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No. 428. Vol. XVII.

INCORPORATING "WIRELESS"

August 16th, 1930.

## SPECIAL NUMBER COUPLING DEVICES



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SEPARATING THE STAGES. QUALITY QUERIES

THE SET OF THE FUTURE

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

THE B.B.C. TO-DAY.

MORE ABOUT THE "A.P." TWO

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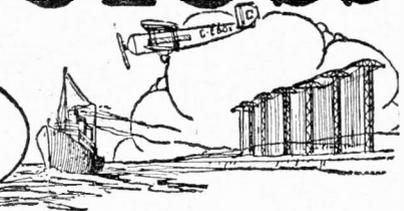
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# Popular Wireless



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NO ESCAPE—  
 THE "SCOT'S" TWO—  
 TOURISTS' TAXES—  
 HEEL OF ACHILLES—

## RADIO NOTES & NEWS

NEW FRENCH STATION—  
 TOPPING UP—  
 PLUGGING-IN AND ON—  
 MORE THEORY—

**Portable Aboard.**  
 TWO adventurous friends of mine went to the Broads for a few weeks' residence on a motor-boat. They issue a note about the portable receiver used as a marine appliance.

Don't take it unless you are prepared to employ a master stevedore constantly to "trim ship." Shift it two inches from metacentre and all the crockery in the cuddy can be heard avalanching! Move the suitcases to get at the petrol, and the craft takes a list to Norwich or Yarmouth. Before one of you goes ashore for "gaspers" or milk, everything must be re-balanced.

The whole thing depends, however, on the relative proportions of boat and receiver. I am writing of a boat which in a good light can be seen to be the larger.

### No Escape.

A PROFESSOR at Cornell University, U.S.A., has demonstrated an apparatus which, he says, will enable the deaf to hear with their teeth. He appears to have directed his inventive genius in this direction so that not even the afflicted may escape radio and the talkies.

Nay, he goes further, and claims, doubtless with a fiendish chuckle, that his little plaything will render audible sounds which can hardly be heard by a person with normal ears. I think that he ought to pull himself up and think of the Hereafter!

### The "Scot's" Two.

THIS is a new set, details of which have been communicated to us by M.H.M. of Edinburgh. As will be seen, M.H.M.'s claim that "The Economy" Three hasn't an earthly with this, is fully justified. All you need is: "One coil (size immaterial), two valves, one transformer, 0-003 fixed condenser, a 2-meg. grid-leak, 60-volts H.T. and a 10-ft. length of flex stretched across the room."

Our friend naively adds "Of course reception was from the local station only. We are roughly two miles away." The diagram shows that the transformer has a core! Man, ye can't afford a luxury like that! And why be so free with the coil? Look! Make it a wee sma' yin!

### To All Concerned.

THIS is a note for J. N. (Durham) and readers in general. Much as I appreciate the bloodhound keenness with which you all follow my Notes, it is not possible for me to discuss jokes

## THE PROGRESS OF POPULAR WIRELESS

Largest Circulation of any Wireless Journal

For some time past the displayed headline on our front cover has been "Highest Radio Circulation in the World."

This claim is amply justified by the following net sales certificate just issued by our Auditors for the first six months of the current year.

As the pioneer of popular broadcasting journals, "Popular Wireless" has never looked back, having held the confidence of a large army of regular readers and advertisers.

Below we print a copy of the Certificate we have received from our Auditors:

3, Frederick's Place, Old Jewry, London, E.C.2.  
 30th July, 1930.

To the Chairman and Directors of The Amalgamated Press, Ltd., Fleetway House, E.C.4.

Gentlemen,—We have examined the books of the Company, and certify that the average net sales of "Popular Wireless" for the six months ended 30th June, 1930 (after deducting all unsold copies during that period, and exclusive of free and voucher copies), were 110,377 copies per issue.

We are, Gentlemen, Yours faithfully,  
 (Signed) Price, Waterhouse and Co.

Our readers will be interested to know that our Autumn and Winter plans are now well in hand, and that we have many interesting features in preparation which will attract wide attention among amateurs during the forthcoming months.

The first issue of the "Popular Wireless" special Exhibition Numbers will be actually on sale September 18th, and the succeeding two issues will also be devoted to a comprehensive and pictorial review of the Exhibition at Olympia.

Readers should keep a look-out for these special numbers, which will prove an invaluable guide to all the leading Stands at Olympia.

POPULAR WIRELESS  
 NET SALES  
 110,377  
 COPIES PER ISSUE

cracked a month ago. The squib either goes bang or is best forgotten! I have most human weaknesses, but I never explain the joke in a joke. However, J. N., between you and me and the "poste"—you are correct.

### The G.E.C. Works—and Plays!

THE spirit of Ariel flew to Coventry and hovered over the 150 acres estate full of nice houses and gardens which the G.E.C. rents to its staff. Then it swooped down and entered the works just in time for a demonstration of the "Osram Music Magnet Four," a fine set which is almost capable of building itself.

A run round the works followed, a fascinating experience because everything is done in the modern way. When I recall some of the dingy, ill-lighted, soul-destroying holes in which I spent some of my shining youth I feel that the world is progressing!

### Real Welfare.

BUT the most pleasant sight was that of the playing fields, tennis courts, and golf course, all of which are run by the employees themselves, in their own way, for themselves. Too often I have seen this sort of thing spoiled by managerial interference from behind the arras and I am glad to learn that at Coventry this flaw does not exist: the G.E.C., in common with many other large firms, has grasped the fact that welfare work is doomed to failure, and can be positively harmful, if it robs the subjects of their natural sense of independence as human individuals.

A fine firm and lucky workpeople!

### Interesting Event.

ALTHOUGH this is not a society page, in the "social" sense of the word, it seems a fitting page to record the advent of Miss Maria Elettra Helena Marconi, the daughter of the Marchese Marconi and his Marchesa, the former Countess Bezzi-Seali. Congratulations to all three of them.

The little lady is lucky to have such an interesting and distinguished papa, although no doubt she is at the present time far more attracted to her little toes. Her god-mother is Queen Helena of Italy and she was baptised on July 30th at the Odescalchi Palace at Civita Vecchia, with sixty airplanes flying overhead!

(Continued on next page.)

## RADIO NOTES AND NEWS.

(Continued from previous page.)

## Taxes on Radio Sets of Tourists.

YOU will bear in mind, of course, that the transport of a radio set into certain European countries for a holiday will cost you gold dust. Talk about safe-guarding! These people certainly look after jolly old No. 1.

Spain charges about half-a-crown for every 2½ lb., which she does not hand back when the set is repatriated. And one has to take out a licence! Belgium, 12 francs for every few pounds, and France 22 per cent. on each set plus 6 per cent. if they are valued more than 700 francs and the loudspeaker is worth more than thirty shillings or so.

## The Heel of Achilles.

JUST as an example of how pride goeth before a fall I may confess that a few days after boasting how promptly I had renewed my radio licence, I was heavily sat on by a tax collector's sleuth who discovered that my dog licence was about as useful as Old Moore's Almanack for 1927. A fair cop! And I went quietly. Drat that mongrel! He's such a part of the place that we take him for granted!

## The Reverse Case.

I WAS, however, luckier than M. Jules Gaillard, who was fined at Liverpool for using his radio set without a licence. According to the report which I received he said that his offence was deliberately committed as a protest against the B.B.C., because he had broadcast for 400 hours and they had not even thanked him. The magistrates thereupon remarked that such a protest was "like not taking out a dog licence because you have been swindled over the dog."

M. Gaillard's complaint is astonishing, but he ought not to forget that he had a splendid advertisement for his orchestra—at the low rate of £2 and £3 3s. costs!

## Another French Station.

IT is reported from Paris that a company has been formed for exploiting a radio broadcasting station under the auspices of Branly, the famous scientist, to whom is generally attributed the invention of the coherer.

It is proposed to build the station some sixty miles from Paris, though it will be connected with a studio in Paris. The station as at present planned will be of 12 kw. (antenna) power, and will emit short and ultra-short waves. By the way, I learn that the new Radio Paris is shortly to begin its trials.

## This "Topping Up."

A DEADLY silence in answer to my question about what it is you are afraid of in ordinary tap-water, that you so religiously use distilled, is at last broken by J. D. M. (Scaford), who suggests that any calcium carbonates (chalk, etc.) present would be converted to calcium sulphate and "probably be deposited on the plates of the accumulator and thus impede its action." As a theory that is fairish—fairish, friend!—though "probably" rather spoils it. However, I have no doubt that a veneer of calcium sulphate would upset the plates, though you do not mention

what is more important, namely, the neutralisation of some of the acid. But what are the facts?

## Why Buy Distilled?

PICKING at random an analysis of ordinary water I found that chalk, etc., was present to the extent of 0.09 gramme per litre. Let us say, therefore, merely for argument's sake, that in "topping up" you use 50 cubic centimetres of water and that you "top up" twice a year. By the end of twelve months you will have put the enormous quantity of 0.009 gramme of calcium carbonate into your cell. In ten years you will have added no less than 0.09 gramme; *nine hundredths of a gramme in ten years.*

That is, unless you have changed your electrolyte once or twice during that period, in which case you probably have got rid of most of the calcium sulphate, too.

## SHORT WAVES.

## MONEY'S WORTH.

How to make sure of getting full value for ten shillings a year disbursed.

News comes of an agriculturist who is using his wireless loud-speaker set as a scare-crow, with satisfactory results.—"Birmingham Gazette."

"If we get loud speakers installed everywhere, the sound of the genuine human voice will become quite rare and refreshing by contrast," we read in the "Daily Mirror."

It is rumoured that radio announcers have taken considerable exception to this summary dismissal from the human race.

Gramophone Contest. Should attract a record entry.—"Daily Mirror."

"American multi-millionaire shoots himself while listening-in," runs a headline.

Well, we've always considered the English programmes bad enough.

At the last moment one of an orchestra which was going to broadcast from a Continental station fell ill. A substitute was found and the broadcast began. The music was futuristic, but the substitute player struggled bravely along. In an interval, the player next to him whispered:

"The 'Aeroplane Suite' next."  
"Oh, my hat!" said the substitute.  
"I've just played that one."  
"It doesn't matter," said his friend.  
"Listeners will never know the difference."  
—"Wireless Weekly."

A scientist states that in a hundred years' time people will be picking up the wireless programmes that are being broadcast to-day. And yet some people still persist in going in for rejuvenation treatment.—"Humorist."

## A New Rectifier.

WE have received from its inventor, Mr. Hakon Rosenkilde, of Copenhagen, a letter about a new form of rectifier for which he makes some interesting and important claims. Owing to the patent aspect of the matter he is unable at present to give us a detailed description, but he tells us that it works on an electro-magnetic principle and is everlasting; that is, it has no part which, like the filament of a lamp, is consumable. Mr. Rosenkilde is of opinion that A.C. mains eliminators made on his plan will probably cost about £3; and, in addition, they will involve no renewal expenses.

## Some Big Claims.

IT is stated that this new device gives half-wave rectification and is so effective that very little smoothing is required in order to get rid of A.C. hum. It has no

polarity. Connect your accumulator to it for charging and the rectifier looks after the polarity for you.

If these various claims are fully supported by performance it would seem that here is something new, and we await with much interest the publication of the details concerning it. I hope that Mr. Rosenkilde will let us into his secret as soon as it is protected.

## Plugging In and On.

H. B. (Dowlais) wants to know how to arrange to have the loud speaker on a plug by means of which the set can be switched on and off, instead of having a switch. The usual stunt is to join the L.S. leads to a plug. The jack must have four contacts, two of which are to be inserted in the filament lead (in place of a switch) so that the insertion of the plug closes these contacts and "makes" the L.T. circuit. The remaining two contacts must be connected, one to H.T. (positive) and one to the plate of the last valve.

## A Little Theory.

A CONTRIBUTOR to the "North Western Daily Mail" alleges as follows: "High-frequency currents are not like ordinary electrical currents—they are far more penetrating." Well, well! It is still taught by professors of electrical engineering that H.F. currents are not so penetrating—I use the word because the "N. W. D. M." does, not because it is happily chosen—not so penetrating as direct current; but now the "skin effect" is in danger! No longer are we to believe that the H.F. current in a conductor confines itself to a thin outer layer! Eh?

## More Theory.

THIS conclusion would be startling but for the fact that the exponent continues, "A small frame aerial, standing in the middle of a room, will receive currents that have penetrated the house—and perhaps a row of houses—to get at it." This proverb clearly shows that we may stick to the "skin effect" belief undisturbed, because its attacker is not qualified for the job. H.F. currents cannot be trained to bore through rows of houses in search of frame aeriels. If the "N. W. D. M.'s" expert thinks that radio communication is effected by means of H.F. bloodhounds or moles, and that H.F. currents are radiated by the B.B.C. he is evidently not clear as to the difference between H.F. currents and electro-magnetic waves.

## Ship to Airplane—8,000 Miles.

THE most remarkable "hook-up" to date is the chain of connections by means of which an airplane flying 3,500 ft. above Buenos Aires spoke by wireless telephony to the steamer "Majestic" which was 400 miles from England, bound east. It was a two-way communication! The chain consisted of the Buenos Aires radio station, the Madrid radio station, the Spanish telephone lines, the French Government's land-line and submarine cable, the cable across (or below) the Channel, land-line to Rugby; from Rugby connection was made with the "Majestic" by the Post Office shore-to-ship radio station. A few minutes with an atlas will show you what a wonderful bit of work that was.

ARIEL.

# THE SET of the FUTURE

by

CAPT. P.P.ECKERSLEY, M.I.E.E.



choice of programme *per se*, and the use of long waves for the reasons given in (a) and (b) should do no more, in general, than extend *local* service areas. It will, in fact, not make distant listening more possible.

Thus it looks as if some other way will have to be found to give the needful variety to the "Morris of the Ether." Of course, my Regional Scheme was designed with all these points in mind, and gives a possibility of variety. But it is a possibility only, so far.

The Regional Scheme is, to my mind, so far largely a failure because of the apparent inability of the B.B.C. to attack the root problem of giving us a *choice*, between programmes. Their policy, if there is one, is to give just the power of selection between two similar things.

### Dodging the Duds!

Most people therefore use the Regional Scheme rather as a convenience to avoid items they don't like than as a stimulus to picking the programme they do.

Mr. Compton Mackenzie, who usually has something quite useful to say about broadcasting, now comes out with the startling statement that the greater choice of programmes makes him disinclined to listen. (At least, so I read in my paper that found me "somewhere in France.") Perhaps the continuation of output of books from one author's pen makes one less and less inclined to read that author, but a good library of books should not disincline one to choose and to read.

If, of course, the books are all the same type and all mediocre, even though by different authors, one is driven away from reading. That, I think, must have been the basis of Mr. Mackenzie's thought, as it is of mine. A mere choice of similar things is a

(Continued on page 630.)

\*-----\*

**Radio reflections on the part of our cheery Radio-Consultant-in-Chief subsequent to a holiday tour in France.**

\*-----\*

I HAVE been spending a holiday in France, in all France, from North to South, from East to West. There has been little of wireless to stimulate a thought, little of "shop" to make one say this or that.

I have been lost with astonishment at the exhibitionism of my compatriots abroad. I have also been lost with astonishment at the quality of the wireless sets I have heard, *parlout*.

One of the most advertised sets, advertised in England as much as in Europe, gives a rasping, horrible snarl, and the more ambitious home-made (or almost) are incredible. But, honestly, incredible!

### Question of Quality.

Why is it, I ask myself, when so much is known about the subject, that everyone who goes into it in a small or big way, seems to have to study it from the beginning experimentally, inflicting his researches on the wretched public?

In my life, at any rate, there are about twenty people whom I know personally and respect technically, who do really understand about quality; what it sounds like and how to get it. In the shops I go into which sell wireless I must say the standard is much higher than it used to be, and much higher, as far as my observation extends, in Britain than in the rest of Europe.

Nevertheless, the standard is comparatively poor. As to private houses, my chief observation in Britain is that unless there is someone fairly keen the set simply does not work. This is particularly true of the old *du* sets, and is still true, except where there are mains-driven sets.

### Wanted—A Form of Radio!

It seems then that knowledge of what to do exists, but that that knowledge has as yet had no large-scale application for the general public. This seems even truer abroad than in England, because I have observed also that in Germany the quality—to my ears at any rate—is generally inferior. Price, on the other hand, is far lower than in England.

What is going to be done to market a cheap set having a reasonable performance? Who is going to do for wireless what both Ford and Morris did for motoring? What is a satisfactory performance in a wireless set?

