnight fame as the first authority to protect radio fans by decreeing certain hours for radio reception.

B.B.C. to have a series of critics, so that the public could have a selection of opinions.

And with Mr. Shaw's opinions we heartily concur. Anything for "Brighter Broadcasting!"

The Component Shortage.

We feel that something should be said about another problem—and one which very closely affects thousands of our readers—in this issue of "P.W."

We refer to the vexed problem of securing certain important component parts for two of "P.W.'s" great autumn successes—the "Magic" receivers—and the "Brookman's Rejector."

We have had several letters from readers complaining that certain parts for these two popular products of our Research Department are proving rather troublesome to procure; in short, from several sources we hear that anxious purchasers have been informed by dealers that they have "sold out," and that fresh supplies have not been easy to obtain quickly.

We have made very careful enquiries of the factors and manufacturers concerned, and while it is true that there has been a definite shortage of some components, owing to the enormous "run" on these items, due to the widespread popularity of the "Magic" sets, and the "Brookman's Rejector," we now have the definite assurance of the manufacturers concerned that they are rapidly meeting the demand and that, in the course of the next few days, constructors should have no difficulty at all in securing the parts required.

Unexpected Demands.

We very much regret that any of our readers should have been delayed in securing any component part for any of our sets—but in the case of the "Magic" sets and the "Brookman's Rejector," although we made enquiries as to the supply of components available before publishing constructional details, and although we formed the impression that there would not be any shortage, we were—although very optimistic about the success of the "Magic" series and the "B.R."—unprepared for the absolute deluge of widespread interest among all classes of amateurs.

One firm alone received orders for 15,000 differential reaction condensers for the "Magic" Three—so our readers can guess that the trade has had a busy time, and that manufacturers have been doing more than a spot of overtime in order to meet the demand.

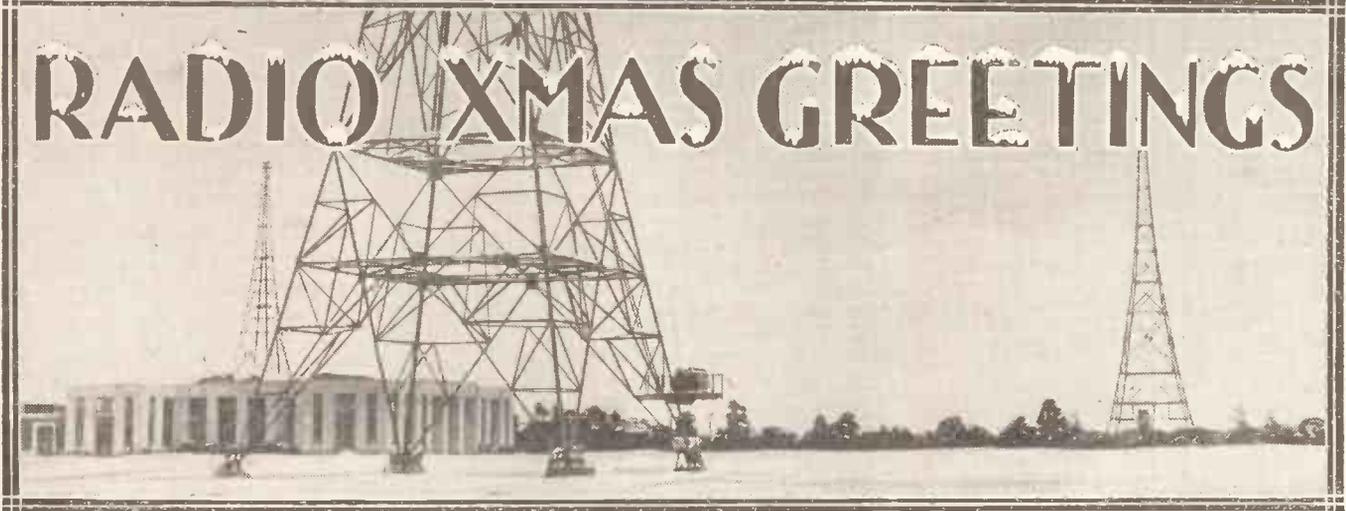
However, if you have been delayed in getting some of the necessary parts, please accept our apologies and those of our advertisers concerned. There is this consolation, sets which cause such a demand are obviously widely recognised as being "the

goods"—and when your components come to hand, you will build up your "Magic" set or "Brookman's Rejector" with extra excitement—and extra appreciation when the apparatus is in use.

Mr. Filson Young takes us to task for a remark in one of the articles in the "Survey of the B.B.C." series. We had remarked upon the growing influence of Mr. Filson Young at Savoy Hill, particularly in connection with the sub-committee of the Programme Board, which does the real work of programme building.

Mr. Filson Young asks us to make it clear that his function is purely advisory; that he has no executive responsibility; and that his advice is confined to programme work, and is not always taken. We are sorry if we gave a wrong impression. It is perhaps not without significance that a programme adviser of the B.B.C. should be particularly anxious to disclaim responsibility for decisions or policy.

RADIO XMAS GREETINGS



From **MARQUIS G. MARCONI, G.C.V.O.**

Once again I have much pleasure in accepting your invitation to wish the numerous readers of **POPULAR WIRELESS** a Happy Christmas and a Prosperous New Year.



Marquis G. Marconi, G.C.V.O.

The future is full of promise and also, it may be, of surprises, and I am still of the opinion that we are a long way from finality in the utilisation of electric waves.

(Signed)

G. MARCONI.

From the **GOVERNORS** of the **B.B.C.**

More and better programmes—clearer and stronger signals—these are the objectives towards which the **B.B.C.** is striving as the Regional scheme is introduced and established. We send cordial greeting to your readers, and hope that they will find the **B.B.C.** programmes increasingly acceptable and varied.

From **SIR AMBROSE FLEMING, M.A., D.Sc., F.R.S.**

I gladly respond to the invitation of the Editor to give a word of greeting for Christmas and a wish for a prosperous New Year to all the readers of **POPULAR WIRELESS**.



Lord Clarendon, Chairman of the Board of Governors.

The radio art continues to make enormous progress and yet there is abundant room for new researches. To these the amateur can contribute, and it is worthy of note that many of the valuable discoveries in wireless have been due to amateurs.

The opening of the new **B.B.C.** station at

Brookman's Park gives additional means for useful experiments and researches.

(Signed) **J. A. FLEMING.**

From **SIR JOHN REITH**

(Director-General of the **B.B.C.**)

In sending good wishes for Christmas and

Here are Christmas messages for our readers from the leading personalities of radio, including the Governors of the British Broadcasting Corporation and the three great pioneers of the science of wireless.

the New Year to all your readers, I would emphasise that recent experience confirms the hope that the prospective development of the Regional scheme will greatly improve and widen the broadcasting service.

(Signed) **J. C. W. REITH.**

From **SIR OLIVER LODGE, F.R.S.**

Once more I send a Christmas salutation to all the listeners and radio experimenters who care to hear from me. They have a good educational instrument in their hands, and one of its functions is to promote International friendliness and goodwill.



Sir Ambrose Fleming, M.A., D.Sc., F.R.S.

Science knows no frontiers, no custom houses, no barriers, no passports; every discovery is of world-wide application. The influence of a genius like Clerk Maxwell, who discovered the possibility of electromagnetic waves in the ether, extends without limit of time or space, far and wide and for ever. Thousands of years hence this method of communication in some improved form will still be utilised, and the benefit will extend to all the nations of the earth.

If only we could speedily take the first step and do away with suspicion and



Sir John Reith.

hostile armaments, great resources would be available for peaceful pursuits. The world would then be drawn together in family relationship, by improved locomotion and easy communication, in ways of which we are already privileged to see and take part in the beginning. What better Christmas hopes can there be for humanity!

(Signed)

OLIVER LODGE.



Sir Oliver Lodge, F.R.S. Scientific Advisor to "Popular Wireless."

From **CAPT. P. P. ECKERSLEY.**

My Christmas message to the readers of **POPULAR WIRELESS** may this

year, perhaps, be taken as more inspired by political than friendly reasons. The cynical may say that only naturally the Radio Consultant to the paper would be inclined to be over-fulsome in his greetings to the readers of the paper in which he exclusively writes.

It is, therefore, more difficult for me to ask the readers of this Christmas message to believe that what I have done in the past is done with equal sincerity at the moment. I do wish the very happiest Christmas and more than that, the very happiest year to all the readers of this paper.

And more than that to all who see in wireless the possibility of the Christmas message of Peace on earth Good Will towards Men existing throughout the year.

(Signed)

P. P. ECKERSLEY.

From a **LEADING RADIO MANUFACTURER.**

Nearly every set that is home-made by "P.W." readers contains at least one example of my firm's activities, so I feel I should like anonymously to send my greetings, as an old friend of the Home Constructor family.

To them all I wish Good Health and a good hot soldering iron; long life and short leads; and the best wish of all—A Happy Christmas and a Prosperous New Year!



Capt. P. P. Eckersley, M.I.E.E.

LATEST BROADCASTING NEWS.

THE PROMOTION OF 5GB.

NEW TALKS CHIEF FOR THE B.B.C.—PROGRAMMES FROM THE CONTINENT—GROUP LISTENING IN WALES.

THE ill-wind of the delay of the second wave at Brookman's Park has blown some advantage to 5GB. The Daventry Experimental Station was due to become the Midland Regional transmitter, anyway; but during the first four or five weeks of the New Year it will be taking the programmes that would have been put out by the London Regional transmitter had it been working.

Thus, during this time, 5GB will play the dual rôle of Midlands station and alternative to both 2LO and 5XX. As soon as the London Regional transmitter is ready, that is early in February, 5GB will settle down to its permanent job in the Midlands. It will be based on Birmingham, and a good deal of its work will consist of relays of concerts and other entertainments taking place in Midland centres.

Apparently, good progress has been made in the negotiations between representatives of the Civic Society of Birmingham and the B.B.C. A deputation came to London recently to return the visits of B.B.C. Governors and Sir John Reith earlier on. There are signs that Birmingham opinion is now more reconciled to the idea of the disbandment of the B.B.C. orchestra there.

It is likely that the changed attitude is due to a substantial increase in the B.B.C. subsidy of the City Orchestra. Meanwhile, another complication threatens. There is restiveness among the musical and municipal organisations of other Midland towns. Why should Birmingham get all the plums? is the general query in places like Nottingham, Leicester and Wolverhampton.

Palestine Finds.

Some recent discoveries in Palestine by Sir Flinders Petrie will be described by Lady Flinders Petrie in a talk "The Lords of the Philistines," which she is giving in the London studio at 7 p.m. on Tuesday, December 17th. Sir Flinders Petrie has just left England for a further expedition and Lady Petrie is this year remaining at home in order to arouse interest in the expedition and to raise funds for its continuance. On the following evening Major Walter Elliot, M.P., is giving a talk (under the auspices of the Department of Overseas Trade) on Central African Development.

New Talks Chief for the B.B.C.?

It is rumoured in well-informed circles that the B.B.C. contemplates appointing a distinguished retired Civil Servant to be chief of the spoken word of broadcasting—talks and lectures; education, both schools and adult; and the Children's Hour and religion.

Programmes from the Continent.

The relay of "Salome" to 5GB listeners from the Cologne Opera House on Friday,

November 29th, and of the Bach Cantata and Military Band Concert from London to German listeners on Sunday, December 1st, were only preliminary try-outs of the new cable and landline facilities which have been provided during the past few months for a regular exchange of broadcast programmes between England and the Continent in the New Year.

On Tuesday, December 31st, 2LO and other stations will relay items from various Continental stations at intervals between 9.40 and 11.40 p.m., after which Continental stations will take the B.B.C. transmission from 11.40 p.m. until 12.10 a.m.

Three other special programmes have also been drawn up for simultaneous broadcasting to British, German, and Belgian listeners. The first will take place on Friday, January 3rd, and the others will

follow at intervals of about six weeks. Further details will be published in our columns in due course.

Group Listening in Wales.

Group listening is becoming more and more popular in South Wales, probably because of the continued trade depression in the colliery districts, with the consequential unemployment among miners who are unable to buy receiving sets, or pay for broadcast licences.

How much the miner values the broadcast programmes and the group circles which enable him to listen in comfort can be judged by the request made to the Institute at Crombach, Aberdare, that an extension of the usual opening hours should be granted on Armistice Night in order that a large audience might hear the play "Journey's End."

The request was granted, but the men were not so fortunate when they asked that the Institute might be opened on Sundays so that they might listen to the broadcast sermons. The petition for this was signed by about thirty men, but the committee adopted the attitude that political bodies might regard Sunday openings as being also useful for other purposes.

The Society of Friends has just installed a receiving set at their Unemployed Miners' Club at Dowlais, near Merthyr Tydvil, for use both in recreation and education.

Other towns and villages in the Rhondda are also taking up group listening, while the schools are displaying an increasing interest in the broadcast lessons to schools.

RADIO PASTOR RETURNS.



The Northwood Pastor who, some time ago, resigned in order to become a "radio doctor" has now gone back to the ministry.

TECHNICAL NOTES.

By Dr. J. H. T. Roberts, F.Inst.P.

H.T. RESISTANCE.

BATTERIES v. MAINS UNITS—A QUESTION OF CONVENIENCE—ETC.

WHOLE-HEARTED advocates of the mains-supply unit—amongst whom, with certain reservations, I number myself—would, no doubt, be surprised to know what a large number of people still use high-tension batteries and even high-tension accumulators.

Of course, in many cases there are very good reasons for this. For instance, quite a lot of people in this country are without electric-light supply, and in such cases must use either high-tension dry batteries or high-tension accumulators.

Apparently there are lots of people who prefer the accumulators, notwithstanding the inconvenience of having these recharged every two or three months. But, quite apart from questions of inconvenience, there are technical points to be considered, and cases arise in which the H.T. accumulator battery, owing to its extremely low internal resistance, is almost the only source of H.T. supply which is suitable.

I had a case in point very recently when I was engaged on some scientific work of a special character. Notwithstanding the fact that I had several types of H.T. mains units on hand, and although it would have been very much more convenient to use one of these, I found it essential for successful results to use a battery of high-tension accumulators.

This, however, as I have said, was a very special case where I wanted the lowest possible resistance in the high-tension unit, and although I could, no doubt, have obtained the same results—or, at any rate, similar results—by taking special precautions with an H.T. unit, I found it simpler to use the accumulator battery, and this was entirely reliable.

I should like to take the opportunity of mentioning that the accumulator battery in question was very kindly lent to me by Oldham & Son, Ltd., and the results which I obtained from it, in the exacting

(Continued on page 769.)

YOUR MAGIC WINDOW

BY CAPT. P. P. ECKERSLEY M.I.E.E.



Our Chief Radio Consultant indicates some of the pitfalls and delusions of listening, as well as the delights of owning a set.

I WONDER how many people are just embarking upon wireless listening this Christmas for the first time. Maybe a present, maybe a purchase, maybe even a deposit—the first.

As a hardened and hoary listener with no illusions left, may I indicate some of the pitfalls, snares and delusions of listening, while still, I hope, making the possession of a wireless set seem well worth while?

Any new purchase is a lovely thing. When I have a new car you may find me surreptitiously stealing into the garage and just looking, and feeling good inside. It's almost a shame to brave the puddles and, as to sheets of rain—awful!—so I lose half my pleasure in driving sympathising with my new paint; I get my real pleasure just looking.

You have a supreme advantage with your wireless set. No paint to dull or bright parts to polish, no feverish searches for the odd greaser which your instruction book tells you is—well underneath somewhere. You may find incipient squeaks in your wireless set as you do with a motor car, but the great advantage of the former is to have, to all intents and purposes, no moving parts; and therefore to all intents and purposes nothing to wear out. Wireless is a "clean" hobby; wireless is a toy which really works; wireless is a window with views of all the world, if you will look understandingly.

Use the "On-Off" Switch.

The great art is to know how to use your magic window; he who knows best is the one who masters the use of his "on-off" switch. There is an awful temptation with a new set to switch it on directly it is installed and silently, eagerly, hopefully, sit and listen and listen and listen and listen and listen. Exercise, books, your other presents, your home, everything vanishes as you sit waiting for the great moment, some great moment just round the corner.

Christmas dinners, Christmas lunches, Christmas chocolates, and Christmas wines, all the great stodge British feast encourages a somnolence and rooted objection to move while the wireless is the best excuse.

It is just this "bulk" listening (as it is

"bulk" eating) that leads to being "fed up," and, your set, from being the new and lovely toy, becomes a menace in the corner and a reminder of payments due. Look in your printed programme, see what it is that will interest you, fasten on to that, and don't expect every item to please you, you would be a very poor sort of individual if you could get pleasure out of every item, always.

Don't Overdo It!

You would not expect to go to every cinema and theatre in London, for example, and never find a second's boredom, why then expect the wireless to do more than sweep the gamut of all tastes, and hope

GIVE IT A DRINK!



Topping up the accumulator with distilled water should be done regularly.

here and there to capture the attention of a minority. You may complain perhaps of the infrequency of the times that you find your taste catered for, in that case address a reasoned letter to Savoy Hill and receive, in reply, a courteous explanation of the great difficulties of running a broadcasting service.

You may find you will, however, arrive at a moment's personal boredom and find no distraction in the local programme or programmes. That is certain. You will turn to your set and ask it to get you some-

thing that is manufactured abroad—a lot of people urge one to "buy British" and then "listen foreign."

Here is a second word of warning. Do not expect too much; a better programme maybe, but one which inevitably suffers in its reproduction from technical disadvantages. For instance, if you pick up the medium-wave stations (any station using a wavelength between 200 and 600 metres) you will experience "fading." The strength will go up and down and when it goes down it goes down to zero and makes a poor sort of harsh noise the moments just before and after complete disappearance.

I would suggest that even the best programmes (if one is interested in listening to them as such) suffer somewhat in disappearing as coherent sound completely every 10 or 20 minutes. If you want European stations other than British, concentrate on the long waves.

A note, too, on volume. The reproduction of orchestral music can be made quite loud for most people without the noise being in any way offensive, but speech should always be adjusted to a volume about equal to a normal man speaking. Remember this adjustment for speech, and notice how much pleasanter it is to listen to people talking on the wireless when reproduced in this way.

Vary the Volume.

As to orchestral music, get it as loud as you can still to be pleasant; true quality can only be obtained when the volume of reproduction approaches that you would normally hear in a concert hall. Piano as loud as a piano in your room. Ballad singing as a person would sing to you. Speech as your friend would talk to you.

Judge your set in general, and remember that even your ears directly in contact with sound are better pleased one time than another. Do not expect your set to reduce everything to a dead level. That would be mediocrity indeed! Your set must always try and escape mediocrity. Thus use your switch well, listen to foreign stations that are worth listening to, keep your volume adjusted to the item, and good luck to the new set—and good luck to you!



LEONARD HENRY SEES THE DAY WHEN :- "WE SHALL HAVE EARS LIKE RABBITS!"

A novel and entrancing idea is developed in this amusing article by one of our most popular broadcasters.

THERE is no mistaking this wireless menace. Day after day, programme after programme, we are strengthening the muscles of our ears by the struggle to see the point of some of the broadcast jokes. As the muscles swell so will the dimensions of our ears themselves. It is unavoidable, like an Income Tax demand note.

For this we have to blame the loud speaker, the modern bellow peril. So long



as our ears were weighed down by earphones their growing power was checked. Any extension must have been inwards, and whatever its effect on the

brain, if any, it could not at least have been disfiguring. There was also a nearness of the sound which rendered violent aural (that's a good word) exercise unnecessary. Of course, some fanatics did manage to grow old and weary, not to say ear-y, in the struggle to get Chile on a cat's-whisker, but every age has its Christopher Columbus and its Charlie Chaplin, and in a serious treatise like this we cannot deal with them all.

Broadly speaking, the earphone was in itself quite harmless. Its only effect upon the lapels of our heads was to squeeze them in a trifle, a good point, since a resemblance to a donkey is not beloved by any man (hear, hear!). But the loud speaker at once proceeded to undo any such good work.

The "DX" Fever.

The high-powered set which was required to work it led man into divers temptations and pitfalls. It showed him all the countries of the world and the transmitters of them. "All these will I give thee," it whispered, "if only you will stretch your ears a little more."

The result is quick and disastrous. A fever sets in, the first symptoms of which are ceaseless twiddlings of knobs, much "Sh"-ings, with occasional delirious outbursts of "Ah! That's got it. Confound it! Gone again."

So long as this illness lasts the muscles of the ears receive intensive exercise. They stick out more (forgive such a vulgar expression, but I am fast getting all hot and bothered in my righteous indignation over this scandal) in an endeavour to stop any sound passing them. Then they shoot upwards with a similar object, and so on, outwards and downwards until they threaten to become as large as the sails of the good ship "Yac-i-hic-i-doo-la."

Presently the fever abates, the patient no longer raves about Vladivostok and San Francisco. His friends congratulate themselves and humour him with antediluvian jokes. As he improves, and the serious lines on his forehead gradually disappear, so their stock of jokes grows lower and lower. But his appetite has been whetted and must be satisfied, and in despair they regale him with chestnuts possessing a pedigree stretching back to Ajar, alias The Open Door.

"Ready for Broadcast Humour."

Thus he is made ready for broadcast humour. Thus is his mind educated down to the level of the microphone, and his taste moulded into so childish a form that he henceforth continually craves for the laughter of his loud speaker.



Leonard Henry the famous comedian.

'Tis the same on every evening,

As soon as tea is done,

He turns on Leonard Henry

And listens to the fun.

And by him, hearing jokes umpteen,

His family do laugh and scream.

Old Kaspar roars both loud and strong,

At every word that's funny;

The reason is his ears are long,

Just like a little bunny.

For his comedian robot

Has made him like a rabbit.

I apologise for the last "o," but claim poet's licence, and, anyway, it improves the rhyme. From the foregoing literary effort you will see that in his endeavours to catch each word the patient has worked wonders with his ears. They have been so improved upon that not a sound escapes them.

Unfortunately they have increased in size once again, and Old Kaspar has to take a smaller size in hats, because in their expansion they have elected to go upwards and it is only with difficulty that he gets even a tiny hat on.

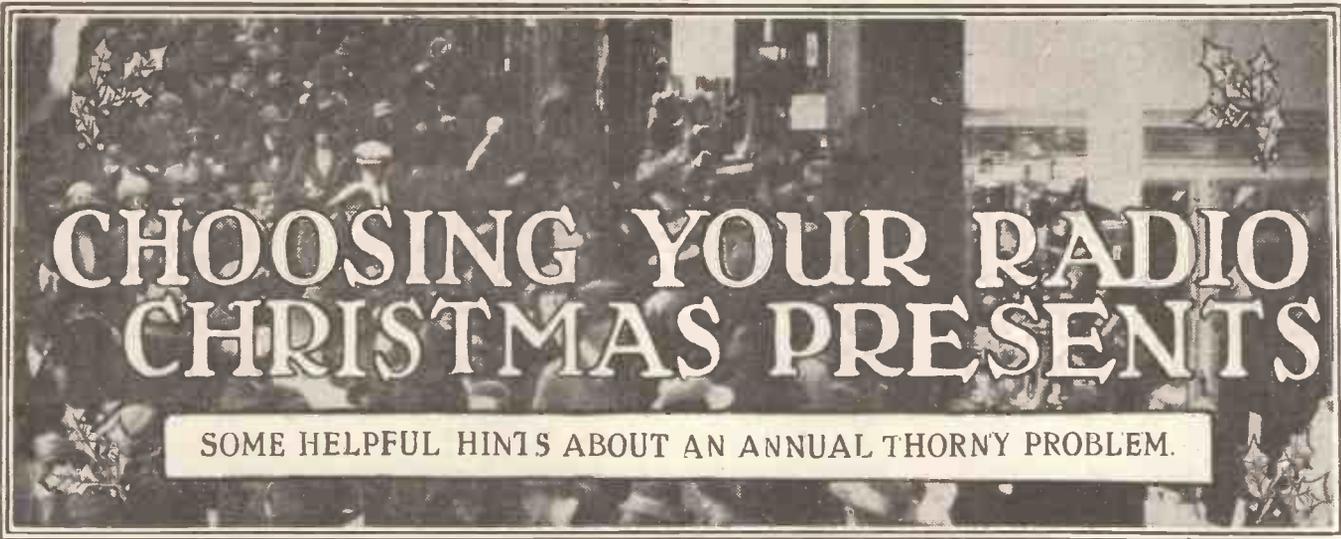
During the rest of the day he amazes all his associates by incessantly laughing at things they never hear. To him each minute sound is brim full of humorous significance. And then, one day as Little Red Rid—tut, tut, what am I saying—his friends discover that he does not see as well as he used to. The Boss slipped up on a banana skin in full view of everyone, but he did not so much as smile. In fact, he seemed not to see the incident at all.

"Forgot to Laugh."

As soon as he was taxed he claimed that he did see it, of course, but forgot to laugh. The excuse was admitted, but he was put down by all and sundry for "further observation." A week or so later a similar incident occurred. Bert Smith was leaving the office for the day when it started to rain and he had to open the umbrella which he invariably took everywhere with him. Immediately he did so, a paper hat, the relic of some hectic evening, dropped upon his unsuspecting head, presenting a riotous spectacle.

(Continued on page 768.)





CHOOSING YOUR RADIO CHRISTMAS PRESENTS

SOME HELPFUL HINTS ABOUT AN ANNUAL THORNY PROBLEM.

DO you remember the story of the young student who received as a Christmas present from his maiden aunt a jar of fruits, sweetmeats, or something of the kind that had been preserved in gin? And of how the graceless young scamp wrote back and thanked her, "Not merely for the present, dear aunt, but for the spirit in which it was sent!"

A radio present is very much like that. So much depends not on what you give, but on the way in which you give it.

The Personal Touch.

It is impossible to overrate the extra pleasure that the *personal* touch in radio can give. For instance, many people could do with a new aerial. But how much more effective is a present of this kind, if you offer to help to put it up! Similarly, to give a dear old grandmother a new earth plate is not enough. The best thing to do is to take it round, dig a hole about half way down to Australia for her, and then leave the old soul convinced not only of the kindness of your heart and skill at wireless, but filled with pride in your powers as a prodger of the soil!

Again, if low cost is a consideration, one of the best presents to give to anyone interested in short-wave reception, is a slow-motion dial. Even with ordinary tuning where an old fashioned dial is employed it would be a great improvement to fit one of the slow-motion type; and if you slip a file and screwdriver into your pocket it is but the work of a moment to change over, and thus put your present into active operation. (Do not forget the file, as often a grub screw will not tighten up properly on

These practical suggestions indicate how to get the utmost radio value from your outlay on Xmas Gifts.

By P. R. BIRD.

the ordinary rounded shaft and it is necessary to file a little niche for it to bear on, when the correct dial setting has been found for it.)

Still talking about the possibilities of the low-priced stuff, have you ever thought of the helpless way in which some people twist



A good L.F. Transformer often puts new life into an old set.

up their battery leads? Whiskery bits of wire, that prick the fingers every time the battery is connected up are often used, and if you take round a set of spade terminals, the whole lot costing about a shilling or so, and fit out the L.T., H.T., aerial and earth etc., with these red and black tags, you will often get more credit and thanks than if you had spent pounds on some complication or refinement that had no practical or immediate effect!

Saving Trouble.

A gramophone pick-up for a loud-speaker set makes an extraordinarily valuable gift where you know your friend is a gramophone enthusiast, but very often the gilt is taken off this particular gingerbread by the trouble in switching over from radio to records. If therefore you have something of the kind in mind, do not forget that usually an ordinary single-pole double-throw switch is all that is necessary to change over the connections, and various schemes for this have been described in this

journal or can be obtained from the Technical Queries Department.

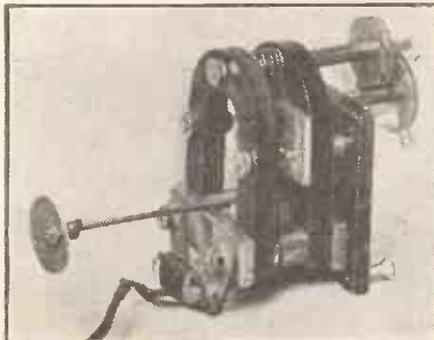
When a gramophone is used, a volume control becomes almost a necessity, so here is a possibility of providing a present which is sure to be appreciated, and here again there is the possibility of introducing the personal touch in giving assistance with the connections, or choice of position, for the added control.

If you know anybody who has only one accumulator and who has to wait for programmes while this is being recharged, you can be absolutely sure of giving a present that pleases if you solve the problem of the missing programmes for them.

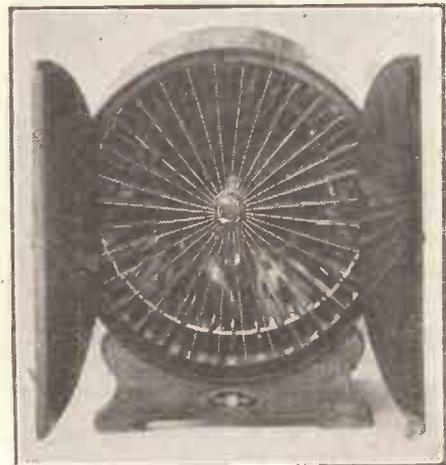
Useful and Inexpensive.

