THE FIRST SCREENED-GRID SHORT-WAVER

Wireless Magazine

EDITOR: BERNARD E. JONES TECHNICAL EDITOR: J. H. REYNER, B.Sc. (Hons.) A.M.I.E.E.

VOL. 6, No. 36 JANUARY, 1928 1/-

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Household Four	A.W. 17	1	6
DX Four	A.W. 18	1	6
Revelation Four	W.M. 24	1	6
Auto-selector Four	W.M. 35	1	6
"A.W." Gramo Radio	A.W. 40	1	6
All-purpose Four	A.W. 43	1	6
All-wave Roberts Four, and copy of "A.W."	A.W. 47	0	4
†The Simplicity Four	W.M. 49	1	6
C.T. Four	A.W. 58	1	6

FIVE-VALVE SETS

1927 Five	W.M. 6	1	6
Two-volter's Five	W.M. 11	1	6
Individual Five	A.W. 25	1	6
Exhibition Five	W.M. 33	1	6
Phœnix Five	W.M. 42	1	6
†1928 Five	W.M. 46	1	6

SIX-VALVE SETS

Nomad Six	W.M. 31	1	6

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Simpladyne Seven (Super-het)	W.M. 22	1	6

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M.C. Three Portable	A.W. 22	1	0
Handy Three	W.M. 27	1	0
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Fonotrol Crystal Set	W.M. 14	0	6
Hi-lo Crystal Set	W.M. 18	0	6
Two-programme Crystal Set	W.M. 25	0	6
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†Centre-Tap Crystal Set	W.M. 50	0	6

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Vol. VI. No. 36

Wireless Magazine

January, 1928

CONTENTS

An Editorial Message

THE January, 1928, WIRELESS MAGAZINE appears on the eve of the year's greatest feast, and so I am offering in this issue the best of everything that may properly appear in a radio bill of fare.

Readers will have noted, I expect, that we have now three distinct "Fives," every one of them meriting attention and possessing its own peculiar advantages.

There is (1) the Exhibition Five, with its standard six-pin split-primary coils and switching for three or five valves. Then (2) we have J. H. Reyner's Phœnix Five, designed purely as a result of his experience with the Solodyne produced by him in 1926 and offering the great advantage of one-dial tuning. Now (3) in this issue we return to an old favourite and, keeping to the Christmas metaphor, we dish it up with new garnishings.

The 1927 Five was, a year ago, the very best set this magazine had yet introduced, but naturally, new ideas and components became known as the months went by, and the experience of many hundreds of users became available. In revising the 1927 Five and now presenting it under the title of the 1928 Five, the good points of the earlier set have been retained, but many detail improvements have been introduced to bring it abreast of the most up-to-date practice. I am sure that thousands of reader's who were interested in the 1927 Five will turn to page 506 in eagerness to see our suggestions for bringing that set absolutely up-to-date.

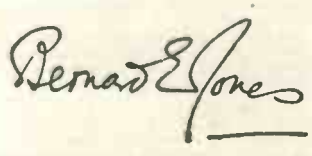
I hope to be in a position next month to present an article by J. F. Johnston showing how his "Simpler Wireless" all from-the-mains system can be used in conjunction with A.C. supplies. In this month's pages is a preliminary article on the subject, the experiments not having advanced far enough to allow of the practical instructions being prepared in time for this issue.

Readers will not be surprised to know that I have been obliged to establish a special department to handle blueprints. The old system of presenting a free blueprint with each issue of the magazine had satisfied only a minority of readers and my decision to substitute for this inelastic practice a system by which one hundred per cent. of my readers can get at only a nominal cost (just half the usual price) exactly the blueprint they individually require has proved an out-and-out success.

Readers are writing in from all parts of the country expressing their appreciation and everybody with whom I have discussed the matter agrees with me that, while at first glance the free blueprint was an excellent idea, the system of supplying at half-price the actual blueprint chosen by the reader is far better and more useful.

The system is simplicity itself: you choose a set in this issue, send us at any time up to January 31 a note of the blueprint required and enclose the special blueprint coupon printed on page iii of the cover, together with half the proper price of the blueprint; immediately we hear from you we send you the blueprint, post free. The February WIRELESS MAGAZINE, will be on sale on Wednesday, January 25.

May I wish all my readers a prosperous new year—a year of keen wireless interest and real progress.



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Aberdeen's Football Corner

A Successful Broadcast Feature That Might Be Copied.

"IN one minute you will receive the Football Corner from the Aberdeen studio. Stand by, please." That announcement is eagerly awaited every Friday evening by Scottish football enthusiasts, for "Peter" is again making regular visits to 2BD.

"Peter" is Mr. Peter Craigmyle, the well-known Scottish referee, who by his genial broadcasting manner last season made the weekly Aberdeen Football Corner a most popular feature not only in Aberdeen, but throughout Scotland.

Each Friday "Peter" sums up the important games of the previous week, comments on the matches to be played on the following day, and gives his forecast of the results.

But it is the correspondence section of the Corner which has especially endeared "Peter" to listeners, and the great number of letters received from all parts of the country is a sure proof of the wide-spread popularity of the Corner.

Information for Enthusiasts

If anyone requires information on any matter connected with the great winter game, he has only to write to 15 Belmont Street, Aberdeen, and on Friday, he will hear his letter discussed and answered. "Write to 'Peter' about it," is now the solution of many a football argument, whether it concerns a point of football law, the date of some historic international match, or the record of some famous player.

Many "football fans" have only a superficial knowledge of the laws of the game, and this "little learning" is probably responsible for the deplorable outbursts of feeling against referees' decisions which sometimes occur. By his weekly explanations of various points of the laws, "Peter" is helping to dispel this dangerous ignorance and is undoubtedly promoting the cause of "cleaner football."

The majority of the queries submitted to the Corner are straightforward ones about the off-side rule, but occasionally unusual problems are received in the invention of which much ingenuity is displayed.

An Amusing Question

Here is one strange question which caused much amusement:—

"A forward shoots for goal, but the ball strikes an outside corner of the goal-posts, bursts and remains impaled on the corner. Thus the ball has not crossed the goal-line, but is technically still within the field of play. If you were refereeing, how would you restart that game?"

The following puzzle was sent in after one of Aberdeen's home matches had been spoiled by a high wind:—"The centre-froward of A team shoots at B's goal, but the wind blowing against him is so strong that his shot is deflected and strikes the corner-post. Rebounding from the post, the ball is carried by the wind right back down the field without touching anyone on either side until it comes to the centre-forward of B team, who is standing in an off-side position near the A goal. He touches the ball with his foot as it is being blown past him, and turns it into the A goal. Is the B forward placed on-side by the fact that the last player to touch the ball was A centre-forward? Would you allow a goal in these circumstances?"

"Catching Him Out?"

"Peter" may protest that the authors of such improbable incidents are trying to "catch him out," but he welcomes such ingenious and entertaining attempts, and solves the problems in accordance with the laws of the game—and we know from his quiet chuckles that he enjoys the fun as much as we listeners do.

Recently, a letter was received from the secretary of a struggling boys' club asking if "Peter" could tell them where they could obtain a second-hand football cheaply—or for nothing. This appeal has met with an immediate response, for a generous listener has promised to provide balls so that "no lad in Aberdeen who desires to play a game of football on Saturday afternoons will be prevented from doing so by the lack of the necessary ball." Applications for these balls must be made to the Aberdeen Football Corner, which is thus adding to the long list of good causes that have benefited from broadcast appeals.