I expect the few, or the many, who read my articles know that I am on the whole

dissatisfied with an evolution which depends upon distant listening. I have always held that the programme ultimately counts; that a continued interest in wireless comes through what is heard and not in the mechanism by which it is heard.

Thus the imperfections of distant listening as they are more perceptible are more likely to destroy fundamental interest. Variety in listening is certainly a *sine qua non*. Choice of programme seems essential.

That choice must be forthcoming, but differently from to-day. The cheap set of the future must give that choice. How it is to do so remains to be seen. There are very big problems to surmount, as:

(a) Even though the European long-wave stations give a greater possibility for distant listening, they give worthless service in large towns due to electrical appliances.

(b) The set of the future must use the mains, and as the mains extend so will the mains background noise.

(c) Even though Europe may get more and more long-wave stations, there will be no more wave-lengths, and hence no more



### "SYNTHETIC" MUSIC

A new musical instrument demonstrated in Berlin, and utilising radio valves. It is said to reproduce the sounds of the human voice and all orchestral instruments with startling realism.

## LATEST BROADCASTING NEWS.

ROMANTIC FIND  
IN EDINBURGH

THE ST. LEGER — "INGREDIENT X" — PROVINCIAL DIVERSIONS — Mr. SHERRIFF'S APPEAL — FEWER CONDUCTORS — PROGRAMME MOMENTS

WHILE engaged in demolition work in the old Queen's Hall, Edinburgh, which is to become the principal studio of the new Scottish Broadcasting House, some workmen recently found a letter, embedded in the centre of a large ceiling bracket, which turned out to be a really interesting "find."

The letter was addressed "To anyone whom it concerns in the demolition of this building, Queen's Street Hall," and read as follows:

"To whoever finds the pair of pliers that I have lost down this wall, may he have a longer use of them than I have had, and good luck and a long life. Perhaps when this is found I will be an old man, or in my grave. My pipe, a very good-smoking pipe in this age, was dropped down the same place in the opposite side, or east side of building. May you never be without a fill.

(Signed) James Cairns,

Electrician.

Oct. 5, 1903."

If Mr. Cairns, who wrote this letter nearly twenty-seven years ago, is still alive—and the authorities at Scottish Broadcasting House hope he is—he will be interested to learn that "his very good smoking-pipe" has been found. A hearty welcome awaits him if he cares to visit the spot where luck was once so much against him.

## The St. Leger.

A running commentary on the St. Leger, which takes place on the Town Moor course at Doncaster, between 2.50 and 3.15 p.m. on Wednesday, September 10th, will be broadcast to National listeners. The commentator has not yet been chosen.

## "Ingredient X."

"Ingredient X," a thriller specially written for broadcasting by L. du Garde Peach, and first produced in the London studios a year ago, is to be repeated for London Regional listeners on Monday, September 8th, and again for National listeners on the following night. Since the first broadcast numerous requests have been received from listeners that the play should be repeated.

## Provincial "Diversions."

In a recent issue we announced that Birmingham had arranged a "Diversions" programme. Now comes the news that Manchester wants to have a shot on Wednesday, September 3rd, and that Cardiff will try its luck on Tuesday, September 9th. Both programmes will also be heard from the National transmitter.

## Mr. Sherriff's Appeal.

Mr. R. C. Sherriff, the author of "Journey's End," is broadcasting an appeal on behalf of the Invalid Children's Aid Association

from the London studio on Sunday, August 31st.

## Fewer Conductors.

Instead of having a different conductor for each of the symphony concerts during the season which opens at Queen's Hall on Wednesday, October 22nd, the B.B.C. has decided that every two or three concerts of the series shall be under one direction. This will enable the orchestra to become acquainted with the conducting of a few of the greatest exponents of the baton, and will, it is hoped, lead to greater efficiency and more enjoyment to listeners.

## Programme Moments.

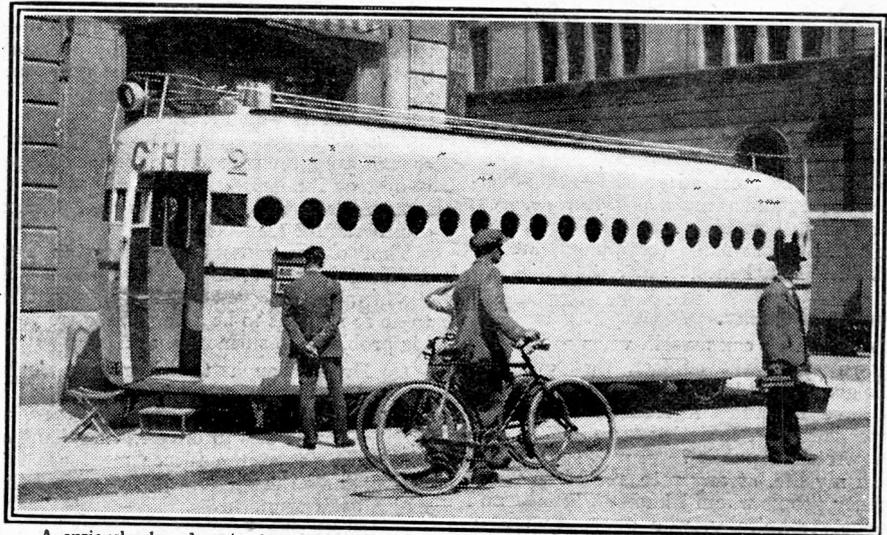
Scenes from the plays of Shakespeare will occupy half an hour of the North-Regional programme on Friday evening, August 29th. There are, of course, many to choose from, but those selected will have some special association with the North.

Eye-Witness accounts of all sorts of events have been included in broadcast programmes, but we do not remember hearing one of a Flower Show, such as has been arranged for North Regional listeners during this month.

Mr. A. J. Macself, the well-known horticultural journalist, is going to describe the glories of the Southport Flower Show. The Southport Flower Show is one of the largest of its kind in the country, and certainly holds the premier position in the North of England.

The next talk in that particularly interesting series entitled "Northern Towns," which Mrs. Kate Lovell is giving to listeners in the Northern Region, will be heard on Tuesday, August 26th, Chester being the town selected. Chester is one of the few, if not the only town in England, which can still boast of a medieval wall, along the top of which it is possible to walk completely round the city.

## THE LATEST IN PORTABLE SETS?



A curiously-shaped motor-home which has been touring the Continent. All the necessary rooms and conveniences of a modern flat, together with radio installation (note the aerial), are provided.

## FOR THE LISTENER

This week our popular contributor—who is holiday-making in Italy—tells of his amusing experiences there with "Belinda," the portable set.

By "PHILEMON"

## A Concert

LAST night, Belinda and I gave a concert to our neighbours. I think you would have been pleased with the setting. The cottage is such as a child might have designed; with a door in the middle and a window at each side of it.

In front of it is a little square of gravel, with two round flower-beds ablaze with monstrous zinnias. Beyond it a vine-trellis, and then the orchard with peach-trees and walnut-trees and vines growing on pillars. It was seven o'clock, and Sunday night.

Everybody was dressed in their "bits of best." Even Giuseppe, a boy of about ten years and usually very dirty, was spick and span in a white cap such as American sailors wear. After a broiling day a cool

wind from the mountains was blowing.

The audience dotted itself about here and there, on the gravel, on the grass. The father of the family, an old man with one eye, leaned against a tree. Belinda stood on a little stool under the window, where I could easily connect her with the aerial and the earth. She looked very charming with her polished wood.

## Birthdays.

By chance Belinda and I had learned that it was Giuseppe's birthday, and we had bought a little present for him, and hidden it. So that the opening of the concert was a great success. For Belinda, assuming the voice of Auntie Sophie, said, "A happy birthday to Giuseppe Constantini."

(Continued on page 630.)



# QUALITY QUERIES

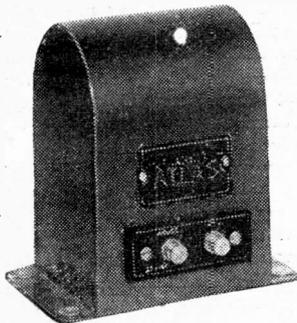
Distortion can be caused by any one or more of many quite different things. But most of these troubles are quite easily preventable as is shown  
By H. A. R. BAXTER.

NO doubt you have often wondered whether there are any short cuts to determining exactly where, in a set, distortion occurs. Perhaps you have read so much about the use of milliammeters connected in valve anode circuits, that you have come to regard them as more or less infallible distortion testers.

Even should this be the case no great harm will have been done, for undoubtedly the most frequently encountered source of really bad distortion is valve overloading. And this the milliammeter in the anode circuit very quickly shows up by wagging its needle.

### Valve Overloading

However, with the more common use of better and bigger valves, and with more attention being paid to H.T. supplies, valve overloading is not now such an overwhelmingly serious business. At one time,



Messrs. Clarke's "Atlas" L.F. Coupling Unit.

of course, it was so prevalent as to be an almost universal habit! There could have been no ordinary broadcast receiver in use seven years ago in which valve overloading was not present to some considerable extent. Plenty of H.T., adequate grid bias, and proper valves grace our modern receivers and make sure they are maintained properly, but it is important to remember that distortion can occur at many other points.

### Different Kinds of Distortion

Now what do we mean by distortion? It is generally used as a portmanteau word, standing for any departure from a perfection in the handling of the energy variations dealt with by the set.

Actually there is Frequency Distortion, which indicates that some of the frequencies are being dealt with better than others. Terrific frequency distortion is found in even the best of loud speakers where the middle frequencies, corresponding with those notes round about the middle C on the piano, are dealt with far better than either the high

or the low-frequencies.

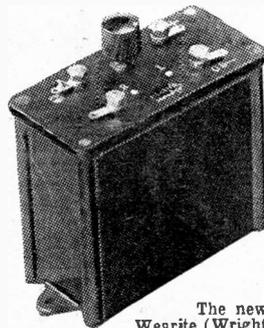
Then there is Amplitude Distortion, such as you can get if you use too much grid bias on a valve, the stronger and weaker impulses then receiving disproportionate treatment. Thirdly, there is Wave-form Distortion, when stray frequencies are introduced.

Now all sorts of things can cause any of these kinds of distortion, and it really is a hopeless job for the ordinary constructor to try to track down everything to its definite source. You want pretty elaborate measuring apparatus, something on the lines of a miniature National Physical Laboratory for such a job.

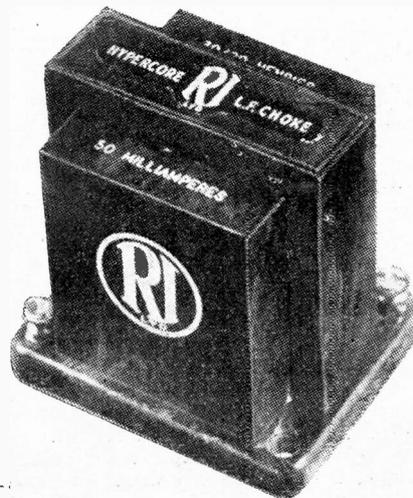
But what can be done is to adopt that old adage—prevention is better than cure, and to select your circuits and all the necessary components with that end in view.

### Many Causes

Distortion can occur through a hundred and one things, and it is possible for such troubles, individually so small as to be



The new Wearite (Wright and Weaire) L.F. Coupling Unit.



The first L.F. Choke to have a nickel-iron core.

negligible, in the aggregate to give rise to effects that, in comparison, render insignificant the worst valve overloading.

It is fairly safe to say that the most critical part of a set from a quality point of view is the low-frequency section. This, you might say, is obvious, but it must never be forgotten that the H.F. part has its very important duties as well.

### Overall Efficiency

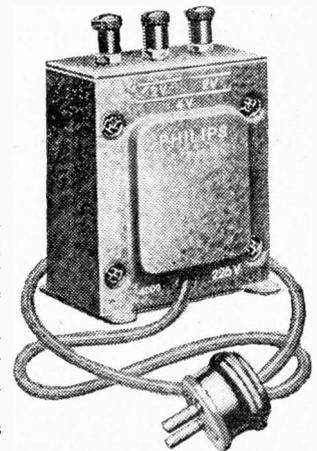
Everybody these days seems to be aiming at a straight line output. Such an ideal is all very well in its way, but its achievement is an empty victory if the loud speaker to which the output is connected is a poor quality instrument.

It is the overall efficiency of the radio-receiving outfit that matters. Obviously then it is the best plan to query the loud speaker first and then work back into the amplifier.

And here you will find plenty to engage your attention. There is another and much longer article in this issue dealing fully with L.F. components.

If you follow the advice that is given, then you will not find it necessary to do much hunting for any but major and more apparent causes of distortion.

In the meantime never forget the importance of paying strict attention to the details of a radio set. An anode resistance of not quite the right value, a condenser that is leaky, a valve-holder that is not quite up to scratch can combine together to produce the effect of one huge fault.



One of the several fine Philip's Mains Transformers.

## THE FUTURE OF BROADCASTING.

A review of some recent pronouncements of importance to everyone interested in the development of the radio in this country.

By N. F. E.

THE question of the future of British Broadcasting is again being raised in the press, especially in the "Morning Post," which recently published a long article giving the views of Mr. George Bernard Shaw, Sir Thomas Beecham, Mr. Charles B. Cochran, and others.

And emphasis has been lent to this revived topic by Sir John Reith's recent speech at the Students' International Summer School at Cambridge.

Mr. Whitely's appointment as Chairman of the Corporation seems to have given rise to the impression that immediate reforms are likely to be made at Savoy Hill, and consequently the views of eminent people on the future improvement of British broadcasting are very much to the fore, plus suggestions as to how the B.B.C. may protect itself against the increasing competition from Continental and other foreign stations.

### G. B. S. Is Surprised!

Mr. Shaw, for example, is quoted by the "Morning Post" as saying (*inter alia*):

"On the whole, I am surprised that the B.B.C. do their job so well. If you have ever tried even to get up one concert a year you will know how difficult that is, but to have to organise a concert each day is almost attempting the impossible."

"The problem of finding fresh artists, and especially fresh stars, is almost insuperable. And the obvious result is a terrible repetition. Some of the songs which they continue to give us are terribly worn out."

"I have thought for a long time that they could have given us a higher standard of singer, but, as I have said before, I think there are only six fine singers in Europe, and even to hear those continually would be maddening."

"I am very doubtful as to how to suggest improvements. I do not think that vaudeville, however, should be broadcast at all. The whole secret of a comic scene or a red-nosed comedian is that you can see his red nose and watch him falling over the piece of orange peel. When they broadcast vaudeville the B.B.C. neglect the first and only rule in the theatre about comic scenes. Comic scenes must not be played in the dark, and the B.B.C. are always playing in the dark."

### A Huge Post Bag.

"Nor do I see that having an experienced showman on their staff to select programmes would help them. If any showman knew what the public wanted he would be able to retire with untold millions in a couple of years or so. Take Mr. Cochran for instance. What salary would he want for spending the rest of his life at the end of a microphone?"

"I understand that the B.B.C. receives a large number of letters, both of complaint and congratulation, from persons who are supposed to have listened to programmes, but how far that is able to help them I do

not know. I sometimes think it would be a good idea if the public were allowed to oscillate their sets or express their criticisms in some way like that, but then one disgruntled man might spoil the enjoyment of a whole nation.

"On the whole I think they do their very difficult job about as well as it can be expected of them."

### Sir Thomas Again!

Sir Thomas Beecham, in expressing his views, is reported to have said that:

"As an artist, I have very little to say about the B.B.C. They mean so very little, if anything at all, in the musical life of the country. It should be clearly understood, what nobody seems to realise here, that the B.B.C. are purveyors of wireless, and that is all."

"They have as yet shown no signs of participating in the musical life of the country. That, in itself, is not to be wondered at. You cannot call the gramophone music, and the wireless is an even poorer substitute than the gramophone. It has no relation to art; for art must consist of real performances. And the public knows this."

### HI! THERE! BELOW!



An American aviator taking part in a three-way telephone test between two planes and the ground station. The framework round the cockpit is a machine-gun mounting.

"It is like a musical box, and how can artists be asked to be interested in a musical box? They may say that they cater for the tastes of millions of people, but they give them something like a photograph, while an artist offers a Michael Angelo painting."

"They have nothing to do with the great festivals, the great choral societies, the great symphony orchestras, or even the great amateur work which is going on all over the country. I suppose it can be said that they touch the fringe of music."

"The art of music is performing. If they had wanted to show that they had real musical interests they could have shown it by trying to help, out of their princely income, the real musical effort which is going on all over the country. The Imperial League of Opera is, of course, a case in point, but by no means the only

one. This, of course, would be a Super-National Programme, but not outside their proper scope, I think.