There are several ways to do this, the simplest and cheapest of all being to fit a crystal and a pair of telephone terminals in series across the first tuned grid circuit, so that even when the battery is disconnected the telephones can be employed if any programme is particularly wanted. When the telephones are removed from the terminals the original circuit remains absolutely unaffected, so this particular alteration can very easily be carried out; it only costs a shilling or so (apart from the 'phones), but it does ensure that even if the accumulator runs down unexpectedly the programme is not missed altogether.

(Continued on next page.)



This Star Loud-Speaker Unit is a 'Wates' product.



The famous Donotone Loud Speaker.

CHOOSING YOUR RADIO CHRISTMAS PRESENTS

(Continued from previous page.)

Better still, though of course, more expensive, is another accumulator, and in this connection it is as well to remember that quite a small accumulator will do perfectly well in many cases, for although



A useful mains resistance (Regent Radio).

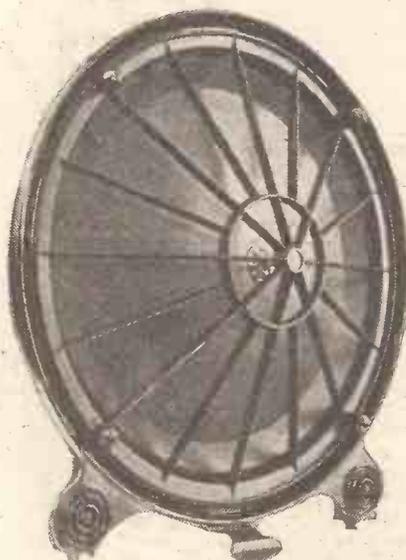
its voltage will have to be the same as that of the main accumulator, its capacity needs only to be large enough to last while its bigger brother is being recharged. Many of the small accumulators advertised in "P.W." are ideal for this purpose.

For All-round Service.

For rendering good all-round service and satisfaction, a new H.T. battery wants a lot of beating. But do not forget that its capacity should be sufficient for the set in question, and that you can put in the personal touch here by ascertaining the total current required by the valves, and thus making sure of selecting the right battery.

Another point worth mentioning is the fact that grid-bias batteries do not last for ever, and if you know that your friend's set has not had a new G.B. battery for six months or more you may be able to clear up that muzziness in reception for him, by putting in a grid-bias battery as well.

There are scores of other inexpensive radio presents, ranging from a tin of flux



Good to look at, as well as to hear—the Mullard P.M. Loud Speaker.

and a reel of wire to a new lead-in or a switch. But before considering the more highly-priced components mention should be made of the possibilities of a wave-trap.

Nothing could be more acceptable to a man who has been blotted out by a strong transmission, than some easily-added gadget which will reduce interference and allow him to pick up foreign stations.

Preserving Programme Purity.

Talking about interference, reminds me that where aerials are very close together a great many people are compelled to put up with spoilt programmes owing to a local oscillator operating.

No Christmas present would be more acceptable than one that offers an escape from this condition of affairs. In nearly all such cases a very easy way out of the difficulty is a set of long-wave coils, for by some fortunate chance the oscillator, in most districts, does not appear to have taken to long-wave listening.

Similarly a set of short-wave coils opens up a new gateway to an enthusiastic long-distance listener. It should, however, be remembered that in all cases of the choice of coils it is necessary to have details of the circuit, and the assurance that the set is capable of operating either on the long or the very-short-wave stations, as the case may be, before effecting the purchase.

If you are prepared to spend a pound or more upon radio presents for yourself or for other people, tremendous possibilities for further enjoyment are opened up.



A "Climax" Unit for A.C. Mains.

Loud speakers, for instance. Who could not do with a new loud speaker, considering that in the past year great improvement in the reproduction has been effected, and the modern instrument is both louder and clearer than many of its predecessors?

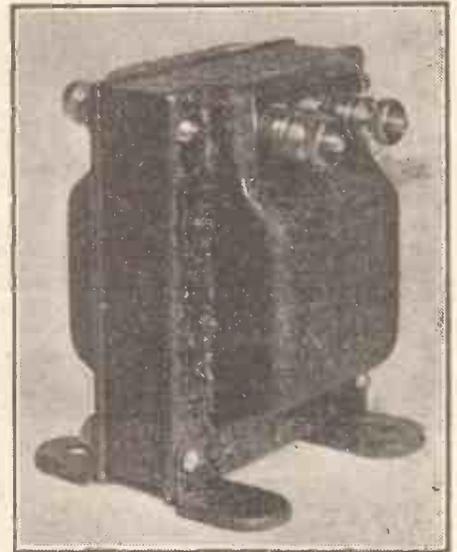
Those new loud-speaker units, too, are extraordinarily effective and can be made up very cheaply, or for a modest outlay a very handsome cabinet may be obtained and fitted up with one of these units, the whole job forming a pleasant task for the holidays and adding an ornament to the house when completed.

A Holiday Task.

Another fruitful radio possibility in the way of a present is loud-speaker extensions to different rooms, and here again the wiring may form a pleasant task for a holiday hour or two, and not a little pleasure may be had in extending the wiring, fitting up plugs and wall sockets, and in laying on radio to the different rooms.

Whilst on the subject of loud speakers, the possibilities of a filter output circuit should

be mentioned. There is nothing that is more worth while where loud-speaker programmes are wanted in different rooms, and all the essential parts are one large L.F. choke and one large condenser.



This L.F. Transformer is an example of Telsen design.

R.C.C. units and L.F. transformers are among the most popular components chosen for Christmas presents, but occasionally when a new transformer is substituted for an old one, a great gain in signal strength is accompanied by a slight hum. If this happens, try changing the leads to the primary of the L.F. transformer.

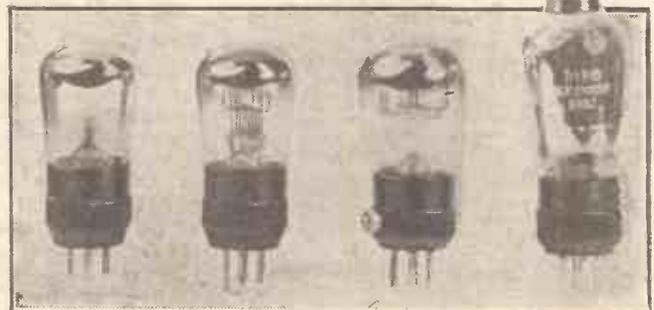
Whatever your radio present may be, whether it is an expensive kit of parts for building a really posh receiver, or a set of new wander plugs or battery leads, you thus have plenty of opportunity of imparting the personal touch. To save somebody the burden and bother of carting the battery to the charging station every week, by fitting a simple little home charger, is to give a radio present that will be remembered for fifty-two weeks in every year!

Permanent Pleasure.

To make a man a present of a milliammeter is to be sure that he can check his quality of reception from this Christmas to next, any time he wants to, and similarly a two-scale voltmeter will keep a check on quality the whole year round.

A well-chosen cabinet is a thing of beauty and a joy for ever. And even a new valve holder may endear you to somebody, especially if you remember to tighten the connections underneath it before screwing it down on the baseboard!

A representative group of Dario Valves.



MUSIC BROUGHT UP SHARP!



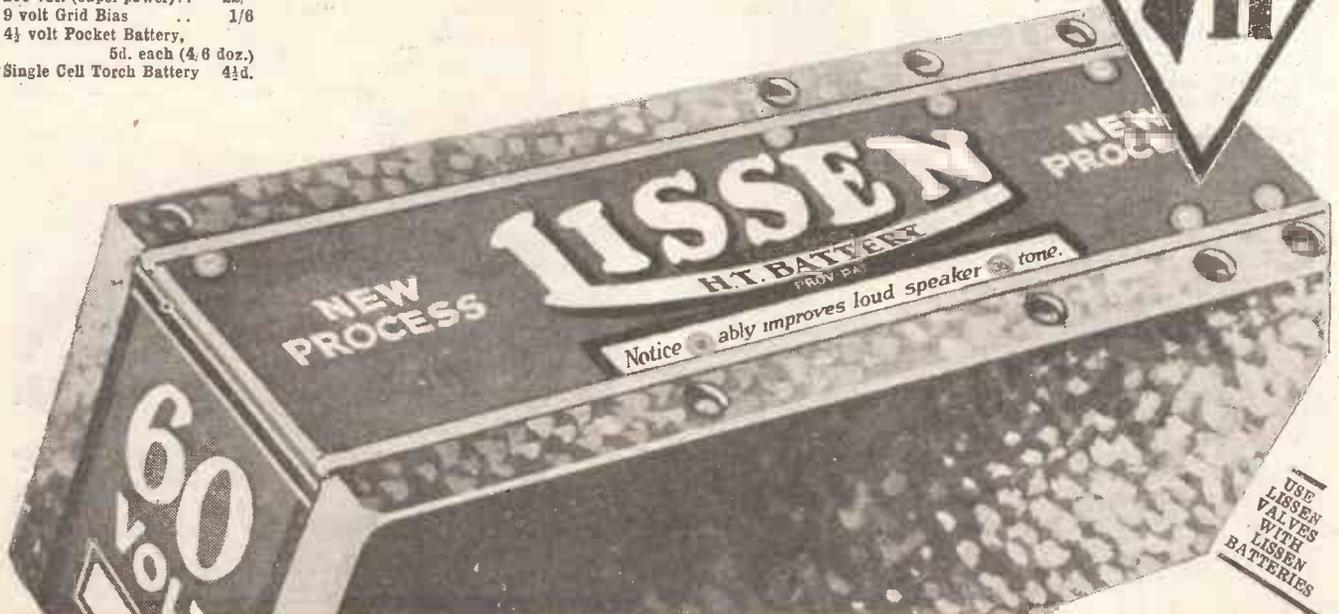
Voices in sharp relief; song clear and true; music full of life; that is what the LISSEN Secret Process does for your Radio.

Because the current that flows from the large cells of this battery is produced by a new chemical combination and process which makes it pure, silent and sustained. There is never a sign of ripple in the current, never a trace of hum. It flows smoothly from beginning to end of the longest programme, and throughout months and months of use.

You want pure power for your radio; any good wireless dealer will supply you with the Lissen Battery that will give it to you.

PRICES.

60 volt (reads 66) ..	7/11
100 volt (reads 108) ..	12/11
120 volt ..	15/10
36 volt ..	4/6
60 volt (super power) ..	13/6
100 volt (super power) ..	22/-
9 volt Grid Bias ..	1/6
4½ volt Pocket Battery,	
5d. each (4, 6 doz.)	
Single Cell Torch Battery	4½d.



LISSEN LIMITED, WORPLE ROAD, ISLEWORTH, Middlesex. Factories also at Richmond (Surrey) and Edmonton (Managing Director: T. N. COLE).

A BATTERY DRIVEN POWER PENTODE

for

ANY SET WITH
ONE STAGE
OF L.F.

Now that Lissen have produced this new battery-driven Power Pentode Valve, you can get fine loud-speaker volume from any set with one stage of L.F. amplification. In any 2-valve set this new Power Pentode gives double volume; in a 3-valve set—H.F. Detector and L.F.—it gives abundant power on distant stations that before were but a whisper.

The Lissen Power Pentode consumes only 7 milliamps of H.T. current. You can therefore run it economically off ordinary H.T. batteries—the only power pentode valve with anything like such a low consumption.

There is no rewiring of your set—just a piece of flex and a wander plug from the pentode terminal of the valve to the highest H.T. tapping on your set (or + 100 volts, whichever is lower)—no alterations necessary at all, and no extra batteries.

LISSEN 2 VOLT POWER PENTODE 17/6

LISSEN

NEW PROCESS

VALVES

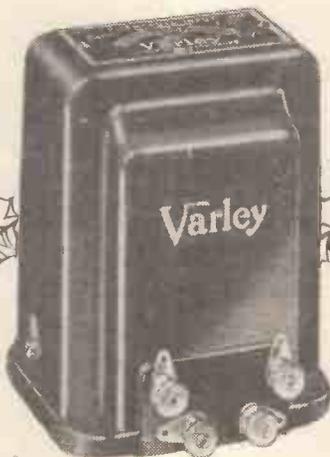
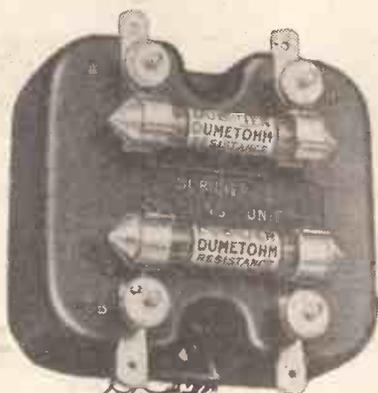
AND A LIVELY
DETECTOR
VALVE

The Lissen Detector Valve is lively because of the Extended Grid, which controls every electron emitted from the filament. Every fraction of energy is utilised, every impulse definitely passed on. And the liveliness LASTS because the emissive surface of the filament is actually amalgamated to it and therefore does not disintegrate.

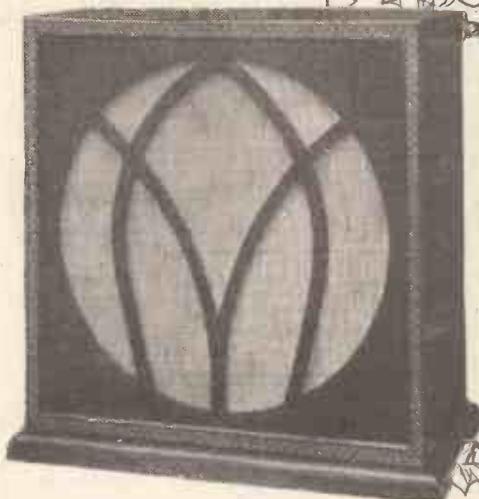
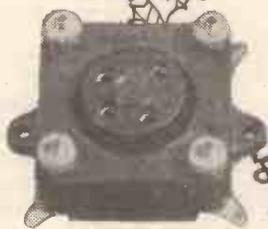
H.L. 210. Price 10/6

LISSEN LIMITED, WORPLE ROAD, ISLEWORTH, MIDDLESEX (Managing Director: T. N. COLE)

RADIO CHRISTMAS GIFTS



Everybody will recognise the R.C.C. Unit as a Dubilier. The Varley Transformer is designed for Push-Pull work, and the Variometer (right) is a Wright & Weaire product. Left, a Benjamin Valve Holder.

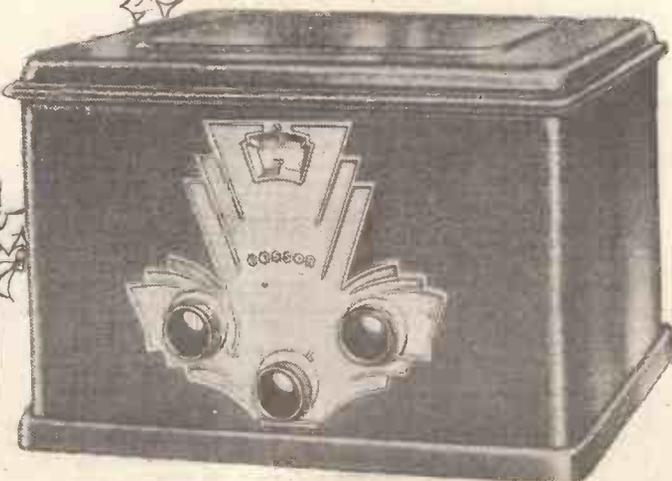


An Amplion standard Cabinet Cone, and, below, a Marconi-Phone "All - Power" Unit.



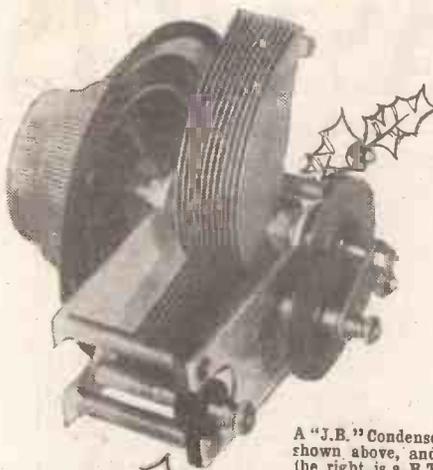
Above, one of the famous "Celestions," and, left, a Lissen L.T. Battery.

To the right is the famous Cossor Two-Valve All - Mains Set.

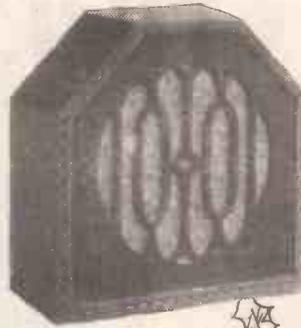


SOME SEASONABLE RADIO SUGGESTIONS, PRESENTED IN PICTORIAL FORM.

SOME MORE ILLUSTRATED SUGGESTIONS FOR RADIO GIFTS.



A "J.B." Condenser is shown above, and to the right is a B.T.H. rectifying valve.



This "Puravox" Loud Speaker is made by Falk Stadelmann & Co., Ltd.



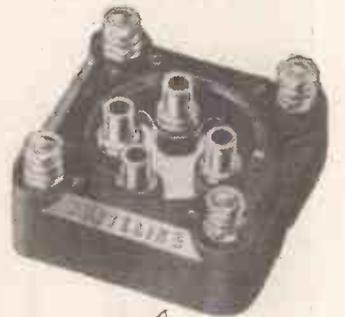
Those who like home-construction will be delighted with a Loud-Speaker unit. This is one of the well-known "W.B." products.

Below, typical Osrarn Valves, and, right, a Blue Spot L.S. Unit.



Examples of new T.C.C. condensers.

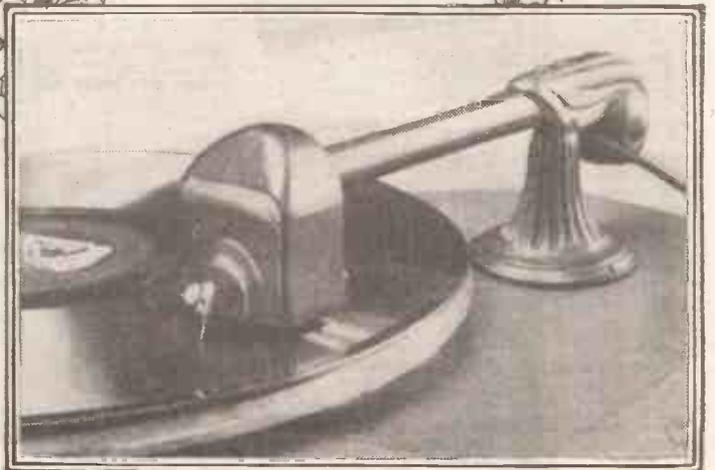
A new "Formo" De Luxe Log variable Condenser (right).



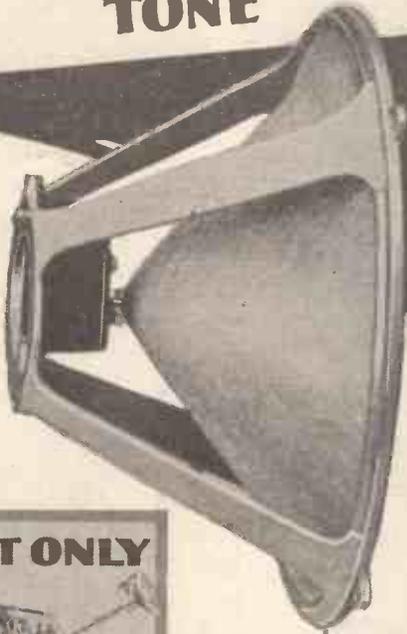
Valve Holder (right) is a Bowyer-Lowe



An Oldham Battery is shown above, complete with the easily-handled carrier given free with each battery. To the left is shown a Burndep't Portable Set which embodies the loud-speaker in the lid. Of great interest to the gramophone enthusiast is the "Phonovox" pick-up with carrier arm, illustrated on the right. This is an Igranite product



**A 4-POLE ASSEMBLY
WITH MOVING-COIL
TONE**



UNIT ONLY



12/6

With the Lissen 4-Pole Adjustable Balanced Armature Unit you can build any type of cone loud-speaker; you can use it with a big baffle board or put it in a cabinet—you can build a linen diaphragm loud-speaker with it if you want to. **PRICE 12/6**
13-in. Lissen Cone 2/6
Cast Aluminium Chassis 7/6

The Lissen 4-Pole Adjustable Balanced Armature Loud-speaker, completely assembled as illustrated, is very nearly as true in tone, as faithful in response as an expensive moving coil speaker. It brings within the reach of everybody something approaching loud-speaker perfection. It is ready to connect up to your set straight away or you can mount it in a cabinet. It has a fine adjustment, and you therefore get the utmost volume from it without chatter

PRICE OF COMPLETE ASSEMBLY 22/6

LISSEN
FOUR-POLE

ADJUSTABLE
**BALANCED ARMATURE
LOUDSPEAKER UNIT**

Obtainable from all radio dealers; insist upon hearing Lissen before you buy.

LISSEN LTD., Worples Rd., Isleworth, Middlesex
Factories also at Richmond (Surrey) and Edmonton.
(Managing Director: T. N. COLE.)

**H.T. ELIMINATORS
YOU CAN USE
LIKE A BATTERY**



D.C.
27/6
Model "A"

A.C.
60/-
Model "A"

**MOULDED CASES
MADE OF INSULATING
MATERIAL—HEAVY
"CAR TYRE" FLEX LEADS**

The current you get from Lissen Batteries is the purest form of current you can get for radio. But if you want to use an eliminator, use a Lissen Eliminator. You'll then get H.T. current from your mains smoother, steadier, better than before. There are 4 types of Lissen Eliminators: one of them will almost certainly be just right for your set. Tell your dealer what voltage your mains supply is and whether it is A.C. or D.C.; tell him what output you require, or what valves you are using, and he will demonstrate for you the Lissen Eliminator to suit your needs.

D.C. MODEL "A."

Employs 3 H.T.+ tapplings: H.T.+1 giving 80 volts for S.O. valves; H.T.+2 giving 60 volts at approx. 2 m/A for detector valves; H.T.+3 giving 120/150 volts at 12 m/A. **PRICE ... 27/6**

D.C. MODEL "B"

Employs 3 H.T.+ tapplings: H.T.+1 and H.T.+2 are continuously variable (by means of two control knobs) and capable of giving any desired voltage up to 120/150 volts at approx. 2 m/A.; H.T.+3 giving 120/150 volts at 12 m/A. for power valves. **PRICE ... 39/6**

A.C. MODEL "A"

Tappings as in D.C. Model A.		
LN 576 for A.C. Mains voltage	200-210	220-230
" 577 " " " "	" "	240-250
" 578 " " " "	" "	100-110
" 639 " " " "	" "	"
PRICE	£ 3 : 0 : 0	

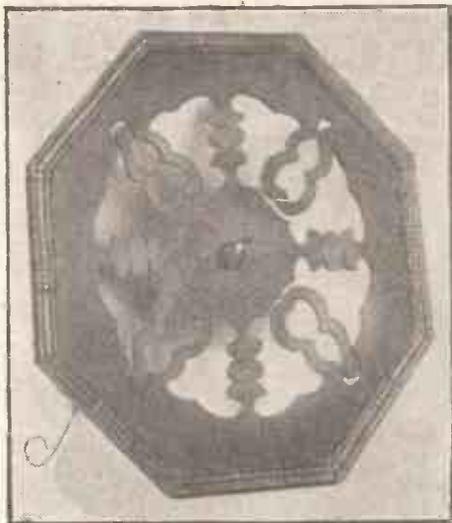
A.C. MODEL "B"

Tappings as in D.C. Model B.		
LN 579 for A.C. Mains voltage	200-210	220-230
" 580 " " " "	" "	240-250
" 581 " " " "	" "	100-110
" 640 " " " "	" "	"
PRICE	£ 3 : 15 : 0	

LISSEN
ELIMINATORS

LISSEN LTD., Worples Rd., Isleworth, Middlesex
Factories also at Richmond (Surrey) and Edmonton.
(Managing Director: T. N. COLE.)

A PAGE OF SURE-TO-PLEASE PRESENTS.

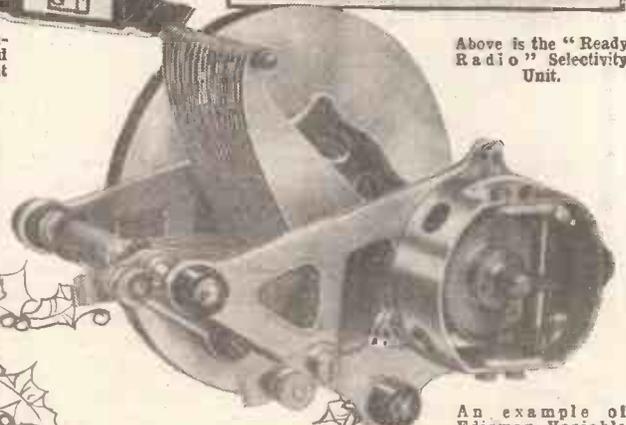


From left to right the above pictures show an M.P.A. Loud Speaker, one of the Carrington ("Cameo") Cabinets, and a new Lewcos Dual-range Coil Unit.



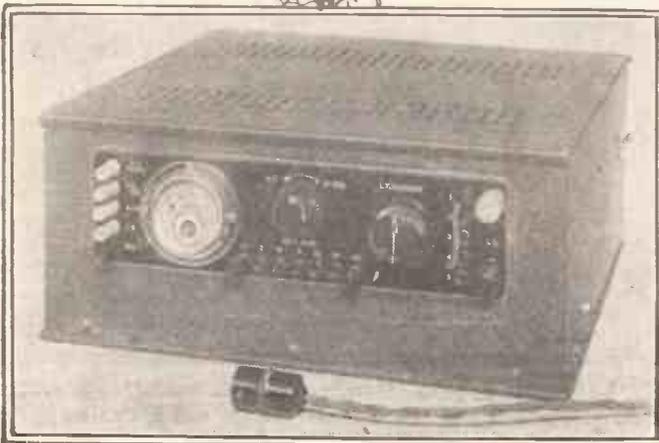
Beside the Westinghouse Dry Rectifier is a Siemens' Dry Battery and below is a "Keystone" H.F. Unit (Peto-Scott).

Above is the "Ready Radio" Selectivity Unit.



To the left a Standard Wet Battery is depicted, and below a Combined All-Power "Ekco" Unit.

An example of Ediswan Variable Condenser design.



"Cosmos" Battery Eliminator for A.C. Mains.

**A PORTABLE
GRAMOPHONE WITH
PEDESTAL TONE**



**LITERALLY
ORGAN-VOICED**

The fun you can get, the pleasure you can give, with this Lissen Portable Gramophone. You can use it any time, anywhere; it will all in odd moments splendidly, and because its tone is so deep and mellow you can give a concert of the classic records that will delight the critical ear.

Lissen have found a way to put a horn of really great length into this portable gramophone—a horn longer than that of many full-sized cabinet models. The Lissen sound-box is extremely sensitive and in perfect track alignment, so that there is tonal truth from every record. Finely adjustable dial speed regulator enables you to play every record at exact recording-room speed.

Have this fine Lissen Portable Gramophone on 7 days' approval. Try it at home; let your friends hear it. If you are not entirely satisfied, Lissen will refund every penny you have paid—you simply send the machine back to the factory within 7 days. Order to-day—send cash with order or fill in Coupon below for extended credit.

**YOURS
for
5/-
DOWN**

**CASH
PRICE 67/6**

or 5/- deposit and
8 monthly payments
of 8/8.

**COUPON FOR EXTENDED
CREDIT TERMS.**

To LISSEN LTD.,
Worple Road, Isleworth, Middlesex.

I enclose 5/- deposit for one Lissen's Portable Gramophone Model No. 4 as illustrated, and agree to pay the balance in eight consecutive monthly payments of 8/8, to you at your Isleworth address,

Signed (full name)

Address

Are you a Householder?

Date

Retailer's Name

(If no retailer selected at time of ordering, leave this blank.)

**LISSEN'S NEW
NEEDLE ARMATURE
PICK-UP**



**HOW THE NEEDLE
IS SUSPENDED**

Held in position by magnetic attraction, without

restriction by mechanical contacts.

**WEARS RECORDS
LESS THAN A
SOUNDBOX**

Use this Lissen Pick-up with any gramophone and any radio set. Use it with old records or with the latest masterpiece of electrical recording—you will hear again the living voice of the artist, and every note of every instrument re-created for you.

Because the Lissen Pick-up responds faithfully to the most minute indentation on the record—the needle armature is so light that the needle-point actually feels its way along the record groove. And you'll find your records almost everlasting when you use this new Lissen Pick-up, because the needle follows the groove and does not plough its way along.

If you want every single record to sound much better than those you hear at demonstrations—if you want radio-gramophone reproduction that comes so near to reality that in a darkened room you would suspect the presence of the artist—get this new Lissen Pick-up and learn what perfection means. Any Lissen radio dealer will demonstrate it for you.

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PICK-UP 30/-**

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(Managing Director: T. N. COLE.)

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L.T. ACCUMULATOR**

One more triumph of Lissen organisation—one more example of Lissen value-for-money—the Lissen L.T. accumulator. Here is a complete range of highly efficient accumulators, sturdily built by Lissen to give absolute satisfaction in use and long life. These accumulators are designed to give absolutely trouble-free service. The plates are all very thick, the containers are strongly made, and the general appearance and finish of the Lissen accumulators is far in advance of usual standards. All the Lissen accumulators listed below are supplied with strong carrier, free.