Stimulating Interest

In every way the Aberdeen Football Corner encourages and stimulates healthy interest in clean sport, and it is a feature that might well be copied by other wireless stations. Other stations may have occasional "football talks"; Aberdeen alone has a regular "Football Corner." Long may it flourish.

What the German Broadcast Listener Gets for His Licence Money

BROADCASTING IN GERMANY

An article—illustrated with special photographs supplied by the authorities concerned—by a special correspondent, Arthur Allan, who has just completed a tour of the more important of the German broadcasting centres

Elaborate arrangements are made for getting "noises" in many German studios. This is part of the Berlin equipment.

ALTERNATIVE programmes have always been a sore question in this country, but our wishes are at last being at least partially and temporarily fulfilled with the birth of Daventry Experimental.

In Germany there has, even if perhaps quite unintentionally, and at first considered by some as an evil, always been a selection of programmes to be had by the owner of a simple one-valve set. This is a result of Germany having been up till 1919 really a confederation of states. Therefore when the question of who was to provide broadcast programmes arose late in 1923, there was no possibility of realising the dream of the new government and laying the responsibility in the hands of one company like the B.B.C.

Divided into Districts

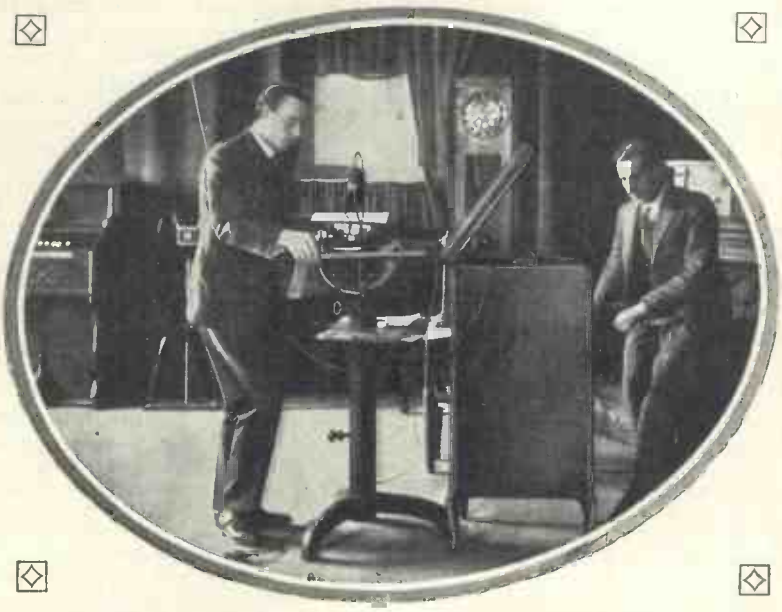
The differences in thought and sentiment were, and are still, far too great for one central programme board in Berlin, of all places as the Bavarian would say, to provide programmes for the different parts of the country even with the help of local co-operation. So the next best thing to do was to divide Germany into broadcasting districts.

This was eventually done, each district obtaining one main station and in time one or more relays. Thus Hamburg became the main North German station with relays at Bremen, Hanover, Kiel and, still to be opened this year, Brunswick.

Cologne, with Langenberg, became the West German centre, etc. Berlin, the capital, has only one relay station in Stettin on the Baltic, but usually the capital's programmes are relayed by the German "Daventry," Königswusterhausen, which in a few months will relinquish its duties and Zeesen will take its place. Zeesen, by the way, is even a smaller place than Königswusterhausen and is quite near to it.

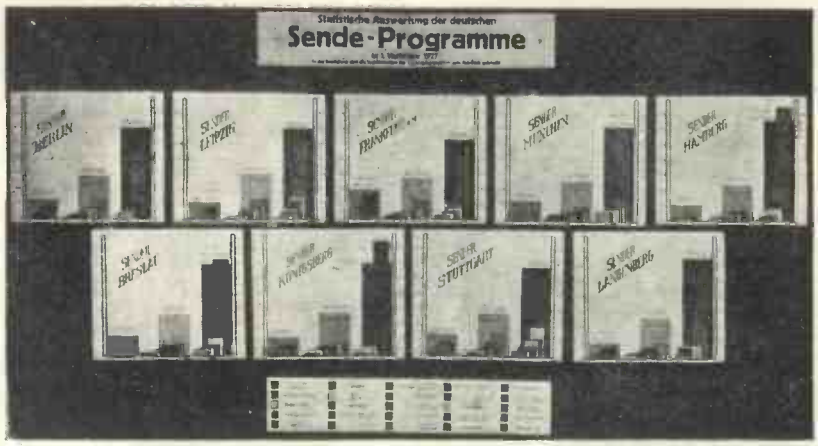
Individual Programmes

Each regional company compiles its programmes, apart from general lines set down by the postal authorities, who are responsible for the technical side of all German broad-



This photograph gives some idea of the very complete equipment installed in the small studio of the Frankfort Broadcasting Station.

casting stations, along distinctive lines of its own. For instance, Cologne and Munich have their own permanent staff of opera singers, the bulk of the other stations follow the same policy as the B.B.C. and only engage the singers for one or more performances, thus preventing listeners from getting tired of always hearing the same singers, who may, having more practice, perform better in front of the microphone, but on the whole may only be rather mediocre artists for purely financial reasons.



Germans are well known for their partiality to statistics. The diagrammatic tables reproduced here show the time devoted to different types of items at the principal German stations

Acoustical "Scenery"

Another striking instance of the difference of programme policy among the German stations is the use of music and other sounds so as to give acoustical scenery during the performance of plays in the studio. Frankfort categorically states that to use them is to make use of not quite

Table showing number of hours of broadcasting at the German main stations compared with three B.B.C. stations

honourable means, as the spoken word alone should be sufficient to convey the desired impression upon the listener.

Shakespeare's plays which, by the way, are perhaps more popular in Germany than in this country, Frankfort continues to say, were originally acted without scenery, so why should there be no possibility of creating a broadcast play not needing acoustical scenery? Thus Frankfort, after some drastic cuts, performed Goethe's *Iphigenie*, a play written after the style of the old Greek plays, and it was quite a success among the listeners.

Hamburg's "Noise" Machine

Otherwise Hamburg, which is the other extreme. They have constructed an ingenious machine for creating all kinds of horrible noises, quite apart from the orchestra which further assists the acoustical effect of the play. It was with great pride that I was shown how one could by simply pressing a button create a composition of noises labelled "Fair," and it was most realistic.

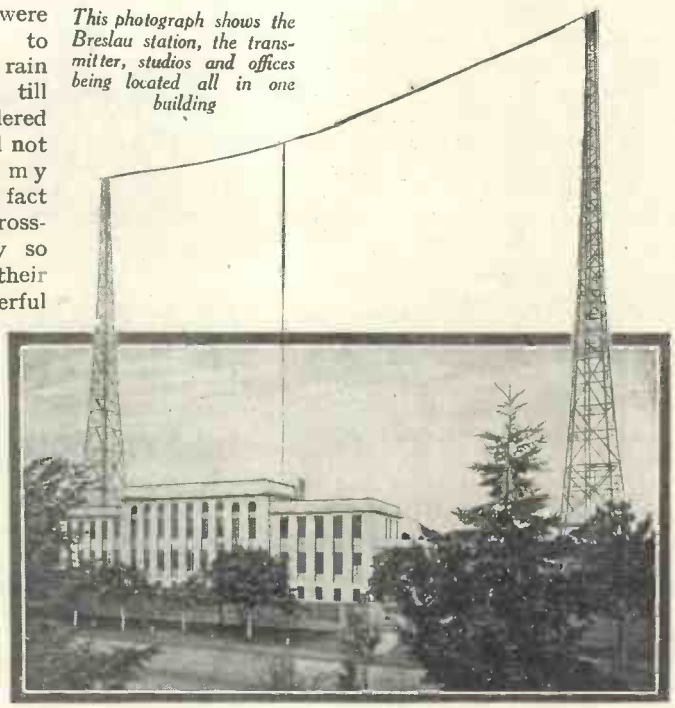
One heard the bells and the tin music created by the merry-go-rounds, the yapping of the dogs, steam whistles, hoarse cries—in fact I was very taken aback when by turning a switch it suddenly ceased and instead I was treated to horses galloping, to horses trotting over wooden bridges, on soft turf and in streets. Waves were caused to swish, rain poured till I wondered if I had not better get my umbrella, in fact I was so engrossed and they so proud of their really wonderful machine that I forgot the time and missed my train to Berlin.