"They have made their point of view quite clear and their function and standpoint ought to be better understood. They are a commercial body, selling wireless. They are not an artistic body, and have made very little attempt to pretend that they are."

Which, of course, is typical of Sir Thomas' views on broadcasting.

Mr. Cochran, the theatrical manager, said he did not pose as a critic of the B.B.C., as he did not know enough about it; but, in his opinion, it has a difficult task which it does well on the whole.

Finally, Sir John Reith said in his recent speech that broadcasting should be conducted as a public service and as nothing else. He did not admit that it was necessary to have personal gain as an incentive to endeavour, and he regarded the presence of commercial motive in any form as most undesirable.

### What Sir John Said.

"The system and the constitution in this country are, I consider, exactly what is required," said Sir John. As regards broadcasting as an advertising medium, Sir John said: "The ether should not be at the mercy of money. Fortunately, with the constitution which we have in this country, the interests of the State are safeguarded. If the service is to be run for the benefit of the people, it cannot afford to be at the mercy of those who are in a position to give programmes for their own particular purpose, and without whose money the service could not be maintained."

Sir John believes that entertainment is the primary function of the broadcasting service in this country, but the danger of interpreting the word in its narrow sense must be avoided. Broadcasting must also carry the responsibility of contributing constantly and cumulatively to the intellectual and moral well-being of the community. He claims that broadcasting has already increased the musical appreciation of the country as a whole.

Sir John wound up his speech by discussing the effect of broadcasting on old-established interests. He said the apprehension existed that it would "queer the pitch" of newspaper sales, badly knock concert promoters and the theatre managers, and reduce church congregations.

### "Broadcasting Sometimes Colourless."

"I think it has already been established," he said, "that broadcasting will produce no unfavourable reaction on any of these interests. Rather, the reverse might be expected. And if broadcasting is sometimes colourless," he concluded, "it must be remembered that democracy is sometimes rather colourless, too."

Sir John's views expressed again that the best way to give the public what it wants is to reject the express policy of giving the public what it wants. In other words, if the B.B.C. were to set out to give the public what it wanted it would not succeed, which is a paradox, of course: but it is a point of view which Sir John strongly adheres to.

Whether he is right or wrong is a matter of opinion, but that he doesn't really pursue this policy to its logical conclusions is obvious by a glance at the programmes.

# THE B.B.C. TODAY

## BY THE EDITOR



**I**N broadcast drama and variety during the past year it can be said with finality that Mr. Val Gielgud has "made good." And probably the chief reason for this success is not any heaven-sent genius or peculiar skill or even aptitude, but rather a clear-cut knowledge of what he wanted, and a determination to get it, whatever the consequences.

Anyway, broadcast drama and variety are now worthy of serious artistic consideration, the B.B.C. brand being infinitely superior to anything of the kind abroad. The principle of anonymity to which Mr. Gielgud nailed his colours has triumphed. The new section of research and experiment has also done well.

### Three Valuable Producers.

In Mr. Sieveking and Mr. King-Bull and Mr. Harding are three radio producers of the first rank in originality and technique. Perhaps it is to Mr. Harding that the most credit is due during the past twelve months, which is the period I am reviewing.

Then Mr. King-Bull has come to the front during the same period. Mr. Lance Sieveking holds his ground, but, apart from the "Intimate Snapshots" and the Chinese show, I would not award him marks for peaks this year. There are rumours, however, that Mr. Sieveking has something very big in preparation.

On the whole, I believe the dramatic production side of the work of the B.B.C. is now ideally handled; it is perhaps the only department at Savoy Hill which can be said to have assumed its permanent shape and character.

If there is any criticism I would make, it is that Mr. Gielgud would be well advised to be more tolerant of the provincial stations and encourage their characteristic original efforts.

### Education and Talks.

Education goes on apace at the B.B.C. When I last reviewed this work at Savoy Hill a reorganisation and expansion were in hand, and it was not possible to say what new form would emerge. As it turned out, Miss Matheson added adult education to her territory with the aid of Mr. Siepman. Mr. Stobart, with Miss Somerville, is left with the schools, religion, and appeals. To merge adult education into

In this fourth article of a short series in which "P.W." is unveiling the mysteries of Savoy Hill, the questions of Drama, Education and Religion are dealt with.

talks was right, but I am not sure it was done for the right reason.

Talks have improved exactly to the extent in which they have acquired entertainment value. This does not mean that they have lost their educational or informative value; on the contrary, the intention has been far more adequately fulfilled.

If adult education had been merged in talks in order that it might conform to the movement towards greater entertainment value, then the reason would have been the right one. But I suspect that the reason was administrative convenience. Anyway,

### A WELL-KNOWN FIGURE



Lord Gainford, Vice-Chairman of the B.B.C.

there they are now all lumped together under Miss Matheson.

But there is an obstacle in the way of the "rationalisation" of the adult education talks. I mean the various committees and bodies comprised under the menacing title of the National Broadcast Adult Council, presided over by the Archbishop of York, and including, of course, all the big guns of the educational trade unions of the country.

### Humanisation Required.

This formidable affair seems to be getting rather more than less say at Savoy Hill, and tends to offset the enlightened activities of the staff in charge. There has been the notable encroachment on the main entertainment period of the Regional wavelengths. I mean the long talks about eight o'clock on 5 G B and the London Regional.

The B.B.C. has allowed itself to get far too much in the clutches of the professional educationists. There was a use for these bodies in a mild way some three years or so ago; but once the B.B.C. had gathered in the prestige that was going, the association should have been faded out, politely but firmly.

It will have to go some day, and there will be terrific rows. Meanwhile, my suggestion to the harassed staff of the talks and adult education sections of the B.B.C. is to get on with the humanising of their work, and, if there is a choice of risks to take, take them as against the cranks' committees and not as against the silently suffering public.

### The Schools Broadcast.

Education on the ordinary schools side continues on the now familiar lines. Radio is settling down as an acknowledged auxiliary to the elementary and secondary school systems of the country. Much useful work is being accomplished unobtrusively and, I hope, without making too big a hole in the licence revenue. Miss Mary Somerville, the actual executive of this work, is a great help to Mr. Stobart. During the past year Miss Somerville has caught up on Miss Matheson in prestige and influence.

Before I leave this subject of education I would revert to the talks and adult side once again. Here is a suggestion. Let it be laid down arbitrarily that not more than

*(Continued on next page.)*

## THE B.B.C. TO-DAY.

(Continued from previous page.)

10 per cent of main programme time be available for material which has not got the basic qualifications of entertainment value.

Religion has not changed a great deal in broadcasting during the past year. The outstanding part, of course, is the weekday service at 10.15 each morning. This has a vast audience, and confers great benefit on many thousands of sick, infirm, old, and lonely folk. With characteristic self-effacement, the founder of this service has done everything possible to preserve his anonymity. It was perhaps just as well that he succeeded in this for the first eighteen months or so. But lately it has become known that he is the Rev. Hugh Johnson, chief assistant to the Rev. Pat MacCormack, vicar of St. Martin-in-the-Fields.

### The Morning Service.

The little book of prayers entitled "This Day," and containing prayers from those selected for the morning broadcast, has run to several editions and, I understand, is again sold out. This is but one sign of the signal social service which Mr. Johnson is rendering by his daily visits to Savoy Hill.

I am paying a good deal of attention to Mr. Johnson because in his success are apparent the secrets of effective religious broadcasting. To begin with, he has a perfect microphone manner; his message is to a million individuals, not an address to a crowd of a million. He is direct, sympathetic without being sloppy, honestly disdainful of cant and humbug, and happily clear of the pitfalls of disabling orthodoxy and intonation.

His service remains short and simple. It is no longer or more complex to-day than it was a year ago. And, above all, it is Hugh Johnson—a word picture of the man. I listen to this service not infrequently; in fact, less and less infrequently. I know business men with none of the ordinary religious predilections or professions who abandon whatever they are engaged on at 10.15 in the morning for the quarter-hour spiritual communion guided by Hugh Johnson. I congratulate Mr. Johnson on his wonderful work and on his unique opportunity of service; I congratulate the B.B.C. on having found Mr. Johnson and on having the sense to give him full freedom of action.

### Religious Broadcasts.

Curiously enough, the only other really bright spot in the broadcast religious activities is at the other end of the day. I am referring to the Epilogue, the personal creation of Sir John Reith, who inherited its inspiration from the manse of his father, one of Scotland's greatest preachers and religious leaders of the late nineteenth and early twentieth centuries.

The Epilogue on Sunday nights is a fitting close to the programmes. It is more; it is a message of consolation and hope comparable with the weekday morning services. It may seem ungracious to criticise such a splendid programme item, but I must register a warning about the tendency to lengthen and complicate the Epilogue, and to give it too much intonation in the spoken parts. Let it remain brief, natural, and simple, as in the beginning.

As for the rest of religious broadcasting, St. Martin's relays, as well as those from St. John's, Westminster, the various cathedrals, and indeed practically all the "O.B." services, are as good, if not better, than ever they were.

But the studio services do not hold their own. There is something thin, almost disconcertingly so. There is a deplorable absence of vitality, and also sometimes a touch of "staginess." Studio services are either declining or the other services are getting so much better that studio services suffer by comparison.

### Need for Alternatives.

I think the B.B.C. should make every effort either to develop its studio services on the right lines or substitute them entirely by O.B. services. There are far too many bad preachers and bad speakers allowed at studio services.

This comes, I suppose, from the balancing feats of the advisory committee of clergy and ministers. High time this was superseded by the fearless choice of good broadcasters with real messages such as Dick Sheppard and Hugh Johnson.

And just a final word. Appropriate musical alternatives to religious broadcasts would be as good for religion as they would be acceptable to listeners generally.

## A POPULAR GOVERNOR



Mrs. Philip Snowden, one of the most active of the B.B.C.'s Board of Governors.

## THE "A.P." TWO.

Some further details about the excellent receiver which was described last week.

**C**ONSTRUCTIONALLY you will find the "A.P." Two an easy job. The only points calling for special mention concern the screen.

The screen itself is one of the standard type always used in "P.W." sets, with a row of perforations along the lower edge through which leads can be passed as required. Actually, there is only one such lead in the present receiver, and that is the

one which goes to one filament terminal of the valve socket  $V_1$ . This lead must be insulated, whatever kind of wire be used for the rest of the work.

### Screen Connections.

The only other lead running through the screen is that secured to the tapping point on the coil  $L_2$  at one end, and the anode of the screened-grid valve at the other, this latter point being the terminal on top of the bulb. This lead should consist of a short piece of flex, and it passes through a hole quite high up in the screen.

Notice very carefully that connection is made to the metal of the screen itself at two places, one being quite close to the panel. This is the lead from the moving vanes of the differential reaction condenser  $C_5$ , and it goes to a small screw and nut inserted in one of the perforations in the screen. A similar connection is made to the screen near the terminal strip and between the condensers  $C_6$  and  $C_7$ , a point you will quickly identify on the wiring diagram.

### The Coils to Use.

The coil sizes should be as follows: Coils  $L_1$  and  $L_2$  are of the "X" type, size No. 60 for the ordinary wave-band, and size No. 250 for long waves. The reaction coil is  $L_3$ , and this should be a No. 50 for low waves and a No. 100 for long waves.

The valves should be one of the screened-grid type and one of the H.F. or "special detector" variety for the  $V_2$  socket. They may be of two, four, or six-volt filament rating, and all will be found to work excellently in this circuit.

The H.T. voltages are quite simple, and you will find that somewhere about 60 or 70 volts or perhaps a little more will ensure good results when applied to terminal H.T. + 1, with some 120 volts on H.T. + 2 and 60 or 70 on H.T. + 3. This latter supplies the detector valve, and accordingly a little adjustment is indicated here to obtain the best reaction effects and the greatest volume on weak signals.

The grid bias on the screened-grid valve will normally consist of a single dry cell, and as this will be of a very small type you will find you can tuck it in between condenser  $C_5$  and the larger one  $C_6$ . Alternatively it can be mounted upon the inside of the cabinet at the back or placed upon the baseboard between the coil socket  $L_1$  and the panel. In the latter position you will find it necessary to provide rather longer flex leads to it from the condenser  $C_5$ , but this will not impair the efficiency of the receiver in any way.

### Concerning the Dials.

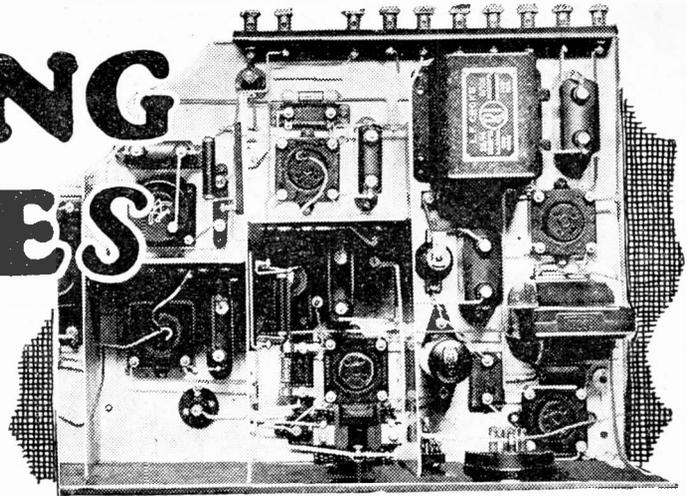
By the way, you may wonder why plain dials and not the vernier type are shown on our original receiver. Well, the reason is that although the selectivity of this little receiver is very good, tuning is not critical, because the volume of even the foreign stations is usually so good that it is not necessary to use a great deal of reaction. Consequently it is quite possible to handle it with ordinary plain dials.

This calls for a little delicacy of touch, perhaps, and so the reader may desire to use the slow-motion type of dial, or slow-motion drive condensers. He can naturally do so if he wishes, but he should just be warned that there is no room for vernier dials of the very large type. Something small and compact like the Igranite "Junior" version should be used.

# SEPARATING THE STAGES

There is no need for your L.F. stages to howl or "motor-boat." Very often instability is caused by an effect which can be eliminated by the use of simple de-coupling devices. How the valves may easily be "isolated" to ensure freedom from trouble is described in this helpful article.

By A. JOHNSON-RANDALL.



THE efficiency of the modern valve and transformer has brought to light certain troubles which are produced by the source of H.T. supply. In sets of less recent design in which two stages of transformer coupling were used, L.F. howling and its associated troubles did not occur very frequently.

Even if instability was present it could usually be cured by some simple measure, such as reversing the leads to one of the transformer windings.

The vast improvements which have been

made in transformer and valve design have increased the magnification per stage enormously, and it is largely this high overall amplification in conjunction with a "coupling" effect in the H.T. circuit which causes L.F. troubles.



The Igranite L.F. choke (type G) is a design in which the windings are sectionalised.

In addition, it is quite usual to employ

valves on the L.F. side which require a fairly heavy anode current and this fact naturally tends to increase the chances of trouble owing to the possibility of the H.T. supply being "overloaded," unless special care is taken in choosing a suitable heavy duty H.T. battery or mains unit.

## Symptoms of Instability.

Readers may not be quite clear as to the meaning of the "coupling" effect referred to previously and unfortunately it is not possible in a short article of this type to explain fully how the H.T. circuit does produce L.F. instability.

It is interesting to note, however, that the plate circuits of all the valves are joined ("coupled") to a common source of supply, and if the resistance of this portion of the circuit exceeds a certain figure, instability will result unless certain precautions are taken.

Incidentally, the symptoms which indicate L.F. instability are howling, the howl taking the form of a musical note, sometimes a low moan and at others a whistle. Also, there is "motor-boating" which can be recognised by a pop, pop, popping, rather like the exhaust note of a motor-cycle engine. Finally, there is the type of instability which shows itself in the form of violent distortion but no audible howling except, perhaps, when the grid terminal of one of the valves is touched with the finger.

## Suitable Values.

Now, it is a comparatively easy matter to arrange matters so that the receiver is immune from instability except in very exceptional cases. The usual procedure is to "separate" the stages, particularly the first and last low-frequency valves by means of "anti-mobo" devices.

An "anti-mobo" device in its most common and widely employed form consists of a resistance and a large condenser. The resistance must be well made, and capable of carrying the anode current for the valve without variation in value.

This is essential, because any small change in resistance value while the current is passing will produce crackling noises in the loud speaker.

A practical value for the "anti-mobo" resistance is between 20,000 and 50,000 ohms. It should not be too high because this would prevent the value from operating at its maximum efficiency.