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Two-plate type, glass containers.
L.N.503 2-volt, 20 amp. hours .. 4/6
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Multiple plate type, glass containers.
L.N.400 2-volt, 20 actual amp. hours, 9/6
L.N.502 2-volt, 40 actual amp. hours, 13/6
L.N.504 2-volt, 60 actual amp. hours, 17/6

TYPE G.X.

L.N.555 2-volt, 24 actual amp. hours, 10/6
L.N.557 2-volt, 48 actual amp. hours, 14/6
L.N.559 2-volt, 72 actual amp. hours, 18/6



It's costly to test valves after you've bought



A BAD Filament WITHOUT "TENACIOUS COATING"

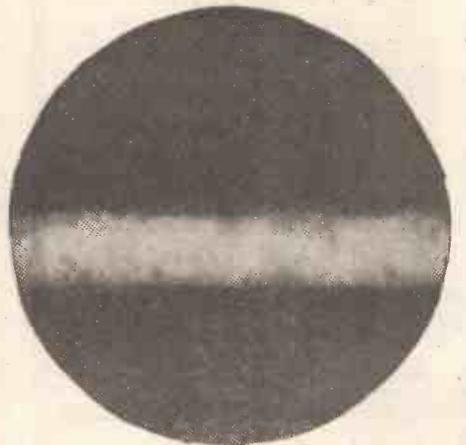
Reproduction from an untouched microphotograph showing part of the filament of a badly coated valve before use, showing a serious gap in the coating. A gap such as this starts the valve off in its life with a poor performance. The valve then prematurely falls.

YOU MAY BE GETTING THIS ←

YOU GET THIS IN OSRAM VALVES →

A GOOD Filament WITH "TENACIOUS COATING"

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



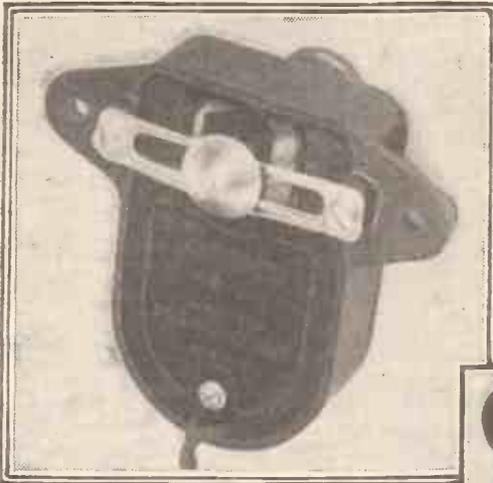
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SOLD BY ALL WIRELESS DEALERS,

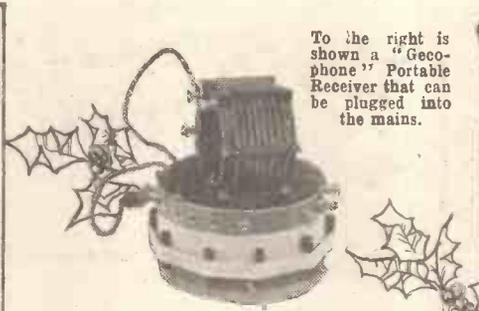
Osram Valves

with the
"TENACIOUS COATING"

WRITE for booklet "OSRAM WIRELESS GUIDE" (1929 edition) giving full particulars of the full range of OSRAM VALVES with the "TENACIOUS COATING." Also helpful wireless information of importance to every listener. Sent post free.

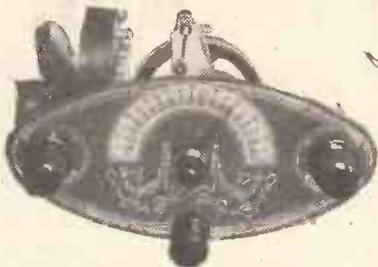


The famous Brown "Vee" L.S. Unit.

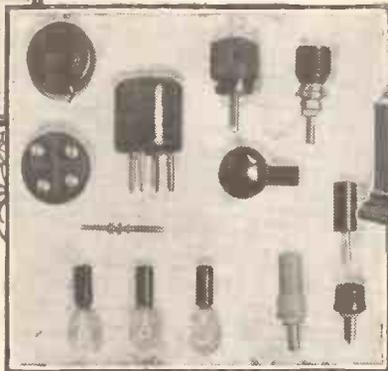


The Paroussi version of the famous "Titan" Coil.

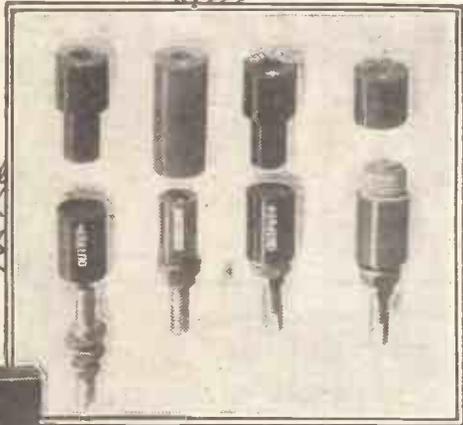
To the right is shown a "Geco-phone" Portable Receiver that can be plugged into the mains.



A Lamplugh Panel Plate Tuner, and, below, a Ferranti Smoothing Choke.



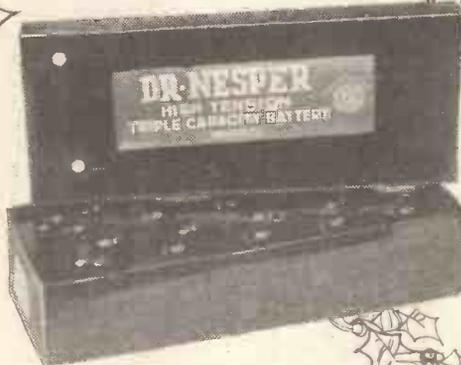
A selection of Lectro Linx connectors ("Clix.")



The handy Plugs and Sockets shown above are made by Belling & Lee.



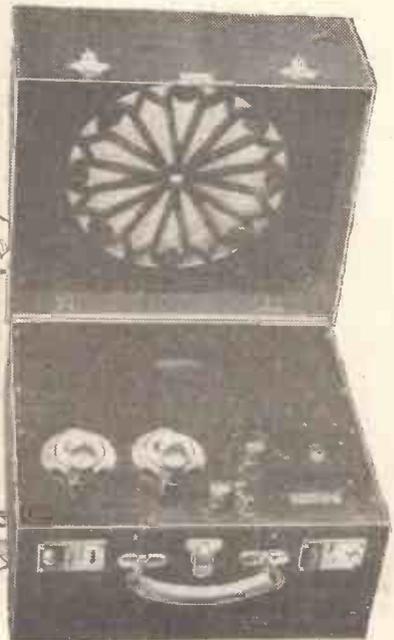
"Don't forget the G.-B. Battery."



A heavy-duty H.T. B. for snper-power work.



To the left is shown the famous "R.I." Hypermu L.F. Transformer, and, above, are two Ward & Goldstone Mains Units. If desired, the parts for mains units can be obtained, and the instruments assembled at home. The portable set (right) is a "Lotus," made by Garnett, Whiteley & Co., Ltd.



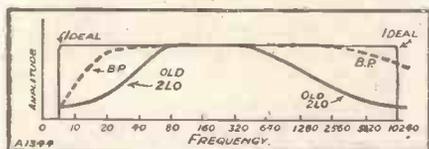


Brookman's Bass.

D. B. J. (Ealing).—"A close comparison between the old 2 L O transmissions and the transmissions now sent out from Brookman's Park would appear to indicate that a greater percentage of bass is being sent out under the new conditions.

"I have always been under the impression that the old 2 L O transmissions were deemed to be perfect for the type of receiving apparatus at the present time available, and I am therefore somewhat surprised to notice the change. Is it that the bass is now being accentuated in order to give a more pleasing effect on power sets?"

The matter is simple. We may draw the characteristic curve as shown in the diagram. Brookman's Park is nearer perfection than the old 2 L O, that is all.



This very interesting diagram indicates how much better than its predecessor is the Brookman's Park Station. It will be seen that it deals adequately with the frequencies from about 20 to 4,000, instead of from about 60 to 650 cycles.

It is done to suit no one particularly, it is done to get nearer an ultimately realisable ideal, both for transmission AND reception.

Matching Impedances.

"PUZZLED" (Weymouth).—"The 'impedance' of the output valve is quoted as 3,000 ohms. What should be the impedance of the choke-output circuit to match this?"

From 6,000 to 9,000 ohms at all frequencies from 50 to 6,000 p.p.s.

Power of a Broadcasting Station.

F. W. T. (Leominster).—"How is the power of broadcasting stations calculated, and do all countries agree in the method of calculating power? Is a German 4-kw. station, for instance, necessarily twice as powerful as a B.B.C. 2-kw. station?"

The power of a broadcasting station is at present expressed as the power in the aerial. This is calculated by the maximum current squared multiplied by the total effective resistance. When all authorities

Capt ECKERSLEY'S QUERY CORNER

Below some varied and representative questions from "P.W." readers are answered in detail by Britain's greatest authority on broadcasting.

express power in this way, then it is time to say that the power of a 4-kw. set is twice that of a 2-kw. set.

But some authorities modulate much more deeply than others, some caring little for quality and much for quantity. We in Britain do our best for quality, and our stations appear weaker than some foreign stations for that reason.

Also, a "distant" station on the maximum volume at night gets an amazing "pick-up" owing to conditions of the Heaviside Layer.

Those "Perfect" Transmissions.

K. R. Y. (Leeds).—"Do the B.B.C. aim at perfect transmissions, or do they in any way endeavour to compensate for the

Under the above title, week by week, Capt. F. P. Eckersley, M.I.E.E., late Chief Engineer of the B.B.C., and now our Chief Radio Consultant, will comment upon radio queries submitted by "P.W." readers.

But don't address your queries to Capt. Eckersley—a selection of those received by the Query Department in the ordinary way will be dealt with by him.

failings of the average receiving set by exaggerating the bass frequencies and so on? Can the B.B.C. get 'straight line' transmissions yet?"

The B.B.C. attempt straight-line transmissions. They do not as yet achieve their object. The result is, however, better than that given by most receivers, thus the problem is extremely difficult.

Remarkable progress has been made, and in the end straight-line frequency characteristics from 50 to 6,000 overall from microphone to true ether will be achieved. There will be slight dips below 50 and above 6,000, but these will be inappreciable by the ear. When I was C.E. of the B.B.C. I always advocated the straight line, as who should tell what was the "average" receiver?

A Colourful Condenser.

A. C. (Grimsby).—"The vanes of my variable condensers are turning green in colour. Why should this happen, and will it spoil my programmes?"

Brass vanes are apt to corrode, especially if in sea air. This will only spoil reception if the vanes get growths on them which get so large as to make a contact between two sets of plates, or if the corrosion produces a bad contact between the terminal and moving vanes.

Threshold Howl; or "Squegger."

H. A. W. (Forest Hill).—"What is the cause of 'threshold howl'? Is it due

to the detector, the transformer or the L.F. valve?"

This is probably due to the detector valve having too high a value of grid leak. The action is that the valve begins to oscillate, but immediately takes a lot of grid current which, feeding through the grid leak, stops the valve oscillating. When the conditions are restored to normal and the voltage on the grid goes back to its pristine value the system again starts oscillating, again quietsens itself, and again, after a fraction of a second, starts again.

It may stop and start a thousand or more or less times a second, depending upon grid leak values, and this produces a howl. Years ago we used to call this a squegger, because the note of the squeak produced was a measure of the resistance of the grid leak, and the system therefore acted as a megger or megohm meter! Try a smaller value of grid-leak resistance.

Buzzing Motor-boating.

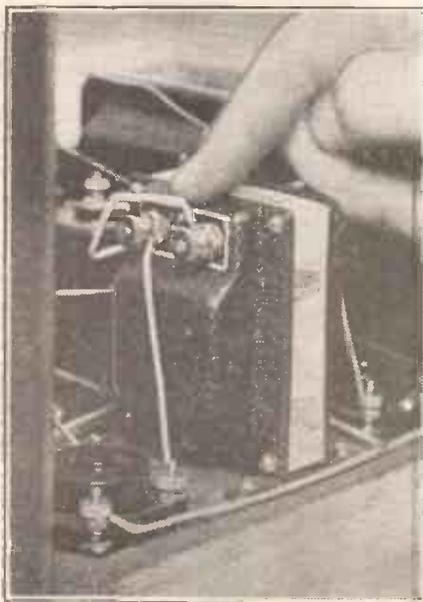
L.P. (Hull).—"I have a Det. and 2 L.F. set with two L.F. transformers of a cheap type. On substituting the first one with an expensive transformer, I get nothing but buzzing and motor-boating.

"Can you help me, as I expected a good transformer would improve matters instead of which it spoils the set altogether?"

Probably you have altered the conditions of reaction in your L.F. circuit.

Reverse one set of windings of the transformer; this should cure your trouble.

If not, try a larger smoothing condenser.



Changing over the primary leads will often cure a buzz.

FERRANTI COMPONENTS

are supreme for quality of reproduction and for safety in mains apparatus.

The price is the lowest compatible with super-excellence of design and manufacture, and is more than justified by the performance.

FERRANTI LTD. HOLLINWOOD LANCASHIRE



Portable Meter.
Type P R 3a
10, 50, and 250 volts
1,000 ohms per volt
Price £2 : 17-: 6



Trickle Charger.
(Incorporating the Westinghouse Metal Rectifier.)

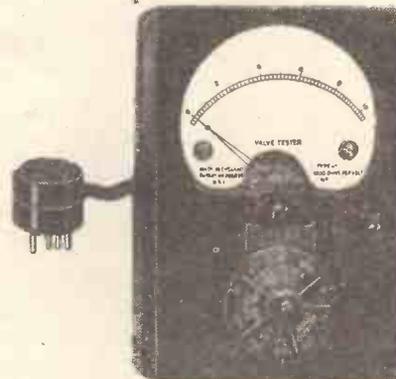
½ amp. Type Price 55/-
1 amp. Type Price 87/6



A.F. Transformers.
Prices :

AF5 30/-
AF3 25/-
AF4 17/6
AF6* 30/-

*Ratio 1/7.



Valve Tester.

Reads :
Plate Volts
Plate Current
L.T. Volts
Grid Bias Volts
Grid Circuit

Resistance 1,000
ohms per volt.

Price £5 : 15 : 0

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"EKCO-LECTRIC" Radio Receivers work direct from the mains—without batteries—without accumulators—without mess!

"EKCO" All-Power Units electrify battery-fed sets, whilst

"EKCO" H.T. or L.T. Units eliminate H.T. or L.T. batteries respectively.

"EKCO" products are British Made by the pioneers and specialists of All-Electric Radio for D.C. as well as A.C. Mains, and can be obtained on Easy Payments.



"Ekco-Lectric" Radio Receiver, Model S.G.P.3, A.C. or D.C. £21.



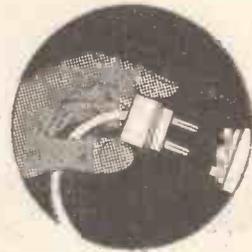
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H.T. UNIT, A.C. Model 2A.10. £3.10.0.



ALL-POWER UNIT, A.C. Model C2.A. £10.17.6.



H.T. UNIT, A.C. Model 3F.20. £3.19.6.

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"EKCO"

"EKCO-LECTRIC" RADIO RECEIVER, Model S.G.P.3. Screen, Grid, Det. and Pentode. Complete with Valves and Royalties. A.C. or D.C. ... £21

"EKCO" H.T. UNIT, A.C. Model 2A.10. For 1-3 Valve Sets, up to 10 m/a consumption. Tappings at 60 and 120 volts. Complete ... £3:10:0

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Ask your dealer, or write for Free Booklet on "All-Electric" Radio!

"EKCO-LECTRIC" RADIO RECEIVER, Model P.2. Det. and Pentode. Complete with Valves and Royalties. A.C. or D.C. ... £12:17:6

ALL-POWER UNIT, A.C. Model C2.A. H.T. Tapping for S.G. Valve and at 60 and 120-150 volts. L.T. 2.6 volts. G.B. up to 12 volts. Complete ... £10:17:6

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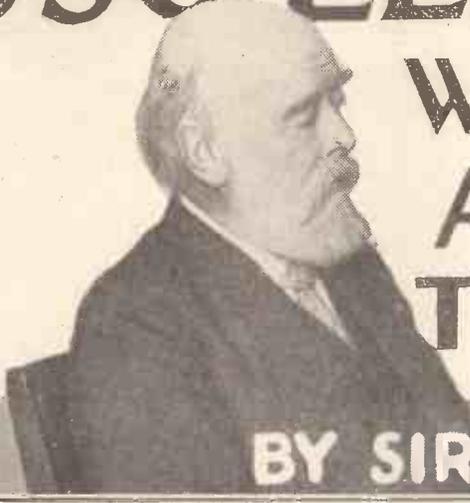
AN "EKCO" POWER SUPPLY UNIT was voted FIRST by PUBLIC in "Wireless World" National Ballot.

E. K. COLE, LTD., DEPT. A, "EKCO" WORKS, LEIGH-ON-SEA.

"EKCO-LECTRIC" RADIO RECEIVERS AND POWER SUPPLY UNITS

OSCILLATIONS

WHAT ARE THEY?



BY SIR OLIVER LODGE

I SUPPOSE everyone knows that a circuit which includes both inductance and capacity is liable to oscillate, at a certain definite frequency, dependent on the product of the inductance and capacity. If you double one and halve the other, the rate of oscillation remains the same. If, on the other hand, you halve both, the rate of oscillation would be quadrupled: it would give what in sound is equivalent to a double-octave rise in pitch. Increasing either the capacity or the inductance lowers the rate of vibration.

By employing a very big condenser and a coil with a great number of turns, one can reduce the rate of vibration actually down to acoustic frequency. Electric rates of oscillation are usually extremely rapid, a hundred-thousand a second, for instance. But with a very big coil and a very big inductance, the rate of oscillation can be reduced to a few hundred a second; and any vibration at the rate of a few hundred a second, if it is made to disturb the air, will give a musical note.

Whistling Sparks

An experiment of that kind is best performed with a Leyden-jar as the capacity, or with some other strong condenser that can stand a big potential, so that it will give a spark. A spark is a means of disturbing the air: it heats the air, and usually gives a sort of crack, which is quite audible. But if the spark is taken from an oscillating circuit, one that vibrates about six thousand or two thousand a second, you won't hear a crack, you will hear a whistle, or even a musical tone of lower pitch than that.

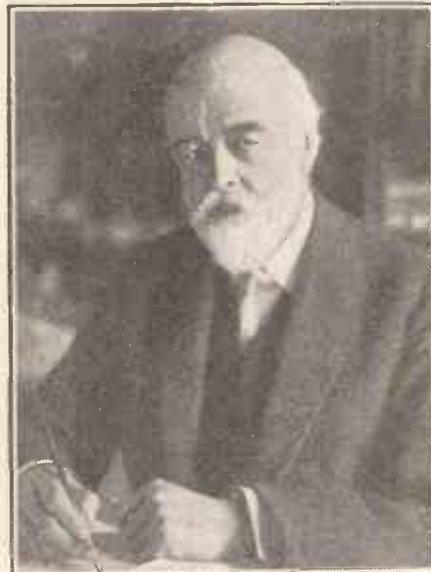
Last century I used to demonstrate these whistling sparks, with a battery of Leyden-jars as the capacity, and with a great coil of wire as the inductance. One could thus bring the spark-note down till it corresponded with some of the notes on a piano.

In some engineering undertakings, these electric oscillations or surgings occasionally gave trouble. When Dr. Ferranti, long ago, laid large electric underground mains from Deptford to London, the lines had a great capacity; there was also a considerable amount of inductance in the big dynamos employed.

An interesting short article on a phenomenon upon which the whole science of radio depends.

So the result was that the circuit had a natural rate of vibration, rather slow but decidedly powerful; and accordingly the voltage rose above what was provided for, and was liable to burst the insulation, until proper precautions were taken to combat the tendency.

If you have a long bath half-filled with water, and tip the bath lengthways, the water oscillates to and fro, and may easily splash over the edge. That sort of thing happened in the electrical case. The surging electricity overflowed or splashed



Our Scientific Adviser in a characteristic attitude.

over or burst through the insulation; or, if it didn't, there was a danger of its doing so. This was very instructive, and excited a good deal of interest.

The same sort of thing would be less

likely to occur in a landline, because a landline has much less capacity, and therefore the energy stored would be less. That is one reason why in long-distance electric power-transmission engineers prefer overhead lines to underground mains! Any surgings that may be encountered are less likely to be violent.

One can get surgings even in a landline. I used to stretch long copper wires—if you can call them wires—as thick as one's finger, round a big theatre, excite high-voltage surgings by means of Leyden-jars, and show that the sparks that could be obtained from the long leads were very much longer than corresponded with the applied voltage.

Electrical Momentum

If the natural length of spark was $\frac{1}{2}$ in. the surgings might give a spark as much as 3 in. by the accumulated momentum. For it must be understood that the magnetic field which surrounds a current confers momentum upon it; and when this is combined with the elastic storage of energy called capacity, it behaves like a loaded spring which can oscillate to and fro with violence, the rate of oscillation depending on the elasticity and the load. The load or the inertia corresponds to inductance in the electrical case, the elasticity corresponds to capacity.

I have seen the effect of these electric surgings in some of the early large-scale radio aerials, when a great steel mast formed an appendage to the circuit. An electric current surged up and down in this mast with such violence that blocks of timber placed against the mast to strengthen it in a storm were charred and smoked, and might have caught fire.

This was notably the case in a great installation arranged by Dr. Goldschmidt near Hanover; and very strong insulators had to be employed in order to prevent their destruction. Wireless operators, as a rule, are not concerned with these violent effects; the self-generated oscillations at a receiving station only produce howling. But the fundamental principles are much the same, whether great or small power is employed; and the rate of oscillation can be reckoned in the same sort of way.

THE "BROOKMAN'S" REJECTOR.

The Editor, POPULAR WIRELESS.

Dear Sir,—With the advent of Brookman's Park transmissions on 30 kw., and at a distance of about 10 miles only from my aerial, I wiped off 16 stations as unobtainable owing to the "wipe out," which was tremendous. I then bought a well-known wave-trap and this I regarded as splendid until your rejector circuit appeared.

I am overjoyed! My set is a straight 4-valve, H.F., det. and 2 L.F., and with the rejector in circuit I am not only able to cut out Brookman's Park but to receive ALGIERS on three valves at fair loud-speaker strength, with an almost inaudible whisper from 2 L.O. Hamburg, Toulouse, Manchester and Frankfurt, etc., are entirely free. Below, Barcelona and Fredriksstad have a flavour of 2 L.O. but Brno is clear.

Considering that Algiers is working, as is announced from that station, on a wave of 364.5 metres and with a power of 12 kw. in the aerial, and furthermore that Barcelona is on 249 metres, I can now snap my fingers at Brookman's Park and I am indeed greatly indebted to you for having presented us with a really good circuit and one which I can strongly advise, not only as a palliative, but a cure.

Thanking you and the manufacturers of the Formadensors for making such a neat component at such a reasonable figure.

Yours faithfully,
H. S. FORD.

Woodford Green, Essex.

The Editor, POPULAR WIRELESS.

Dear Sir,—I have before me wave traps and such like, for which I have paid from 12/6 to 20/-, not one of which has proved of any value.

I rigged up your rejector and tried it out one Sunday with amazing results. Cutting Manchester clean out, leaving Toulouse without any interference, and as I have a screen-grid H.F. stage, that is some test. Every good wish.

Yours faithfully,
CHARLES BURDON.

The Palace, St. Anne's-on-the-Sea.

THE "MAGIC" THREE.

The Editor, POPULAR WIRELESS.

Dear Sir,—I have built this set and in conjunction with the "Brookman's" Rejector I am at the moment listening to a Continental coming over like 2 L.O. It's "The Goods."

But when I first finished it, it nearly got me locked up. I could get nothing but an awful shrill whistle with anything over 18-volt H.T. on the detector. I changed over the primary on the first transformer and it was a little better then. When, however, I put in the volume control it was stable at once. I wonder if other constructors came across this same snag?

Now I've a bone to pick with you—had I known you were putting up a "Four" I would have waited for it. Can you give us an H.F. S.G. unit to place in front of the "Magic" Three? This, in a way, would

CORRESPONDENCE.

THE "BROOKMAN'S" REJECTOR A FEW OF THE MANY LETTERS RECEIVED CONCERNING THIS WONDERFUL DEVICE.

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.—EDITOR.

be better than the Four, as on local and 5 GB the S.G. is not wanted.

Thanking you for many enjoyable hours of construction. (One good set I made up was the "Progressive" Four.)

Yours faithfully,

H. J. HUDSON.

P.S.—I am a member of the Queen's Park Radio



Getting ready for a special broadcast from Canterbury Cathedral.

SHORT-WAVE NOTES.

By W. L. S.

is a regular reader of "P.W."! He advises me that his station will not be heard after the end of this year, as he is returning to England, and he is not certain where he may be posted in the future. So those British transmitters who have not yet worked Ascension Island had better do so as quickly as possible, or they will miss the boat!

Australia and America.

A Hampshire reader reports making up a single-valve short-waver, and the very first thing he heard on switching on was the "ticking" noise that has been causing me so much mystification. Regarding Australia and America, G. A. C., if you search round that little band of wavelengths where you find Zeesen and Hilversum, you will undoubtedly hear W 2 X A F, Schenectady, almost any night after 10 p.m. or so. This is the worst possible time of year to receive Australian broadcasting, but you might be lucky during the early

Society and later on will take the "Magic" Three down to the club for inspection by local "fans."

London, N.W.10.

(An H.F. unit is coming very shortly.—Ed.)

THE "MAGIC" SERIES.

The Editor, POPULAR WIRELESS.

Dear Sir,—I desire to convey my sincere congratulations and thanks to you and the members of your Research Dept. for the splendid developments they have achieved.

This week your "Magic" Four fills me with admiration and envy—the cost of making and running being beyond my modest resources.

May I trust you will soon be giving us an ordinary three-electrode H.F., Det. and L.F. "Magic" Three—if possible in time for Christmas?

Yours faithfully,

E. J. MORRIS.

Pontypridd.

"PENTODES" ARTICLES.

The Editor, POPULAR WIRELESS.

Dear Sir,—I cannot agree with Mr. O. Green's letter on page 620 of this week's issue of POPULAR WIRELESS.

As a mere amateur, I do not understand much of the technical side of wireless, but thanks to "Pentode" I am beginning to.

I hope therefore that this series will last, as I am deriving great benefit from it.

I should also like to see in your paper more about the entertainment side of wireless, and deprecate the fact that you have stopped publishing those Life Stories which I have enjoyed so much.

Wishing your paper every success.

I remain, Yours faithfully,

Leyton.

EDGAR BROWN.

[Ed. Note.—As our reader will soon see, we have some further articles in our Life Stories series.]

LOW H.T. VOLTAGES.

The Editor, POPULAR WIRELESS.

Dear Sir,—I read with interest your correspondents' accounts of low voltage H.T. on their receivers. I think the following remarks regarding low H.T. on transmitters may interest.

While operating station G 5 Q K, a few months back, tests were carried out on 170 metres with G 6 P A, of Teynham, Kent (about 40 miles). Although he reduced his H.T. downwards from 300, it was found possible to easily read his telephony signals and repeat back every word to him, when as low as 9 VOLTS was used. This was on a two-valve receiver (o-v-1) this end. Bearing in mind that the valve on the transmitter (A.C.T. 25+) had been used before, with an anode voltage of over 300 volts, it certainly was a very interesting test—40 miles speech on 9 volts! Especially, too, bearing in mind the wave-length used (170 metres). Greater distances than this can, and have been, achieved on 42 metres, and I think perhaps some readers will write to you on such feats, which should make good reading.

Yours faithfully,

RONALD C. HORSNELL (2 A B K),
Member R.S.G.B.

Wickford, Essex.

THOSE readers of "P.W." who also take the "Wireless Constructor" will by now know all about the "Chassis" construction that has been evolved by Mr. Percy Harris, whereby the home-constructor may make up a set that really rivals in appearance a commercial product. The basis of the scheme is an aluminium "chassis" 1½ in. deep which takes the place of the baseboard. All the wiring and quite a few of the smaller components may be placed underneath this chassis out of sight.

Another Set.

To come to the point, I have made a short-waver on this principle, using a standard chassis such as is now procurable from several manufacturers, and I am delighted with the set in every way. I have used a metal panel as well as the metal chassis, and the layout of the receiver looks quite imposing in its simplicity. Such components as "anti-mobo" resistances, by-pass condensers, etc., simply ask to be put underneath, and the way this simplifies the wiring is amazing. Readers will probably hear more of this receiver, or its followers, later.

My recent remarks about S N I A A, the station in Ascension Island, South Atlantic Ocean, have brought forth a long and interesting letter from the operator, who

mornings on almost the same wave-length.

In answer to G. A. C. and several other correspondents, a good home-made H.F. choke for short-wave work only consists of 80-100 turns of No. 28 D.C.C. on a boiling tube of rather less than 1 in. diameter. A rubber stopper to fit the tube can be screwed down on the baseboard and the tube "plugged in."