Berlin follows along the same lines as Hamburg in the manner of acoustically illustrating what is going on before the microphone. Its largest piece of noise-making apparatus consisting of a large tin bath tub which can be lowered into the main studio, but is usually hidden behind a panel in the wall.

An Unfortunate Performer

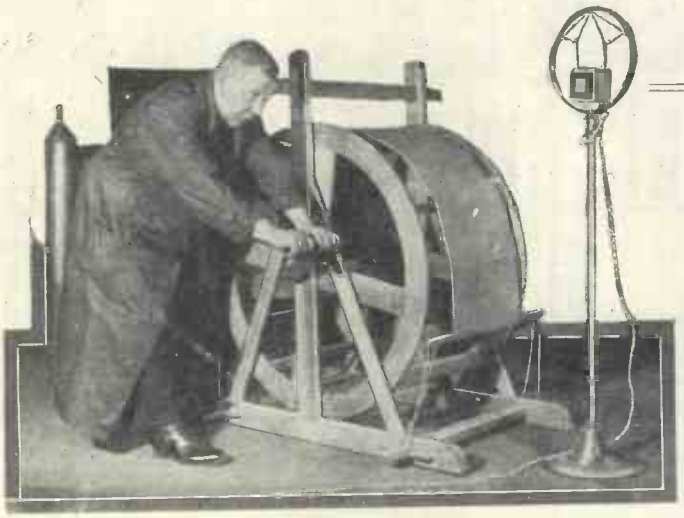
This special arrangement rather astonished me and I asked if it was ever used for its original purpose and was laughingly told that some unfortunate performer had once made its acquaintance—just when they had been imitating a heavy downpour of rain, too!

With these perhaps somewhat obvious differences are coupled differences of outlook and of artistic opinion. Hamburg lays great stress



This photograph shows the Breslau station, the transmitter, studios and offices being located all in one building

Broadcasting —



Part of the noise-producing apparatus at the Berlin broadcasting station

on giving Low German features (Plattdeutsch) an important place in the programme, in the same manner as perhaps Gaelic might be used in the north of Scotland. Munich equally stresses items in the Upper Bavarian dialect, as perhaps Glasgow might feature Broad Scotch.

Station Personalities

Apart from these purely idiomatical differences are many others perhaps not so obvious, but all helping to build up, if one may say so, the personality of each individual German station. If a listener becomes bored with his local programme, and if he has, till Zeesen has been opened, at least a one-valve set, he can tune-in at least two different programmes, and if his set is any good at all most likely quite a number more. These alternative stations are all using his own language, but are transmitting quite a different programme from his local station—not only as concerns the items, but also built up as it were on a different basis, although always retaining one characteristic, that is, they are all German.

Relaying Complete Operas

One typical feature of all German programmes is that they devote one evening a week during the greater part of the year (nine months) to the relaying of a *complete* opera from the local opera house. When I say local, I do not mean that the opera house is only of local importance, for all the greater German towns or cities have a first-class opera house, the institution mostly dating from the times before the war, when the minor German kings and princes were able to subsidise them. Frankfort was the first German broadcasting station to relay a complete opera from the opera house.

Still, it is not always plain sailing and much the same difficulties as we experience in this country are to be met with in Leipzig, where the broadcasting of the world-famous concerts from the Gewandhaus has not been permitted yet as the orchestra there think that if the purely technical reproduction of their music in the homes of listeners is not as good as the original performance, and it cannot be expected to be just yet, this will throw a shadow on their renown and they will lose their prestige.

So these concerts, perhaps the best of their kind in that country of music, Germany, cannot be broadcast because of the artistic scruples of the performers. Great musical conductors, such as Felix Weingartner, have thought it quite worthy of their musical talent to conduct symphony concerts in the studio.

Central Relay Control

To prevent all German stations from hitting on the same evening for relaying, say, their opera or their weekly symphony concert, the stations decided to club together and organise one central control—the Reichsrundfunkgesellschaft in Berlin constitutes this much needed medium.

Every month each station sends a delegate to the meeting of the central programme board in Berlin. This board sees to it that the stations do not all send the same type of programme at the same time and on the same day, thus assuring listeners of as complete an alternative programme service as could be desired, that is, as long as their sets are able to tune out the local station.

Interior view of the special noise machine used at Hamburg. It is described in this article

The Deutschlandsender on 1,250 metres, of course, always affords an alternative programme for everybody; even crystal-set owners will be able to listen-in to Zeesen all over Germany, it is claimed, except in the immediate neighbourhood of Berlin.

The transmitter on 1,250 metres is used during the day time for purely pedagogical lectures sent out and arranged for by the "Deutsche Welle." Here you can learn English by listening to the lectures, etc., and then send in your exercises to be corrected—one might term it the Radio University. In the evening, as

— in Germany (Continued)

already mentioned, the best programme in Germany is put on the air.

Free Advice to Listeners

The different stations have different means of helping their listeners-in other than radio matters. Most of the stations offer a free service of technical advice. Leipzig goes so far as to even carry out small repairs and give advice after inspecting your set in your own home, and all free of charge. Frankfort gives you coupons on presentation of your licence which grant you reductions on concert seats, etc.

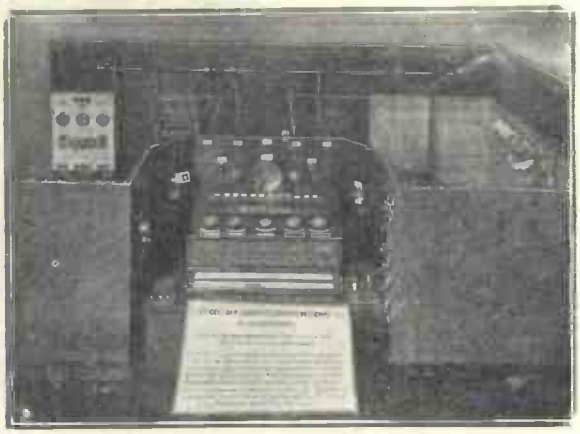
Little S.B. Work

Simultaneous broadcasts throughout Germany are few and far between—perhaps at very great events, a few times a year. The three last were when the "Junker" machines started on their intended flight to America, speeches at the opening of this year's session of the League of Nations in Geneva, and the celebration ceremonies at Hindenburg's eightieth birthday.

The upper hall of the Old Exchange in Leipzig is used as a studio by the broadcasting station in that town

Most main stations are connected to their relays by means of their own specially-laid subterranean cables, and the main stations themselves are linked up by means of the usual trunk telephone lines.

Do not overlook Capt. H. J. Round's special article, "A Talk About Short Waves," on page 483 of this issue.



This complete scale model of Hamburg's noise machine was exhibited at the last German radio exhibition

Some Crystal Secrets

"OLD-TIMERS" who have used a carborundum crystal with a steel contact and applied potential from a dry cell will know that there is a deal of difference between working such a detector and one of the many "ite" varieties, such as bornite-zincite (perikon) or silicon.