The condenser must be a large one, and 2 mfd. is the smallest practical size. It is usual to employ a 2 mfd. condenser to start with, the value being increased to 4 mfd. if there is any tendency for the receiver to "motor-boat" or howl.

Since the first and last stages are those which most require "separation," the de-coupling unit is placed in the anode circuit of the detector valve. The resistance is inserted between the H.T. supply and the L.F. transformer primary winding. In other words the H.T., instead of going directly through the primary to the anode of the detector, passes first of all through the resistance and then through the primary winding.

The condenser is joined as follows: One terminal is taken to the junction of the de-coupling resistance and transformer winding, and the other is connected to L.T. negative.

The last, or output stage of the set, can be "separated" by means of a filter choke and condenser. The choke must be of good make, having a low D.C. resistance in order to reduce unnecessary loss of voltage, and its value should be in the neighbourhood of 20 henries.

The choke is connected between the H.T. terminal which supplies the last valve, and the anode of the valve itself.

A lead is then taken from this latter side of the choke to one terminal of a 2 mfd. condenser. The other side of the condenser is joined to one terminal of the speaker, and the remaining side of the speaker is connected to L.T. negative.

If these precautions are taken no receiver should suffer from instability on the L.F. side, unless the H.T. supply is unusually bad. Sometimes the simple resistance and condenser by-pass "anti-mobo" unit proves to be quite effective without the help of an output filter.

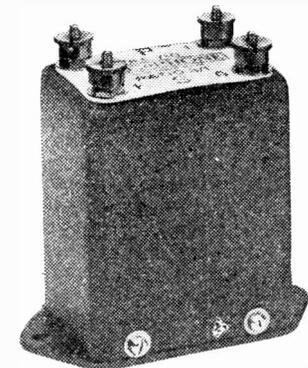
## The Important Stages.

Apart from its value as a stabilising device, the filter scheme is very useful in other directions and it therefore thoroughly justifies its inclusion in any two-transformer-coupled receiver.

In certain instances it may be worth while to de-couple the intermediate L.F. stage, but generally speaking it is the first

and last stages that are of primary importance.

It should be remembered that the de-coupling resistance cuts down the effective H.T. voltage which is applied to the valve, and its value should be adjusted in accordance with the H.T.



A transformer of compact dimensions —The Gecophone "Hi-Flux."

available. It is useless to use a resistance value so high that the effective voltage is reduced to a figure which will not permit the valve to function satisfactorily.

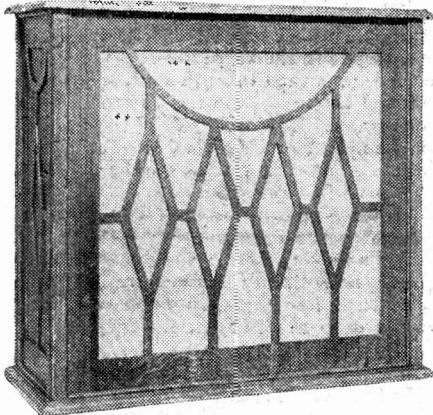
## FROM THE TECHNICAL EDITOR'S NOTE BOOK.

# Tested and Found—?



## A FINE LOUD SPEAKER.

I HAVE just concluded a series of tests with an "Aptus" loud speaker, a product of Moore & Co., of Dale Street, Liverpool. The "Aptus" is of the double-linen diaphragm type, and it really is an excellent proposition. Indeed, I consider it



The "Aptus" Loud speaker.

one of the very best loud speakers outside the moving coil class that I have yet heard.

I am afraid I do not know much about Moore & Co. and they may be quite big or very small manufacturers, but they are certainly producing a fine loud speaker. They have a number of models available, and the speakers are also supplied in complete kits for home assembly from prices ranging from 22s. 6d. upwards. I would certainly advise "P.W." readers to ask their local radio dealers to let them hear "Aptus" speakers in operation.

## A NEW MAINS VALVE.

I recently received a Triotron S.N.4 valve. This is a mains valve, with a 4-volt filament, designed to operate as a detector or H.F. valve and for first stage L.F. positions.

It has an impedance of 8,000 ohms and an amplification factor of 22. It is of the indirectly-heated type, and the construction appears to me to be completely sound.

The majority of "P.W." readers no doubt know more about ordinary battery valves than these A.C. types, so a word about characteristics may be as well. The ordinary rules and regulations regarding impedance, etc., do not apply quite as usual.

Generally, the equivalent A.C. valves are of lower impedance,

For instance, this Triotron S.N.4 really is an efficient H.F. detector type, despite what may seem to be a rather low impedance. Also, it is a fine first-stage valve.

## FERRANTI PRICE REDUCTIONS.

The Ferranti people tell me that they have been able to effect certain reductions in the prices of their cabinet-type loud speakers. This will be very good news indeed to those "P.W." readers who had intended to purchase such instruments.

## R.I. IN THE NORTH.

We hear that Radio Instruments, Ltd., have appointed Messrs. J. D. Morrison and Co., of 10, Whitworth Street West, Manchester, their representatives for all their products throughout the whole North of England, including Newcastle, Yorkshire, Lancashire and North Wales territories.

## THE "BROWN BUDGET."

The latest issue of this enterprising house organ is quite in sympathy with the season in which it was produced, and is of a delightful "summery" character. One of the several very readable illustrated articles is entitled "Let's Make Summer Days Radio Days."

## A NEW H.T. UNIT.

A comparison between the cost of H.T. derived from dry batteries and that from the A.C. mains is sometimes startling. If you get 300 hours' service with an H.T. battery, you have not done so badly, but the cost of running, for instance, a Tannoy Portable Unit, for supplying H.T. current to a quite big set for 300 hours is a matter of but a few pence, 3d. or 4d.

The Tannoy Portable Unit P.2 is made by Tannoy Products, and it is one of those most useful devices designed mainly for replacing the H.T. battery in a portable set.

A very sound scheme as I have explained before on this page. Although the P.2 has the quality of compactness to a high degree, and can actually be fitted into the H.T. compartment of a portable set, it can, of course, be used with ordinary types of receivers.

It incorporates a Westinghouse Metal Rectifier, and there are

three H.T.appings, one for supplying a screened grid voltage, one variable for the detector, and one giving a maximum H.T. of 120 volts at 15 to 20 milliamps for a power valve.

A special feature of this Tannoy mains unit is that all the components, transformer, chokes, etc., are earthed to the metal casing, which, in turn, is connected to the H.T. negative terminal. The purpose of this is to provide adequate shielding against stray magnetic fields.

The price of the Tannoy portable unit P.2 is £3 15s. complete, and it is suitable

## WHEN YOU ARE BUYING—

### 27.—TERMINALS, PLUGS, ETC.,

You cannot judge the true merits of a wander-plug merely by looking at it. Try it in one or two representative sockets.

However ingenious may be its design, it may fail when given that acid test.

Also see that it enables a flexible lead to be joined easily and neatly to it.

Terminals for mains units and mains sets should always be of the insulated type.

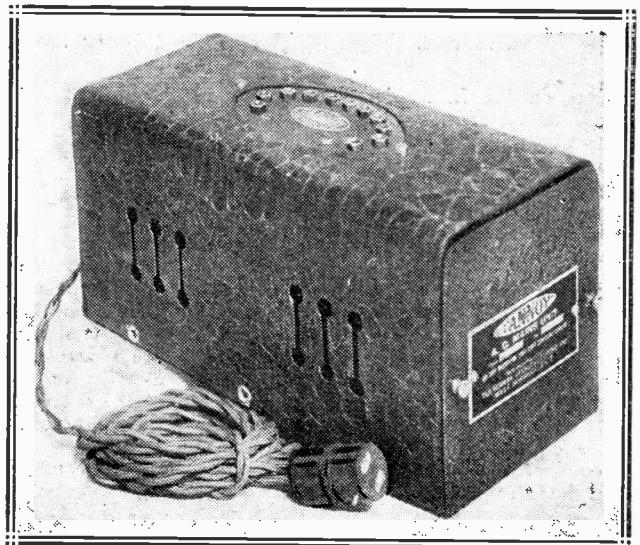
A terminal that will take straight tags as well as ring or hook lead ends is likely to be of more real use than one which is nothing but a milled nut running down a screw.

If you buy indicating terminals see that the lettering is going to be easily visible when the devices are fixed to a set.

for A.C. mains of 200 to 250 volts. I have tested the article and find it quite satisfactory. The outputs are up to specification, and the smoothing is adequate.

## ALL THE ELEMENTS.

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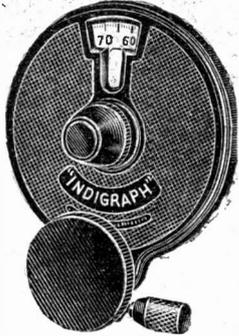
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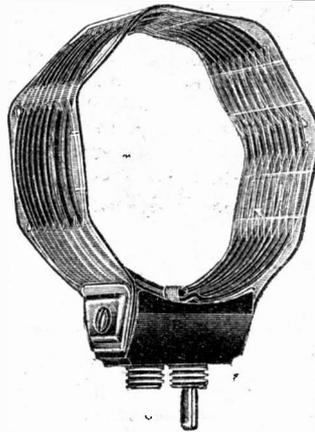
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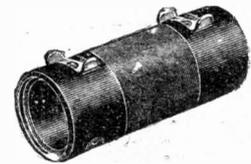
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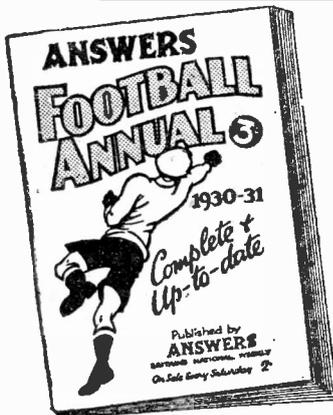


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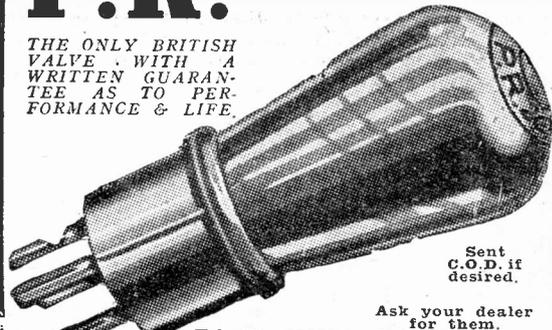
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	GPR 9	3.5-4	.09	22,000	14.5	H.F. Det.
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	GPR 11	3.5-4	.09	44,000	41	R.C.
	GPR 17	5-8	.14	20,000	17.5	H.F. Det.
	GPR 18	5-8	.14	11,000	9.5	L.F.
<b>SUPER-POWER</b> <b>12/6</b> EACH Post 4d.	GPR 19	5-8	.14	75,000	41	R.C.
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# ALL ABOUT L.F. CHOKES AND TRANSFORMERS AND R.C.C. UNITS



Varley's new 300 henry L.F. Choke for power detector systems.

an L.F. transformer is an article that demands scientific design.

Actually, we have only hinted at the complexities accompanying its construction, but we hope that the constructor can at least clearly see that an L.F. transformer is no small-workshop proposition. All the resources of the largest manufacturing concerns are strained to the utmost in the production of low-frequency transformers capable of giving decent performances.

It is most illuminating to make a quick change-over from one transformer to another in a set that is working. The difference between a good transformer and a bad one is quite startling.

Choose your transformers carefully and pay good prices for them, for they are indeed important components.

### Appearances So Deceptive.

The appearance of an L.F. transformer counts for nothing; indeed, in no other cases are appearances so deceptive. Some of the most polished and handsome-looking L.F. transformers which have passed through our research department have proved the most inefficient.

amounts of wire, and this means correspondingly smaller secondary windings and lower self-capacity.

You will see from all the foregoing that

Also, weight goes for little these days when you have nickel-iron transformers weighing only a fraction of a pound. The safest guide is the reputation of the manufacturer.

Much of the foregoing applies to the L.F. choke. L.F. chokes used for intervalve coupling need to have pretty high inductances and negligible self-capacities. The third requirement is that they should be able comfortably to carry the anode current that flows through the circuits in which they take their places.

A resistance-capacity coupling is similar diagrammatically to choke-capacity coupling except that, instead of an L.F. choke, a resistance is used. This resistance has to contribute neither inductance nor capacity, and the less it has of either of these qualities the better.

### The Only Barrier.

Anode resistances that are wire wound are frequently specified for the simple reason that wire provides a resistance that does not alter appreciably in value with atmospheric or temperature variations. But it should not be forgotten that there are composition resistances capable of constancy in operation.

Both choke-capacity and resistance-capacity L.F. couplings necessitate the use of fixed condensers, and such fixed condensers need to be somewhat superior in quality to those used in some other positions in a set.

If you refer to a diagram in which "R.C." or choke-capacity coupling is included you will see that the coupling condenser is probably the only barrier against a large proportion of the high-tension voltage being imposed upon the grid of the valve.

It is clear, then, that a coupling condenser must be able to stand up against high voltages without breaking down or developing leakages.

It must have a very high insulation re-

sistance. For this reason it is quite usual to advocate mica condensers for coupling purposes. Mica being reckoned a much superior substance to the paper that figures in some constructions.

### Paper Dielectrics.

However, there are some paper condensers that are completely satisfactory for coupling purposes but, again, we must warn readers to place more reliance on reputations than mere printed claims.

L.F. transformers and L.F. chokes that are used in output arrangements have to fulfil special requirements, and those components which are satisfactory for inter-valve coupling may fail miserably at such points.

We will deal in some detail with the L.F. choke used in this special position—i.e. an output circuit, and practically everything we say in regard to it can be applied to an L.F. transformer so used, in general and its primary winding in particular.

The purpose of an output choke is, broadly speaking, threefold. It takes its place in the anode circuit

wire must not be excessively thin, and the core must be so constituted that "saturation" is not reached.

### Voltage Drop Through Chokes.

At the point of "saturation" or where saturation begins, the inductance of the component begins rapidly to fall off.

An output choke should have a low resistance, 300 ohms or less, whereas an L.F. choke used for inter-valve coupling may have a thousand or two ohms resistance, without occasioning as great an H.T. voltage drop owing to the higher impedance

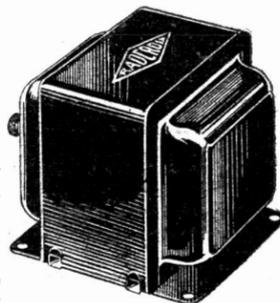
the impedances of the external parts of the anode circuit.

But as the impedance of the valve gets less so does the anode current rise until, at the end of the set where you generally find a super-power valve, the anode current may reach 28 to 30 milliamps or even more.

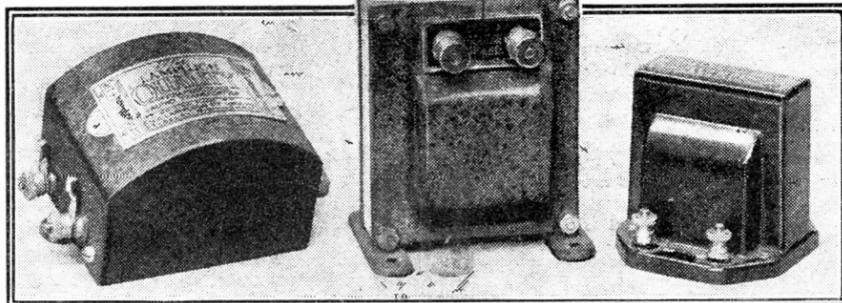
An L.F. choke must be of particularly special design if it is going to be able to handle as much current as this. The



An R.C.C. unit, using Carborundum resistances, made by The Carborundum Co.



The Radcroix L.F. Transformer is sold by the Wholesale Wireless Co.



From left to right you have here, the Lamplugh Golbone (Ward and Goldstone), and Lotus (Garnett, Whiteley); L.F. transformers.

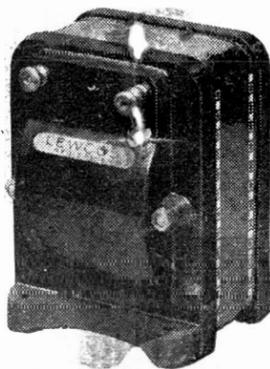
of the last valve and replaces the loud speaker. The L.F. impulses are handed on to the loud speaker through a condenser shunt.

The L.F. choke takes the brunt of the anode current and the loud speaker is saved from its depolarising, saturating influences. And being as it should, of a lower ohmic resistance than a loud speaker, there is less H.T. voltage drop.