Unintelligible Telephony.

Have readers noticed that on occasions the transatlantic telephony on 20 metres is almost unintelligible? I am not certain myself whether it is due to the fact that they receive a "check" on their transmission via a loud speaker in the same room, which emits audio-frequency howls, doubtless due to interaction effects; or to the fact that they are using frequency inversion or some form of side-band telephony. At all events, there is great difficulty in deciphering even a word sometimes.

How many readers have heard W F A or W F A T? The former is the base ship and the latter one of the smaller craft of the Byrd Antarctic Expedition. The expedition is wonderfully well equipped with short-wave radio, without which it would not have been so successful as it has been. I believe W F A has been in direct touch with New York almost since they started out.

THE NEW BA2-21

AN
AMPLION
PRODUCT



A balanced armature movement of great sensitivity able to handle considerable volume and reproduce with high efficiency all audio frequencies. Adaptor plate to fit varied chassis types, and fitted with terminals for three alternative values of impedance. Gives splendid results in combination with any valve set, and can be used with pentode valve without special transformer.

**NO SPECIAL
TRANSFORMER
NEEDED WITH
PENTODE VALVE**

GRAHAM AMPLION LIMITED
25/26, Savile Row, Regent Street, W.1



Here's how "J.B." do it

Follow the lights and see for yourself the improvements in the J.B. Drum Dial, one of the most popular models in the J.B. range. It is made in both a Bronze and Oxydised Silver finish and costs

10/6

The scale is Ivorine reading 0-100 and is reversible so that reading may be altered to 100-0.

All parts of the Dial are insulated from the Condenser, so that the drum becomes an anti-capacity shield and may be earthed.

The scale is flush with the panel and may be read with ease. A powerful and positive friction drive is used which prevents backlash and slipp.

By an improved method the Control Knob is placed immediately below the scale—the most convenient place for it.





IF DICKENS HAD BROADCAST!

by BRANSBY WILLIAMS

IT is nearly a century and a quarter since Charles Dickens was born in 1812.

Suppose he had been born a century later. Suppose that instead of finding himself growing up in a period when enraged workers were smashing factory machinery, when the triumph of coal and iron was only beginning, when Chartism was rife, and when imprisonment for begging was common, he had found himself in an atmosphere of jazz, cocktails, women in business, impressionism in art, musicians writing symphonic works descriptive of football matches—what influence would it have had on the development of his genius?

It is an interesting speculation. For without a doubt, Dickens would have been as unexcelled over the ether as he was in the medium which he was forced by Fate to choose. He would make an ideal broadcaster. He was a great speaker. One has only to read some of his collected speeches to realise his command of word and thought, and those who heard him tell of the hold he had on his audience, compelling them to tears or laughter.

In the present broadcasting programmes there are one or two artistes who seem to have caught the public imagination by providing material peculiarly suitable for performance in front of the microphone, and in almost every case their success can be attributed to one factor. It is almost always because they take their material from real life, subjecting it, of course, to the rigid selection which is the secret of all art.

The Ideal Broadcaster

It is only thus, by taking a widely human attitude, by embracing all the little comedies and tragedies which are likely to come the way of the average man and woman, that it is possible to appeal to so diverse a body of people as the immense radio public. The ideal broadcaster must be a mirror in which is reflected humorously, whimsically, tragically—it does not matter much which—the world in which he moves and lives and has his being.

If one takes this to be a roughly accurate definition of the really successful radio entertainer, it inevitably follows that Dickens would have felt quite as much at home in front of a microphone as he did in his study with pen and paper. He was as much at home as he was at his reading desk when he thrilled his audiences with his rendering of the murder of Nancy by Bill Sikes—and roused them to roars of laughter when he presented Pickwick, Sam or Tony Weller. His rendering of the "Christmas

A special article by one of the greatest impersonators of Dickensian characters.

Carol" will never be forgotten by those who heard him.

"So Sanely British"

For he was, above all, a mirror in which was perfectly reflected the age in which he lived; its characters, its institutions, its virtues and its vices. He took for the raw material of his novels those things which, by the very nature of his audience, the broadcaster must choose. He portrayed the everyday lives of everyday people of his own generation, just those kind of people



The author of this article as Tony Weller—Sam Weller's father.

whose descendants now switch on the wireless every night in their countless thousands.

He had the faculty of reflecting the life of his day and creating characters, which even if sometimes a little exaggerated, yet live and are vividly representative of their times.

His whole character and outlook, so sanely British, would endear him to listeners if, by some miracle, he could be projected into the twentieth century. And what a wide field he would find to-day for his wholesome satire and the cheerful optimism which he could show even in the face of the depths of misery!

He would have no difficulty in finding modern counterparts for Mr. Bumble, that parochial functionary who could be human but only showed it at very rare moments; or for the improvident Mr. Micawber; or even for that humbug, Mr. Pecksniff. His hatred for shams and his reforming zeal would find no lack of subjects to-day. But where he reached one person by his novels, he could to-day reach fifty via the microphone. Would he be the sort of man to miss such an opportunity?

In any case he was as successful aurally in his own day as he was in the medium of the written word. His readings and his lecture tours met with great receptions wherever he went, indicating that he had the makings of a wireless "personality." Even to-day, nearly sixty years after his death, I find no lack of interest in my own stage interpretations of his work.

A Lovable Quality

I find enormous interest in my broadcasting Dickens' characters—receiving hundreds of letters from admirers from all over Britain. I wonder what the Spirit of Dickens thinks of my attempts? I am vain enough to think that he might be lenient with me when I remember some of the atrocious murders of some of his people I have heard on the wireless.

And with it all he had one lovable quality which would endear him to the heart of every wireless listener if it were applied to contemporary life—an all-embracing sense of humour which made him see that life, even in the midst of squalor, could be worth the living. He was what will always appeal to the Britisher, an optimist, which is only another way of saying that he was a romantic realist.

So that there seems every reason for supposing that had Dickens been born a century later, he would be no stranger to Savoy Hill. Everything about him, his wide human sympathy, his contempt for pretentiousness or humbug, his humour, and his faculty for re-creating the life around him are all qualities which would be found in an ideal broadcaster.

It seems impossible that any man could achieve a reputation, in his own lifetime, more brilliant and widespread than his. One cannot help feeling, however, that had his genius flourished a century later, his radio reputation would have been even greater!

A MAN went into a radio store in order to purchase some aerial wire. "How long do you want it?" asked the shop assistant.

"As long as they broadcast," replied the customer.

"I see," smirked the shop assistant, "5 X X, sixteen hundred metres, let's say five thousand feet; that will be five pounds. Anything else, please?"

Now that anecdote, one that I have manufactured especially for this occasion, points a very obvious moral; you cannot get anything worth while unless you are prepared to pay for it. You may pay for it in coin, or you may pay for it in kind, but pay for it you must. I have Einstein himself to back me up in that. Newton and his apple provide further confirmation.

You pay for your radio programmes in many ways. And the ten-shilling licence fee is but a mere incidental. Don't expect to get a solid chunk of Christmas radio fare thrown at you free of all further cost. You simply must spend a little time seeing that everything is in ship-shape order.

Supposing you were so rash as to refuse to believe this—but that is unthinkable.

The Vital Point.

Two things have to be done to ensure a constant supply of h. and c. (Abbrev. of hymns and concertos, being Sun., and Wkly. Bdetg. Prgms.); the ether waves have to be coaxed past your aerial and the subsequent electron activity has to be communicated in fattened form to your loud speaker.

Now here is the vital point; one tiny speck of dust no larger than an ant's eyebrow can throw the whole works out of gear. I can visualise one of Bach's most brilliant Cantatas sailing merrily through a chain of valves and transformers and building up and up to a magnificent fortissimo, and then, suddenly, coming crash up against that bit of dust and saying, "Not a grid leak, nay, not an atom forrarder until you sweep up that path!" Meanwhile the loud speaker is dumb and the audience is glum.

But seriously, and it is inevitable that the serious note be struck, for a Bach cut-off is

a serious matter, a radio receiver should be kept as free from dust as possible. Some dust is quite harmless but, as Shakespeare so truthfully said, "There is dust and dust, and the wust dust is soot." At least, if it weren't Shakespeare it ought to have been.

Remove That Dust.

And the dust that accumulates on accumulators and other radio gear installed in towns consists in great measure of carbon particles, and particles that are much more acid in nature than otherwise. Do you ever get a ray of sunlight dancing into your drawing-room? Perhaps you'd consider it a pretty rotten drawing-room or kitchen if rays of sunlight didn't dance into it. I know that there are always bars of sunlight—that's an old joke!

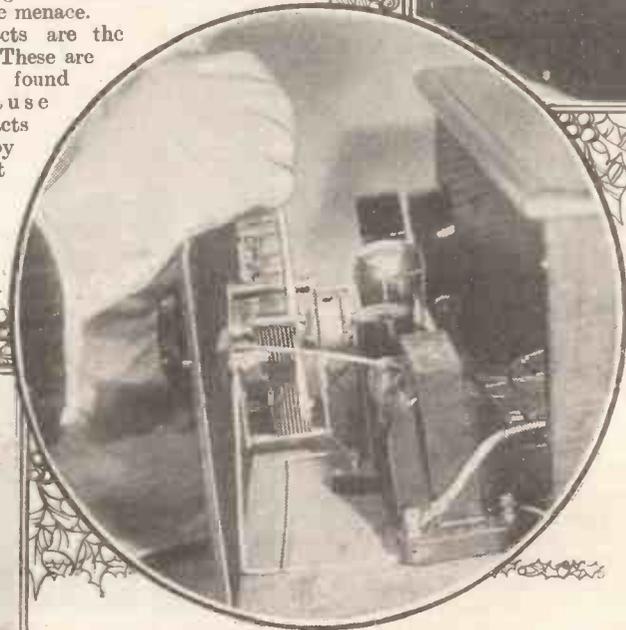
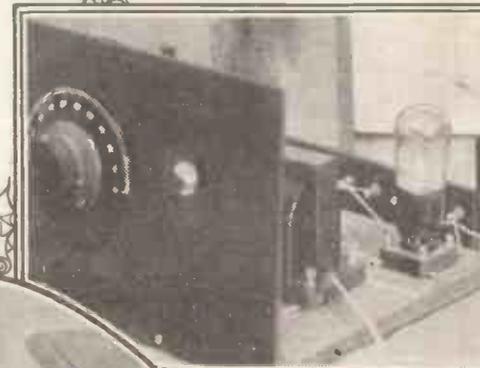
But, however beautiful a ray of sunshine is poetically, the mere fact that you can see it proves that there is dust in the air. And dust that will settle and possibly, if not removed, stop your lovely Bach music material getting through. Borrowing a pipe cleaner from your sister or aunt, you should gently remove every speck of dust from between your condenser plates and from between the terminals of all the bits and pieces that constitute the best set in the road. That is yours, of course.

Pay particular attention to the switches; think how terrible it would be if you couldn't switch the receiver off just before all those talks. It isn't so much the dust that you have to worry about with switches, with these, eroding corrosion that tarnishes the contacts is the menace.

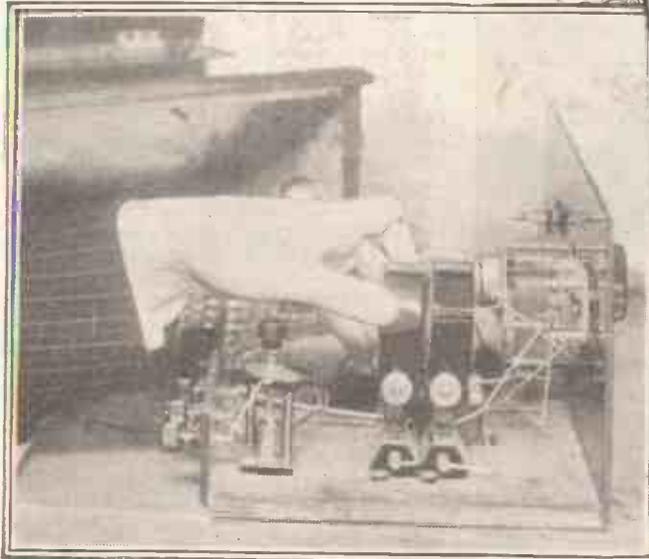
Pressure contacts are the chief offenders. These are not often to be found nowadays because "wiping" contacts are preferred by strong, silent listeners, and these, since the broadcasting of Debussy's "Study In Canon Form,"

LISTENING CHRISTMAS

Hints and Tips to keep your set in shape
By G. V. DOW



In a few minutes round the whole of the set. Be sure everything is in shape. See that the accumulators are clean and the leads are making good contact (heading photo), and the grid-bias battery points are in contact. Any dust that may be on the contacts can be removed by the use of a pipe cleaner and the on-off switches and contacts examined if necessary.



It sometimes happens that after a time the socket connections of plug-in coils cease to make good contact. The pins should be cleaned and opened out a little with a penknife.

are by far in the majority.

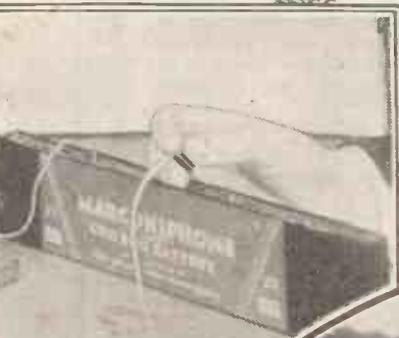
If you have push-pull switches by all means use them, but don't forget to give them a twist every now and then—if it is possible to do this without twisting the set as well. This twisting (don't say it if you lisp) will wipe the contacts clean.

Not so very long ago the British Broadcasters broadcast(ed?) some very good aerial advice. As far as I can remember, they told you to put your aerial up again if it had fallen down (that was conceit), and to overhaul it at least once a year to ensure that it didn't fall down again (that was optimism). I have nothing to add to this except that I would advise you to make your yearly overhaul just before Christmas. It will ensure that you do not miss the magnificent Christmas programmes, and, besides, there may be plenty of snow and ice about. At the worst there will be rain.

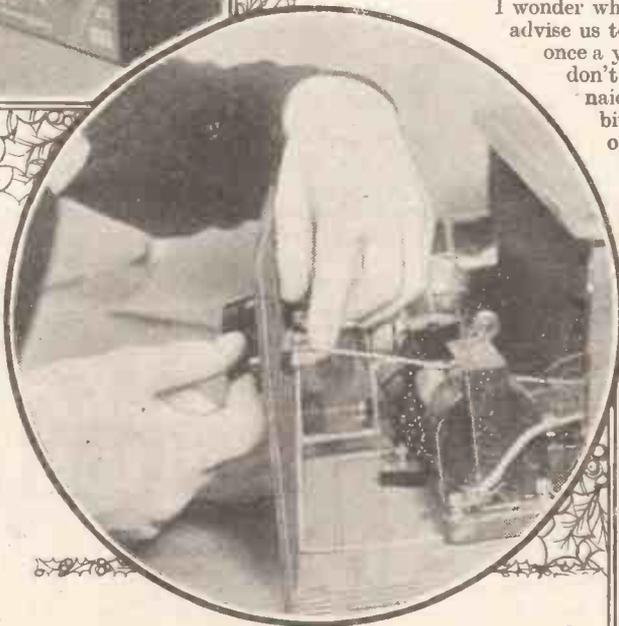
Further excellent Corporation advice is

NG AT AS

What will help you to
get in good order.
DING, Grad.I.E.E.



you can run
outfit making
in good order.
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that you should not oscillate. This is most important. You can't comfortably listen to Stravinsky if your set is oscillating; the squeals and grunts may lead you into mistaking the melody for a Bartock composition, for Bartock, I believe, favours the bizarre in sound. Further, you will prevent all your neighbours from enjoying that Chamber Music they have been looking forward to for so long.

If you are prudent you will see that all your batteries are brimming over with electrons, ergs and what-not before the arrival of the close season for charging stations and wireless shops. If you have

the faintest suspicion that your one and only accumulator is not going to stand up to the strain, use your set for brief periods over a long time, rather than for long periods over the longest possible time within the battery's capabilities.

An accumulator will give you more ampere hours of service if you work it for short periods. Get the "switch-off" habit; its good for the battery and it saves the loud speaker from missiles.

Re Those Leads.

Fortunately, our noble Art Editor has provided some helpful illustrations to garnish these pages and these will tell you a great deal about this Christmas listening, or listening at any time for that matter, that I shall have no space to deal with in words. However, I still have inches of blank column before me, and this is just as well because there are several other vital points I have to place before you.

Let me lead you to the leads. Are you sure that your connecting wires are O.K.? Be a bit selfish just for once, don't worry about your neighbour's leads, unless he nails them to the wall and the nails come through into your parlour and push the ornaments off the piano.

A loose connecting wire, or a connecting wire that may come loose, is a dangerous thing to have snaking its way about. The cat walks across the carpet and shakes the outfit slightly and—phut! three valves go west and all the shops are shut and, even if they were open, there's no more money in little Willie's money-box!

I wonder why the B.B.C. didn't advise us to overhaul our leads once a year? Perhaps they don't consider it quite the nice thing to use little bits of wire to join up our batteries; perhaps it is their view that this is a practice only to be spoken of in darkened corners of studios when

tected with rubber and fabric so that the mice can't bite through them and get shocks. Above all, see that the wire is clean where it is bared at its ends and that no whiskers fray out and tickle adjoining terminals. They don't like it.

People are apt to grow attached to a grid-bias battery; I once heard of an amateur who used to call his G.B.B. "Annie." "Why do you call your grid-bias battery Annie?" asked a friend. "Annie volts up to nine," said the amateur affectionately.

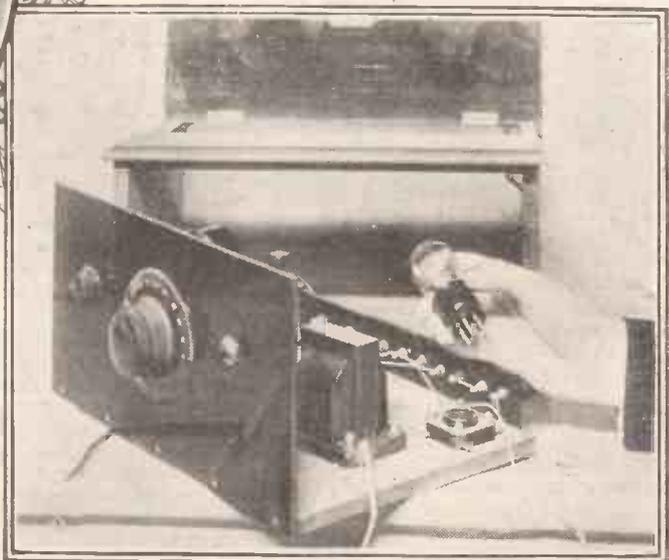
Grid-bias batteries are not grocers and they don't have to supply currents, so that they enjoy comparatively long lives. Nevertheless there comes a time when the stoutest of grid-bias batteries will relinquish the task of holding up a grid. The dire results are that up goes the H.T. current, much to the annoyance of the H.T. battery, and the response curve of the loud speaker assumes nightmare shapes.

Be Charitable.

There is an official at B.B.C. headquarters known to his enemies as the "Educational Director," and it is this worthy whose life work it is to find errors in the "Encyclopaedia Britannica." He is the man who, so runs common belief, first discovered that "monosyllable" is a polysyllable. You are going to hamper this gentleman's work very badly indeed if you fail to arrange your loud speaker so that it will serve that great party you are having as well as it has served your ordinary quite small family circle in the past.

Don't forget that while some people will not absorb "uplift" broadcasts, a lot of people will absorb a lot of sound wave energy. Besides, some of them will whisper just as the professor is making his most momentous remarks.

Finally, don't despond if the programme items look dull on paper, you can scrape up many a hearty laugh if you accept what you are offered in the right spirit. A recent talk from 2 L O was entitled "Some good roses to grow." Let your imagination wander; the announcer might have slipped up; those words have definite possibilities, and the mere thought of them makes you smile, doesn't it?



The valve pins must fit into the holder snugly and any looseness should be rectified by opening them out a little. Any dust that has accumulated must be removed.

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found—?



NEW FERRANTI A.F.5 TRANSFORMER.

The A.F.5 Ferranti transformer is the senior model of an important range of these components. Its price is 30s. but it has a performance curve which fully justifies it, and, from a constructor's point of view, it has the very great advantage that it can be mounted in any position, on its side or even on its top.



The Ratio 1/7 Ferranti A.F.5

It is heavy and substantially built and employs the well-known Ferranti patent method of winding which figures throughout the whole range of Ferranti transformers.

The normal ratio of the A.F.5 is 1 to 3.5, but it is now available having a step-up ratio of 1 to 7. In reference to this, the Ferranti people say, "the 1 to 7 ratio transformer does not naturally provide such even amplification as the 1 to 3.5 model, but it has been designed particularly for those people who require big amplification per stage, such as is normally obtainable with a pentode valve. The use of the new A.F.5 transformer gives equally as great amplification as a standard transformer when used with a pentode, and considerably better reproduction. The actual performance from the reproduction aspect is slightly better than that of our standard A.F.3 when this latter transformer is used with a suitable low-impedance valve."

We suggest that short-wave enthusiasts will find this A.F.5 1 to 7 ratio model of

particular interest, as also will those who, requiring sets economical in maintenance, wish to get the greatest possible return for each valve used.

VARLEY INSTRUCTIONAL BOOK.

The Varley people have issued a series of instructional books which cover various groups of their components. Their system of distribution is that when a person receives a Varley component he has the instructional booklet which refers to that particular component and also all the other components in the same section.

Thus, supposing you purchase a Nicore L.F. transformer, you receive instructional book B, which is packed with diagrams and data concerning not only the Nicore transformer, but output chokes and other such devices, and there are valve charts, and all sorts of interesting and informative features.

A USEFUL DEVICE.

The screened-grid valve is a wonderful invention and operates most effectively. But it has brought with it at least one little snag, and this is the necessity for a connection carrying the H.T. to an elevated point representing the top of the bulb. Here is attached a terminal and, in the ordinary way, you have to lead to this a flexible wire which has to be connected or disconnected every time the valve is taken out and put back in the set.

It is possible to develop burnt-out filaments and other such things that are liable to follow the dangling about of a live H.T. lead. But it is not to be expected that Mr. Bulgin would leave us long without a practical and ingenious remedy. Thus we now have the Bulgin screened-grid valve connector. And to fix this in position, all you have to do is drill a hole in your screening partition or screening box, slightly larger than that necessary for taking an ordinary wire, and screw in the device. You are then perfectly safe, and the removal of the valve is even facilitated. Moreover, a really efficient connection is assured. And not the least attractive point about this latest production of the house of Bulgin is its price, which is but a shilling.

AMPLION LOUD-SPEAKER UNIT.

I had thought, and mind you this is only a personal expression of opinion, that the attitude of Graham-Amplion, Ltd., to the home construction of loud speakers was, "How foolish of you. We can provide you with instruments costing no more than your home-made outfit which will give you better results." And, judging by some of the home-made loud speakers I have heard, I am thinking that they could be very right. But now we have the new balanced-armature Amplion Unit, type B.A.2, and, having tested

this, I think I can provide the Amplion Co. with a P.S. to their remarks which would run in this way:

"If you must make your own loud speaker here is a unit, the type B.A.2, which will enable you to get real change out of your queer pastime."

But seriously, I was very glad to see this new Amplion unit, for its arrival cannot fail to give a fillip to the home construction of loud speakers and, remembering that there are still on the market very cheap loud speakers which give very cheap results, the loud-speaker home-construction movement is decidedly one to be encouraged. Generally speaking, a manufactured loud speaker, if it fails at all—as so many of the cheaper ones do—fails in regard to its cone construction and mounting more than in its unit. Remembering this, it is not difficult to see why the superiority of the home-made loud speaker using a really good unit as well as

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

a scientific design and construction of cone and mounting reaches such a good standard.

And when a unit of the quality of the type B.A.2 Amplion, which costs only 21s., is used, the proposition has even greater possibilities. A unique feature of this latest Amplion line is that it is fitted with three terminals enabling various impedances to be provided.

CONDENSERS FOR THE "BROOKMAN'S" REJECTOR.

Constructors will be interested to learn that Messrs Radio Instruments, Ltd., are now producing these and are inviting inquiries from anywhere and everywhere.



The New Amplion Loud-Speaker Unit.

TAKE YOUR CHOICE! OF THE READY RADIO MAGIC KITS

ALL KITS ARE OFFICIALLY APPROVED
By "POPULAR WIRELESS"
READY FOR IMMEDIATE DESPATCH

"MAGIC" THREE

LIST OF APPROVED PARTS

	£	s.	d.
1 Panel 18 in. x 7 in. drilled (Resiston)	8	0	0
1 Cabinet to fit, with baseboard 10 in. (Ready Radio)	10	0	0
1 .0005-mfd. variable condenser (Lissen)	6	6	
1 Vernier dial (Jackson)	5	6	
1 .00015-mfd. differential reaction condenser (Ready Radio)	5	0	
1 L.T. on-off switch	1	3	
3 Sprung valve holders	3	9	
2 Single-coil sockets (Lotus)	1	4	
1 400-ohm baseboard mounting potentiometer (Ready Radio)	2	9	
1 Baseboard-mounting neodyne type condenser (Magnum)	5	0	
1 H.F. choke (Varley)	9	6	
1 L.F. transformer (R.I. "Hypermu")	1	1	0
1 L.F. transformer (Igranic J.)	17	6	
1 .0003-mfd. fixed condenser (Igranic)	1	3	
1 2-mfd. Mansbridge type condenser (Lissen)	3	6	
1 2-megohm grid leak and holder (Ediswan)	2	0	
1 25,000-ohm Resistor and holder (Ready Radio)	2	5	
1 Terminal strip, 18 in. x 2 in. (drilled)	2	0	
10 Terminals (Belling & Lee)	2	6	
1 Set of valves as specified	1	13	6
1 Lewcos No. 60 X coil	4	9	
1 " No. 40 coil	3	6	
1 " No. 250 X coil	6	6	
1 " No. 100 coil	4	6	
1 Set of short-wave coils (2 : 4 : 6 : 9)	10	6	
1 Set of MAGIC insulated connecting links	2	0	
Screws, nuts, etc.			6

TOTAL (INCLUDING VALVES) £9 16 6

Any of the above components can be supplied separately if desired.

KIT A less valves and cabinet £6 : 13 : 0

KIT B with valves less cabinet £8 : 6 : 6

KIT C with valves and cabinet £9 : 16 : 6

Deduct 10/6 from each kit, if Short Wave Coils not required.

All kits include special Ready Radio connecting links, and official Blue Print with full wiring and operating instructions—free with all kits.

NO SOLDERING REQUIRED.

Away with interference—
Ready Radio Selectivity Unit. Price 20/-

"MAGIC" FOUR

KIT A less valves and cabinet £9 : 19 : 6

KIT B with valves less cabinet £12 : 15 : 6

KIT C with valves and cabinet £14 : 8 : 0

1 set of Short-Wave Coils (20-50 metres) can be supplied separately if desired. Price 7/10.

For full list of approved components see issue dated November 30th. All kits include special Ready Radio connecting links.

NO SOLDERING REQUIRED.

"MAGIC" TWO

KIT A less valves and cabinet £4 : 17 : 0

KIT B with valves less cabinet £6 : 0 : 0

KIT C with valves and cabinet £7 : 2 : 6

For full list of approved components see issue dated November 2nd. All kits include special Ready Radio connecting links.

NO SOLDERING REQUIRED.

READY RADIO DESPATCH

When you buy radio parts you naturally want them quickly. You also would be happier with the knowledge that in the event of subsequent difficulties you can obtain technical advice without trouble.

TO HOME CUSTOMERS

Your goods are despatched post free in sealed cartons or carriage paid by rail. Note.—You can if you desire avail yourself of the C.O.D. system.

TO OVERSEAS CUSTOMERS

All your goods are very carefully packed for export and insured, all charges forward.

Telephone No.
Hop 5555
Private Exchange.

Ready Radio

Telegrams :
Ready Hop 5555
London.

159, BOROUGH HIGH STREET, LONDON BRIDGE, S.E.1

READ THIS!

14, Beechwood Crescent,
Burley, Leeds.
Messrs. Watmel's,
High Street, Edgware.
30th Sept., 1929.

Dear Sirs,
I have already purchased one of your balanced armature loudspeaker units, and I must say it is a really fine piece of work and is giving splendid results on a 6" floating cone. I am now curious to see what sort of cone you recommend, so please forward me your literature on the subject.

I must say that the thing that persuaded me to buy your unit is the way it is constructed. You are evidently not afraid of letting anyone see how it is made, and not boxing it up like most cone units on the market.

Yours truly,
(Signed) A. Davison.



PRICE
18/6

This bears out our claim that the Watmel is the "best of the British units." Try one—or better still, buy the Watmel Cone Speaker Kit (including Cabinet) at 55/-; and make up your own Speaker, using this Unit! Full particulars and instructions on application.

Watmel

WATMEL WIRELESS CO. LTD.,
Imperial Works, High St., Edgware, Mx.
Telephone: Edgware 0323. P. & T.