All crystals, however, have the property of allowing oscillatory currents to pass through them in one direction, but not to any appreciable extent in the opposite direction.

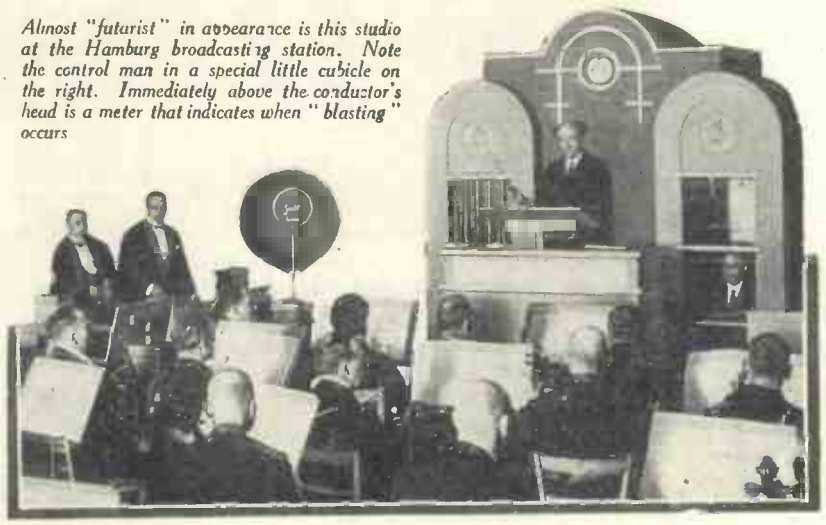
The theoretical difference between carborundum and, say, a perikon detector is that in a bornite-zincite combination an increase in flow of current is perfectly proportionate to an increase in the applied potential across the crystal; whereas, after a certain voltage has been applied to a carborundum crystal, the increase in current is out of all proportion with the greater voltage applied to the detector.

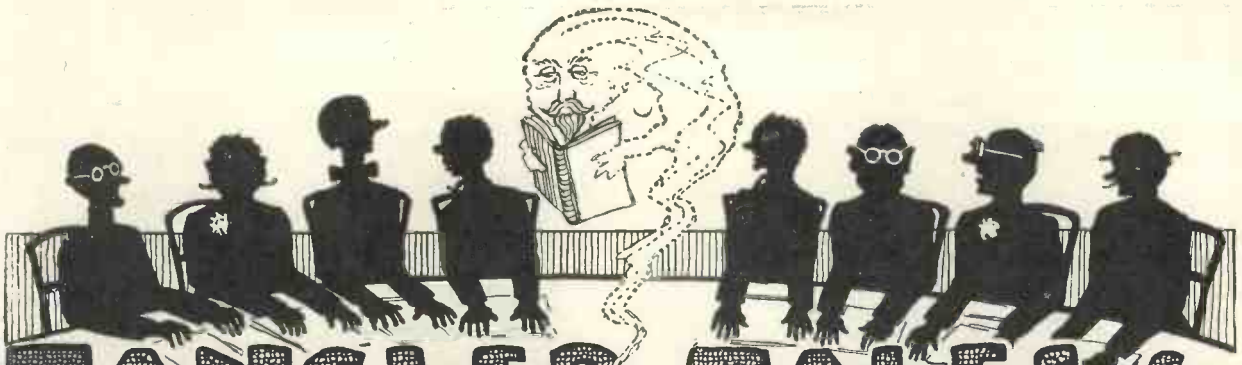
Improved Results

This explains why, if the "biasing" voltage applied to a carborundum-steel detector is adjusted very carefully, results far better than those given by perikon detectors may be obtained.

K. B.

Almost "futurist" in appearance is this studio at the Hamburg broadcasting station. Note the control man in a special little cubicle on the right. Immediately above the conductor's head is a meter that indicates when "blasting" occurs





TANGLED TALES & CURSORY RHYMES

by 'Fishglue'

"THE time has come, the Walrus said, to talk of many things," and, now that Sir Oliver Lodge is busy, Bernard Shaw's had a quiet night, and Mr. Reyner has got his new Phoenix Five one-dial set off his chest, it's Uncle Fishglue's turn to talk about them.

Let me state quite simply, and never in all my life was I more simple, that I know quite a lot about poets and poetry, and therefore, as fashion dictates, totally disagree with them. I could tell you more about the inner life of the poets, and how they spent their dinner-money (and spare time, when the former was all gone), than the *Sunday Slanderer*, but I won't.

The point is this. The Psychic and Psupernatural Psociety, to which I have the honour of being Perpetual Uncle, decided, on my recommendation, to ring up the departed poets, via a séance, ask them what they meant by it all and what they intend doing about it. The result was astounding!

While, for political and other equally silly reasons, I am unable to disclose any names, I wish to make it perfectly clear, to readers of the WIRELESS MAGAZINE, that the poet people are extremely sorry for what they've done, and agree that they'd no right to leave the most wonderful subject in the world out of their poems, and agree that, by the help of our Psociety, it's up to them to put the matter right with the world.

The revised editions are exclusive to the WIRELESS MAGAZINE.

First one!

Ready?

Coming over!

Attend all ye who list to hear,
The noble crystal's praise;
I tell of the thrice D.X. deeds,
She wrought in ancient days
When Marconi, the Invincible,
Against her, launched in vain,
The umpteen Watts of G.N.F.
And bags of tonic train.
You see, it was the *Hesperus*
That sailed the wintry seas,
With her aerial drooped,
Her down-lead looped,
And her masts with baggy knees;
When up spake the skipper's daughter,
A lass of two feet four,
Saying: "Wake up, Pa!
Find a nice fat spa,
And we'll sail to the rocky shore;"
But old King Cole, the skipper,
(A Ramorian proud was he).
Said "No blank fear
We'll stop right here
And transmit across the sea,
For the men who were boys when I was a boy,
And they'll come and hold hands with me";
So they called up the Wigan Light-house,
QRT and SOS,
And the announcer there, from his easy chair,
Said in Broadcasting English, "Oh, yes,
We're calling the cattle home, now, sir,
And can't cross the Goodwins, we fear
So put your wreck down on a lower wave,
Smooth it out, then relay it up here."

That, of course, is a big improvement, isn't it?

After that, there was a long silence, followed by the sound of snowdrops pushing their way through concrete, then all was still. It was weird, uncanny, gruesome as anything, then a shadowy finger went round the room. Mene! Mene! Tekiel! Touched! And the fellow that was touched, well, it was his turn to be inspired by the next poet who wanted to be down to date.

The chap whose turn it was didn't seem to like it. He went purple in the face, coughed twice, then did it again, then sniffed, then used his handkerchief, then started, in a voice like two pieces of tissue paper, the next spasm:

(No, we missed that one, because the secretary, who, up to the present, had put everything into black and white, except soda, was beginning to feel the strain.)

However, the chappy who was inspired wasn't at all a good medium, and, as soon as he started, the kettle stopped singing and darkness fell, which would have been all right, as it broke nothing, only the treasurer put his hand in the next chap's pocket, because it was too black (the darkness, I mean) for him to see it in front of him (I mean the hand).

The next thing was:

"The Hebrews came down like a wolf on the fold,
Singing Breakum! We Mendum! Get new valves for old."

Then, "Time, gentlemen, please—thank you."

That, of course, finished the s´ance for that night, although it is proposed to hold another at an early date, D.V., P.M.G., and weather permitting.