### Output Chokes.

Thirdly, it is usually possible more easily to match up the characteristics of the valve with an L.F. choke or the primary of an L.F. transformer than with the magnet or coil windings of a loud speaker.

It is important to note that the inductance of an output choke does not, generally speaking, have to be as great as that of an L.F. choke used in inter-valve coupling arrangements. The nearer you get to the end of the set the lower become the impedances of the valves and the lower may become



The "Lowcost" people make this Blue L.F. transformer.

of the valve concerned. You can easily work it out yourself, remembering that current times resistance equals voltage.

In the case of a detector valve in whose circuit an L.F. choke may be found, an anode current of only one milliamp or so is all that may be met or even needed. On the other hand, the anode current flowing in the anode circuit of the output valve may be, as we have said before, anything up to 20 or 30 milliamps.

Low self-capacity in an L.F. choke is a vital requirement, for capacity across its terminals will tend to cause a falling-off in high notes.

### How Resistances are Made.

Reverting back to inter-valve coupling, we must not forget to mention the vital importance of values. It must always be remembered that no one component has a solo duty to perform. Indeed, the whole success of any circuit will depend upon achieving a correct matching of component parts.

It is interesting to note what a large variety of materials and methods have been employed in the manufacture of anode resistances and grid leaks.

In the very early days various paste and compressed powder types of resistances were to be found that were far from being satisfactory.

For some reason it seemed that designers were loth to try other schemes. But they must have explored every possibility of pastes and powders to the utmost.



A filter output choke made by Messrs. A. F. Bulgijn.

layers of gold electrolytically deposited on glass and contained in vacuum, and wire-wound types, additionally to carborundum and other non-metal varieties.

It is not safe to say that any one scheme is absolutely the best, or that any fails in any particular way.

### Current-Carrying Capacity.

There are several different schemes of manufacture, and the vast majority result in satisfactory components.

Remembering the main factors that go to make a satisfactory resistance, it is not hard to confine one's choice to those suitable for particular jobs.

A current-carrying capacity is important in anode resistances, and these should also have negligible self-capacities.

Also all resistances, wherever they figure, should be absolutely impervious to weather and atmospheric changes, and retain their values in face of slightly-changing operating conditions.

Special care must be taken in the choice of variable resistances, more particularly when these have to carry anything in the way of current.

A wire winding in such a case has much

to commend it, although there are two things of vital importance to note. The wire may be thin if it is a resistance of some thousands of ohms, and a rubbing contact, if such is used, must be very carefully designed if it isn't going to wear the wire through in a fairly short time.

### Variable Resistances.

On the other hand, if the contact is not firm, a poor-running connection may be made, and produce noises.

Constructors should not be prejudiced against variable resistances of the compression type simply because it is well known that earlier specimens failed badly.

Actually there are many compression type variable resistances on the market to-day that are really first-class. These can carry heavy currents where specially designed to do so, and can be used as variable

anode resistances quite safely.

They provide wonderful gradations of resistance, and are reliable and consistent. Particularly does this apply to those that employ special carbon or graphite and mica

mixtures of secret kinds. By the way, don't forget that it often happens that a resistance figuring in an anti-mobo arrangement has to carry just as much current as an anode resistance.

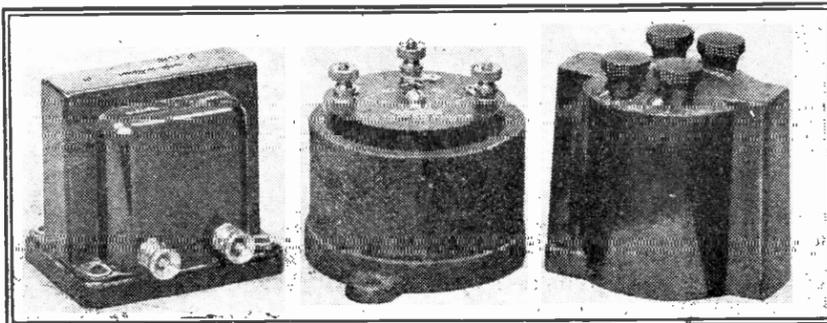
And on the L.F. side this may run into quite a few milliamps.

That reminds me that there are a few points in regard to values that I have not yet dealt with.

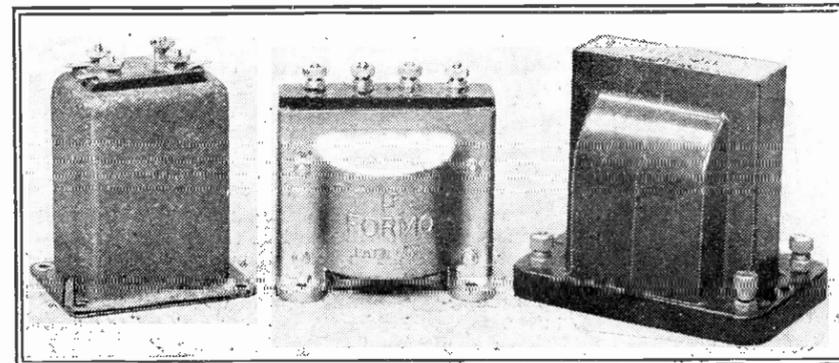
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This high-ratio Ferranti is the A.F.S.



Here are (left to right) the Burton L.F. transformer, the Watmel coupling unit, and a Brownie L.F. transformer.



Above, you see (left to right), Fye, Formo, and Brown L.F. transformers.

## QUALITY COMPONENTS = QUALITY RESULTS!

## COUPLING DEVICES.

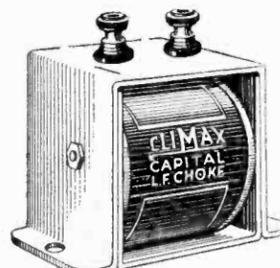
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Always adhere closely to the values stipulated in a set design, and remember that if you insert an anti-mobo in a set that does not incorporate one already, you will be dropping the H.T. on the anode of the valve intimately concerned.

Therefore, you should put up the H.T. a little on that valve to get back to your original conditions. If you don't do this your increased stability may be misleading!

You can work out fairly closely the drop occasioned by a resistance by multiplying its ohms by the current passing through it.

Supposing your anode current is about 2 milliamperes and you put in an anti-mobo resistance of 20,000 ohms. You can easily see that you will drop at least some 40 volts, so you should put up your H.T. on that valve to that extent.



A Climax L.F. choke.

applies to the holders of grid leaks and anode resistances.

Should the material have an appreciable conductance, and by that I mean enable current of an appreciable quantity to pass, the value of the component or components will be badly upset.

### Upsetting a Circuit.

Therefore, you see how important it is to pay the strictest of attention to items which ostensibly appear to be rather unimportant.

Perhaps you, with thousands of others, think of, for instance, a grid-leak holder as being of no more real importance electrically, than a grid-leak battery clip. You think of it merely as a mechanical fixing.

But supposing the resistance between the two clips of a grid-leak holder were as low as 2 megohms (two million ohms). Then if a 2 megohm grid leak were held in the holder its effective resistance would be reduced to one megohm because of the parallel path provided by the faulty material of the holder.

And, by the way, we often strike holders that have resistances even lower than 2 megohms, though it is only fair to say that they are not products of the well-known British manufacturers.



The Brandes L.F. Transformer

You can appreciate

the upset to a circuit when one or more of its grid leaks or anode resistances has its value very badly put out in such a way.

I must not conclude this article without mentioning those special L.F. coupling schemes that certain firms are now producing.

Most of them comprise tapped L.F. chokes, and these are made to act as auto-



A Graham-Farish Anode Resistance.

transformers. An auto-transformer, or auto-coupled transformer, to give it its full title, is a transformer having only the one winding. It is in first essentials an L.F. choke.

But a tapping is taken somewhere between the two ends of the winding. There are, therefore, three terminals.

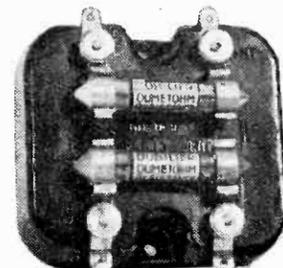
### Auto-Coupled Transformers.

By using two of these, the tapping terminal and a winding-end terminal, you can use a proportion of the one winding as a primary and the whole of the winding as a secondary.

The step-up in voltage will be similar to that which you get in an L.F. transformer, the ratio being that of the turns of wiring between the tapping and the end of the winding and the whole of the winding.

In short, the primary of an auto-transformer is common with a part of the secondary.

The obvious reason why, in the usual way, all L.F. transformers are not of the auto-coupled type is because where-



The Dubilier R.C.C. Unit.

as the secondary has to be a big winding in comparison with the primary, it does not have to carry anything much in the way of current.

It can be and is, therefore, of very thin wire and its resistance is an asset in that it tends to reduce resonance effects. Make it of thick, low-resistance current-carrying wire and you introduce self-capacity, resonance, etc.

But the special coupling units are not merely ordinary tapped L.F. chokes, but for the most part comprise combinations of special tapped chokes and ingenious resistance-capacity shunts. And they do give excellent results.

### Regarding R.C.C. Units.

Most R.C.C. units are wired into a circuit just like an L.F. transformer.

You have a small device carrying four terminals that are in fact marked just like most transformers, viz., "A," "Anode" or "P"; "H.T. +"; "G" or "Grid"; "G.B.-" or "Grid Bias."

There are no electrical advantages in

having the components for R.C. coupling nicely fixed up in the one unit.

From the point of view of the results given separate anode resistances, grid leaks and grid condensers can be used just as freely.

### Wiring Simplified.

But the complete R.C.C. unit makes for compactness and certainly simplifies wiring for some of the essential circuit connections are, of course, made in the unit itself.

Personally, I prefer an R.C.C. unit that has interchangeable components, so that the anode resistance, or grid condenser, for that matter, can be changed at any time without the necessity of referring to the wiring of the set.

But that is not so important when an amateur builds a set to a published design for the simple reason that the values will be very carefully laid out and variations from them will not be wise.



Messrs. Ormond make first-class L.F. transformers.

However, it must be ascertained that the unit carries component parts of exactly the value required for the particular set for which the unit is to be purchased.

### Components "In Team."

Don't be led into accepting one

that has values "near enough." Values in components used in R.C.C. stages are very important indeed.

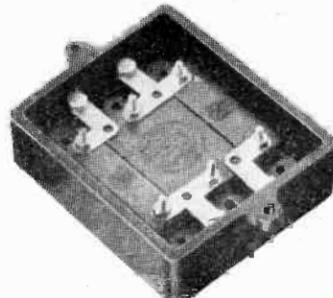
And what must be remembered is that each individual item is working in conjunction with other items, as I have already said.

There is a definite relation between, for instance, the value of the grid leak and that of the grid condenser in an R.C. coupling arrangement.

And you must not alter the value of the one without also altering the value of the other, and only then with a clear insight into the whys and wherefores of the design of amplifier stages.

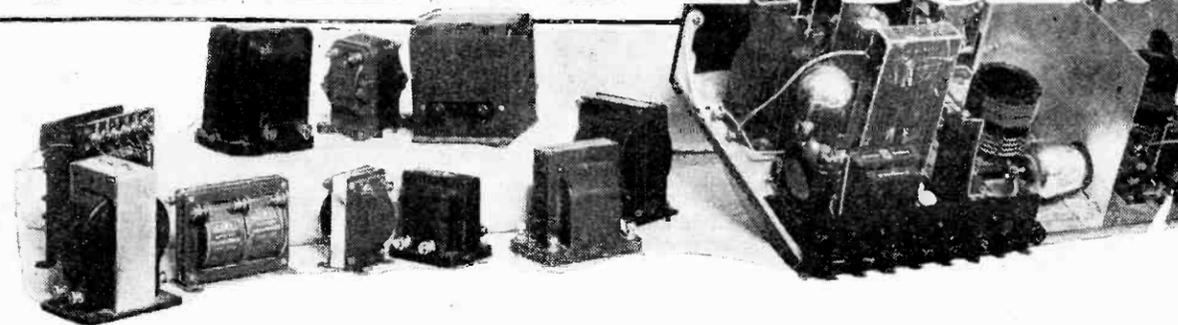
You see, having altered those two values so that "in a pair" they team up nicely you may have to consider the advisability of rearranging the anode resistance values, changing the valve, altering the H.T., and so on!

The design of a radio set is far from being a haphazard business, and it is up to the constructor to do his bit by using just those items recommended by the designer.



A view of an Edison-Bell R.C.C. Unit.

# COUPLING DEVICES



THE valve does the real work in a radio set, and all the other devices are slaves of this lamp. The aerial tuning circuit is adapted to the frequency of the received energy, and passes this on to the H.F. valve for amplification.

The amplified energy is then handed over either to another H.F. valve for further amplification, or to a detector valve, which then develops a low-frequency replica of the broadcasting-studio microphone current.

Standing next to the detector valve is a low-frequency amplifying valve, and there are three commonly-used methods of linking them.

The most popular of all is the L.F. transformer, a very straightforward and easily understood component. Choke-capacity and resistance-capacity couplings are quite familiar systems, but first of all let us deal with the L.F. transformer.

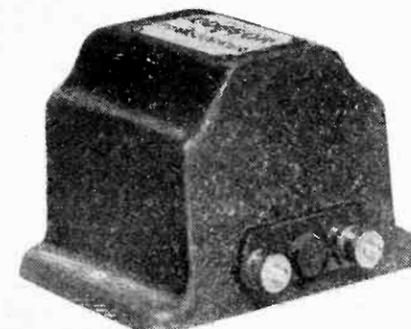
### Inside a Transformer.

An iron core, two windings of wire, four terminals, and a case. That is, in brief, the L.F. transformer.

You could make a transformer by winding two small bunches of wire on an iron nail. And the bunches of wire could be side by side or on top of each other. But it would not be a good L.F. transformer for a considerable number of reasons.

First of all, there probably would not be sufficient wire. You may find two or three miles of wire inside a first-class commercial production.

Then, again, the core would compare very badly with the scientifically-designed commercial version. This is not a solid mass of metal, but is composed of a number of sheets of a special alloy metal, and these sheets are known as laminations.



Here is the well-known Cossor L.F. transformer.

An informative and interesting chat about the main components that figure in L.F. stages, illustrated by a carefully prepared selection of photos of dependable L.F. Chokes, Transformers and R.C.C. Units.

By G. V. DOWDING, Associate I.E.E.

The reason for dividing the core into layers is so that those parasitic energy-wasters known as Eddy Currents are minimised.

Further, the core is always arranged so that it has what is known as a very good magnetic circuit. You want to confine the developed magnetism to the core and windings, and not let it go spreading off into the surrounding air.



The new Lissen Hypernik L.F. transformer.

The core is generally of rectangular shape with a bar across its middle, the windings being accommodated on the bar. But miles of wire and a laminated core do not guarantee a good low-frequency transformer.

There are several other considerations. The primary winding must have a high inductance and the secondary winding a low self-capacity, and neither quality is as easy to obtain as might be thought.

There is another factor which has not yet been mentioned that makes certain compromises necessary. This factor is "step-up" ratio.

### Stepping up the Voltage.

An L.F. transformer not only passes the energy on from one valve to another for further amplification, but it also increases the voltage of that energy. A transformer has no amplifying properties of its own, and it increases the voltage at the expense of current, so that the power in watts remains the same, minus a loss occasioned by a certain amount of wastage in the transformer.

Anyway, the voltage goes up at the secondary terminals, and this enables us to

get more out of the amplifying valve because, as you probably know, a valve is a voltage-operated device. The degree to which the anode current of a valve is varied depends upon the voltage or potential differences between its grid and filament.

The voltage step-up in a transformer is obtained by having a larger number of turns of wire in the secondary winding than in the primary, and the step-up effected is directly proportional with the numbers of turns of wire in these windings.

If the secondary has twice the number of turns there will be, for all practical purposes, twice the voltage, and the step-up ratio is one to two. A quite common L.F. transformer ratio is one to four, and this indicates that there is four times the amount of wire in the secondary.

### Two Vital Factors.

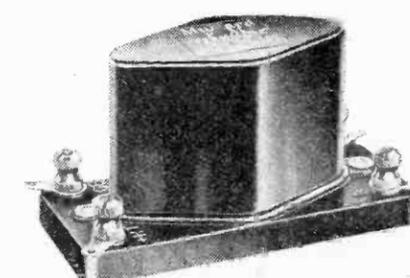
As the amount of wire in the secondary winding is increased, so is its self-capacity, and capacity in a secondary winding is something we want to avoid. Or, at least, we want to keep it as low as possible.