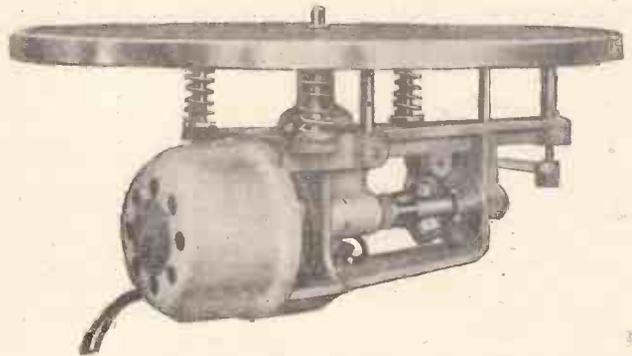
An acceptable gift

The IGRANIC-PACENT PHONOVOX PICK-UP



Supersedes the old sound box. Makes the gramophone electrical, and gives unexpected beauty in records, and rich, pure tone even from an old gramophone. The Phonovox Pick-Up offers a new joy to the lover of music. Fitted in a moment, and worked with a radio set. With an Igranic Phonovox an old gramophone becomes as modern in reproduction as the most up-to-date expensive gramophone.

Price 21/-



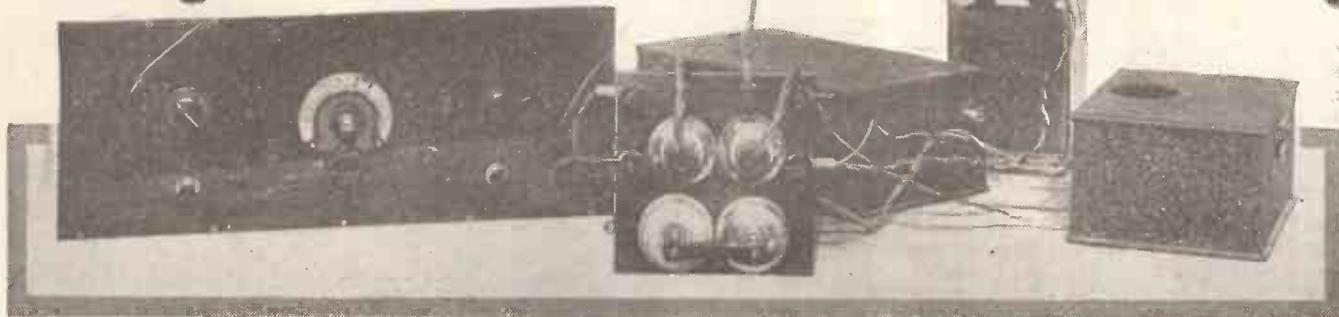
IGRANIC-PACENT PHONOMOTOR

The Igranic-Pacent Phonomotor is a silent single-phase induction motor, which is extremely economical in power. It is the ideal motor for electric gramophone. Supplied in two models only, 110 volt and 220 volt A.C.

Price £6 : 6 : 0



An Auto AC Switch



WHILST visiting a friend the other day, I was surprised to see a rather fine wireless set apparently out of commission. I was informed on enquiry, however, that it could only be used during certain hours, for the "operator" was away from home.

On examination, it was found that the set employed an H.T. eliminator, whilst the accumulator was fed by a trickle-charger. The alterations necessary to bring the set and eliminator into a "receiving" state were many.

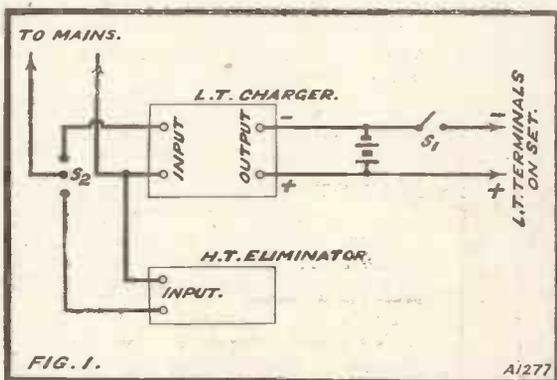
It occurred to me then that there must be many people in similar circumstances, for

This handy device enables you to do all the switching needed with an A.C. set, using a trickle charger, with just the one simple control.

Designed and described by
J. R. WHEATLEY.

(3) The low-tension accumulator must be connected to the charger.

It is possible to obtain the desired results by means of two coupled switches, as can be seen below. Fig. 1 shows the theoretical arrangement of the two switches.



S_1 is a normal tumbler switch, whilst S_2 is a two-way tumbler switch, equivalent to an S.P.D.T. switch. On closing S_1 the filament circuit is made, S_2 opens and then closes in the opposite direction, disconnecting the charger from the accumulator, joining the mains instead to the high-tension eliminator. When S_1 is opened the opposite sequence of connections is carried out; a further note regarding this point will be given later in this article.

The actual constructional details are quite simple, since the

By slightly staggering the switches it is possible to arrange so that the high-tension eliminator is disconnected before the filaments are switched off.

To simplify the connections from the charger and eliminator to the switch panel, two batten holders are employed. The output from the charger, the accumulator connections, and connections to the set are made by means of insulated terminals mounted on the panel.

The mains connections are taken via the back of the switch panel to their respective contacts.

Easily Connected.

By arranging the flexible leads in this way there is little fear of a shock being received, irrespective of the manner in which the switch is handled.

When wiring the board insulated wire such as Glazite or rubber covered "flex" should be employed, care being taken in the case of wire with poor insulation that the wires do not actually touch, or an unpleasant short-circuit may result.

The actual method of connecting up the switch to the accumulator, set, high-tension eliminator, and charger, are quite simple.

(Continued on next page.)

a good combination for A.C. mains users to-day is surely a high-tension eliminator with a low-tension accumulator trickle-charger.

Simple to Arrange.

The whole of the necessary change-over in connections could obviously be made by means of a switch, or a combination of coupled switches.

LIST OF COMPONENTS.

- 1 Switch block, 6 in. x 6 in.
- 2 Batten holders.
- 1 Ordinary tumbler switch.
- 1 2-way tumbler switch.
- 6 Insulated terminals.

Examining in detail the actual changes to be made, we find that there are three:

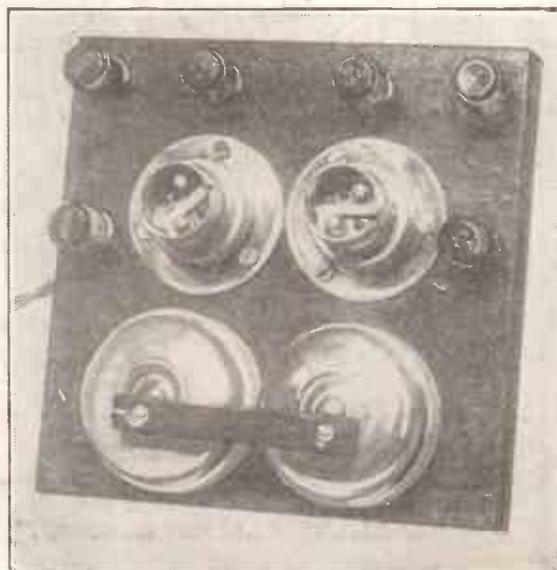
(1) The filament leads to the set must be broken.

(2) The high-tension eliminator must be disconnected.

whole of the components are standard electrical fitting, and for the base a standard switch block 6 in. x 6 in. is employed.

The distance of the two switches apart will depend on the length of the operating arm. If any trouble is experienced in obtaining this coupling strip, it is quite simple to shape one from a piece of hardwood or ebonite.

Having procured a piece of material of suitable length, drill two holes—of a slightly smaller size than the thimbles of the switches—and at the correct distance apart. If the material is now split from each end to the holes, the coupling arm will spring over the two thimbles, and will allow the two switches to be operated together.



The few terminals, two lamp sockets, and a double switch are the main items of this simple but exceedingly useful device.

AN AUTO A.C. SWITCH.

(Continued from previous page.)

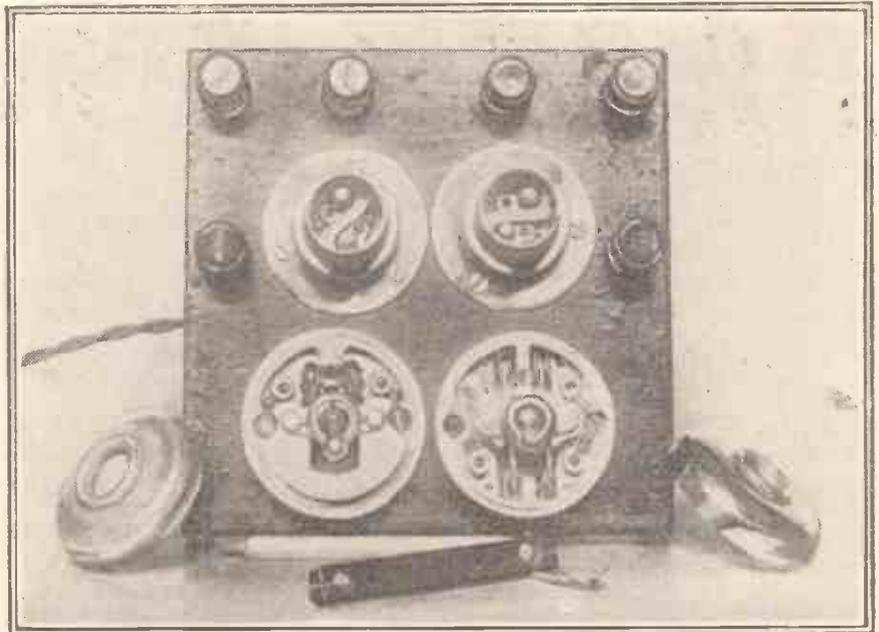
The mains adaptor plug connected to the eliminator should be inserted in the left-hand batten holder, and the "charger" mains plug placed in the right-hand holder. (These connections are given, looking at the switchboard from the front.) The left-hand pair of terminals are to be connected to the accumulator direct.

The Switchboard Connections

The terminals at the top edge of the switchboard are to be taken to the leads from the charger, which are normally joined to the accumulator when the latter is placed on charge.

The remaining terminals marked "to set" are joined to the low-tension terminals on the set.

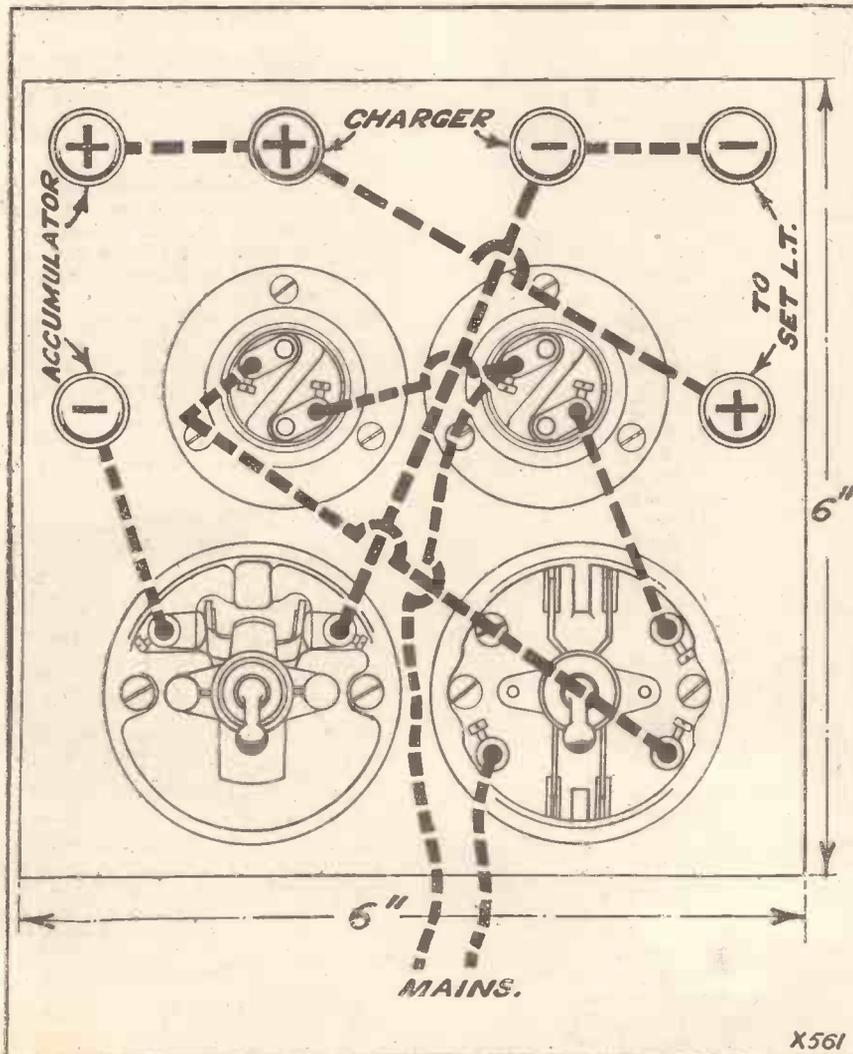
Care must be taken in connecting up the switchboard to watch that the mains plugs are in their correct batten holders. This can, of course, be verified from the position of the switches. Obviously the low-tension switch (S_1) must be closed when the high-tension eliminator is joined to the mains.



The switch covers are removed so that you can see the types of switches employed.

Make quite certain also that the positive and negative terminals of the charger,

accumulator, and set are correctly connected.



USEFUL TIPS.

The "P.W." "Brookman's" Reflector is a standard cure for the problem of interference from a near-by station.

When unwinding aerial wire from a coil, remember that kinks must at all costs be avoided, for even though carefully straightened, they afterwards represent weak places in the wire.

When looping a wire to fasten under a terminal remember that the direction of the loop should be the same as the direction of the thread of the screw.

As the real difficulty of using Litz wire is simply that of properly baring, cleaning, and soldering its strands, an easy type of Litz wire to work is the silk-covered variety which has a silk covering on each strand, and not the usual enamel.

A good method of obtaining selectivity with an old-fashioned aerial coil is to wind 20 or 30 turns of No. 24 D.C.C. around it, connecting the aerial and earth wire to these, the other connections to the main coil being as formerly.

Earth efficiency is quite as important as the aerial, and a wire broken under the ground may give just as bad results as a defect in the aerial or lead-in.

When overhauling the aerial remember that the lead-in tube should also be inspected to make sure it is in first-class working order. (Only perfectly clean contacts should be tolerated at this point.)

Never place a lead-in or aerial wire near a metal gutter pipe or anything of the kind, or signal strength is sure to suffer.

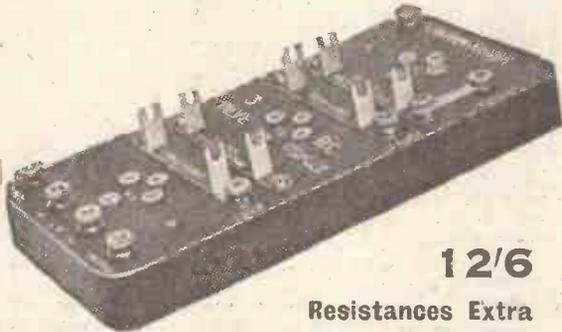
If you have a semi-variable condenser on hand and not in use, remember that inserted in series with the aerial lead it is often a great aid in improving selectivity.

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for Reception



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THREE VALVE R.C. COUPLER



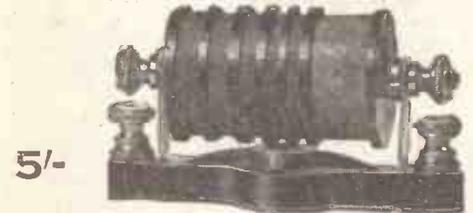
·0003 .. 4/3 **·0005 .. 4/6**
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VARIABLE CONDENSER



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"MEGITE" 2/-



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"MULTIWAVE" H.F. CHOKE



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FIXED MICA CONDENSERS



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COMBINED FIXED CONDENSER AND STANDARD GRID LEAK



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"MEGITE" NEW PROCESS GRID LEAK 2/-



6^d.
VERTICAL HOLDER



HORIZONTAL HOLDER 6^d.

GRAHAM FARISH

Write for descriptive leaflet to Dept. P.W.



22/6
"ELECTROFICIENT" ELIMINATOR CHOKE



BROMLEY

KENT



All Editorial communications to be addressed to the Editor, POPULAR WIRELESS, Tallis House, Tallis Street, London, E.C.4.

The Editor will be pleased to consider articles and photographs dealing with all subjects appertaining to wireless work. The Editor cannot accept responsibility for manuscripts or photos. Every care will be taken to return MSS. not accepted for publication. A stamped and addressed envelope must be sent with every article. All inquiries concerning advertising rates, etc., to be addressed to the Sole Agents, Messrs. John H. Lile, Ltd., 4, Ludgate Circus, London, E.C.4.

The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless receivers. As much of the information given in the columns of this paper 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 the trader would be well advised to obtain permission of the patentees to use the patents before doing so.

QUESTIONS AND ANSWERS.

"PLEASING THE KIDS!"

D. M. (near Gloucester).—"One of my ideas for pleasing the kids at the party is to use a loud speaker concealed in a cake! It's a small cone speaker, and my wife can fake it to look exactly like a big cake with trimmings on, and it will stand on the tea-table.

"Two thin wires will run from it through the tablecloth and down to the floor, and thence to the set in the next room. The idea is to get them all chattering at the table, and then to put in remarks from the cake itself! It ought to be great fun, but the snag is in the connections to the set.

"Last year a friend of mine worked a 'ghost' in the same way, using an L.F. amplifier. He put one loud speaker on the 'input' terminals and groaned into that. The 'ghost' then groaned like one o'clock through the ordinary speaker connected to the L.S. output terminals! But I have no amplifier

except in the set itself, which is an H.F. Det. 2 L.F. (two transformers). How do I connect up the two speakers to this so as to make the cake talk?"

The two concealed wires from the "cake" must be brought to the ordinary L.S. or output terminals on the set, which will be in the next room. You then pull out your detector valve and undo the two leads (from H.T. + and plate) which go to the primary of the first L.F. transformer. Leave these free (being careful not to let them touch anything else in the set, of course!) and join the primary terminals to the leads from a second loud speaker. Anything you say into this will now be amplified, and will be heard at the "cake" end, where it ought to cause considerable astonishment.

P.S.—We hope the party will be a huge success, and that the "currents" will get through to the cake quite satisfactorily.

THE ACCUMULATOR AND THE CHRISTMAS HOLIDAYS.

S. R. (Solihull).—"All told, it will be nearly three weeks before we are back home again, and I don't know if it's safe to leave the accumulator idle all that time. Would it be better to take it to a charging station or to empty it?"

If you don't care about leaving it at the charging station, there is no need to do this, or to empty it. Get it well-charged up before you go away, and you can safely leave it standing idle at home for three weeks without any fear of damaging it.

You will find on return that it will need re-charging again, but after this has been done it should behave normally once more.

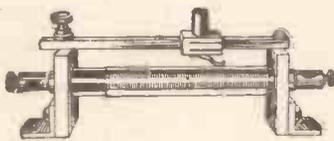
TRYING FOR AMERICA.

P. L. (Cambridge).—"Generally, I am up at five-thirty every morning, so I'm afraid to sit up late at night to mess about with wireless. But this holiday I'm going to try for America on my new short-wave two-valver. What is the best time to listen, and do you think I stand a good chance of getting the States on two valves?"

(Continued on page 744.)

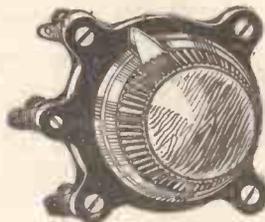
The Crowning triumph of the "Magic" Series The "MAGIC FOUR"

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Baseboard-mounting 400-ohm
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25,000-ohm ANODE
FEED RESISTOR (WIRE WOUND) 2/5
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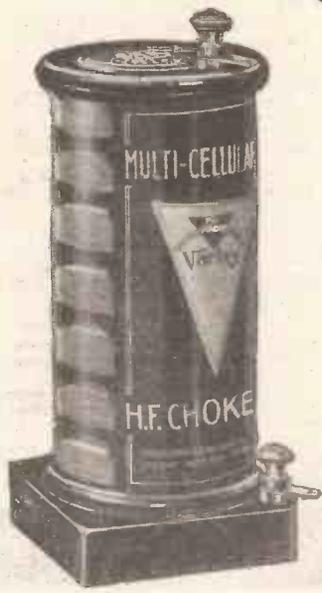
VARLEY

for the

MAGIC 3

and the

MAGIC 4



MULTI-CELLULAR H.F. CHOKE

PRICE 9/6



NICORE I L.F. INTERVALVE TRANSFORMER

PRICE £ 1



STANDARD LOW FREQUENCY CHOKE

PRICE £ 1

These wonderful VARLEY components have played no small part in the success of the Magic 3 and the Magic 4.

First there's the Varley Multi-cellular H.F. Choke—specified for the Magic 3—the "no-peak" choke—the choke which can claim complete freedom from minor resonances—the choke whose wide range of efficient choking increases the number of stations you can tune-in on any receiver.

Be sure you build it into the Magic 3.

Then there's NICORE 1—an amazingly efficient L.F. Transformer, whose constant amplification (of the order of 80) means greater volume and first-class all-round performance. It costs only 20/-—insist on NICORE 1 for the Magic 3.

And lastly there's the Varley L.F. Choke for the Magic 4. This is one of a series of new Varley components, all of which are becoming increasingly popular because of their high-efficiency, reliability and excellent performance.

Section B., C. & D., of our 1930 catalogue gives full particulars of these Varley products—write for your free copies to-day.



RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 742.)

The best time to try is from midnight till 3 or 4 a.m., but often any time after 9 p.m. will find the States "biting." You ought to get several U.S.A. stations any good night with any real S.W. set, but if the first night you try seems a "dead" one, don't despair, as conditions vary a lot and the next night may bring you several stations in the first hour.

When conditions are good, U.S.A. stations can be picked up quite clearly even on one valve, (and before it is dark in America), so we quite expect that you will succeed with two valves if the set slides nicely in and out of oscillation.

IS IT BROKEN ?

L. S. (Bradford).—"How is it possible to tell whether or no a hidden wire—like that in an enclosed H.F. choke—is broken, by means of a pair of 'phones'?"

Defects in the wiring of a receiver, or those arising from faulty components, may often be detected by a very simple series of tests with a pair of 'phones and a dry cell. One tag of the 'phone should be connected to one terminal of the dry cell, and two flex leads should be connected, one to the remaining 'phone tag and the other to the remaining terminal of the dry cell (a flash-lamp battery is quite satisfactory).

These two flex leads, if now touched lightly together, will produce a strong double click in the 'phones, one click when they make contact with each other and another when they are separate again. They may thus be used for testing for continuity in leads, etc., since the loud double click is ample evidence that everything is satisfactory.

A fault on the coil holder, for instance, such as a break between the terminal and the plug or socket to which it is connected, may now easily be detected, since if one flex lead is connected to the terminal and the other to the side of the holder to which the terminal should make connection, absence of the double click is positive evidence that the component is faulty.

On the other hand, if one of the flex leads is connected to the socket of the coil holder and the other to the plug, if a double click is heard, there is a short-circuit across the holder.

Similar tests may be made with valve holders, both for testing for a connection between each

terminal and its socket, and for testing for short-circuits between the sockets.

Variable condensers may also be tested by this method, a short-circuit between the plates giving rise to the usual double click, which should not be present in the usual way.

It is, of course, essential to see that all leads are removed from the components under test, and also

"P.W." TECHNICAL QUERY DEPARTMENT

Is Your Set "Going Good" ?

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

Whatever your radio problem may be, remember that the Technical Query Department is thoroughly equipped to assist our readers, and offers an *unrivalled* service.

Full details, including scale of charges, can be obtained direct from the Technical Query Dept., POPULAR WIRELESS, The Fleetway House, Farringdon Street, London, E.C.4.

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

LONDON READERS PLEASE NOTE: Inquiries should NOT be made in person at Fleetway House or Tallis House.

that no coils are in position in the coil sockets when these are tested.

Complete circuits may be tested in this manner. For example, if the A.T.C. is in parallel with the A.T.I., in a simple tuned aerial circuit, one flex lead placed on the aerial terminal and the other on the earth terminal will give a certain test for continuity between these points.

It will be seen from the foregoing that this method may be extended to tests for almost any component or circuit.

COILS FOR THE "TITAN" THREE.

"DEALER" (Bournemouth).—"Can you let me know what makes of 'Titan' coils were officially approved by 'P.W.' for the 'Titan' Three?"

The following makes were tested and approved: Burne-Jones, Paroussi (Parex), Peto Scott, Ready Radio, Simmonds Bros. (Bercliff), St. Mary's Motor Co. (Javex), Ward & Goldstone, Wright and Weaire.

QUALIFICATIONS FOR A WIRELESS OPERATOR.

In a recent number of "P.W." (No. 330) the qualifications for the position of wireless operator were given. P.W.M.M., "Sparks," and others have kindly pointed out that the regulations have recently been altered somewhat and, instead of sending on a Morse key for five minutes, the candidate is now required to send at 25 words per minute for three minutes. Also, code has to be sent for three minutes at 20 words per minute.

Full details are obtainable in the Postmaster-General's handbook of Wireless Telegraphy, which is obtainable from H.M. Stationery Office, Kingsway, London, W.C.2.

ACCUMULATOR CAPACITY.

R. M. M. (Hendon).—"What is the formula for calculating the capacity of a battery from the size of its plates?"

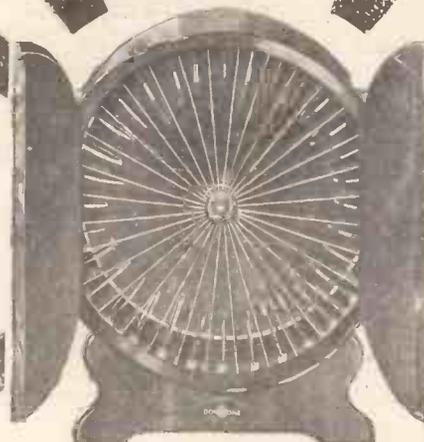
The capacity is not usually calculated in this way, as your statement suggests; but as it is sometimes convenient to be able to approximate the capacity in this way, a formula is sometimes used, and this was given in a recent catalogue of the Exide Batteries (issued by Chloride Electrical Storage Co., Ltd., Clifton Junction, near Manchester).

Here it states that "if the capacity of a battery is not known, it may be approximated *very roughly* by multiplying the total area of the positive plates in each cell by two-thirds. For example, a cell containing four positive plates, each measuring $3\frac{1}{2}$ in. x 4 in., would have a capacity of $3\frac{1}{2}$ in. x 4 in. x 4 in. x $\frac{2}{3}$ = 40 ampere hours, approximately, at

(Continued on page 746.)

DONOTONE

THE BEST LOUD SPEAKER



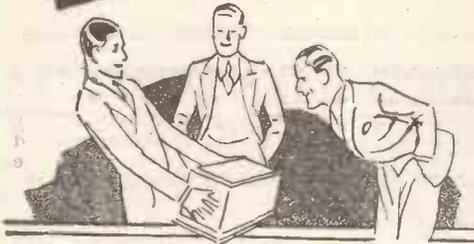
THE Speaker with the wonderful tuned gongs will make AN IDEAL XMAS GIFT which will give pleasure *all the year round* and be a daily reminder of your kindly act. From 5 Gns

DEMONSTRATIONS DAILY.

THE DONOTONE (Regd.) LOUD SPEAKER,
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USE GOOD COMPONENTS!



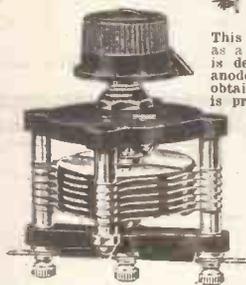
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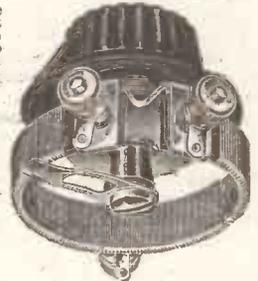
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ORMOND DIFFERENTIAL CONDENSER.
 This model has been specially designed for use as a Reaction Condenser in circuits where it is desirable that the total capacity between anode and filament remains constant, to obtain a perfectly smooth control. Insulation is provided between fixed and moving vanes, obviating all danger of short circuiting. "One-hole" fixing.
 Price 4/-.



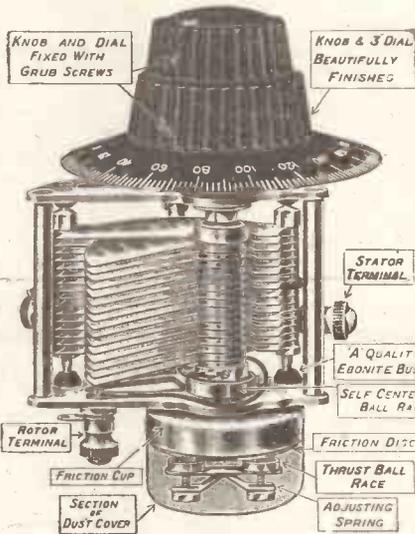
ORMOND POTENTIOMETER.
 This model is of the open type, the resistance wire being wound on an insulating former, supported on a metal frame, air spaced. "One-hole" fixing. Complete with Bakelite Dial. For Baseboard mounting an additional aluminium bracket may be supplied. Resistance 400 ohms.
 Price 2/6 each.