Strange, isn't it, but we don't seem to be hearing so much about those super-heterodynes nowadays. They're like measles, you know, popular for a time, and then——. Still, I thought they were going to do more than they have done, 'cos;

Hiram K. Hiram (Née Hiram) one day,
Said the new supersonic had sure come to stay;
He guessed it would oscillate inside and out,
The A.F.'s would whistle, the N.F.'s would shout.
But I don't think he knows what he's chatting about,
Cos I've nursed one and cursed one and never got nowt.

Probably Mr. Reyner is running away with the field now. To be perfectly candid, providing you don't let the Editor suspect it, I don't know much about Mr. Reyner's new circuit—I wish he'd have spoken to me about it first—I'll probably be able to make one, if I can get the Editor to publish another fifty of these, then we'll discuss it in more detail.

I'm afraid I've been rather neglecting my Kiddies' Corner lately (it's a long time since I tidied it up), so let me get at it.

◆ ◆ ◆

Uncle Fishglue calling, kiddies, and you can't stop him whether you want to or not. I've got some letters here that I really must answer ("Stop tickling, Aunty Arsenic"). That's better, kiddies.

Now then!

WILLIE WACKERS, from Wolverupton.—Thank you for your letter, Willie—you do write nicely—how old are you?—yes—I remember—nine—weeks or months, Willie? Yes, I know that little piece of poetry. It goes like this, doesn't it?

Little Miss Muffet, she sat on a buffett
And tried to tune-in Paraguay,
But if she'd half the sense her
Pa'd got, she'd condense her
Condenser; now what do you say?"

HAROLD SLOSH, Lower Uppaguhmtree.—So glad you joined our circle, Harold, you'll feel just as at home now as if you lived in our square. I do hope you get that wavemeter for your birthday.

BABY BIG EYES.—Fancy you listening-in, chick, and I'm sure you must feel awfully proud of yourself. Don't get your dum-dum mixed up with the H.T., luvums, or it might interfere with your teething. What a dear, sweet duckums of a mama you have, to put condensed milk on the terminals for you!

Now, just one moment, Aunty Arsenic is going up—I beg your pardon, going to *sing* "Up in a Toy Balloon." That will be nice, won't it? Then we'll have to kiss you good-night, 'cos we've got heaps and heaps of people to talk to, and it's time you took your gollies and teddies up to bye-bye. Good night, kiddies.

Thank goodness that's done with.

Now, then, there's my usual back answers to tackle.

◆ ◆ ◆

A gentleman wishes to say that the B.B.C. do not allow their right hand to co-operate with their right pocket to the extent which his performance merits.

No! no! I really don't think so, they're not utterly, utterly utter—not utterly—I must inquire. But, will ye n'er come back again?

◆ ◆ ◆

Psmythe Jhones, Poshford, writes:

It's a far, far, better thing I do,
To use six valves, instead of two;
It takes me five to cut out Crewe
And the other one gets Daventry.

Possibly, Psmythe, but what would you do with seven?

◆ ◆ ◆

The Reverend Cyril Cornflower writes that although he's purchased a five-valve set, he doesn't get much encouragement from Dorcas, who just ignores him when the music's on.

Well, Cyril, just hold the phone terminal with one hand and get her to do the same. Then each of you hold one end of the phone leads. She can only hear the programme then while she's kissing you. Sort of combined oscillation and osculation. Got the idea?

◆ ◆ ◆

Worried Mother.—No. Wireless won't cure ringworm, and Lux won't shrink woollens. Try Peg's Paper!

◆ ◆ ◆

Ike E Mo. Jerusalem.—Yes, it is wiser to carry a spare, but why should Ikey lose a crystal?

◆ ◆ ◆

Irate Tyro writes that my advice has ruined his set. Not at all. That's because you took it. I'm most hurt about it. If you knew any better, why did you ask me, and if you didn't, it's an experience for you. Better luck next time.

◆ ◆ ◆

After that, I must close.

Oh, sharper than the serpent's tooth——

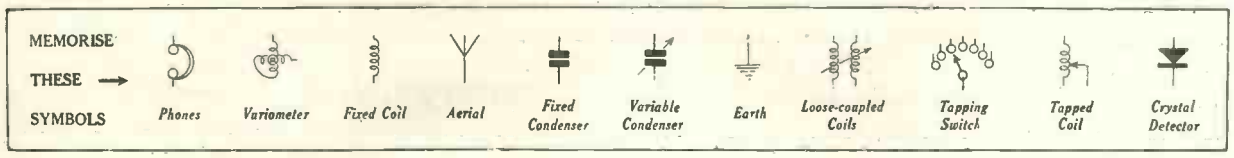
You know the stunt, don't you?

Yours indignantly, but more in sorrow than in anger,

Fishglue.

Transmission and Reception on the Road

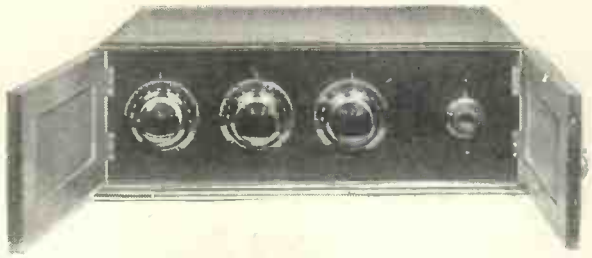
Experiments in transmission and reception between moving cars have recently been tried during a successful European tour. This photograph shows one of the cars—a Standard saloon—in Spain. Note the frame aerial mounted at the side of the bonnet



In this article the Technical Staff of the "Wireless Magazine" is able to give full constructional details of a really powerful short-wave three-valver—the first particulars to be published of a short-wave set using one of the new screened-grid valves for high-frequency amplification. The receiver will appeal to all those who are keen on short-wave development.

The Screened-grid Short-waver

A Special Receiver Incorporating Efficient High-frequency Amplification with a Screened-grid Valve



Designed, Built and Tested by the "W.M." Technical Staff from a Circuit suggested by Capt. H. J. Round

THERE is no lack of evidence in the WIRELESS MAGAZINE offices of the great interest that is being taken in the possibilities of long-distance short-wave broadcasting by amateurs everywhere; every post brings inquiries for constructional details of short-wave receivers and, in the belief that many readers are in need of such a design, we are now publishing particulars of a screened-grid valve short-waver.

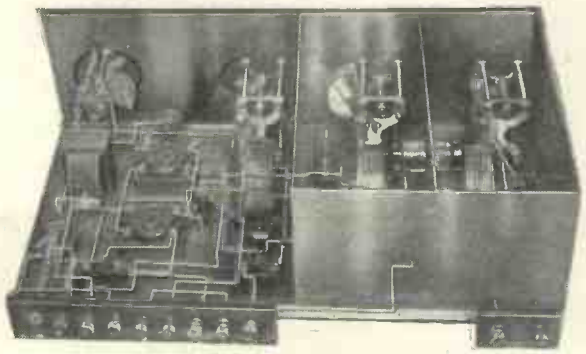
Special Circuit

This set is based on a circuit recommended by Capt. H. J. Round, who developed the screened-grid valve to its high state of efficiency in this country (and who, by the way, writes on short-wave work on page 483 of this issue).

Most readers of the WIRELESS MAGAZINE will already be familiar with the merits of the screened-grid valve as a particularly efficient high-frequency amplifier for ordinary broadcast reception, but these are, we believe, the first details to be published of a special short-wave receiver using one of the new valves.

It is well known that the chief difficulty in constructing short-wave apparatus is to avoid small capacities which may easily by-pass (with subsequent loss) signal energy. The mechanical construction of the screened-grid valve at once makes it particularly useful from this point of view, and it has the additional advantage that it is "self-neutralising."