You might say that we could get a higher ratio and a greater voltage step-up by decreasing the number of turns in the primary. But to do this would be to reduce—other things being equal—the inductance of the primary winding, whereas we want a high inductance primary winding. A hundred henries is the sort of thing that we find in a good modern transformer, and such high inductances are obtained and the secondary winding capacity reduced by sectional winding.

By using, instead of ordinary iron, special silicon- and nickel-iron alloys the magnetic qualities of the core can be considerably increased.

The result is that a high inductance primary winding can be obtained with smaller

(Continued on next page.)



An established favourite—the Mullard "Permacore."

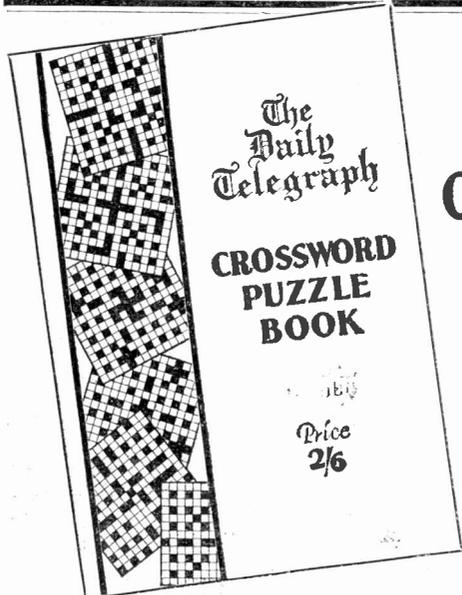


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# CAPT. ECKERSLEY'S QUERY CORNER

**A.C. VALVE DETECTOR — THE BEST  
AERIAL WIRE—A MAINS PROBLEM—  
THE H.F. STOPPER.**

Under the above title, week by week, Captain P. P. Eckersley, M.I.E.E., late Chief Engineer of the B.B.C., and now our Chief Radio Consultant, comments upon radio queries submitted by "P.W." readers. But don't address your queries to Captain Eckersley—a selection of those received by the Query Department in the ordinary way will be dealt with by him.

### A.C. Valve Detector.

G. C. (Tottenham).—"Is it possible to arrange an indirectly-heated A.C. valve as a detector in such a manner that it can deal with a considerable signal input and yet be very sensitive to weak signals. I understand that the bias would have to be altered to suit the two sets of conditions."

What you are saying is, can I get an indirectly-heated cathode valve which, connected in some way as a detector, has perfectly linear response. Because if you will see my diagrams, one gives a non-

I am unable to see how any aerial wire composed of an ordinary copper wire and arranged physically in exactly the same way can increase the sensitivity of the set to which it is connected.

It, maybe, is a failing of mine, and I may be ignorant, and without doubt those who claim the advantages you enumerate must have an honest motive, but, as a technician, I fail to see the technical processes which bring about the effect claimed.

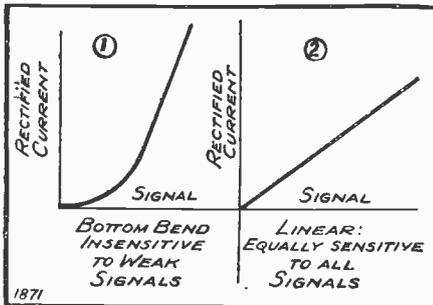
I am sorry to expose my ignorance but, always desiring to learn, perhaps you could write to those who claim the superiority, and ask them exactly what it is that happens, and if you would then write and tell me I would be extremely grateful to you.

After all, those discoveries should be given to the scientific world because patents protect the inventors commercially.

You have changed nothing except the valves. I assume that the magnification obtained is much the same as before and that you are not mistaking greatly increased sensitivity for apparent lack of selectivity, which is one possible explanation.

I reject it because you have given me no evidence that such is the case; but if it is so, reduce the size of your aerial, when apparent selectivity will be restored. But you have done something else; you have tied on to your earth point a great mass of electric wiring.

### GRID DETECTION BEST



Showing non-linear and linear rectification by a valve detector.

linear bottom bend response, and is insensitive to weak signals. The other, a straight-line detector, is equally sensitive to all intensities of signals (within limits).

It has lately been proved that grid-leak detection approaches linearity provided the valves are correctly chosen. The main point is to use the detector as an L.F. amplifier, plenty of volts on the anode and a not-too-high value of grid leak.

Write to valve manufacturers, putting question and answer as on this page, and they will be sure to help you to choose.

N.B.—Remember, plenty of anode voltage and a smallish (relatively) grid resistance.

### The Best Aerial Wire.

B. T. S. (Kilmarnock). "I have recently noticed that most peculiar claims are made for some types of aerial wire, such as an improvement in quality, increased pick-up—in fact, the use of such wire makes a crystal set equivalent to a single-valve receiver.

"I am unable to see how any aerial wire can possibly make this difference, and I should be glad to receive an explanation of this."

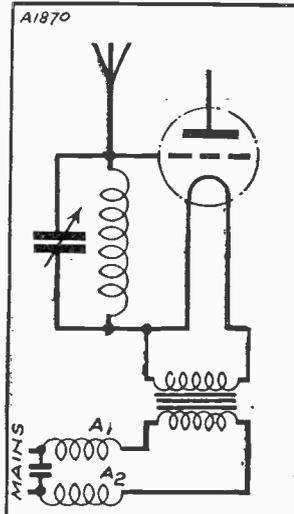
### A Mains Problem.

V. L. (Tottenham, N. 17).—"Here is an interesting problem I came up against recently.

"I owned a four-valve set incorporating an ordinary neutralised H.F. valve which normally gave me a good degree of selectivity at the above address. Having A.C. mains available, I decided to change over to directly-heated A.C. valves, and, having done so, found to my dismay that the aerial tuning had become extremely 'flat.'

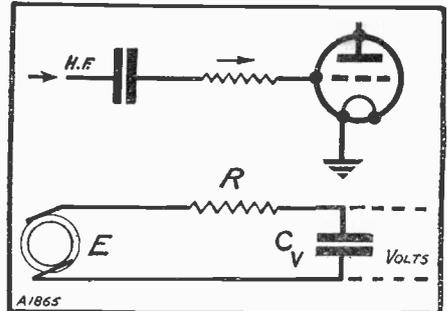
"I tested all voltages, coils, aerial and earth, and made certain the H.F. valve was properly neutralised, yet the trouble still persists. Can you kindly suggest how I might overcome the difficulty?"

### CHOKING THE MAINS



Using H.F. chokes in the mains supply.

### THE H.F. STOPPER



How the series grid resistance works.

You have, in fact, brought up your mains to the set, and the high frequency may be all over the place because of this. May I suggest putting a pair of air-cored chokes in your incoming mains leads and perhaps a SMALL condenser across as shown?

### The H.F. Stopper.

A. T. (Muswell Hill).—"Is the value of a grid leak used in series with the grid of an L.F. valve as an 'H.F. stopper' usually critical?"

Oh, no, it's not critical. The point is that the electrical system can be represented as a voltage applied in series with a resistance to a condenser. (See above.)

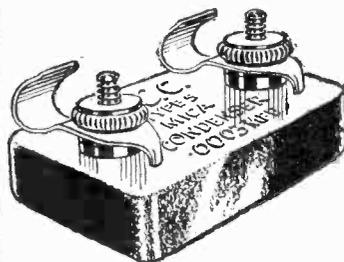
We want the resistance R to be of such a high impedance compared with the grid earth capacity of the valve ( $C_v$ ), that impedance of  $C_v$  is negligible compared to R.

If  $C_v$  is 10 m-mfds. and the frequency is  $10^6$ , say, then impedance of  $C_v$  is about 15,000 ohms, and R has to be larger than that by, say, five times. But I don't know what the value of  $C_v$  is taken to be. At any rate, R is not critical, surely.

# TESTS OF TIME

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



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

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**WARNING.**—When buying the Wates Patent Chassis beware of imitations with the Cones fixed to the baffles—insist on seeing the name Wates before purchasing.

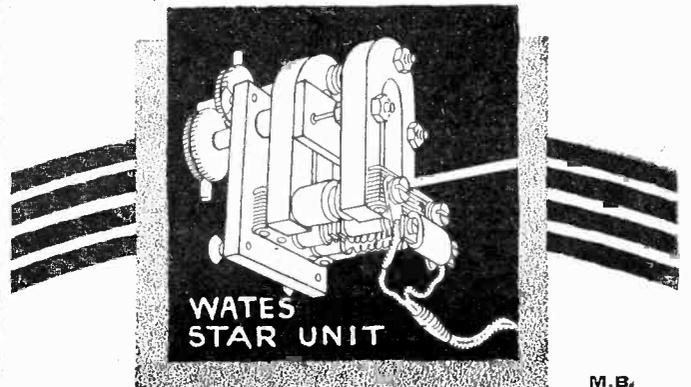
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WATES STAR UNIT

M.B.

### THE PERFECT SET.

The Editor, POPULAR WIRELESS.

Dear Sir,—I have found the "Perfect Set" for local conditions. As I am interested in foreign stations as well as the local, and as the two B.P. Stations come in on a loud speaker worked off a crystal set I required something above the average.

I have made up the "Magic" Three, the "Magic" Four, the "Magic" Two, and the "Magic" H.F. Unit, and given them all a good try-out.

The "Three" with the addition of a "Brookmans Receptor" gave good results on foreign stations, but was really too powerful for local reception, as even with a volume control, it was hard to get really good quality. The only way to get really good quality was to use an indoor aerial about 6 ft. long.

The "Four" is a fine set. Very selective and there is no need to use a wave trap with it. I have got over 60 stations with it at good loud-speaker strength, but the same trouble occurs with the local. I could get both B.P.'s with an inside aerial, 4 ft. long, at full loud-speaker strength.

Then I made the "Two." The quality on the two B.P.'s is superb. I have an old reaction condenser in the aerial lead and mounted on the panel. With this in action there is no need of a wave-trap as the two B.P.'s are quite separate, and it also acts as a most delightful volume control. I have also built in the H.F. unit so that I can switch it on when required, and with this in action I can get all the stations I want. The long-wave stations are so strong that one has to shout to make oneself heard in a large room and the quality almost as good as the locals.

I use a pentode and an output filter with a Regentone mains unit and large cone speaker.

When using the H.F. unit, of course, the condenser in the aerial lead is not required as the set is very selective.

I should like to thank your staff for the very fine sets you turn out.

Now what about a "Magic" Four, with two H.F. stages and plug-in 2-pi coils, with three tuned stages, not ganged? A "Super Magic"!

Yours faithfully,  
C. H. N. SMITH.

Ealing, W.13.

### TWO FINE SETS.

To The Editor, POPULAR WIRELESS.

Dear Sir,—I have just made your "Economy" Three, and I wish to congratulate you for same. This set should fill a long-felt want; the volume with 120 volts H.T. is amazing. I have not had an opportunity of testing for selectivity as yet. (Can you give me the number of turns required for a coil for 5 X X?)

250 X-coil, 75 or 100 for reaction.—Ed.  
Whilst on the subject, my colleague wishes to thank you for the "Magic" Three (we make these sets alternatively as they are introduced), also every success to the "Blue" unit.

Yours faithfully,  
F. V. ALMER.

Leicester.

### CORRESPONDENCE.

#### THE PERFECT SET.

TWO FINE SETS.

A VICTOR-KING "MAGIC."  
THE "MAGIC" FOUR.

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

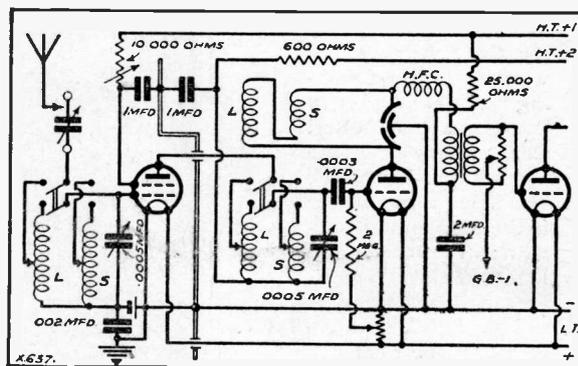
#### A VICTOR-KING "MAGIC."

The Editor, POPULAR WIRELESS.

Dear Sir,—I have been most pleased with the "Magic Four" ever since I built it—its stability when working from D.C. eliminators, its selectivity and its tremendous volume have been its most pleasing features, and yet there is one drawback as against your "Titan" series, and that is the necessity of changing three coils whenever one wished to change from one wave-band to the other.

I have watched with interest the various ideas for "wave-changing," but I have not liked the idea of eight point switches and six coil holders and coils in the set, and so, until I read about the "Yee-Kay" Four in "Wireless Constructor," July, 1930, I have not done anything to do away with the rather tiresome business of coil changing. I thought it would

#### A FINE FOUR-VALVER.



Mr. Currie's "Magic" circuit, which includes a Victor King wave-change scheme.

be a good idea to try Mr. King's method on the "Magic" Four, and I am pleased to say that my new "Yee-Kay-Magic" Four comes well up to expectations.

I left the L.F. end of the set as it was, put in the extra coil holder in the H.F. end and used a Wearite D.P.D.T. switch for wave-changing. Then I used the old reaction coil holder for the extra coil in the tuned anode, and made the two neat and ridiculously cheap reaction coils as specified by Mr. King (a bank of 20 turns of No. 28 gauge D.C.C. stuck on to the short-wave coil, and a bank of 50 turns of No. 32 D.S.C. stuck on to the long-wave coil).

These were connected in series and were connected to the plate of the detector valve, the differential reaction condenser and H.F. choke exactly as in the old "Magic" Four. I used a second Wearite D.P.D.T. switch for changing over the anode coils and on the first try-out the results were perfect.

When one thinks that a perfect reaction coil can be made for any of the "Magic" series for a penny, and the coil holder dispensed with, one would think that it is worth while for any set builder to seriously consider this method of sticking his reaction coils on to the "X" coils and fastening two crocodile clips on to the ends of the wire.

He has then a double coil with all the advantages of the two-coil method, and a saving of about 5/-. Also this method of obtaining reaction by two coils in series is so simple that one would have thought that it would have been given more prominence before now.

Yours truly,  
DONALD I. CURRIE.

Dentlightshire.

#### THE "MAGIC" FOUR.

The Editor, POPULAR WIRELESS.

Dear Sir,—Since my last letter, I gave up the "Magic" Three and have now built the "Magic" Four 1930, and I am glad to inform you that it has turned out better than I expected. The volume is terrific and this set is fit for a very large hall. I am getting all the S.A. stations at more than I can hear strength.

But, on the short waves, it is simply marvellous; the tuning is very simple and some stations I can tune-in as if I was tuning in the local broadcasting stations. On some it is free from hand-capacity entirely.

In order that you may be able to verify, I mention that on Monday, 19th May, I got G 5 S W broadcasting an International Concert, I got him when he was broadcasting from Brussels, from where he went on to London.

In conclusion, please accept my sincere congratulations for the set and thanks for same.

Yours faithfully,

M. D. BARMANIA.  
Umzimkulu, E.G., South Africa.

JUDGING from the steady fall in my correspondence of late, I should imagine that most of the true short-wave enthusiasts are now engaged in the peaceful occupation of sun-bathing on the beach of some distant resort, far from the worries of radio.

Perhaps I may be allowed to tell them that they are not missing anything! The short waves are still dead, and I, personally, am getting all ready to bury the corpse. It hardly seems as if those good conditions that we all expect daily are ever destined to return.

Probably my departure for a fortnight's holiday later on will coincide with a phenomenal improvement—for a fortnight!

#### A New Norwegian.

The remarkable fact is that the high-powered stations are hardly affected at all; but the amateurs, even the "semi-commercial" amateurs, are completely blotted out. V K 2 M E, Sydney, for instance, is still being heard consistently by a number of my correspondents. The "Elettra" on 26 metres, comes next in order, and quite a number mention a new Norwegian broadcasting station on 31 metres.

Rome (3 R O) on about 33 metres, is not attracting quite so much attention as when he first came on, but several readers mention Rome on 80 metres as being a good station on which to test.

### SHORT-WAVE NOTES.

By W. L. S.

My stock station for showing non-technical visitors is Zeesen. Quality of reproduction (even on my "hot-stuff" short-waver) is so amazingly good, and strength so great that it never fails to impress the ordinary broadcast listener, who has probably never heard a German station so strongly in his life, even with a set using twice the number of valves.