ORMOND NO. 3 JACK.
 Brass frame heavily nickel-plated, springs of nickel silver, the contacts being riveted in. The depth behind panel is only 2 1/2 ins. Unique spring method for attaching connecting wires; soldering is not absolutely essential. (Single Open Filament.) Price 2/6.
 The Ormond Plug will fit any standard Jack. Price 2/6.



THE ORMOND COUPLER FOR GANGING.

For use as a coupling between two condensers mounted in gang formation to obviate the necessity of strictly aligning the condenser spindles. It comprises a bakelite ring on which are sprung two sockets mounted back to back, the gang ends of the condensers being secured by means of locking screws. This provides a universal point.
 Price 1/3.



THE ORMOND SMALL LOGARITHMIC CONDENSER WITH FRICTION CONTROL.

Designed for use where space is limited, this condenser is of the highest efficiency with such value that law will be correct under average conditions. The slow motion friction control movement is of ideal ratio 55:1. Direct drive used for rough setting. Terminals and soldering tags for connections. One-hole fixing. Complete with 3 in. Knob and Dial and slow motion Knob.

Capacity	Price
.00013	11/6
.00025	11/6
.00035	11/9
.0005	12/-

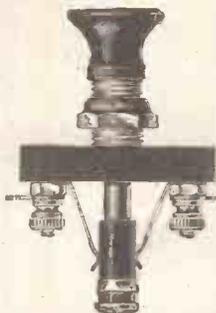
Supplied without friction control in similar capacities at 4/- below these prices.



THE ORMOND BALL-BEARING TURN-TABLE.

Of extremely robust construction, the two plates are spun from sheet steel and heavily plated. A rubber ring is fitted to the base directly beneath the ball race to ensure a perfectly smooth movement under the most exacting conditions.

8" in Diameter, Price 6/-
 7" in Diameter, Price 5/-



THE ORMOND TWO POINT PUSH-PULL SWITCH.

A very compact Switch of robust construction. May be mounted on a metal panel and insulated by means of the ebonite bush if necessary. Complete with knob, terminals, and soldering tags. One-hole fixing for 1/16" panel ONLY.
 Price 1/3.

ORMOND NEUTRA-CONDENSER.

A new type of enclosed condenser expressly designed for neutralising valve capacities. Capacity varies approximately 6 microfarads per revolution of spindle. Dustproof with no danger of short circuit, minimum capacity approximately .0000015 mfd., maximum capacity approximately .00005 mfd.

Adapted for either baseboard or panel mounting.
 Price 4/6.



ORMOND FIXED RESISTOR.

This resistor is supplied in various values suitable for most valves. Easy to fix, terminals and soldering tags for connections. Supplied in resistances of .5, 1.5, 2, 4 and 10 ohms.
 Price 6d.
 Base, Price 8d.



RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 744.)

the twenty rate of discharge." (This formula is not applicable to the Exide mass type of cell.)

"PENTODE'S" ARTICLES.

J. M. S. (Purley) and many others consider that Capt. Eckersley and "Pentode" contradict each other in recent "P.W." contributions. "Pentode" stated that the sounds in the broadcasting studio, through the microphone, caused the steady carrier-wave to rise and fall in amplitude. Capt. Eckersley in his article said that various frequencies were emitted in accordance with the modulation.

Modulation is an involved business, but, fundamentally, the modulation carried out by our broadcasting stations definitely is an amplitude modulation. There are also systems of frequency modulation when the frequency of the carrier is altered in accordance with the sound-wave frequencies, but these are not in common use.

It is presumed that a family of new radio frequencies is set up by amplitude modulation; nevertheless, it is a fact that it is difficult, if not impossible, in practice to amplitude modulate without affecting the carrier frequency to some extent.

But readers should remember that in amplitude modulation the frequency of the carrier is not purposely altered, it should remain perfectly steady and is purposely kept so in some cases by elaborate systems of control.

ARE THE SHORT WAVES WORTH WHILE ?

D. F. P. (Bury St. Edmunds).—"I have always been rather interested in these short waves, but as I am not a very expert reader

of Morse, I am wondering whether the interest there is sufficient to warrant building a two-valve short-wave set. In fact, what I want to know is: For one who is more interested in the programmes than in the long distance possibilities, are the short waves really worth while?"

Whatever may have been the case a year or two ago, the short waves distinctly are worth while nowadays. It is surprising, indeed, how many programmes are available on these high frequencies nowadays. More surprising still is the fact that

NEGATIVE G.B. ON H.F. VALVE.

"MR. MELODY" (Bridlington, Yorks.).—"I have been trying the effect of negative grid bias on my H.F. valve, and it seems to me that it clears up reception quite a bit.

"I notice, too, that it has a definite effect upon the plate current, which, considering how troublesome H.T. batteries are to replace, is an important point in my opinion. But it seems rather a nuisance to be only able to vary the grid bias just from 1½ or 3 volts, and

WHEN WRITING TO "P.W."

PLEASE REMEMBER THE FOLLOWING POINTS:

- Letters should be written on only one side of the paper.
- They should be as concise as possible.
- Non-Technical Queries cannot be answered if no stamped addressed envelope is enclosed.
- Technical Queries should be made on the Application Form which will be sent to you on receipt of a post card.

quite a number of stations come over at really dependable and worth-hearing strength, special favourites being one or two Americans, at least one Dutchman and a German, whilst other stations are continually cropping up and providing good programmes.

The inability to read Morse is absolutely no drawback whatever, for there are a great many programmes of the ordinary kind (music, etc.) being broadcast on the short waves, particularly from America. Even a two-valver will often put a programme of this type on the loud speaker, though, of course, a certain amount of skill in handling is necessary before such remarkably good results are obtainable.

I should like to try intermediate values. I assume this would be possible by the aid of an ordinary potentiometer such as was used for controlling H.F. filaments in the old days.

"I have one of these on hand with a maximum resistance of 400 ohms. Can I use it, and if so what are the connections to the return? (G. leak in this case.)"

The grid leak is attached as usual to the grid of the H.F. valve and to its condenser and the remaining end of the grid leak goes to the slider of the potentiometer.

(Continued on page 750.)

ABSENT MINDED DOCTOR TO PATIENT :—



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P.G.F.5. 20 a.h.
2 v. **11/9**
as illustrated.
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2 v. 13 9
P.G.F.9. 40 a.h.
2 v. 15 9

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Like every other Peto & Radford Battery the P.G.F. is

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It embodies these further special features. The plates are sturdy. Paste is held in by interlocking grids. The lid is of crack-proof, acid-proof Dagenite, hermetically sealed at the edges. Terminals have acid-proof glands, and, because of their different diameters they cannot be reversed. There is ample acid-room, and plates are held in place by glass key-ways in the box.

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Accumulators & Corrosion



Some practical hints and tips on the care of accumulators which every user of such should read very carefully.

By A. S. CLARK.

WHAT a lot of radio troubles the word "corrosion" can conjure up in one's mind—broken joints, bad connections, noisy condensers, spoilt accumulators, etc. Perhaps the last of these is the worst, due probably to the corroding agent being more in evidence.

I expect you are acquainted with the sight of a corroded accumulator whose terminals are fast disappearing and being replaced by a sticky blue-green mess. Has an accumulator in the above state ever made you resolve to keep all acid off the tops of your cells, and have you ever experienced corrosion in spite of this? If so, you have no doubt begun to wonder exactly what is the cause of this wholesale destruction of terminals.

The "Gassing" Process.

We are all familiar with the gassing that takes place when an accumulator is charged, and which generally lasts for a time after charging is completed, and many may consider it to be the cause of the corrosion. To use an Irishism we may say that it is and it isn't. Accumulators must not be charged in a workshop, we are told, because all the tools will be spoilt if they are. This seems to bear out the idea that the gases given off by the accumulators cause corrosion in the same way as, say, chlorine gas.

Before accepting the above, however, we must consider what gases are produced when an accumulator is charged. Without going into the formula for the chemical action that takes place, since this is really very complicated, it may be stated that oxygen and hydrogen are obtained. These two gases when combined form water, and they are given off due to the electrolysis of the water in the electrolyte. This is in a way a secondary process that takes place during charging.

Saturated with Acid.

Since neither oxygen nor hydrogen is a corrosive agent in the general sense of the word, the gas itself does not do the damage. But the gases have to come through the acid, and they may be "saturated" with a fine spray of the electrolyte. This they carry with them and deposit on all materials with which they come into contact. Consequently, no matter how clean you keep the tops of your accumulators, something else must be done if the terminals are to be protected from the acid.

The electrolyte of an accumulator is

dilute sulphuric acid, and eats into practically all metals except lead. The plates of an accumulator are made of lead, and that is why they are not destroyed. The above fact is also made of use by some manufacturers of storage batteries, who cover their terminals with a coating of lead. It soon wears off the threads of the screws, however, and therefore all terminals must be kept clean and generously coated with petroleum jelly or vaseline to protect them from corrosion.



Accumulator terminals must be kept clean and covered with petroleum jelly or vaseline, or the acid may attack them and cause them to "seize up" and become quite unusable.

If charging is done at home, the batteries should be well away from the set during the recharging process. It is not advisable, in case of gassing after charging, to keep the accumulator in the same cabinet as the set. If this is done there is a risk of corrosion in all sorts of awkward places, and all the bright parts will probably go dull. Since oxygen and hydrogen when mixed together in the right proportions are very highly explosive, charging should be done in a well ventilated place and no light brought near to the accumulators.

We have already noted that the electrolyte of an accumulator consists of a weak solution of sulphuric acid. Unless, however, the proportion of acid to water is correct, proper service will not be obtained. The proportion is stated in the terms of the specific gravity of the acid. When the acid of an accumulator gets low, it is due to the evaporation of the water in the

electrolyte, therefore water only, and not mixed acid, must be added to bring up the level. This, of course, does not refer to the loss of water while an accumulator is being charged. The specific gravity when an accumulator is charged should be 1.250, and if it is necessary to bring up the level immediately after charging, it should be done so that this value remains.

Delicate Apparatus.

Accumulators are not, although many enthusiasts seem to think so, hardy accessories that can be treated "any old how." They are really delicate pieces of electro-chemical apparatus and need proper attention if they are to give their full capacity and life. A little attention to the makers' instructions is therefore always worth while.

In your dealings with accumulators do not forget that the acid will ruin such things as carpets, clothes, etc., in a short time. If you are unfortunate enough to spill some acid, soak the article or cover the spot in some alkaline substance, such as soda or soap. The easiest thing to use in such cases is, of course, ammonia.

FOR YOUR RADIO NOTEBOOK.

Although the ordinary H.F. valve only takes up to 1 millamp H.T. current, this is not true of the screened-grid H.F. valve, which may take up to six times as much.

Although the maximum high-tension consumption is not so great in the case of H.F. as of power valves, the anode current taken by them can often be reduced by suitable negative grid bias in just the same way as is done at the low-frequency end of the receiver.

Usually a power valve takes more H.T. from the set than the detector and the high-frequency valves put together.

In an average modern set, the H.T. consumption, in rough and ready figures, is H.F. valve half a milliamp, detector one milliamp, L.F. valve two milliamps, and power valve four milliamps. (Super-power valve at least eight milliamps, probably twelve or more.)

A loose sliding resistance is one of the commonest causes of crackling and scratching noises, which would be avoided if the contact was properly adjusted.

When resistance-capacity coupling is used, difficulty in obtaining reaction is often due to the fact that a bypass condenser of about .0001 mfd. capacity may be necessary, one end of this being connected to the H. T. + and the other end to the junction between the reaction coil and the coupling resistance.

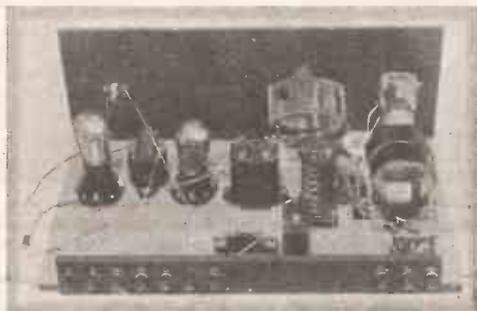
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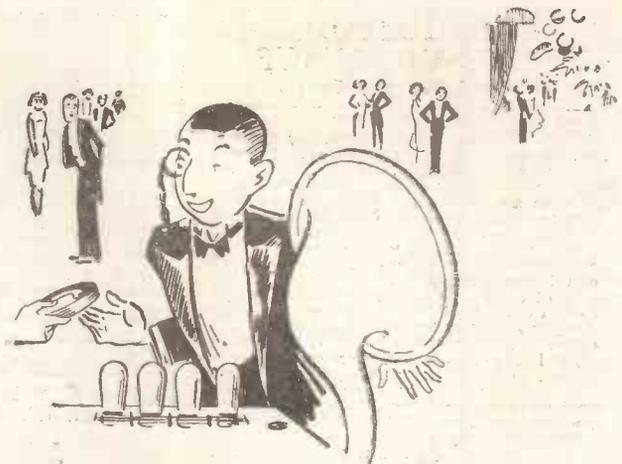
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RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 746.)

The potentiometer (400 ohms) that you have on hand is quite suitable for the purpose, but you will need a flashlamp or other small battery. You can use 3 volts or so maximum, unless you wish to experiment with slightly higher voltages than this, though these are not usually employed. All that you have to do to connect up is to join the positive end of your battery to the negative filament lead of the H.F. valve, and join the maximum negative of the battery to an on-off switch. The remaining side of this on-off switch goes to one end of the resistance of the potentiometer, and the other end is taken either to the positive of the battery or to some of the wiring connected to this (earth, I.T., etc.).

We have included a switch because unless this is done there is bound to be a quick running down of the battery, so we do not advise you to dispense with this on the grounds of "economy" (so-called). The maximum negative voltage is obtained when the slider, which is attached to the grid leak, is moved up to that end of the potentiometer which is connected to the battery negative if the wiring is carried out as described above.

HOW TO NEUTRALISE.

"LONG-DISTANCE LADDIE" (near Glasgow).
—"I am a comparative newcomer to high-frequency amplification. What is the best method of neutralising?"

The following method of neutralising is recommended for use in sets employing one stage of H.F. and provided with a reaction control.

Set the reaction control at minimum and likewise the neutralising condenser. Now, oil setting the tuning condensers so that the two tuned circuits are in step with each other, it will probably be found that the set is oscillating.

To test for oscillation touch one or other of the sets of plates of the tuning condensers (this may be either the fixed or moving, according to the particular set). You will probably find that the set will only oscillate under the above conditions when the two circuits are in tune with each other and this can be used as an indication.

It is convenient to perform the operation at some point near the middle of the tuning range. Now increase the capacity of the neutralising condenser. (In the case of such condensers as the Gumbrell "Neutrovernia," this means screwing downwards.)

Test at intervals for oscillation as this is done and you will presently find that the set has ceased to oscillate and will not recommence even when the tuning dials are slightly readjusted. Now increase the reaction a little, until the set once more oscillates, and again increase the neutralising condenser setting until oscillation ceases. Slightly readjust the tuning condensers again to make sure that the set is completely stable once more.

Proceed in this way until it is found that the correct adjustment of the neutrodyne condenser has been over-shot. Once this point has been passed it will be observed that further increases of the neutrodyne condenser setting no longer stop oscillation, but cause it to become stronger.

The object is to find such an adjustment of the neutralising condenser as will permit the greatest setting of the reaction condenser to be used without

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producing oscillation. It will then be observed that when the two tuned circuits are in step and the set is brought to the verge of oscillation, a slight movement in either direction of the neutrodyne condenser will cause the receiver to break into oscillation.

It is to be understood that in the preceding notes, where a reaction condenser is spoken of, any form of reaction control may be understood.

A QUESTION OF CONTACT.

N. G. G. (Warrington).—"On ordinary broadcasting wave-lengths the set is absolutely perfect, but when I change over to long waves I am troubled by a very curious phenomenon. Signals come through all right, but they are much weaker than one would expect and I

have to employ quite a lot of reaction to get real results.

"This in itself would not be so bad, but it is accompanied all the time by a nasty scratching noise which is very irritating, and which is practically continuous. It hardly seems likely to be a bad contact, because it is not very bad unless reaction is brought up too strong, and then it is, as I say, very regular and continuous, and very irritating to listen to.

"It certainly is not due to any form of interference outside, as neighbours' sets are not troubled with it, and I do not find it worse on one wave-length than on any other. I have examined the coil very carefully. It is of the 6-pin type, but I cannot see anything wrong with it except that, being an old coil, it is a trifle dull compared with the other coils, which are new. Can you suggest anything which might be wrong, and which would overcome this?"

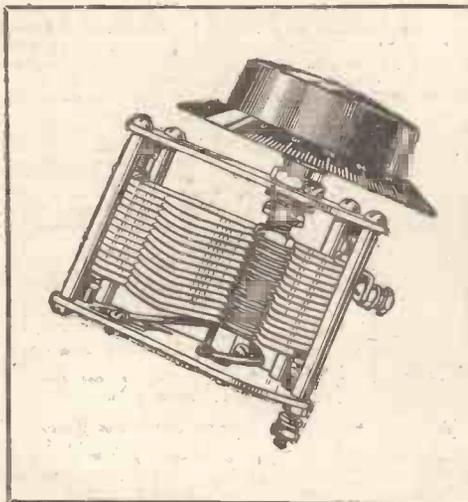
We think that the probability is that one of the soldered joints to the legs of the coil has become dry. This results in a peculiar form of contact which might appear to be good to the eye and might escape detection by ordinary methods, but which, during reception, would give rise to the symptoms you describe, and prove very irritating to listen to.

While you are re-soldering, examine the whole of the windings as carefully as possible, and especially where the wire is bared, or is loose to make connection with the pin. Make sure, also, that all the pin contacts are nicely open and clean, so that good contact is obtained here.

THE "P.W." STANDARD LOADING COIL.

C. D. W. (Beccles, Suffolk).—"I should like to make the 'P.W.' Standard long-wave coil. How should it be wound—number of turns, etc.?"

One of the standard formers ready for winding can be obtained from either Messrs. Burne-Jones or Wright & Weaire, and you will find it has a series of saw cuts in the ribs, which form slots for the winding, and in each of these you should wind 27 turns, making 216 in all, of No. 26 D.S.C. wire, with tapings brought out in any convenient fashion at 25, 60, and 80 turns, counting from the beginning, which should be labelled "0," the finish being marked "216."



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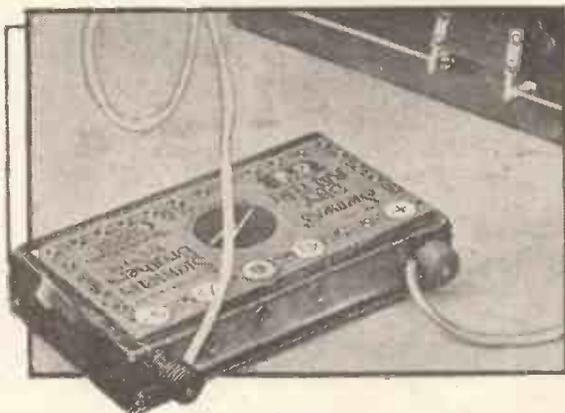
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FINDING FUZZINESS

The milliammeter is useful for detecting distortion and is an instrument all amateurs can use with advantage.

By A. JOHNSON-RANDALL.

EVERY set, however perfect, can distort. One of the most valuable aids for checking and reducing the possibility of distortion is a milliammeter. Most listeners look upon such an instrument as this as a luxury, but to those with musical ears its purchase is money well spent. A good milliammeter of first-class make can be bought for 30s., and there are others which are quite reliable retailing at about £1 or even less.

Where Distortion Occurs.

In a properly operated set distortion, in nine cases out of ten, takes place at the last valve, which becomes overloaded on certain notes or passages. If the set is not being correctly operated, the distortion will still be carried forward and appear in the last stage, so therefore, if

we shall be able to see whether any distortion is taking place.

A milliammeter measures current in thousandths of amperes, and is inserted between the H.T. battery or supply and the plate of the last valve. In this way it indicates the anode current actually flowing in the plate circuit of this valve.

The reader will no doubt ask how a device for measuring anode current can indicate distortion. This needs a little explanation. The valve has a steady plate current flowing through it, all the while the filament is alight. When signals are received the impulses produce fluctuations in this anode current, but if they are distortionless they do not alter its mean value—that is to say, the needle of the milliammeter will remain steady.

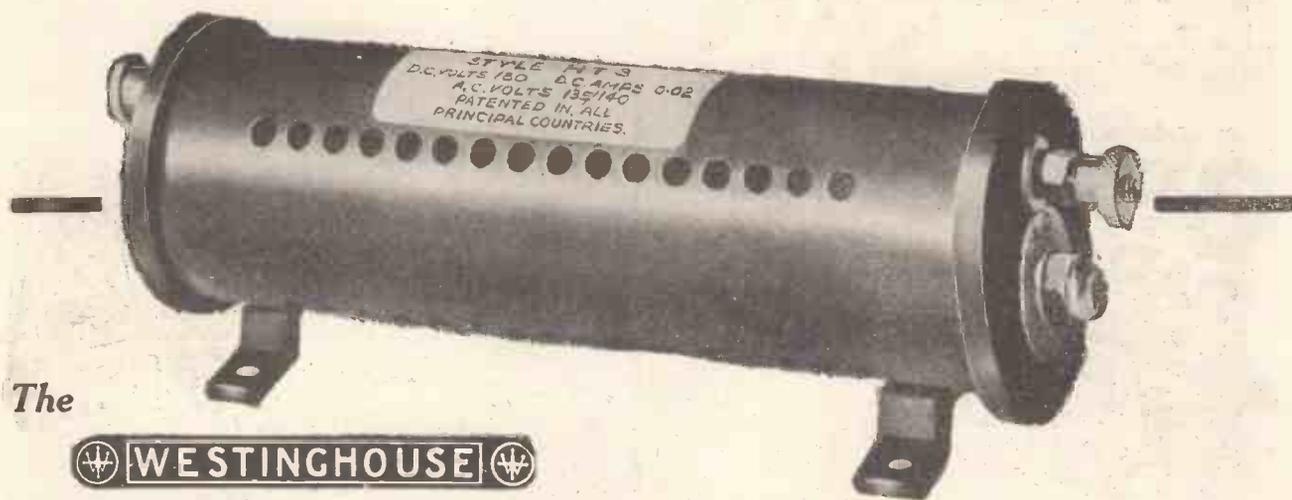
If, however, the valve becomes over-

loaded through the signals being too strong or because of some defect in the set itself, the needle will kick violently. The procedure is to adjust the set in such a way that the needle does not oscillate more than 10 per cent of the steady reading.

Reduce the Reaction.

Let us suppose that we have connected a suitable milliammeter in the circuit of the last valve in an ordinary three-valve set consisting of a detector followed by two low-frequency stages: It is observed that when the broadcast programme is being received at normal volume the needle kicks violently to and fro. It is obvious that the last valve is being overloaded in some way, and first of all the expedient of slacking back the reaction should be tried. I am assuming, of course, that the set to commence with is well away from the point of oscillation. If too much reaction is

(Continued on page 754.)



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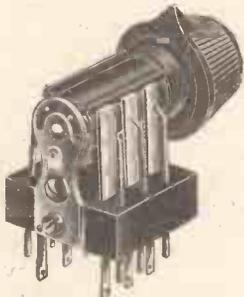
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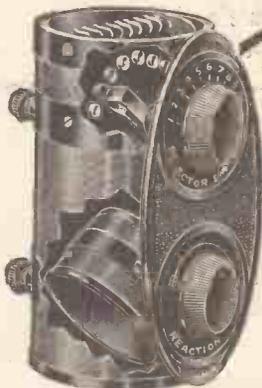
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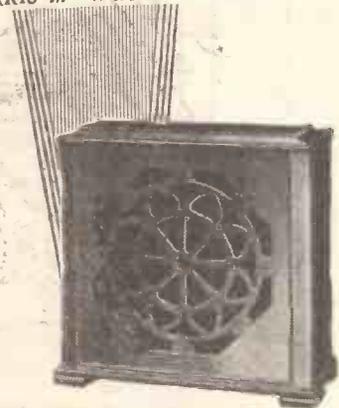
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FOREMOST NAME IN SOUND REPRODUCTION

FINDING FUZZINESS.

(Continued from page 752.)

used, distortion is bound to occur, and no adjustment of grid bias or high-tension will remedy this state of affairs. The usual symptoms of too much reaction are woolly reproduction and the over-amplification of certain notes which will tend to persist and jar.

Check the H.T. Voltage.

Let us suppose that slacking back the reaction to a point well away from the edge of oscillation does not remedy the trouble. In this case, then, we must try detuning a little, or if there is a volume control in the set we can use it as a "dimming" device to reduce the strength. If the last valve is simply being overloaded, a point will be reached when the needle remains comparatively steady and no violent kicks occur.

You may find now that in order to bring about this desirable state of affairs you have to reduce the volume far below that necessary for full loud speaking. The procedure then is to check up the H.T. voltage and grid bias, and, if possible, to increase both values so as to give the valve a better chance of dealing with the signals.

Try a Super-Power Valve.

If, for instance, you are only using 100 H.T., increase this to 120, and also the grid bias accordingly. It may be, however, that you are only using an ordinary small power valve when you should be using a super-power valve. If so, you will have to

change over to a super-power valve, retaining the same H.T. voltage, but increasing the grid bias to a value suitable for the new type of valve. Now you will be able to handle much louder signals without distortion.

You can also see whether your L.F. side is causing trouble with the aid of a milliammeter. You will notice here that the

kick backwards whenever overloading occurs and if too much grid bias is being employed the needle will kick forward.

A milliammeter will also indicate the state of your H.T. battery. For instance, with a new battery and a certain grid-bias setting, the needle will flick over to a certain steady reading.

When the H.T. battery commences to run down, the current passing through the milliammeter will get less, and the needle will take up a position indicating a lower reading. With a transformer-coupled set it is only very rare that the needle kicks backwards, and in the main it will be found that the majority of the kicks that take place are to the right.

Grid Choking.

With a resistance-coupled set the needle does sometimes kick back, and on certain passages it will kick backwards and remain there for some time. This indicates choking, and can be caused by too high a value of grid resistance or too large a coupling condenser. When this effect takes place it is as well to try increasing the grid bias because this sometimes cures the trouble.

For most ordinary sets a milliammeter having a maximum reading of 25 to 30 milliamps is quite suitable, because with this particular range the needle will be somewhere near the centre of the scale in most normal working conditions. Not only will a milliammeter indicate distortion, but it will enable the current to each valve to be measured and thus show whether the valves are functioning properly. The meter has a multitude of other uses, and no enthusiast should be without one.

COMING SHORTLY!

If you are after magical results, you will be interested in the

MAGIC H.F. UNIT

to appear *exclusively* in "P.W." You can't afford to miss it!

Place a Regular order for "P.W." now.

needle kicks violently only when certain notes, particularly the higher ones, are reached. If so, it is not improbable that your amplifier is at fault, and if you are using two transformers, try reversing the leads to the primary of one of them. Then, again, you can also check your grid-bias setting.

When you are using too little grid bias, your milliammeter needle will tend to

4/6

Postage
4d.



THE WONDERFUL NEW GOLDEN P.R. VALVE

By a special process employing an extremely rare element in minute and precise quantities, in the coating of our Golden Series, we have been able to turn out a valve of extraordinary efficiency.

ABNORMAL SELECTIVITY and VOLUME

Although the L.T. Filament consumption has been kept more or less to our standard to secure robustness, the emission has been increased BY OVER 50 PER CENT. For selectivity and volume, we believe a better valve cannot be obtained anywhere with such a low consumption of H.T. and L.T. The glass bulbs are of a distinctive golden colour and each valve has a golden guarantee band.

INSIST ON THE GOLDEN P.R.

Ask your Trader for a Golden P.R. Valve, and do not be put off with any other. You will be positively amazed at the greatly increased efficiency of your set. Remember, insist on the Golden P.R.

DOUBLE the VOLUME of Your LOUD SPEAKER

Fit a P.R. Moulded Paper Cone to your speaker and you will be positively amazed at the difference. Double the volume and much greater purity in tone. All the notes come out in their correct value. No resonance—no "drumming"—just pure and real music. The P.R. Cone is the only one which correctly reproduces the human voice as well as instrumental music. That is why it will improve any cone speaker, no matter the make or price. 11" diameter, correctly proportioned, ready to fit, complete with washers and screws. Can be adjusted instantly. No cutting, sticking or wash leather required.



3/6

Post 6d.

The Paper which has improved Speakers all over the World.

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LIST OF P.R. SUPER GOLDEN SERIES.						
4/6	Type	Fil. volts.	Amp.	Imp. ohms.	Amp. fac.	
EACH Post 4d.	GPR 22	2	·095	24,000	13·5	H.F. Det.
	GPR 32	2	·095	12,000	9	L.F.
	GPR 42	2	·095	40,000	32	R.C.
POWER 7/6 EACH Post 4d.	GPR 9	3·5-4	·09	22,000	14·5	H.F. Det.
	GPR 10	3·5-4	·09	10,000	9	L.F.
	GPR 11	3·5-4	·09	44,000	41	R.C.
SUPER-POWER 12/6 EACH Post 4d.	GPR 17	5-6	·14	20,000	17·5	H.F. Det.
	GPR 18	5-6	·14	11,000	9·5	L.F.
	GPR 19	5-6	·14	75,000	41	R.C.
SCREENED GRID 15/- Each Post 4d.	GPR 20	2	·15	6,000	7	Power
	GPR 40	4	·15	6,000	7	"
	GPR 60	6	·15	6,000	7	"
15/- Each Post 4d.	GPR 120	2	·3	3,000	4·5	Super Power
	GPR 140	4	·2	3,500	4·5	"
	SG 25	2	·2	220,000	150	S.G.