Careful metal screening overcomes a great deal of unwanted capacity interaction, and the combination of efficient shielding and the use of a screened-grid valve has enabled us to produce a really powerful short-wave receiver that is truly trans-continental in its scope.



View of the Screened-grid Short-waver with all the shielding in position

This set will appeal particularly to our overseas readers who want to pick up 5SW, as well as to amateurs in the British Isles who desire to keep in touch with short-wave developments throughout the world.

A glance at the circuit diagram will show clearly how the receiver is arranged. It should be noted a fixed bias of 1½ volts negative (provided by a single dry cell) is applied to the control grid of the screened-grid valve, while to the screening grid is applied a potential of approximately 80 volts positive, tapped off from the ordinary high-tension battery.

The aerial is coupled to the aerial tuner (all the coils are of the plug-in type specially designed for short-wave work) through a small fixed series condenser of .00005 microfarad capacity, while the grid condenser of the screened-grid valve is of extra large value, namely .001 microfarad.

The high-frequency coupling to the detector valve consists of a tuned-anode arrangement used in conjunction with a small variable coupling condenser leading to the top of a grid coil associated with the detector valve. In the original receiver use has been made of an ordinary neutralising condenser in this position.

H.T. Supplies "Blocked"

It is important to note that the high-tension supplies to both screening grid and the anode of the high-frequency valve are "blocked" by

Incorporates Efficient H.F. Amplification for Long-distance Work

means of 2-microfarad condensers connected to the metal shielding.

Reaction is obtained on the detector valve in an unusual way which has recently been developed by Capt. H. J. Round. It is very satisfactory in operation and does away with the necessity of a special reaction winding.

Tuning-in Facilitated

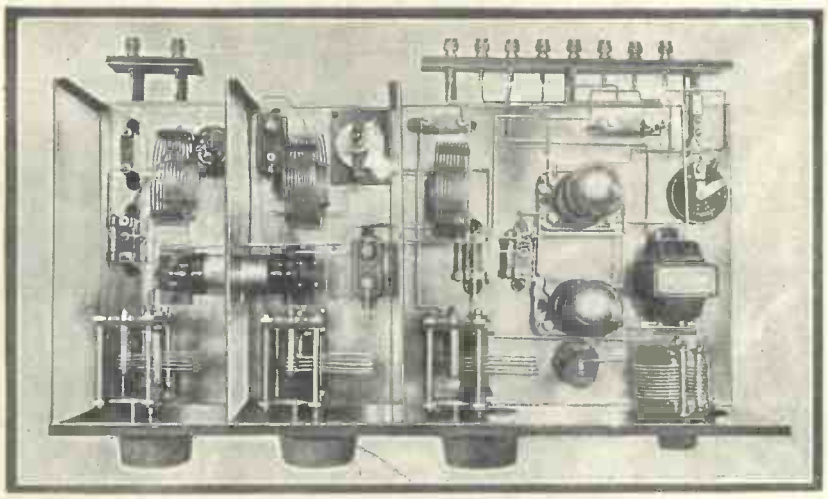
Associated with the detector valve is an extra aerial terminal and another small coupling condenser, the purpose of which is to facilitate the tuning-in of difficult stations on two valves before the high-frequency side of the receiver is brought into operation.

In the anode circuit of the detector valve is incorporated a high-frequency choke to block the passage of stray high-frequency currents into the low-frequency side of the set, where they might cause unwelcome interference. This choke is essential to the proper operation of the set and it *must* be specially wound for short-wave work. An ordinary "broadcasting" choke will be useless in this position.

A jack is provided for plugging in a loud-speaker or pair of headphones as desired, and this is so wired that when neither is in use the filaments of all the valves are automatically switched off.

Metal Screening

So much, then, for the general scheme of the receiver. The only other point that need be mentioned here is the metal shielding. This is provided behind the panel (to prevent body-capacity effects), on the baseboard (to shield stray earth capacities), and between the variable tuning condensers and their associated tuning coils.



Plan View of the Screened-grid Short-waver, showing the disposition of the components

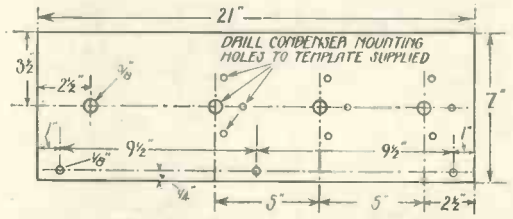
For building the Screened-grid Short-waver the following components will be required :—

Ebonite panel, 21 in. by 7 in. (Becol Will Day, or Raymond).

Two .00005-microfarad fixed condensers (T.C.C.).

.001-microfarad fixed condenser (T.C.C. type SP, Dubilier, or Atlas).

Three .0002-microfarad variable condensers (Cyldon Short-wave, Igranic, or Formo).



Panel Layout of the Screened-grid Short-waver

Three single coil holders (Lissen, Lotus or Peto-Scott).

Two 2-megohm grid leaks (Dubilier, Mullard or Graham-Farish).

.5-megohm grid leak with holder (Dubilier, Mullard or Graham-Farish).

Screened-grid valve holder (Parex).

Two anti-microphonic valve holders (B.T.H., Lotus or Benjamin).

1½-volt grid-bias cell (Ever Ready or Siemens).

.0002-microfarad reaction condenser (Cyldon Bébé, Peto-Scott or Ormond).

Two 2-microfarad fixed condensers (Dubilier, T.C.C. or Hydra).

Neutralising condenser (Peto-Scott, Wearite or Ormond).

.0003-microfarad fixed condenser (T.C.C. type SP, Dubilier or Atlas).

High-frequency choke (Wearite or Collinson).

Low-frequency transformer, ratio 4 to 1 (Gecophone, Pye or R.I. and Varley).

6-ohm baseboard-mounting rheostat (Lissen, Ormond, or Igranic).

.001-microfarad fixed condenser (Dubilier, T.C.C. or Atlas).

4-point jack (Igranic No. 68).

Two plugs for loud-speaker and headphones (Igranic).

Two terminal strips, 10 in. by 2 in. and 3 in. by 2 in. (Becol, Will Day or Raymond).

Ten terminals, marked :—Aerial, Earth, Aerial, G.B.+, G.B.—, L.T.+, L.T.—, H.T.—, H.T.+1, H.T.+2 (Belling-Lee).

Copper screen (Camden Engineering).

Short-wave plug-in coils (Atlas).

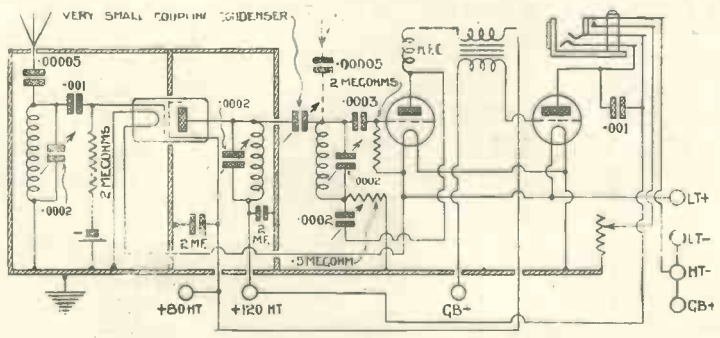
Cabinet and baseboard 10 in. deep (Artcraft).

Glazite for wiring.

Screws, etc.

Five 1-in. lengths of ebonite tube for distance-pieces.

It should be noted in each case that the particular component used in the original set is mentioned first and the layout is designed for parts of that size only.