I have to hand an interesting letter from an amateur in Nigeria. The most striking point in the letter is that he says nothing is ever attempted about 40 metres on account of atmospherics. This alone ought to encourage some of our enterprising firms to make "Overseas Model" receivers. This gentleman uses a "Thomas Model Short-Waver," described in "M.W." some time back, although he has had several other sets at different times.

#### X's and Wavelength.

As usual, he mentions Huizen as the star station, with runners-up in the persons of Bandoeng P L E, Kootwyk, W 2 X A D,

W 8 X K, Rome 3 R O, and G 5 S W quite passable on occasions.

In connection with atmospherics, he says that they are rarely audible below 17 metres, even during a lightning storm. I confirm this from my own recent experiences. Above 25 metres he finds it is almost impossible to work during daylight for months on end, although the noise quietsens down after 10 p.m.

Yes, J. F., I confirm all your remarks about G 5 S W, but I think a change is imminent. I think the wave-length used is against the station, in the first place. The 31-metre stations probably get out better simply by virtue of the different wave-length, apart from the question of power or efficiency.

#### That "Mush."

This atmospheric and "mush" business is very puzzling, even here in London. At certain times of the year when conditions are good enough to warrant one's loss of sleep in the early morning, there is often a queer rushing sound to be heard that is absent at all other times of day. This seems to come in only when conditions are extra good, and I have noticed it repeatedly over a period of several years.

One can, conversely, always tell a bad morning or evening by the complete absence of background,

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gramophone  
and gives  
perfect music**



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**THREE NEW  
CHARTS**



**Build your own  
FERRANTI  
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The Ferranti H.T. Supply Units are accepted as the standard by which all such apparatus should be judged. They are designed to afford adequate power, silent power—and completely safe power. Constructional charts are available from which it is easily possible to build a unit exactly suited to your needs; a unit which will conform entirely with the requirements of the Institution of Electrical Engineers.

Here are given brief details of the three latest charts. Make your choice—or write to us stating requirements and put an end once and for all to the H.T. battery bugbear.

**TYPE No. 1.**—Describes a unit for use on A.C. Mains of 200/250-volt 40/100 cycles. Incorporates a Westinghouse Metal Rectifier. Capable of an output of up to 100 milliamps at 200 volts (at lower milliamp outputs the voltage is higher). Designed for use with the most powerful receivers and amplifiers that can be used in the home. The instructions show that by the omission of certain components the unit can be adapted specially for feeding all sets of the Screened Grid Three type.

**TYPE No. 2.**—This has a similar performance in every way to Type No. 1, except that it employs a Valve Rectifier which is lower in price, but may need replacement from time to time. The output is up to 80 milliamps at 200 volts.

**TYPES 7 and 8.**—This chart describes two units. One is suitable for three-valve receivers calling for not more than 120 volts, 20 milliamps, and the other is for use with similar receivers having a rather larger Super Power Valve in the output stage. It gives 180 volts, 30 milliamps.

FERRANTI LTD. HOLLINWOOD LANCASHIRE



All Editorial communications should 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. Lyle, 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 reception. 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.

### A "MAGIC" THREE FAULT.

H. G. (Sheffield).—"I have recently made up your 'Magic' Three for a friend of mine, and am somewhat disappointed with the results therefrom. I have taken great pains with the wiring, and have placed the components slightly wider apart than the design as issued in 'P.W.', owing to the fact I had a larger panel and baseboard at my disposal. Results on the long waves are pretty satisfactory and volume on 5 X X excellent.

### CAN WE HELP YOU WITH YOUR SET?

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 by phone or in person at Fleetway House or Tallis House.

Radio Paris and Hilversum are at fair loud-speaker strength. It is on the medium wave-band, however, where the fault lies.

"5 G B, Local, Manchester, are all good speaker strength, but when we try for the foreign stations results are poor. I have used all good parts.

"The coils are made up as detailed in a recent article in 'P.W.', except that I have made them all X coils, tapping them pro rata as for the 60 X size. I made a 75 X; 50 X and a 200 X and have used two C.T. coils, 35 and 100 for reaction, not using the C.T. terminal, of course.

"The aerial condenser is of modern design, fitted with S.M. dial. On tuning with this

condenser, which is O.K. mechanically and electrically, the stations all seem cramped from 0 to 50 degrees, but nothing but morse signals above this reading.

"On my own set (the "Radiano Titan") the stations are all spread evenly over the dial so it makes me think there is something wrong with the aerial or det. end of the set.

"My friend's aerial is about 60 ft. single wire, well insulated, led in direct through the window, the only joint being in the lead-in tube. Earth is a galvanised pole with lead soldered into it.

"The lead-in is only 6 ft. long. Good batteries, etc. Can you throw any light on my trouble?"

"(P.S.—The B.P. rejector is a really great device and does all you claim.)"

We are afraid that the trouble lies in that home-made tuning coil you are using for the L.I. socket. Are you sure that the number of turns, etc., is correct, and have you got it so arranged that the aerial is tapped at the lower end of the coil and not in towards the top of it?

If the tuning condenser is of .0005 capacity and the stations tend to be all in the first 50 degrees, it is almost certain that the coil is much too big and that some of the turns taken off it would assist in curing the trouble.

We should try the effect of using a bought 60 coil so as to compare it if you can get hold of one, and also of reversing the coil holder connections if necessary.

(The improvement to the anode resistance that you mention would probably make for better control and ease of handling, but it would not affect the placing of the stations on your dial, which is the real trouble. The only thing that is likely to affect this is the reduction of the capacity of the aerial tuning condenser if too big (which seems very unlikely) or a reduction in the number of turns of wire in the coil which is tuned by this condenser.)

### IMPROVING SELECTIVITY WITHOUT ALTERING THE SET.

H. J. (Hampstead).—"I wonder if you could help me with the following rather unusual circumstance? The set I am using is a three-valver which belongs to a friend who has gone abroad for twelve months, and who lent me it to use exactly as I like while he is away.

"It has been a great blessing, and was absolutely perfect before the London station went to Brookmans Park, when a certain amount of trouble occurred by getting two programmes mixed up together. However, it was bearable and by altering the tuning I could generally get the one I wanted most.

"Recently, however, I moved to a different address where I find that I am quite unable to separate the two. I have called in the local wireless people and two of them have told me the same tale, namely, that I must alter the set to a more up-to-date circuit.

"As it is not my own set, I am particularly loth to do this, so I come to you as a last resort. Is there any way so that I can get either programme, and hand the set over to my friend exactly as I received it?"

Yes, you can improve the selectivity by external alterations alone, if you are prepared to make a simple modification.

What you will have to do is to undo the aerial from the aerial terminal on the set, and take it to a new little unit, a lead from this unit going to your aerial terminal in place of the direct lead as before. The unit consists of a plug-in coil holder, a plug-in coil size No. 60 or 50, and a variable condenser of about .0005 mfd. maximum capacity to tune this coil.

The condenser can be either of the ordinary tuning type known as an "air" condenser, or one of the small semi-variable condensers that are boxed up and have a screw-down adjustment which enables the capacity to be altered. In addition to these you will need a very small neutralising condenser and a couple of terminals.

Mount the coil holder and the condenser on a board or panel, or in a box in any convenient way, with the neutralising condenser standing close and the two terminals conveniently placed upon the unit. Mark one of the terminals A and the other E.

Now join up the A terminal to one side of the coil holder, to one side of the variable tuning condenser, and to one side of the neutralising condenser. Join the E terminal to the remaining side of the condenser, and to the remaining side of the coil holder.

### EASY ALTERATION.

The unit is now ready and all you have to do is to take the aerial lead off the set, place it on the A terminal of the unit. Leave the earth lead joined to the set, but connect it also to the unit's E terminal.

Then take a short piece of flexible wire and run it from the aerial terminal on your set to that side of the neutralising condenser which was left vacant. Set this condenser about half-way round or less and then tune your new variable (or semi-variable) condenser.

The easiest way to do this is to leave the condenser in the set adjusted to its normal position for tuning, say, the London Regional, and vary the new condenser on the unit until the programme from this station comes in at good strength.

You will find you can then vary the volume by readjusting the neutralising condenser, and after a satisfactory strength has been obtained note the positions of the two variable condensers for the London Regional station, and repeat this procedure for the National Programme. That is to say, first tune the set to receive the National programme with the aerial in its former position, and then transfer the aerial to the unit and tune the unit until the National programme also has been brought in there, noting the condenser setting for this station.

It will be found that when the unit is in use the tuning is not as before, very wide or non-selective, but is extremely sharp, and, in fact, you may have some little difficulty at first in finding either of the transmissions unless the tuning on the set itself is properly adjusted to that station.

When you have found the respective readings all you have to do is to leave the unit in circuit permanently and to adjust the condensers to their

(Continued on page 628.)

## TECHNICAL TWISTERS

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Prior to the advent of the S.G. valve, high-frequency amplifying valves were unstable, owing to the . . . . . between the grid and plate.

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The missing words (in order) of T. T. No. 21 were: Directional; Rotated; Directions; Maximum; Interference.

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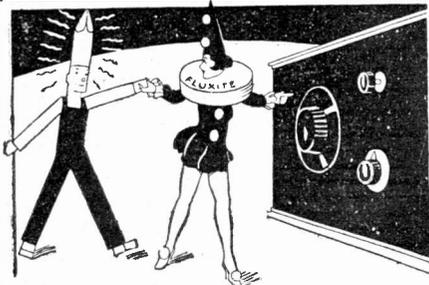
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238



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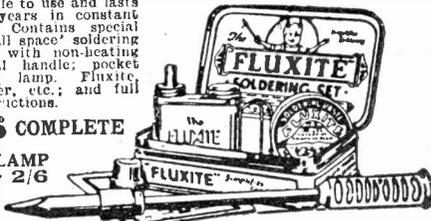
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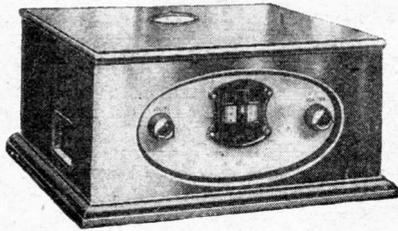
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## RADIOTORIAL QUESTIONS AND ANSWERS.

(Continued from page 626.)

respective readings as required. Probably you will find that with the unit thus installed you can make selectivity so sharp that it is necessary to know the settings for the stations, for it may be quite easy to pass them altogether unless you know where to look for them.

### THE "EUROPEAN" THREE.

D. F. T. (Exmouth, Devon).—"I am going to build the 'European' Three, described in July 26th 'P.W.', but should like to use an R.C. stage instead of two transformers, if possible.

"Left over from my old set I have a 'second stage' R.C. unit in good condition. It is marked +, A. G., and L.T. Where should these connections go?"

You should get good results from the arrangement. Mount the unit on the baseboard in place of L.F.T.2. "L.T." on your unit corresponds with G.B. -; "G." with "G."; "A" with "Plate"; and "+" on the unit corresponds with "H.T. + transformer connection.

### WHAT DO YOU THINK ABOUT THIS?

A Lambeth reader of "P.W." worked a home-made loud speaker from a "Magic" Three with such success that another "Magic" Three enthusiast (who lived at Croydon) commissioned a similar loud speaker.

The set, the loud-speaker unit, the chassis, and the L.S. cabinet, etc., were all duplicated, and when finished the second loud speaker worked magnificently on the Lambeth set. But when taken (by 'bus) to Croydon and connected up there, it was insensitive and unsatisfactory. The set to which it was joined was in perfect order, and all connections were O.K. So eventually the new loud speaker was examined again, and it was found that—

Can you guess what was wrong?

N.B.—There is no prize for answering this but from time to time we shall give a radio problem (followed the next week by the answer) in the hope that readers will find them both interesting and instructive. (Look out for the solution to the above next week.)

*The trouble which was described last week—loss of signals when an S.G. H.F. unit was connected up—proved to be due to a confusion of the valve's connections. (The terminal on the top of the bulb is the plate, or anode, or output terminal, and not the screen. The screen is joined to that pin of the valve which is opposite the grid pin.)*

### LOUD-SPEAKER CONNECTIONS.

L. N. (Herts.).—"The whole time it has been in action the set has given the utmost satisfaction, and I was particularly pleased with the loud-speaker reproduction, because I had made the instrument myself (the Mural Cone), from the instructions in 'P.W.'"

"Unfortunately, the loud speaker suddenly failed me, so I took it to a friend for an overhaul, and he told me that it was 'de-magnetised' and useless. I cannot make out why it should give out in such a fashion, and should be very glad if you could tell me the reason and how I can put it right."

Your connections between the set and the speaker were wrong. Except in cases where an output filter circuit is used, it is very important that the loud speaker should be connected in circuit the right way round.

Here is the reason. If you look at the diagram from which it was built, or if you examine the set itself, you will see that the plate terminal of its last valve holder is connected to one of the "loud speaker" terminals, the other "loud speaker" terminal going to the H.T. positive of the battery. So all the current from the H.T. battery to the plate has to flow through the loud speaker,

Whenever an electric current is flowing it is accompanied by a magnetic effect, so that by running a current through the loud-speaker windings you are, at the same time, introducing a magnetic action there.

Now the loud speaker itself depends for its action upon a magnetic field around the permanent magnet inside it, and every loud-speaker manufacturer knows that a valve's plate current running through the instrument will either assist this permanent magnetism, or oppose it, according to the direction in which that current is made to flow.

If you examine your loud-speaker terminals you will find that one of them is marked + and the other -, or else one has a red terminal and the other a black one, or some other distinguishing mark has been arranged for so that the two can be distinguished.

If the actual terminals of the loud speaker are hidden from sight and, instead, it is provided with a cord, you will find that the two ends of the cord are distinguished from one another in a similar fashion. Probably one is coloured red, or has a red thread running through it, or the tag itself is shaped or coloured or marked, for identification of + and - leads.

Similarly, that loud-speaker terminal on your set, which is connected (internally) to the H.T. + terminal, should be marked with a + sign, and the other loud-speaker terminal (which goes to the plate of the last valve) should be marked with a - sign.

When you connect up your loud-speaker leads the red one (or that which is marked +) should ALWAYS be joined to the + loud-speaker terminal on the set. And the - loud-speaker lead should, of course, go to the - loud-speaker terminal on the set.

When joined in this way, current flowing through the instrument will not be opposing the permanent magnets inside it. If the leads are reversed, your current is continually at variance with the permanent magnets, and in due time they will suffer to such an extent that results will "fall off," and the speaker become relatively insensitive or silent altogether.

It is then said to be "de-magnetised," and this, no doubt, is the trouble with your speaker.

Unfortunately, the trouble is one which can only be put right by a properly-equipped factory, so we should inquire of the makers whether they are prepared to do this for you. Possibly they may recommend you to get it re-magnetised by another firm specialising in this class of work, but in any case the job is one that cannot be undertaken by an amateur.

### SHORTING THE SHORT-WAVE CONDENSER.

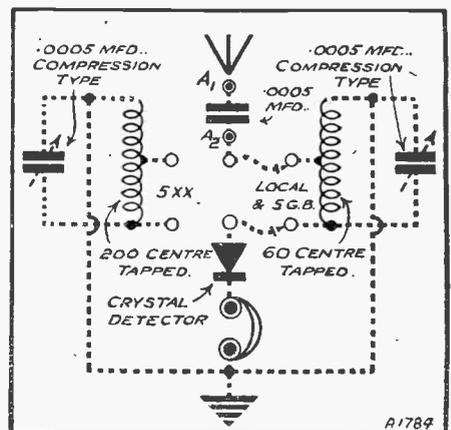
S. W. P. (Paddington, London, W.).—"For the short waves I want to use a .0003 condenser (fixed) in series with the ordinary tuning condenser, to give finer tuning. Would it be O.K. to bring this fixed condenser in and out of circuit by an ordinary on-off switch on the panel?"

The method you suggest is quite satisfactory, provided it is carried out properly.

The leads to the panel must be short and well-spaced, and the switch itself must be one with a good strong contact in the "on" position.

When in the "off" position it must merely open the circuit definitely and cleanly, so, provided you choose a suitable switch and fit it properly, the scheme should give good results.

## POPULAR "WIRELETS" No. 16



The dotted lines show the connections of last week's "Wirelet," the circuit providing easy wavelength-changing without the necessity of re-tuning after the condensers have once been set.

# RUSSIA'S 'RED' RADIO

Details of broadcasting in Russia, where talks take up the greater part of the programmes.

From a SPECIAL CORRESPONDENT.