Valves or more sent POST FREE. Matched Valves 1/- extra per set.

GET PERFECT RESULTS OR GET YOUR MONEY BACK

Each valve has attached to it a written guarantee covering 7 months. In the event of the valve losing emission or becoming inefficient in any way during this term a new valve will be supplied under the terms of the guarantee. If not fully satisfied that the valves received are equal to any they should be returned within a week, full refund will be made by return of post.

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P.R. PRODUCTS,
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(Opposite G.P.O. Tube Station)

Telephone: CITY 3788.

CUT OUT

Brookman's Park, your Local Station and Morse!

Invest in this Harlie Wave Selector. Simply plugged in between aerial and set. No drilling. No valves to burn out. No alterations to set.

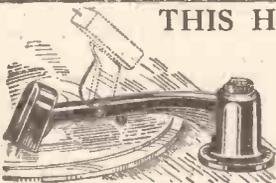
- A. 200-700 metres (for 2LO, 5GB etc.) **12/6**
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£100 Guarantee. If found unsatisfactory and returned within seven days of purchasing from us direct we guarantee to return your money in full or forfeit the sum of £100. A similar arrangement can be made with your dealer.

Harlie WAVE SELECTOR



THIS Harlie GRAMOPHONE



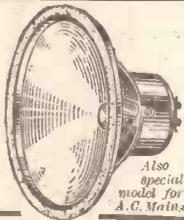
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Model 28, 220v. D.C. } £3 10 0
Model 29, 4-6v. }
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Harlie MOVING COIL Loud Speaker

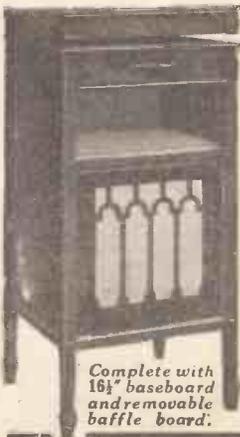
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Complete with 16 1/2" baseboard and removable baffle board.



"MAJOR" CABINET FOR YOUR RADIO-GRAM

Especially suitable for Mullard Orgola, Osram Music Magnet, and for panels up to 18" x 8".

Loud Speaker compartment is 18" x 18" x 16 1/2" OAK £7-10-0 MAHOGANY £7-15-0

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STANDARD SAC RECLANCHE PERMANENT H.T. BATTERY

NO NEED TO BUY ANOTHER BATTERY

You have often worried over the H.T. problem. You would not for one moment hesitate if you knew thoroughly the merits of the Standard Permanent Wet Battery. That is why you should send for the Standard H.T. Book now. It will pile fact on fact to convince you that the Standard H.T. Battery is in every way a sound and economical proposition, and in its present form

ABSOLUTELY OUTFRIVALS THE DRY BATTERY

Think of its advantages. Steadier full-bodied current supply that gives greater purity of reception than any dry battery, current. It is self-regenerative. All the time it is out of use it is recuperating. It stands far heavier use over longer periods than dry batteries and

IT CAN BE REFILLED AT HOME

to register its original voltage, cheaply and simply, with the wonderful Cartridge Sac Refills, the new invention that has made Standard H.T. paramount. In short, it will give you at least four times the life of the average dry battery and then you merely refill again—that means, once installed, Standard solves the H.T. trouble for ever. We ask all listeners to think seriously about this money-saving H.T.—get the free book. Over 100,000 sold. Satisfaction guaranteed.

Write to-day to THE STANDARD BATTERY COMPANY, Dept. P.W., 184-185, Shaftesbury Avenue, London, W.C.2.

NO DEPOSIT. NO REFS. Order on cash or deferred terms. Deferred orders are delivered two or three days from date of order.

POPULAR MODEL
No. 3. CARTRIDGE MODEL BATTERY. 96 volts. (10,000 milliamps). Comprises two trays of 72 cells each, with lid and necessary electrolyte chemical. Cash £2 13 10 or 9/5 down and 5 monthly payments of

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Standard Batteries are British Made and Guaranteed.

Stocked by Halford's Stores, Curry's Stores & all Radio Dealers, who also supply free descriptive literature.

Any voltage or capacity supplied. Delivered in neat Unibloc Containers, occupying minimum space. You merely fill jars with chemical provided by us, and press home corks in mouth of same. Battery will then register correct voltage & is ready for the first twelve months' service.



CABINETS (on left)

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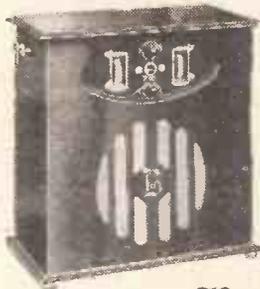


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BRITISH
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DUPLEX
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An entirely new loud speaker. Gives finer results due to new Brown "Vee" Reed and Duplex Cone principles. Pure tone and rich volume. In three models: V.10, £5 10s.; V.12, £7 10s.; V.15, £12 10s.



**The Brown
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The secret of the successful performance of the Brown Receiver (it gets over 40 Stations in an hour) is the honest value that is put into it. Only the finest components that money can buy are used. In 4 models: Type A (for battery operation) £12 7s. 6d. Type A.M. (for mains operation) £20 10s. Types B. and B.M. £9 7s. 6d. and £17 10s. respectively. All models also supplied in kit form at slightly lower prices.

Ask your Wireless Dealer for particulars of Easy Payments.

Brown

From all Radio Dealers. Write for Catalogues and full particulars, to Dept. B

S. G. BROWN, LTD.
Western Ave., North Acton, W.3.

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YOUR NEW SET.
By D. GLOVER.

THE moment when you feel that you are in possession of the best possible set that radio science can devise is a glorious one. You have the sensation that you have complete mastery of the ether. You think of all the hundreds of thousands of inferior listeners desperately twisting knobs to get such easy game as Langenberg; your superiority complex is in full blossom!

Unfortunately, this happy state of affairs doesn't last long with most of us. Now and then one comes across an enthusiast who has completely drugged himself, and is in possession of a prehistoric outfit that he considers the equal to anything that has been fashioned, but this type of radio cabbage is a rare vegetable.

And, in a way, this is just as well. It would be a bad thing for the wireless industry if every set or component sold became a permanent fitting in someone's house. Also, it would be a rotten thing for the progress of radio in general if the average amateur ever adopted the idea that we have got as far as we can go, and that there were no improvements to be made. Further, it would be an unhappy state of mind, the state of mind that makes for stagnation and is the antithesis of ambition.

The Other Extreme.

Nevertheless, I don't want you to think I consider the other extreme particularly desirable. There is that type of amateur who is never quite satisfied with anything even for a few days.

He builds a new set every week or so, and wears a cynical smile of permanent dissatisfaction. Probably he is just as happy in this state of perpetual discontent as anyone else. Anyway, he doesn't do anyone any harm and is a great supporter of the industry.

The happy medium is struck by the amateur who builds a new set every autumn for use as a domestic programme provider, and adds small refinements every now and then. He may or may not have one or two purely experimental receivers going, which are quite often drastically rebuilt.

Of course, there is a very large number of constructors who have sufficient mechanical ability to build any set described, however complex, but yet have not sufficient technical knowledge to be able to read circuits. They cannot, for instance, form independent opinions as to the relative values of the various innovations that are brought to their notice.

An Interesting Period.

Actually, it is impossible to state a complete case for every minor improvement that comes to light; perhaps it is not always possible for the expert to determine exactly their potentialities.

There is always a period when even experts are divided as to the merits of a new thing. During the transition of a radio invention from theoretical argument to practical application on a universal basis, the unimaginative constructor holds his hand. The real enthusiast jumps in

(Continued on page 758.)

**THERE IS NO
SUBSTITUTE for**

**TRIX
FIXED
CONDENSERS**

YOU cannot mistake quality. And quality is the keynote of TRIX Fixed Condensers. It reveals itself in the real ruby mica insulation. It reveals itself in the genuine COPPER foil — and in every little feature of these excellent components. Capacity is clearly engraved on case as you can see. Such high quality at such low price isn't to be found elsewhere. Convince yourself by testing them yourself! All values.

The Brown Moulded Case in the Blue and Orange Carton. Write for details of complete TRIX range.

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PRICE FROM
1/-
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**PATENT STEEL
WIRELESS MAST
DAMP PROOF! ROT PROOF!!**

26 Feet high. In 3 sections of 1 1/2 in. Steel tube tapering to 1 in. Carriage, London, 1/6; Midlands, 2/6; elsewhere, 3/6. Weight 24 lbs. **15/-**

34 Feet high. In 4 sections of 1 1/2 in. Steel tube tapering to 1 in. Carriage, London, 2/-; Midlands, 3/-; elsewhere, 4/-. Weight 34 lbs. **21/6**

The "SUPER" MAST.
42 Feet high. In 5 sections of heavy 1 1/2 in. Steel tube tapering to 1 in. A real bargain. Carriage, London, 2/6; Midlands, 3/6; elsewhere, 4/6. Weight 46 lbs. **29/6**

P.R. are made of British Steel in 9 ft. lengths, from 1 1/2 in., tapering MASTS to 1 in., and are supplied with cast-iron bed plate, steel ground pegs, stay rings, galvanised steel wire stays cut to lengths, pulleys, bolts and fullest erecting instructions. No further outlay necessary.

NO HOLES TO DIG
Minimum Radius 3 ft. 6 in. The easiest Mast to erect. Anyone can put it up.

GUARANTEE.
Money refunded without question if not satisfied and returned within 7 days.

Pay C.O.D.

**P.R. PRODUCTS, M.16., P.R. HOUSE,
NEWGATE STREET, LONDON, E.C.4.**
Opposite G.P.O. Tube Station.

THE JOY OF SURPLUS POWER



**11/6 down
and they
are yours to
use and enjoy!**

**All LOEWE
RADIO products
amounting to an
aggregate sum of
not less than £5
can be obtained
on attractive
H.P. terms. Full
details from
your dealer.**

You can now secure the wonderful new LOEWE RADIO Reaction Receiver together with the LOEWE RADIO Loud Speaker for a first payment of 11/6 only! Purchase completed in 9 monthly payments of 12/8.

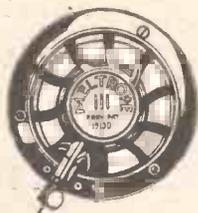
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The LOEWE RADIO CO., LTD.,

4, Fountayne Road, Tottenham, N.15. 'Phone: Tottenham, 3911/2.

—“bring your old Gramophone
up to date, in time for the
Christmas Holidays!”



by fitting the new MELTROPE Sound Box, its greater definition, forward tone, and range being wider than many Sound Boxes costing more than double.

Suitable for all types of tone arms

Price 12/6

AMPLIFIERS LTD.,
Billet Road, Walthamstow, E.17.

High-grade
**QUEEN ANNE STYLE
FIGURED OAK CABINET**

Height 3 ft. 3 ins. Depth 1 ft. 3 ins.
For Panels up to 21 ins. X 7 ins.
Baseboards up to 11 ins.

£5.5.0

Carriage Paid.

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Manufacturer of all types of wireless
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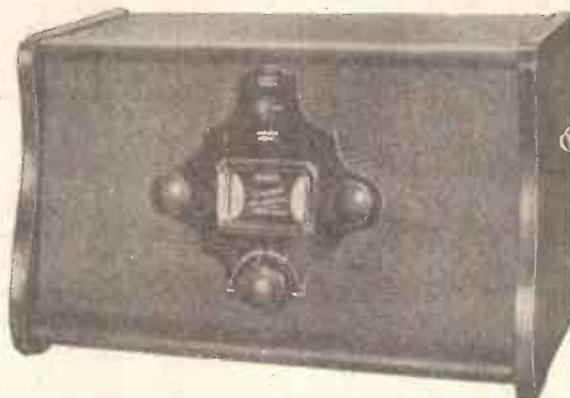
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Estimates Free.

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**A SUPERB
RECEIVER
AT A MODERATE
PRICE - - - -**



**RECEIVES 20 - 25
STATIONS AT LOUD
SPEAKER STRENGTH**

You want perfect reception, with a large choice of programmes, at a small cost? The Burndept Screened Ethophone will give it to you. Skilful use of the Screened Grid Valve in the H.F. stage makes the set so selective that local interference is reduced to a minimum. A Pentode Valve in the output gives an amplification equal to two ordinary valves. The veriest tyro will find it simple to operate—a single switch starts operation, and commands wave ranges of 210-550 and 650-2,100 metres. Long range, exceptional selectivity, perfect tone, and extreme economy—those are the reasons why you should get a

**Burndept
SCREENED ETHOPHONE**

Price complete including royalty **£11.8.0**

or on generous Hire Purchase Terms

Write for specifications and particulars of Hire
Purchase Terms.

BURNDEPT WIRELESS (1928) LTD.,
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London Showrooms: Roxburghe House, 283, Regent St.,
W.1, and 15, Bedford St., Strand, W.C.2.

B.3

YOUR NEW SET.

(Continued from page 756.)



famous
the linen
double diaphragm
speaker

An illustration of Model U 14 at £5 5s.; it is worth ten if its price were assessed upon results.

**“does the
“Breakaway”
says
“Popular
Wireless”**

“The design of the ‘Air Chrome’ is a complete breakaway from the conventional” says a Popular Wireless Test Report. “The ‘Air Chrome’ has qualities that have hitherto been almost peculiar to the moving-coil class. Bass notes come through excellently, while the harmonic range is so well embraced that high notes retain their individuality. Speech is crisp and natural.”



**BRILLIANT IN
MUSIC AND SONG**

Every musician, every technician, every dealer acclaims that Air Chrome is the magic password to natural radio—gloriously brilliant in music, speech and song. The secret lies in its double linen diaphragm—an ingenious and patented principle developed to an incomparable height of electrical efficiency. Cabinet Models from £3 : 19 : 6; Chassis Types from £2 : 2 : 0.

**ULTRA
AIR CHROME
D.L.D. SPEAKER**

ULTRA ELECTRIC LIMITED,
661-663, Harrow Rd., London, N.W.10

Baldry Ad. U 110

and tries the arrangement for himself and forms his own judgment.

But I am getting away from the main subject, which is that of new sets in the concrete, rather than new inventions in the abstract. And the point I particularly want to make is that, while one must not ever expect to meet a set design that will remain indefinitely current in its class as a world-beater, there are receivers placed before you that will doubtless hold their own for very long periods. The “P.W.” “Magic” Three is a very good example.

It cannot be stressed too often that revolutionary discoveries and inventions which, in single strokes, render old existing apparatus obsolescent, if not obsolete, are so rare in radio as to be almost unknown. Certainly we have had remarkably few all told, and it may be that as wireless is now a stabilised science we shall have no more.

Rebuilding a Set.

More probably steady development will continue on the lines of the past year, which was remarkably free even from those periodic false alarms and academic wolf cries that haunted previous years.

A set grows old slowly; very slowly—so slowly, in fact, that only a trifle of titivating will keep it abreast of the times. The S.G. valve came, the Pentode arrived. I am using as a domestic outfit a four-valver, embodying neither of these things. But the time has come for that four-valver to be rebuilt. It will be a fairly extensive rebuilding, because panel wave-changing is to be included.

Would it be better to scrap the whole instrument and pick out the best of its component parts for inclusion in a totally new design? In my particular case, this won't be necessary, for with all due modesty, I have the knowledge to permit me to evolve out of the major portion of the original structure a design that will be quite new. The alteration will be extensive, but not such that will necessitate a new cabinet or anything else as drastic.

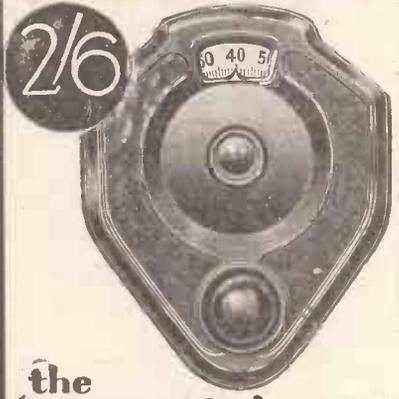
**IDENTIFYING
SHORT-WAVERS**

SHORT-WAVE stations are, as a rule, easier to identify than medium-wave stations. Short-wave stations which give their own programmes, generally announce in English as well as in their own language, but the difficulty is with the short-wave stations which only relay the programmes of medium and long-wave stations. Take, for instance, Zeesen on 31.38 metres.

This station rarely, if ever, announces in English, but the German call of this station is easily recognised by an Englishman as it is generally “Achtung, Berlin!” or “Achtung, Koenigswusterhausen,” whichever particular station is supplying the programme. Certainly, that last word is not so easily recognised, but a closer examination reveals

(Continued on page 760.)

Brownie



the
**“DOMINION”
Slow Motion Dial**

A VERNIER Dial at 2/6! Bring your set up-to-date by fitting this slow-motion dial. The mechanism is of special non-backlash construction which makes very fine tuning easy. Finished in smooth black or beautifully grained mahogany bakelite, this unique dial gives high-class finish to every set in which it is included.

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wireless

Nelson Street Works,
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BARGAINS!

Send stamp for list of Wireless Bargains and prices of **KLEER-KUT COILS** for “Magic” and other Sets.
L. BRUCE, 99, King Henry's Rd., LONDON, N.W.3.

CLEARING STOOKS

SURPLUS STEEL MASTS
AT BELOW PRICES TO CLEAR

26 ft.	STEEL MAST, tapering 1 1/2" to 1". Carriage. London, 1/6; Midlands, 2/6; Elsewhere, 3/6. Weighs 28 lbs.	8/-
34 ft.	Tapering 1 3/4" to 1". Carriage. London, 2/-; Midlands, 3/-; Elsewhere, 4/-. Weighs 40 lbs.	11/-
40 ft.	Tapering 1 1/2" to 1". Carriage. London, 2/6; Midlands, 3/6; Elsewhere, 4/6. Weighs 50 lbs. A super mast	16/6

OUTFIT WITH MAST. Mast rings, ample galvanised wire (cut to lengths), Pulley, Cleat, Solid Metal foot rest, and strong, galvanised stay fasteners. Note.—Our Masts are stayed at 4 ground points (not 3), which ensures safety. ACCESSORIES. Best Manila Rope Halyards (will not rot), 50 ft., 1/6. 100 ft., 2/6. Special Anti-rust paint (sufficient for Mast), 1/6; Coppered earthing tube, 1/9. Special Aerial. Has 14 strands of No. 28 gauge Enamelled high conductivity pure copper wire, 100 ft. 3/9. Money refunded if mast returned intact and carriage paid within 7 days.

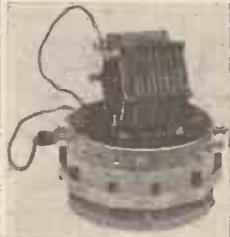
ADELAIDE STEEL TUBE Co., Ltd.
Kent House Road, Beckenham, Kent.

MAKE A GRAMOPHONE
Or buy Cabinets for Wireless at a quarter shop prices Order Set as shown. British double spring motor, 12" velvet turntable, swan arm, metal sound-box, amplifier, needle cups, for £1 18 6 p.p., and build your own Cabinet. Machines sold by others at £10-£20 do not contain better fittings. Motors from 9/6. Repair parts. Lists free. 64 pp. 1930 Catalogue Drawing From 2/6. Post 1/- and How to Make Gramos. 3d. REGENT FITTINGS CO. (P.W.), 120, Old St., London, E.C.1.

PLEASE MENTION “POPULAR WIRELESS” WHEN REPLYING TO ADVERTISEMENTS.

PAREX COMPONENTS FOR ALL

MAGIC SETS



- DIFFERENTIAL REACTION CONDENSER. Officially Approved 5/-
- NEUTRALISING CONDENSERS 5/-
- WIREWOUND RESISTOR 25,000 ohm. 2/6
- H.F. CHOKE - - - 3/6
- ALUMINIUM SCREEN - - - 2/-

TITAN COIL
GUARANTEED AND APPROVED **15/-** each.

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INVALUABLE TO EVERY AMATEUR & CONSTRUCTOR

"POPULAR WIRELESS" BLUE PRINTS

OF TESTED CIRCUITS 6d. EACH

"P.W." BLUE PRINT

- Number
1. DETECTOR VALVE WITH REACTION.
 2. OUT OF PRINT.
 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).
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 8. 1-VALVE REFLEX AND CRYSTAL DETECTOR (Employing H.F. Transformer, without Reaction).
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IDENTIFYING SHORT-WAVERS.

(Continued from page 758)

that it is only "Kurn-iggs-vooster-howsen." Perhaps the most easily recognised stations are the Americans. The General Electric group, W2XAD, W2XAF, W2XO, W2XK, W2XAC, etc., are especially clear in their announcing. During the regular programmes, there is a break after every few items with "There will now be a brief pause for station announcements."

Then you are told "This is station WGY of the General Electric Company at Schenectady, New York." Then, at lesser intervals, the short-wave stations themselves announce, "This is station W2XAD (W2XAF, W2XAC, W2XO or W2XK, as the case may be), of the General Electric Company, at Schenectady, New York, United States of America."

Repeated At Intervals.

This formula is repeated, almost without variation, at fairly frequent intervals throughout the whole of the programme. The frequency (or wave-length) of these stations is also sometimes announced via ether.

Station PCJ at Eindhoven, Holland, on 31.4 metres, is also, of course, easily recognised as they always announce in English as well as in several other languages. PHI, at Huizen, on 16.81 metres, does likewise.

THE CHANCE OF A LIFETIME!

BUILD THE "ECKERSLEY" THREE

Exclusive details in **MODERN WIRELESS**

Special Double Xmas Number. Price 1/6 Now on Sale. Price 1/6

PLE, at Java, Dutch East Indies (which, by the way, is coming over at splendid strength now, try for him on Wednesdays 12.40 to 2.40 mid-day), is also easily, recognised as announcements are made in Dutch, French, German and English, generally in that order.

Easily Recognised.

Pittsburg is not so easily recognised, as the other American stations, as they do not seem to announce so often, but at intervals, you will be told "This is station KDKA, Pittsburg, the World's Premier Broadcasting station."

3LO Melbourne, which is off the air at present, is very easily recognised, as the call-sign is repeated frequently.

Posen, Poland, announces as "Radio-Posnan," the word "Radio" being with the long "a" as in most other European languages. Announcements from this station are also sometimes made in French.

DOA, Döberitz, is another station very easy to recognise when one becomes used to the German pronunciation. DOA is pronounced "Day-oh-ah"

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W14. 4 volts C.T. 4 amp.

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Telephone: Clerkenwell 5312.

NORTHERN NOTES
FROM OUR SPECIAL CORRESPONDENT

THE welcome news comes from official quarters that listeners in the North may expect about 90 per cent of the broadcasting on one of the two wave-lengths radiated from the new Moorside Edge high-power station to be Northern material, produced in the North Region itself.

As I indicated in POPULAR WIRELESS recently, there has been a good deal of difference of opinion within the B.B.C. concerning the composition of the programmes for which this new high-power station is to provide transmission throughout the North of England and the North Midlands, and this announcement now clears the air very considerably.

Real Northern Channel.
At one time there was a danger that, with one wave-length devoted to programmes relayed from London and other non-Northern sources, the second wave-length would also be more or less centralised upon London, and might be grabbed, so far as they could, by the adult education enthusiasts. With 90 per cent of its material of Northern origin, however, the second wave will be a real Northern broadcasting channel.

The differences within the B.B.C. have been between those who desired this complete identification of the second wave with the North, and those who considered, not that there should be no Northern material, but that the proportion should be comparatively small. The reasons for this opposition to the further development of Northern programme activities has been mainly economic, as the expense of a distinct Northern wave will be heavy.

And now, the policy having been decided, the Northern programme officials are eagerly awaiting the completion of the transmitting station at Moorside Edge.

Their ambition is to interpret through that second wave something of all the activities, artistic events, and controversies of the North, to bring to Northern listeners the best of Northern talent, and always to bear in mind the taste and temperament of the Northern audience.

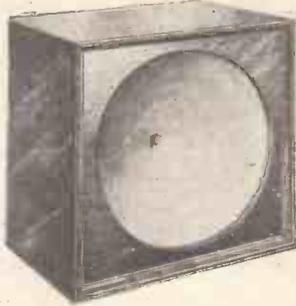
I am assured that it will be possible to give an artistic contrast, as well as this geographic alternative, between the two waves, so that when the "London" wave gives perhaps Chamber Music the Northern wave will give possibly a Military Band concert.

Coming Programmes.
The North Regional Director, in a recent talk through the Northern stations (which now consist of Manchester, Leeds-Bradford, Liverpool, Hull, Sheffield, Stoke and Newcastle), revealed the North Region's plans for programmes during the winter. Concerts by four of the most famous Northern orchestras will be heard on a number of occasions. They are the Hallé Orchestra, the Liverpool Philharmonic Orchestra, the Leeds Symphony Orchestra, and the Newcastle Philharmonic Orchestra.

(Continued on page 764.)

5/- BRINGS THIS SPEAKER TO YOU
DOWN. SEND FOR ONE TO-DAY. FOR ONE WEEK'S TRIAL.

Test it at your leisure against ANY Speaker at ANY price. We know it is the equal of any.



Talking won't convince you, but hearing - it on your set will. If you are not fully satisfied, pack it up and return it to us within a week, and your money and postage will be refunded. If you decide to keep it—remember your judgment is final—remit the balance, 30/-, or, if you prefer it, 2/6 a week for fourteen weeks, 40/- in all. C.O.D. 5/6.

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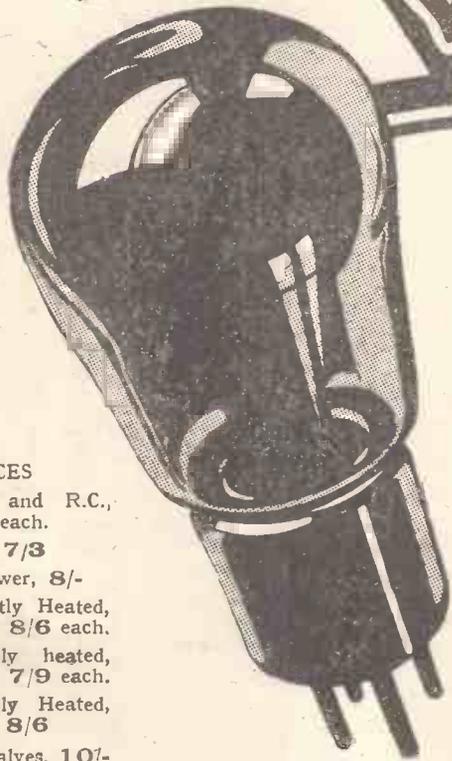
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Super Power, 8/-

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THE MODERN MODE IN HOME MUSIC



RADIO OR GRAMOPHONE MUSIC AT THE TOUCH OF A SWITCH!

The Instrument which converts your existing Radio Receiver into a modern Radio Gramophone

Specification: Garrard double spring motor with 127 Turntable, B.T.H. Pick-up, double balanced Armature Speaker, handsome Oak Cabinet, French polished antique finish. Height, 3'; width, 23"; depth, 17".

PRICE £12 19s. 6d.

The Adaptagram is also supplied as a complete Radio Gramophone, incorporating our famous 5-valve Screened Grid Receiver in the following models:—

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— SELF GENERATING —

Per doz.	No. 1.	No. 2.
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Jars (waxed)	1 3 1 6	
Bags	1 2 1 9	
Zincs	10 11	
Rubber Bands (24)	4	
Terminals	8 10	

Special sizes for Pentodes

LONG LIFE : SILENT : ECONOMICAL

Sample doz. (18 volts), complete with bands and electrolyte. No. 1, 4/1; No. 2, 5/-; post 9d., terminals extra. No. 3, with terminals, 7/6 (10,000 mill-amps), sample unit 6d. Orders 10/- carr. paid. New illustrated catalogue post free.

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86% OF OUR STUDENTS PASS AT FIRST

PLEASE be sure to mention "POPULAR WIRELESS" when communicating with Advertisers. THANKS!

NORTHERN NOTES.

(Continued from page 762.)

And, of course, the Northern Wireless Orchestra will not rest on its laurels. In lighter fare, special arrangements are to be made for a number of Northern dialect entertainers. On the dramatic side, a new series of plays of Northern life commenced on November 16th with Harold Brighthouse's Lancashire play, "Mary's John."

It is hoped that religious services will be relayed from the cathedrals of Carlisle, Durham, Newcastle, York, Chester, Bangor and Liverpool, as well as from certain Northern churches.

A Special Series.

In talks, there will be some interesting series. Professor C. H. Reilly, Professor of Architecture at Liverpool University, is giving a series on "Post-War Buildings in the North of England"; Professor Abercrombie on town-planning; Mr. W. P. Crozier, of the "Manchester Guardian," is to give a series of monthly talks on "How the North Moves," and the advent of Christmas will be enlivened by some Christmas stories of the North, to be given by various Northern authors on Fridays, starting on December 13th.