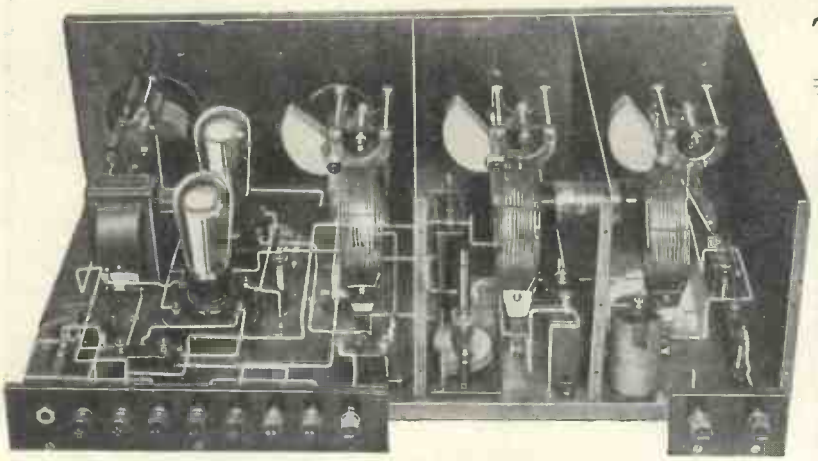
Circuit of the Screened-grid Short-waver (H.F., Detector and L.F.)

Full-size Blueprint

Before actually starting the building of this receiver the constructor is particularly advised to get together all the components, especially if alternatives to those used in the original WIRELESS MAGAZINE receiver are utilised.

In all cases it will save a great deal

The Screened-grid—



Rear view of the Screened-grid Short-waver

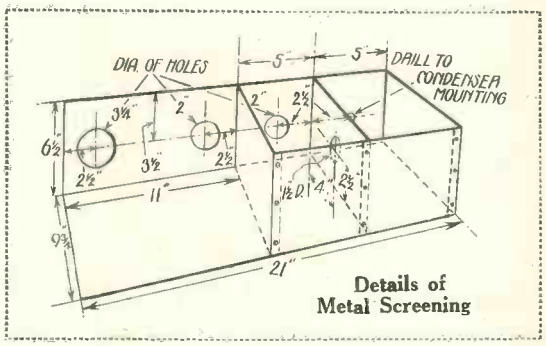
of time and bother if a full-size blueprint is used. This can be obtained for half-price, that is 6d. post free, up to January 31, if the coupon on page iii of the cover is used. After that date the full price of 1s. will be charged (applications from overseas readers will be allowed an appropriate extension of time). Ask for blueprint No. W.M.51, and address your inquiry to Blueprint Dept., WIRELESS MAGAZINE, 58-61 Fetter Lane, E.C.4.

The only part of the construction that is likely to present any difficulty at all is the assembling of the screen, which can be of either sheet cooper or aluminium. This screen can be bought as a complete unit or it can be made up by the constructor. All the dimensions are clearly indicated on one of the sketches reproduced in these pages.

Insulating the Condensers

It will be seen that there are four variable condensers mounted on the front panel, and it is of the utmost importance that all of these except that on the extreme left of the panel (looking from the front) should be insulated from the screening. This is accomplished by cutting holes in the screen to clear any supports. These clearing holes are indicated on the layout and wiring diagram reproduced in these pages and on the blueprint by diagonal lines.

When the necessary clearing holes have been cut, the four variable condensers can be mounted on the panel and the latter screwed on to the baseboard. Then the part of the screen that covers the baseboard should be lightly tacked down. Before mounting any of the baseboard components, the dividing screens should be placed in position and soldered to form a continuous metal shield. Do not forget the hole to accommodate the screened-grid valve.



Details of Metal Screening

Next, all the baseboard components can be mounted in the positions indicated on the layout. When doing this do not overlook the dry cell which supplies a bias of 1½ volts negative to the screened-grid valve. In order to keep the terminal strips away from the metal screens it will be found convenient to screw them to the baseboard with five short lengths of ebonite tubing to act as distance-pieces. This arrangement is clear from the photographs.

Filament-rheostat Contact

Fixed to the terminal of the baseboard-mounting rheostat will be found a soldering tag; if this is bent underneath the component it will make good contact with the copper sheet on the baseboard and save the necessity of making a soldered connection, although a soldered connection has been indicated in the wiring diagram.

It is advisable to inspect the underneath of the neutralising condenser (used as a variable coupling condenser in the anode circuit of the screened-grid valve) to make sure that all screws in the base are properly countersunk and will not make contact with the copper sheeting when the component is screwed into position.

If any screws are likely to make contact the condenser should be placed on a small piece of mica sheet, which will act as an efficient insulator.

When all the components have been mounted in position, wiring up can be started and here the blueprint will prove invaluable. It will be observed that each terminal point is marked with a small letter of the alphabet; these letters indicate which points should be connected together and in what order.

Connecting Up

For instance, first connect together all those points marked *a* with one

VALVES TO USE IN THE SCREENED-GRID SHORT-WAVER

Make.	H.F. 2v.	H.F. 6v.	Detector. 2v.	Detector. 6v.	L.F. 2v.	L.F. 6v.
B.T.H.	—	—	B22	B4H	B23	B4
Cossor.	Screened-grid.	Screened-grid.	210 L.F.	610 L.F.	Stentor Two	Stentor Six
Ediswan	—	—	DR2	GP4	PV2	PV4
Marconi	Screened-grid.	Screened-grid.	DEL 210	DEL 610	DEP 240	DEP 610
Mullard	—	—	PM1	PM5 X	PM 254	PM 6
Osram	Screened-grid.	Screened-grid.	DEL 210	DEL 610	DEP 240	DEP 610
Short-path	—	—	SP 18 G	DE 50	SP 18 RR	SP 55 RR
Six-Sixty	—	—	210 L.F.	6075 H.F.	215 P	610 P

— Short-waver (Contd.)

wire or as few wires as possible; then, all those marked *b*; and so on through the alphabet. If the alphabetical sequence is followed, the wiring will automatically be built up most efficiently from the bottom upwards.

Special Wiring Points

There are one or two special points to note. The part of lead *k* going from H.T.+2 to one side of the 2-microfarad condenser should not be completed until the back screen has been placed in position, when all the other wiring is completed. The same applies to connection *l*, which goes straight from the back screen itself to the earth terminal, and to the aerial lead *m*. Holes in the dividing screens for connections *g*, *j*, and *n* should be made where required with some sharp-pointed instrument, such as a bradawl.

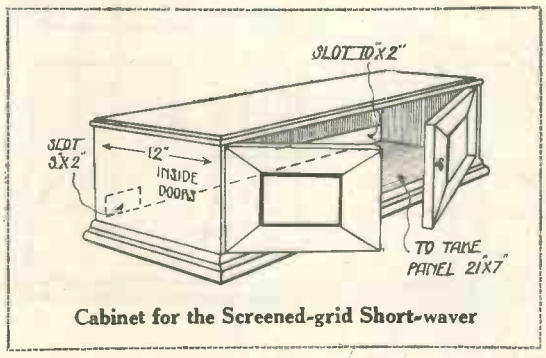
It is essential, of course, to use insulated wire, unless the holes in the screens are bushed with some insulating material.

Screen Connections

The star-shaped symbol on the layout (and blueprint) indicates that the connection is made direct to the screen; there are six such connections (not including the lead to the positive terminal of the 1½-volt dry cell). If difficulty is experienced in soldering the ends of the wires direct to the copper sheeting, they can be attached to small brass tags which can then be screwed or bolted to the metal without difficulty.