THE Soviet did fairly well out of the Prague wave-length conference—and it meant to do so! Broadcasting is a communistic thing which the heads of the Soviet regard as one of their most dangerous weapons, and they intended to get as many exclusive wave-lengths as they could.

In the end they got only one exclusive wave—Kharkov's 1,304 metres—but they have ten others, all on the long waves: and what a lot of talk is broadcast! Komintern's 40 kilowatt station comes in well, though most of the other Russian stations are difficult to get just now, and broadcasts in many languages (including English) but mostly Russian, of course, are given. One talk follows another.

## Behind the Scenes.

What is it, ask those who don't understand the language? Is it educational talk, or dangerous Soviet propaganda? Let me take you behind the scenes of Soviet broadcasting.

Last year there was a rumour that "the Russian stations" were sending out anti-Polish propaganda in order to create a new European trouble, and that a Polish amateur station had been started to jam the Russian transmissions. Two daily papers in this country took up the rumour and said that Russian broadcasting ought to be controlled—or stopped!

Needless to say, there was nothing serious in the rumour. There was a station transmitting the offending talks, but it was proved to be run by a couple of amateurs, financed by a political party of no importance, and the power was only a few watts. Directly the Soviet Government heard of this, strict action was taken. Stirring up radio trouble is not the Soviet's way of going about things, although "red" propaganda without direct reference to any station is broadcast day after day.

## Witch-craft!

Now, there is a body known as the Radio Peredacha in Moscow. This arranges programmes and directs the amount of Russian patriotism which shall be broad-

cast. It is more of a Government body than the B.B.C. It is the Soviet's "Publicity Agent."

What dwellers outside Russia fail to understand is that the Soviet is not wishing to convert the world to "Bolshie"-ism. It wants first to bring the whole of Russia into line. That is why there is so much talk on the wireless. It is 75 per cent high-pressure education!

Look up the list of Russia's stations, and you will find Moscow, Kiev, Sverdlovsk, Moscow-Stchekovo, Leningrad, Tiflis, Rostov, Moscow Popoff, Kharkov, Bakou and Moscow Komintern—eleven altogether; yet there are actually over fifty stations working in Russia, many of them not recognised by the Soviet.

A big difficulty is that Russia is so large, and is peopled largely by village folk. This latter disadvantage is hard to dispel, for the simple peasants are afraid of wireless, and the Soviet has had to send many technical men touring the country to prove, in the outlying districts, that ether-waves don't work witch-craft!

There was a remarkable instance, at the opening of the New Komintern station, of the ignorance of the country folk. A party of farmers in the village of Wiatchka, who were able to hear radio for the first time, were invited to a communal-listening

meeting; but they held a meeting on their own, first of all, and decided that the radio waves were the cause of the bad crops at the beginning of the year. Then they cheerfully burnt down the house where the Soviet test receiver was installed, and chased the Soviet radio officials out of the village!

## The Urge to Educate.

Yet the idea of the Soviet is to run radio by the people for the people. A strange sight to a foreigner is the costume worn by station officials. Coarse caps, mufflers and leather jerkins are the order of the day, but anyone who has been to Leningrad in the after-Revolution years will know that this is in keeping with the present communistic Soviet ideas.

The capital is a gay city at night, in parts, but the lack of money and the depressing communistic schools and kitchens, which make mere "units" of men and women alike, are reflected in the broadcasting.

In Russia there is, to-day, an educational "urge," and the average Englishman who understands Russian will not want to listen to the Soviet stations for more than a few minutes. To cover the whole of the country the talks are given in four dialects, and in English, Finnish and Esperanto.

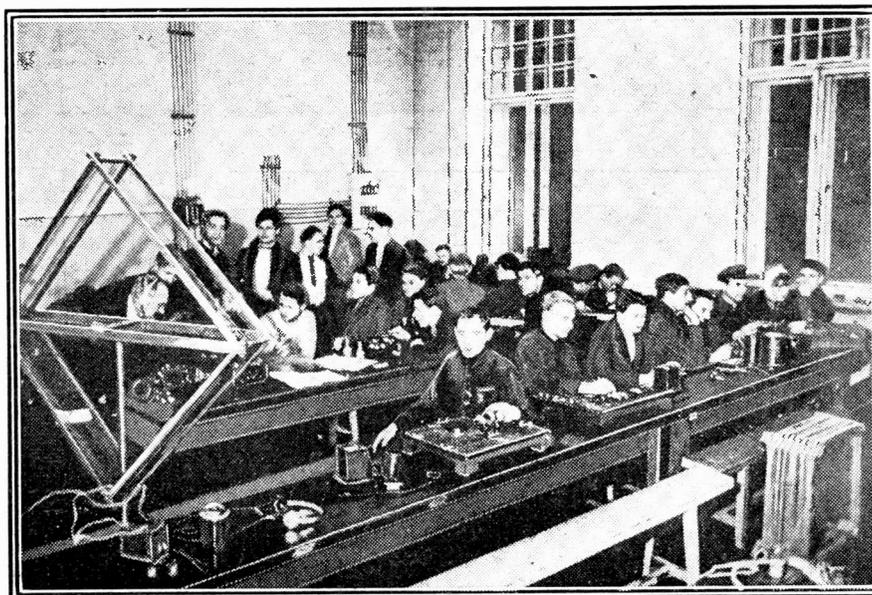
## All Talk!

There is a children's hour, as unlike our own as could be imagined, for, again, it is all talk. The little children are, after the Revolution, known as the Young Lenin, and the Young Lenin talks on the wireless are for kiddies up to about ten years of age.

It is harmless "school" talk, and not anti-British propaganda; so we needn't bother!



## IN A RADIO INSTITUTE AT MOSCOW



The main use of broadcasting in Russia is for educational purposes, but many of the peasants think it is witch-craft, and therefore practical radio instruction is very necessary.

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**FOR THE LISTENER.**

(Continued from page 608.)

"Go and look under the faggot of sticks in the cowshed."

Everybody laughed, because they thought it was a joke; but nobody, not even Giuseppe, stirred.

Then Belinda (me ventriloquising) said: "Will Giuseppe wipe his nose and go and look under the sticks in the cowshed!" At last they got him to go, and he came back, smiling all over his face, with a small model aeroplane in his hand.

This part of the programme was such a success that we have since learned the birthdays of the whole neighbourhood, from the least unto the greatest! We therefore doubt whether it was really a success after all!

**Jazz.**

Luckily we got into the tail end of a dance programme from Rome. They liked it. There were six couples. Gravel or grass seemed to make no difference to them.

Personally, I'm not much good at it anyway, and the unevenness of the orchard ground rather cramped my style; but I did my duty like a man, and if I found my buxom partner's toes more often than usual.

These Italians dance with fire. They also hug you. It was a tiny, and not very exciting, band. Heaven knows what would have happened if it had been Jack Payne's!

**Sports.**

Then we sat down, counting our bruises, to listen to some "sports notes." This is a universal feature in Continental Sunday programmes.

I would have given them a bob all round if I could have heard how the Test Match had gone on Saturday; but apparently the Test Match means nothing to Rome, where Mussolini is safe from challenge by Bradman.

Then I switched them over to Langenberg for a running commentary on the "International Riding Tournament" in German.

I translated for them, but got rather muddled; so I picked up (clever!) Paris and a talk on a "Cycle Tour of France," which was easier. I asked them which language they liked best, after their own; and with one accord they said "Inglese!" I acknowledged the compliment, while Belinda went off into a roar of atmospherics.

**THE SET OF THE FUTURE.**

(Continued from page 607.)

convenience, and in the end one takes a convenience for granted, whereas a thing of beauty is a joy for ever.

The B.B.C. is going to spend over half a million pounds on the technical equipment of the Regional Scheme, and no one yet has sat down and asked themselves seriously how the technical equipment can be used for the greatest benefit for all.

There are many difficulties delaying the development of the "Morris of the Ether." There is chiefly the fact that the technical man has to compromise in his design because the customer insists on distant listening as he says it assists variety.

Hence bad quality and bad performance; hence the failure to produce something truly right from all points of view. The Regional Scheme could be made to give true variety when the purely local-station cheap set would have a greater appeal. It has not much hope now.

I have proposed, and still believe my proposal merits perhaps more serious consideration than it has received, that a true variety might be given if one wave-length of the Regional Scheme were devoted to the B.B.C. (National), while the other was handed over, with proper guarantees, to private enterprise. I know there are difficulties, but there are always difficulties.

**TECHNICAL NOTES.**

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

**Short-Wave Reliability.**

**T**HE importance and reliability of short-wave communication is still further emphasised by the decision to install a short-wave transmitter as a permanent part of the equipment of the League of Nations Broadcasting Station.

You will remember that the question of the establishment of this station has been under discussion for some two or three years past and the matter has been delayed owing to Swiss fears that, in the event of a European war, the neutrality of Switzerland might be involved. I understand that the Radio Suisse Company has actually commenced work in connection with this new station and that both a short-wave and a medium-wave transmitter will be employed.

In this way it will be possible to transmit *communiques* to all parts of the world. The actual power of the station is still under consideration, but I understand it will be in the region of 50 k.w.

**For Broadcast Relays.**

The normal purpose of the station will be to transmit its communications to countries which are members of the League, but as this will not occupy a great deal of its time, it will also be used for the relaying of various European broadcasts. In this way the station will make certain European broadcast programmes available to British listeners, whilst on the other hand, certain British programmes will be made through this station available to Europe and other parts of the world.

(Continued on next page.)



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Trans. Keys by Brown, 7/6, cost 45/-. Lightning arrestors, vacuum tube, 2/6d. Earth Spikes, 1/3d. Insulators, 9d. doz. Ironclad Slider Rhcos., 2,300 ohms wirewound, 110m/a, for direct on mains, 17/6d. Violet Ray Sets in case, 27/6d., List 70/-. Television Motors, D.C. or A.C., 25/-, List 40/-. Combination Mains supply adaptors, B.C. with 2 p.n. plug, 9d., List 1/6. Eye Universal H.T. Eliminators for Portables or Sets, £3 7s. 6d., List 45. Eye 6-1 L.F. Transformers, 13/3d., List 22/6d. "Blue Spot" Units, Model O, 10/-, List 21/6d. Ditto on Cast Classis, 20/-, List 34/-.

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## TECHNICAL NOTES.

(Continued from previous page.)

### The First Valve.

I wonder how many of you know that the first valve with which Dr. de Forest commenced his experiments (which eventually resulted in the development of the 3-electrode valve) was made with a gas-flame with two wire electrodes inserted into it?

Working, in 1907, with a large spark coil, he noticed that every time a spark occurred across the gap a Welsbach gaslight nearby would flicker. It occurred to him that the wireless waves sent out from the high-tension spark must have some influence on the heated gas within the gas mantle.

He then set to work to make a little spoon-shaped electrode, containing common table salt, which was supported upon a wire and introduced into the flame, whilst above this he placed a small piece of platinum wire to act as another electrode. A battery and receiver were shunted between these two electrodes in the flame.

The effect of the salt was to increase the conductivity of the flame and to improve the valve action.

### And the Latest!

Quite fair results were obtained with this curious form of detector, and this gave de Forest the idea of using a bulb filled with gas and a heated filament as the source of heat. From this simple experiment one thing led to another, until eventually the various forms of 3-electrode valve, very similar in general features to those in use to-day, were evolved.

### Impedance and Design.

One of the most noticeable features about valve design during the last year or two is the way in which "output" or power valves have been developed with a very low impedance, and yet at the same time having a reasonably high amplification factor. It is a fairly straightforward matter to reduce the impedance of a valve—which is, of course, essential if the valve is to act as a power valve and handle a fairly large amount of power—but to keep up the amplification factor at the same time is another matter, involving very careful design. For instance, if the grid has a close mesh, the valve will usually have a fairly high impedance, and in such a case it is a simple matter to give the valve a high amplification factor.

### Mutual Conductance.

For a power valve the great point is to have the impedance as low as possible and yet a reasonably high magnification factor. The mutual conductance of the valve may be taken in popular interpretation as an indication of the general goodness or all-round suitability of the valve for the particular intended purpose and, inasmuch as the mutual conductance depends definitely upon both the impedance and the amplification factor, you will see the importance not only of keeping the impedance down but also of keeping the amplification factor up. Modern power valves often have a mutual conductance of from 2 to 3.

### H.T. Consumption.

Of course, the reduced impedance of the valve means a higher H.T. current

(Continued on next page.)

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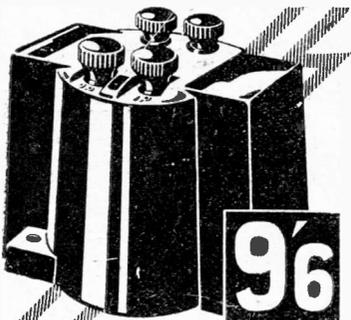
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—SUNDAY GRAPHIC—

## TECHNICAL NOTES.

(Continued from previous page.)

consumption, and many output valves now consume up to 25 milliamps or even more.

Perhaps I should here refer once more to the importance of the correct value of grid-bias, especially on the output power valve, as this affects very materially the amount of H.T. current consumption. Of course, you can overdo the grid-bias business, and the amount of grid-bias voltage applied should only be sufficient to prevent the flow of grid-current on the loud signals.

### Full or Half-Wave?

The old question as to using half-wave and full-wave rectification continues to crop up from time to time. Readers wanting to know whether a full-wave rectifier substituted for the existing half-wave rectifier will give twice as much power.

At first sight it seems obvious that if you have alternating current supply to a rectifier and you rectify both halves of each cycle you must be getting, in the form of d.c., twice as much power as you would if you rectified only one half of each cycle.

In fairly simple conditions, such as the rectification of low-tension alternating-current from a transformer for the purpose of charging a low-tension battery, you will find that this is the case. One of the simplest ways to prove this to yourself is to take a stepdown transformer with a divided secondary, the centre point of the secondary being connected to the battery to be charged and the ammeter being, of course, in series with the battery.

### Difference in Current.

The other pole of the ammeter is then connected to the centre electrode of the full-wave rectifier, whilst the remaining two electrodes of the rectifier are connected respectively to the opposite ends of the transformer secondary. This, of course, is the usual arrangement.

If you disconnect one end of the secondary, thereby leaving only the other half of the secondary in operation, you will at once notice that the current indicated on the ammeter drops to roughly half its previous value.

The same argument applies if you use a transformer with a single untapped second-

ary and employ the Gratz formation of rectifiers, which comes to the same thing as the above.

### The Power Circuit.

Where people sometimes go wrong in considering this problem is in assuming that the power circuit will operate just as effectively with full-wave rectification as with half-wave.

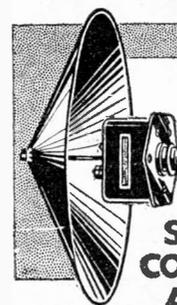
You must remember that the circuit will have been designed to give the necessary power (and smoothing, if it be a circuit in which smoothing is required) with the half-wave rectifier, and merely introducing a full-wave rectifier will almost certainly complicate the conditions and quite possibly not give even such good results as with the half-wave.

The full-wave rectifier will give about twice the current in the proper conditions, but this does not mean to say that there is necessarily any advantage, from the power point of view, in using a full-wave rectifier instead of a half-wave.

You can obtain any desired amount of power just as well with a half-wave rectifier as with a full-wave: it simply means that you have to use a somewhat higher voltage with half-wave than with full-wave.

Perhaps a simple illustration may help to make this clear. If one motor-car has 20 horse-power and another motor car 40 horse-power, the second car may go twice as fast as the first, or may carry twice the load at the same speed, but you cannot be sure what it will do unless you know the various circumstances in which the trial is to be made.

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## LISSEN VALVE PRICES UNAFFECTED.

IT was stated in a recent issue of "P.W." that the firm of Lissen was also one of the valve manufacturing concerns which had agreed upon a general price reduction in valves. We are informed, however, that this is not the case, and that Messrs. Lissen's valves will still be sold at the usual prices. Readers will please note this correction, which Messrs. Lissen have requested us to make.

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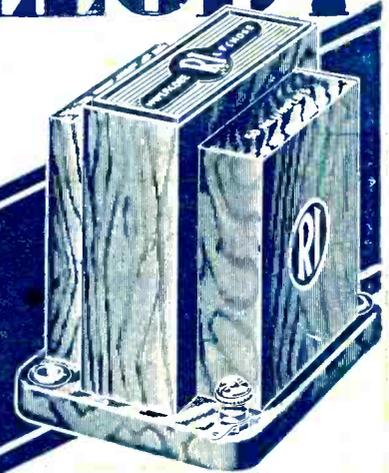
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