It is a curious fact that the absorption of Newcastle into the Northern Region was due to Brookman's Park. The second transmitter at the London Regional station is to broadcast on the wave-length used by Newcastle before it entered the Northern grouping.

When this wave-length was removed from Newcastle no other exclusive wave-length was available for the Newcastle transmitter, which had consequently to go on the common wave-length, 288.5 metres, which is shared by all the Northern stations except Manchester.

Experiments have shown that stations using the common wave-length and situated in the same district must send out the same programme, and it was therefore essential that Newcastle, on its new wave-length, should broadcast the same programme as the other Northern stations. Hence the absorption into the Northern Region, to whose group programmes Newcastle is contributing its quota.

Future Programmes.

As to the future, much depends on experience when Brookman's Park and Moorside Edge both get going with two programmes. It is probable that the Moorside Edge station will not provide an adequate service for the Newcastle area, in which case it is probable that the Newcastle transmitter will be given an exclusive wave-length again.

Whether Newcastle will then regain its programme individuality, or will remain in the Northern Region, will also depend on experience in the near future.

In any case, the studios at Newcastle will be retained, as also will those at Manchester and Leeds, although the studios in other Northern towns will probably be abandoned when the Moorside Edge station comes into full service.

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A WAVE-CHANGE
"BROOKMAN'S" REJECTOR**

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are easily installed by any amateur, and being of Polished Bakelite, with Highly Nickel Plated Covers, lend distinction to any room. Made for series or parallel wiring.

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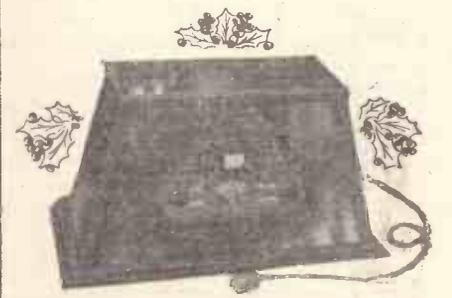


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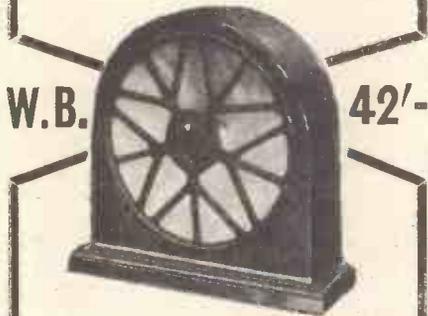
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DISCARDED DETECTORS.

How to Utilise Them for Up-to-Date Purposes.

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

THE junk box of every wireless amateur generally has hidden away in it at least two or three crystal detectors which, being no longer of any use to their owner, have thus been unceremoniously consigned to that storehouse of radio relics.

Such discarded articles, however, like many other old pieces of radio apparatus, have their uses for up-to-date purposes, and, with a little consideration, one may devise quite a number of interesting applications to which an old crystal detector, no matter whether it be of the cat's-whisker, perikon, or completely enclosed type, may be put.

Effective Arrester.

An old detector, for instance, is capable of serving as quite an effective lightning-arrester, should such an article be required



Fig. 1. An old Perikon detector used as a lightning-arrester.

in the home radio installation. The photograph shown at Fig. 1 gives an example of this type of use. The photograph shows the greater portion of an old perikon detector of the vertical type. The upper adjustable handle has been removed, but the ball-and-socket joint retained for the sake of convenience. The crystals have been removed from their cups and their places occupied by gramophone needles.

Included in the aerial circuit of the set, this gadget will serve well for a simple and easily-made form of lightning-arrester. It is also useful as a spark-gap for various radio and electrical experiments.

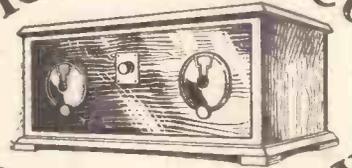
Many Uses.

There are many uses of a similar nature to which an old double crystal detector can be put, all such uses, of course, being based upon the high resistance of the rectifier unit.

Have you ever used a crystal detector as a grid leak? Some detectors are capable of providing very interesting low-resistance leaks for experimental purposes. One of these articles with which the writer experimented was extremely interesting. It consisted merely of the moulded case of an old and disused permanent detector. The

(Continued on next page.)

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LECTRO LINX LTD.,
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DISCARDED DETECTORS.

(Continued from previous page.)

crystals and detecting wires were removed, and several of the largest lumps of galena which it was possible to find were packed in their place. The cavity was subsequently filled up with wax, and the device formed a low-resistance grid leak with a value of rather less than a megohm.

Another method of making such an article is to fill up the moulded case of the detector with galena powder, ground up very finely, and then to seal it over with wax or with black composition from old flash-lamp batteries in order to keep the powder from falling out.

The disadvantage of this type of construction, however, is that unless the galena powder is very tightly compressed, it is inclined to shake about within the detector case, and so to alter the value of the resistance more or less continually.

Limiting Interference.

Readers who suffer from local interference in their reception—interference, for instance, such as is caused by the presence of nearby electrical apparatus—would do well to try the effect of placing one of the crystal resistances described above (or, in fact, even an ordinary crystal detector, without alteration) across the aerial and earth terminals of their sets. The idea being, of course, to endeavour to leak away to earth the interfering currents.



Fig. 2. Cat's-whisker type of detector in series with loud-speaker lead acts as tone control.

Such an experiment may be successful, or it may not. The result obtained all depends upon the nature of the receiver, the type of disturbance received, and also the aerial and earth arrangements which are provided. Still, however, the experiment is worth trying, not only with one detector or improvised crystal resistance placed across the aerial-earth terminals of the set, but also with two, or even more of these placed across the aerial-earth terminals of the receiver.

Finally, should you desire to work a small loud speaker off a powerful amplifier, break one of the speaker leads and place a crystal detector of one type or another (preferably adjustable) in series with the lead, as shown in the illustration, Fig. 2. In this manner, the distortion and blasting resulting from the over-loading of the loud speaker will be obviated, and, what is more, it will often be the case that a purity of tone better than that normally given by the speaker will be obtained.

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Bluespot Unit 65K, 25/-; Chassis, 12/6; Do. Major, 15/-; B.T.H. Chassis, 12/-; Unit, 15/-; Brown's Vee Unit, 25/-; Chassis, 15/-; Amplion Cone, 21/-; A.O. 40, £3; A.R.B. Born, 27/6; Celestion G10, 75/-; Marconi Octagon, 30/-; B.T.H. O.2, 37/6; Bluespot 49, £2-2-0.

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EXTRAS IF REQUIRED

L.T. 2 Volts, 8/6, 9/-, 10/6
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(OFFICIALLY APPROVED BY "POPULAR WIRELESS")



20 to 2,000 metres on this set.

Tremendous volume and superlative quality.

KIT OF PARTS.—18 x 7 Panel, .0005 Variable S.M. Dial, Reaction (Differential), L.T. Switch, 3 Sprung V.H., 2 Coil Sockets, 400-ohm M.B. Potentiometer, Neutrodyne B.B., Lewcos H.F. Choke (or R.I. Dual), Hypermu and Igranite "J" L.F., .0003 Fixed, 2 mfd., 2-meg. Leak and Holder, 25,000-ohm Wire-wound, 16 x 2 Strip, 10 Terminals, Wire, Screws, Baseboard, 16 x 7 Panel, Carriage and Packing, 2/- (U.K.). **79/6** Nett Cash

SET OF 40, 60x, 100, 250x, 10/- COILS

MULLARD VALVES 33/6 S; TRIOTRON 18/6 Set CABINETS 17/6. (Carr. 2/- on cabinet if not bought with parts)

SPECIAL! Kit of parts as above SPECIAL! Set of 4 Coils as above SPECIAL!!! 18 x 7 Cabinet as above

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Sir,—Thank you for set, etc., for which I am very proud; it is all I claim. I was extremely astonished; its merits are unequalled. Wishing your sets every future success, and thanking you again, I remain,
Yours sincerely,
(Signed) A. Wall.

From Francis Shaw, of Olney, Yorkshire, 9/11/29:—
We have received the wireless set in good condition. We are very satisfied with it, and thank you for the courtesy shown to us. I am yours faithfully,
(Signed) Francis Shaw.

From A. C. Morton, of Hartley Winney, 3/10/29:—
Dear Sir,—Have received wireless set, etc. (yesterday). I am more than pleased with same. It has surpassed my expectations, and you can be sure I shall recommend your firm in future to my friends. Yours truly,
(Signed) A. C. Morton.

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From Mr. Ivan J. Clark, Colchester, 6/11/29:—
Dear Sirs,—Thank you for the Magic 3 kit which arrived safely, and with which I am getting astonishing results. These notes were ordered from you by my brother. Yours truly,
(Signed) Ivan J. Clark.

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Kit.—Panel 14 x 7, .0005 S.M. Condenser, Differential Reaction, o/o Switch, 2 Sprung V.H., 2 B.B. Coil Holders, H.F. Choke, Lotus or Teisen Radiogram 12/6, 400-ohm B.B. Pot., Neutralising Condenser, .0003 and .0005 Fixed, 2-meg. and Holder, Strip, 10 Ter. **55/-** The minals, Wire, Screws, Clips, Flex, Plugs. **Lot Post 1/- Not C.O.D.**

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60-roll, 8/-; 100-volt, 13/-; 120-volt, 15/6; 100-volt Super, 21/-; 45-volt Super, 13/-.
As supplied to R.A.F., Cinemas, etc.
Lissen, Everready, and Siemens' Batteries stocked.
Postage 1/- extra.

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Lissen	12/6	Applion BA2	21/-
Ormond	12/6	Blue Spot	25/-
B.T.H.	15/-	Brown "Ves"	25/-
Trigon	17/6	Wates' Star	35/-
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Chassis for above units:

Ormond	7/6	Blue Spot 11"	12/6
B.T.H.	12/6	Blue Spot 14"	15/-
Watmel	12/6	Brown	15/-
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For 2 and 4-volt Accumulators ... 29/6
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SIZE: 34 in. high x 22 in. wide x 16 in. deep.
QUOTATIONS GIVEN FOR OTHER SIZES.
Deliv. 7-10 days.

A COIL MOUNTING HINT.

ON short-wave receivers utilising ordinary plug-in short-wave coils it is the increasing practice to fix the baseboard aerial coil holder by one screw, allowing it to be moved to vary the coupling between the aerial and the grid or reaction coil. This enables "flat spots" on the tuning condenser to be obviated, and is more efficient than putting a condenser in the aerial lead.

When removing coils, special care has to be taken owing to the fact that, fixed to one side only, the holder is likely to be pulled from the baseboard or the screw-hole broken. Also the coil is not always in line with the others when in a swivelling holder, as the one screw tends to pull the holder to one side.

If a piece of celluloid, mica or similar insulating material is cut in a semicircular shape and fixed, with screws, to the baseboard over the unscrewed leg of the coil-holder the coil may still be swung round, but the holder is as firm as when fixed with two screws.

WE SHALL HAVE EARS LIKE RABBITS.

(Continued from page 714.)

Did our patient laugh? He did not. Not so much as a ghostly smile—the sort which is put on when the host's little boy makes one of his "funny remarks" and one feels called upon to do something appropriate.

His eyes wore a solemn expression, the same that had hovered over them during the working hours of the day. The ludicrous appearance of his friend passed right over him without having the slightest effect. Such a peculiarity caused considerable comment in the office, and soon it began to be remarked upon at home also.

When his family and friends compared notes they could no longer doubt that his eyes had altogether lost their sense of humour. He could see quite satisfactorily; none of the details escaped him, but to him they no longer seemed funny.

... "Grew Swiftly Worse"

As time went on his state grew swiftly worse. His ears became more and more rabbit-like, and when he smiled it was only around them that his face changed. His eyes were always sad and preoccupied, no laughter ever reached them. In time, too, they seemed to recede into his head. In some moods the pupils were almost invisible, and heavy lines marked the upper part of his face, in strong contrast to the neighbourhood of his ears, which was bathed in a long continuous smile.

As his ears reached higher and higher he was compelled to have his hats made to measure, with special holes in them through which to thread his ears. And the steady disappearance of his eyes made it imperative for him to wear huge lenses of terrifying focal length. So immense were they that—

And that, dear friends, concludes to-day's fable.

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TECHNICAL NOTES.

(Continued from page 712.)

conditions in which it was used, said a great deal for the high quality of these accumulators

A.C. Valve Pointers.

Now that A.C. valves are becoming increasingly popular, a number of step-down transformers for heating the filaments of these valves are making their appearance on the market. It is necessary, however, to exercise more than ordinary care in the selection of a filament-heating transformer, as an unsuitable one may lead not only to unsatisfactory results, but actually to the damage or destruction of your A.C. valves. As you know, indirectly heated A.C. valves are now standardised with the 4-volt heater, and it is very important that the voltage applied to it should be as near as possible to this figure. If the voltage appreciably exceeds 4 volts, the over-running of the heater will be liable to cause damage and, in any case, will mean inefficient operation of the valve.

If the voltage is much below 4 volts (about 3½ volts being the lower limit), whilst the heater will not be damaged, the valve will not operate correctly.

Load and Output.

You will see from this the desirability of using a filament-heating transformer which will maintain its low-tension output voltage reasonably near to the rated value, even with very various loads. For example, you may sometimes be using only one valve, whilst in another case you may be using several valves with the same transformer.

With a properly-designed transformer the output-voltage should be nearly independent of the load over a reasonable range. The property of a transformer in virtue of which it maintains its output voltage with varying load is known as "regulation."

A transformer in which the regulation is good will consume practically no energy in the primary when there is no load on the secondary, and as the load on the secondary is increased the energy-consumption in the primary will, of course, increase correspondingly, but the output voltage will remain constant, or nearly so.

In large transformers, as used in power stations and so on, the regulation is often extremely good; but with very small transformers, such as the filament transformer which we are considering, it becomes increasingly difficult to design the transformer so that the regulation will be really good.

Good Regulation.

I had an opportunity recently of examining the new Philips' filament transformer, and in this instrument the designers have certainly succeeded in securing remarkably good regulation for so small a transformer.

This unit is designed to give the necessary 4-volt output, and it maintains this output voltage even with heavy loads on the secondary. If you are using several valves, and you should switch off one or more of them, you need not, therefore, fear that an excessive voltage is going to be thrown upon the remainder.

Inasmuch as the resistance in the 'filament'

(Continued on next page.)



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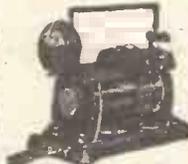
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TECHNICAL NOTES.

(Continued from previous page.)

circuit (that is, the resistance of the filaments and the resistance of the transformer secondary) is comparatively small, it is important to remember that any other resistances which may be included in the circuit must also be very small, or else they will dominate the existing resistance of the circuit as a whole. This point should be borne in mind with regard to the leads or other conductors which are used in the filament circuit.

A Loud-Speaker Trouble.

A reader wants to know how to cure the reedy noise in his loud speaker; this, he says, "keeps on re-appearing on certain fairly high notes and certain types of speech that sound like a tinny 'eek' and rather high-pitched."

This may be due to two or three different causes; it may possibly have something to do with the amplifier (question of grid-bias and so on) although I think it much more likely, from the description, that it is an actual mechanical fault in the loud speaker itself.

Assuming it to be in the loud speaker, it is probably due either to the diaphragm being too close to the pole-pieces (a matter which is very simply remedied by means of the adjusting knob) or to the diaphragm being improperly seated at its edge; I am referring here to the ordinary type of loud-speaker unit.

If, however, the loud speaker is of the reed type, or if the armature is connected to a cone diaphragm, it is possible that the driving pin is not properly tightened up either at the armature end or at the end which fits the centre of the cone diaphragm.

Imperfect Cones.

A further possible cause, with a cone diaphragm, is some bulge or other irregularity in the diaphragm itself. If the cone has been damaged in any way or has not been properly made in the first instance and suitably stiffened, you will often find that some small part of the cone is free to vibrate on its own account.

Being of small area this little patch will probably have a natural-vibration-frequency rather high. When different frequencies are passed into the cone, one particular frequency may be picked out and reinforced in the way described.

We understand from Messrs. Ready Radio that new and large stocks of condensers suitable for the "Brookman's" Rejector are now available. These condensers—known as "Brookman's" condensers—are quite suitable for the Rejector. They call for a slightly different method of mounting, and it is suggested that the terminal strip be increased in size to form a small panel upon which they can be mounted direct. Details will be found elsewhere in our advertisement pages.

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A RAPID GUIDE TO RADIO

A JUMPING-OFF SERIES FOR THE NEW AMATEUR

By "Pentode"



NO doubt, quite a number of you have wondered how the current of electricity could dash backwards and forwards about one of the circuits I included in my article last week. This circuit had in series with it a variable condenser which can be described as consisting of two sets of metal plates separated from each other by air.

If the current were the sort that you get from a battery, a condenser would constitute an obstacle that would completely prevent current flow.

In Fig. 1 you see a condenser joined in series with a battery. The condenser is merely a break in the circuit; the complete metallic path is interrupted. However, the current that is rushing about in the aerial is not direct current but alternating current of very high frequency. It changes its direction with extreme rapidity.

Condensers In Series.

And it "gets through" the condenser in that way. The component is "charged" or filled with energy every time the current rises to its maximum in the one direction. It fills up when it is connected to a battery, but in this case it remains filled and there is no subsequent current flow.

With the A.C. the reversal of the current has the effect of first permitting the condenser to discharge itself, and then it fills again with the voltage across it reversed. The one set of plates were first negative and then positive.

It is an important point that wherever there is a negative charge of electricity there must be a corresponding positive charge. Remember, a "negative charge" merely indicates that something has more electrons than something else. Then there is an attempted flow of electrons from the one point to the other to stabilise matters. This I fully explained in the Chat About Batteries.

Now you will be able to see how a number of condensers in series communicate electron activity.

Supposing we connected three condensers in series in a circuit in which there was A.C. (alternating current), as in Fig. 2.

Electron Instability.

When the one plate (or set of plates) of condenser A were positive, the one plate of condenser C would be negative—there would be the difference of potential between that is necessary for a current flow. The one plate of condenser A has a deficiency of electrons, and the electrons on its other

plate would endeavour to get across the gap to make up this shortage.

And electrons from the plate marked + of condenser B would rush along the connecting wire to assist. This would make this plate of B deficient in regard to its other plate, and the electrons in this would endeavour to get across and make up this new shortage.

A "Breakdown."

The same thing would happen in condenser C, so that you see that no matter how many condensers there were joined in a chain, electron activity could be communicated to them all. Once you get

Although this series of "how it works" articles is in itself quite complete, readers will find it interesting and instructive to examine the "Close-ups for Constructors" feature overleaf after reading each week's instalment. Here they will see, every now and then, the various component parts referred to and may frequently trace their circuit connections.

(9) MORE ABOUT CONDENSERS.

the true meaning of positive and negative into your head many things that were hitherto mysterious to you will prove to be quite easy to understand.

At least, I hope you will now see how electron activity can chase through fixed and variable condensers without the necessity for an actual flow of electrons from the one plate of a condenser to another across the air, mica, or whatever constitutes the dielectric. Of course, if there is a tremendous shortage of electrons on the one plate or set of plates of a condenser it may happen that the dielectric ceases to act as an insulator. Then there is what is known as a "breakdown," the dielectric is punctured and current flows through it, making a spark as it does so.

Where Care Is Necessary.

You have to see your condenser is built so that it can handle its electron shortages without this happening, especially if the condenser is used in an electric-power-mains radio device.

But we must get back to our tuning. I have said that by arranging our coils and condenser to have certain values of inductance and capacity we can tune our aerial system to receive any one particular wave-length.

Well, here is the formulæ, if you want to juggle with it, although it is not a formulæ many amateurs seem to bother about:

$$\text{Wave-length (in Metres)} = 1885 \sqrt{\frac{\text{Inductance (in Mhs.)} \times \text{Capacity (in Mfds.)}}{}}$$

Now the capacity of the average aerial (without any added condenser) will be about .0003 mfd., but its inductance will be only a few mhs., and these we don't generally

worry much about, as the coil you will use to tune in your local station will have an inductance of some two hundred or so microhenries.

In regard to the actual aerial wire and its accompanying earth connection, capacity is the only tuning factor that materially matters, except in very short-wave tuning.

Let us do a little calculating; it's good for the mind! Supposing we have a coil of 200 microhenries inductance and a variable condenser having a maximum capacity of .0005 mfd. and a minimum capacity of .00005 mfd.

The condenser is joined across the coil for tuning an aerial which contributes .0003 mfd. of capacity.

A Little Calculation.

We won't worry about the inductance of the aerial. The total inductance, we are going to assume, is 200 mhs.; no, let us be precise in this case and say the aerial has an inductance of 16 microhenries (this is an average figure), and that our total inductance (aerial plus coil in series) is 216 microhenries.

We can vary the capacity from .00035 mfd. up to .0008 mfd. What wave-length range can we cover?

Our minimum wave-length will be $1885 \sqrt{216 \times .00035}$ metres and our maximum will be $1885 \sqrt{216 \times .0008}$ metres, and we can smoothly tune in any wave-length between.

Well, that is O.K. as far as it goes, but the figures have not yet been wrestled with; although, if you cannot tackle roots, it doesn't matter, for you seldom meet them in practical radio.

And The Results.

216 multiplied by .00035 is .075, and the square root of .075 is approximately .27. Multiplying .27 by 1885 we get 509 as our minimum wave-length.

216, multiplied by .0008, is .1728. And the square root of .1728 is approximately .42. Then, if we multiply .42 by 1885, we arrive at 791.7 metres as our maximum wave-length.

I hope you are able to follow this rather rough-and-ready figuring. Anyway, the result is plain—the tuning range of the components and aerial in question is 509 to 791.7 metres. Not a very useful wave-band, by the way—it leaves out 2 L O and even 5 G B! A slightly smaller coil would be necessary for them.

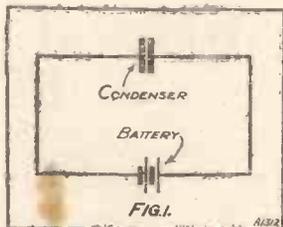


FIG. 1.

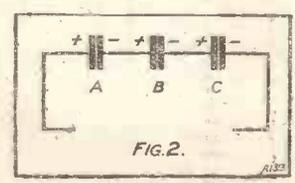
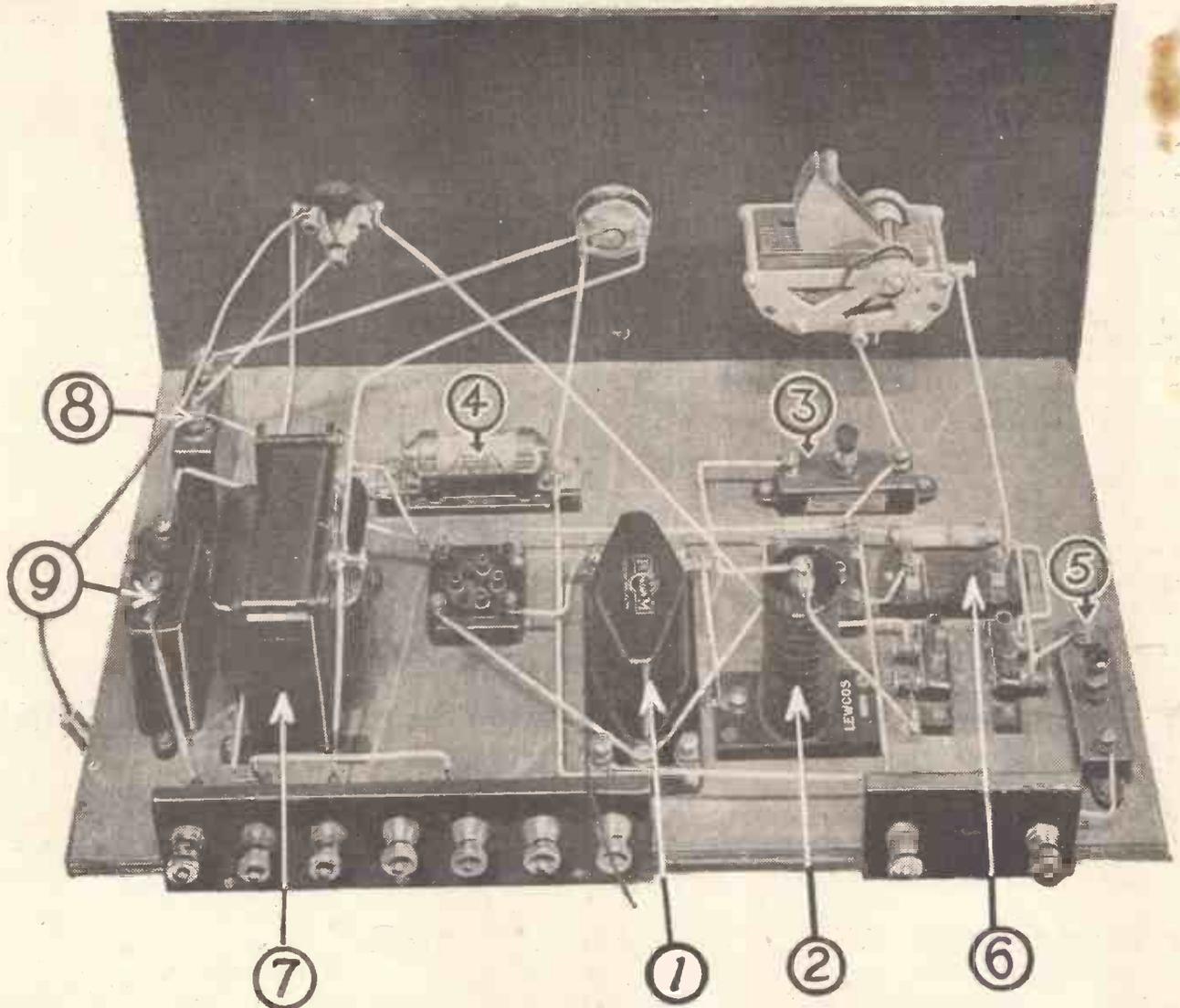


FIG. 2.

CLOSE-UPS FOR CONSTRUCTORS.

THE NINTH OF A PICTORIAL SERIES FOR SET BUILDERS.



THE L.F. transformer, which, in the above two-valve set, can be seen at (1) is a vital component. Also, it is a remarkably interesting one. Of course, all the parts figuring in any set are of importance, and, you might even say, of equal importance.

But there are degrees in the harm inferior components of different kinds can do. The L.F. transformer is a link in the chain whose weakness, if any, can evince itself in two ways. It can affect both the sensitivity and the quality of reproduction.

The transformer used in this particular set is of most up-to-date design. Its compactness is striking, when it is remembered that only a year or two ago the size and weight of an L.F. transformer was accepted as some indication of its efficiency. If it were very light and very small one used to think "well, this cannot be much good, because its windings will be small and its core tiny."

These New L.F. Transformers.

But the L.F. transformer shown in the photo, despite its comparative smallness, is far superior to those earlier transformers of the bulkier kind. Mere bulk is not now reckoned as a virtue or as implying virtues.

These new transformers have cores built of special alloys of great magnetic permeability, and their windings are arranged so that altogether a wonderfully even amplification is possible.

It will be noted that the transformer is completely enclosed within a metal casing. This both protects its windings and reduces the

possibility of coupling effects occurring between it and any other component.

The H.F. choke, indicated at (2), is of special construction conforming with certain modern requirements. You will be able to see that the winding is carried in slots. The reason for this is that if the winding were not sectionalised unwanted capacity would creep in to reduce the effectiveness of the device.

Compression Type Variable Condensers.

This particular H.F. choke has a very high order of efficiency, and can deal with a wide band of frequencies.

There are two "compression" type variable condensers in this set (3) and (5). You will remember that these figure in the famous "Brookman's" Rejector.

In one case the compression variable is connected in series with the aerial (5), and this provides a variable degree of selectivity. It is a considerable improvement over a fixed condenser for the purpose, and costs but little more.

The component marked (4) is a wire-wound resistance. The advantages of wire winding are that, generally speaking, greater current can be carried, and that there is a constancy of resistance. The disadvantage may be an introduction of unwanted capacity and inductance in any but a good make.

At (6) is a grid leak and condenser. The larger object is not a holder for the grid leak in this case, (7) is an L.F. choke, and (8) and (9) are fixed condensers.

Lifelike as your own piano-

Your ears cheat your eyes, so vivid is the reproduction of a Mullard Speaker. As you listen enthralled to the serene melody of a Chopin nocturne, the artist seems to take shape before your eyes, his hands moving dreamily over the keyboard of your own piano. An exaggeration you say? . . . but you will alter your opinion when you hear a Mullard Speaker. Its perfect tonal reproduction and wonderful interpretation of touch and technique will convince you as it has already convinced a thousand other sceptics. You will agree that Mullard Speakers make Radio ring true!

Model 'H' Type Speaker, PRICE £6 6 0
Model 'C' Type Speaker, PRICE £2 10 0

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The Stands provided are also of exquisitely grained Walnut or Mahogany, designed and finished to match the cabinet. They are fitted with one drawer and shelf.
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Its selectivity is guaranteed to satisfy the most exacting radio connoisseur—"impossible to tune to any part of the dial without encountering a station" says the "Wireless World" test report of Aug. 21st.

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