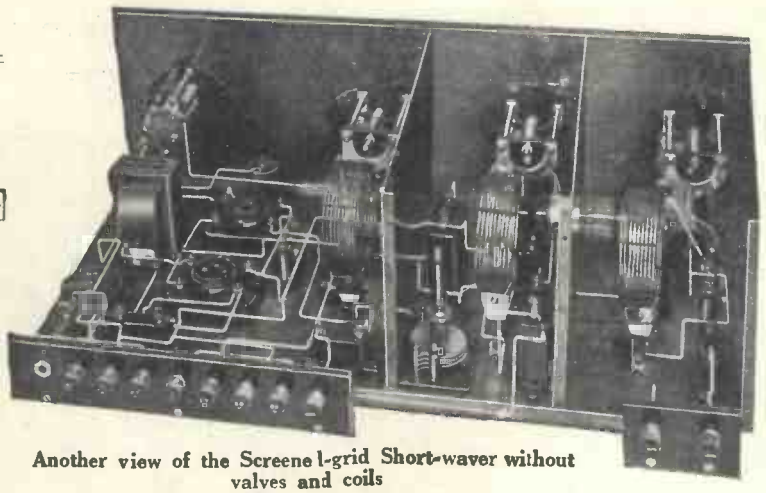
The grid condensers used in the original receiver are provided with three terminals. It should be noted that these are not spaced equidistantly and care should be taken to wire them up in the manner indicated. The actual condenser is between the terminals marked *c* and *a* on the first condenser; the terminal *h* being left free for accommodating a grid-leak clip.

A few notes can be made at this stage regarding valves and coils.



Cabinet for the Screened-grid Short-waver

Either 6-volt or 2-volt valves must be used as there is not at present on the market a 4-volt screened-grid valve. The detector should have an impedance in the neighbourhood of 10,000 to 15,000 ohms, while the last valve should be of the power type. A list of suitable valves is included in these pages.



Another view of the Screened-grid Short-waver without valves and coils

In the original receiver built by the WIRELESS MAGAZINE plug-in coils of the make indicated in the list of components were used. For the 20 to 50 metre band the following sizes are suitable: Aerial, No. 4; anode, No. 4; and grid, No. 4.

When all the wiring is completed and the back plate has been fixed in position, a rough test can be undertaken.

First put the rheostat about three-quarters of the way "in," and place valves and coils in their holders. Apply 120 volts to H.T.+2, about 80 to H.T.+1 and about 6 or 9 volts negative to G.B.—; connect the remainder of the terminals in the ordinary way, putting the aerial to the terminal on the large strip.

Now plug in the phones or loud-speaker and put the central tuning condenser right out of mesh. The plates of the neutralising condenser used as a coupling device should also be out of mesh. Adjust the reaction condenser until the set is on the verge of oscillation and tune in the ordinary way with the right-hand tuning condenser.

When A Signal Is Heard

When a carrier wave is heard, readjust the reaction condenser and tune the central (tuning) condenser until a click or change of note of the carrier is heard. Repeat this process with the extreme left-hand condenser.

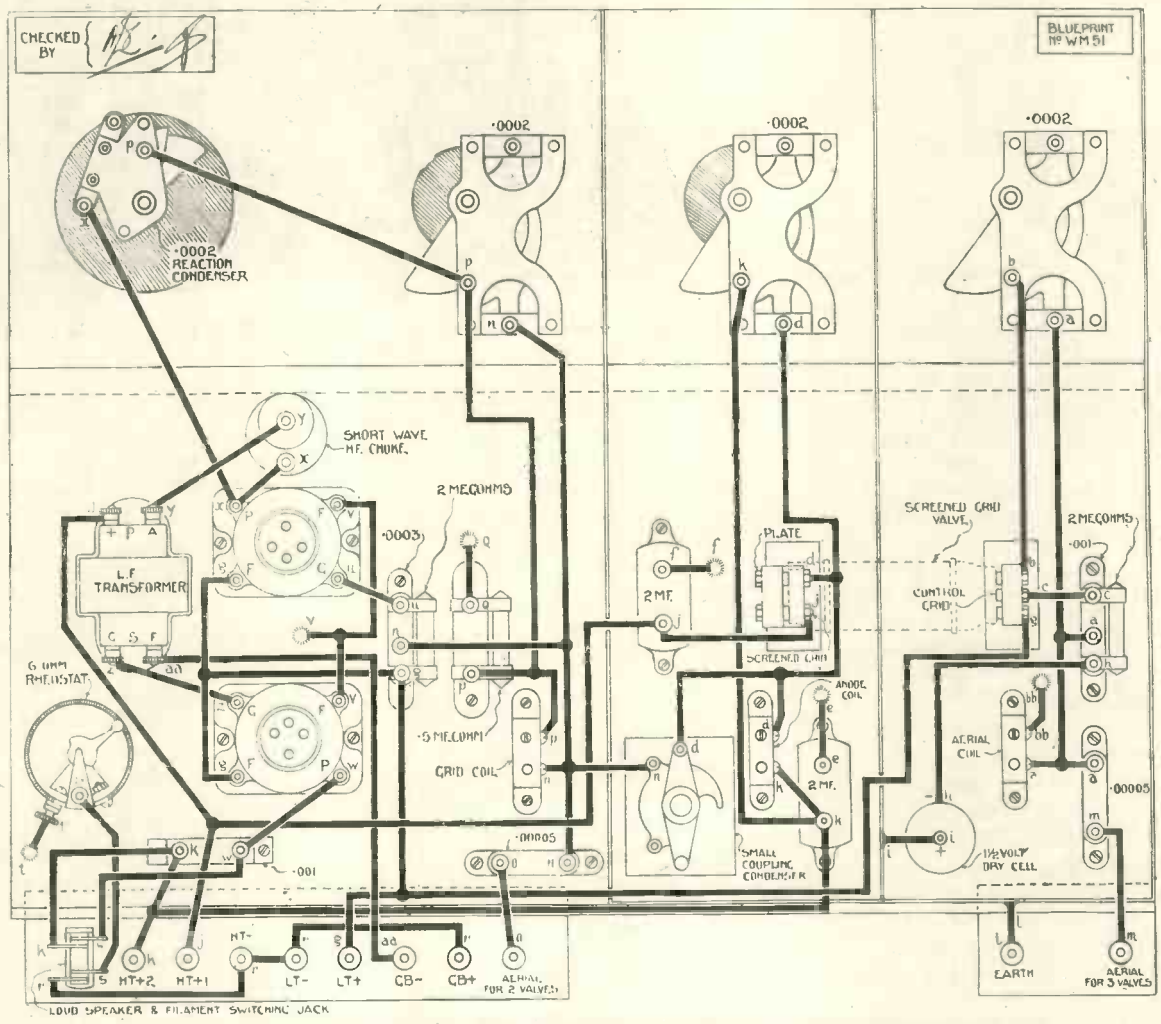
So far only the detector and low-frequency valves have been used, but the aerial connection can now be moved to the other aerial terminal. All three valves are now being used and a slight readjustment of all

At the time of going to press with these pages we are unable to give any report regarding the reception of short-wave broadcasting with this receiver because for a fortnight none of the usual "regular" stations have been working during the periods when we have been able to listen.

But although no broadcasting was available we did receive a very large number of amateur short-wave transmissions from all over the world.

In his article "A Talk About Short-waves" Capt. H. J. Round promises to test this short-wave receiver himself at an early date and suggest improvements for the benefit of "Wireless Magazine" readers—if he thinks any are necessary.

The Screened-grid Short-waver (*Cont.*)



This layout can be obtained as a full-size blueprint drilling guide and wiring diagram for half-price, that is 6d. post free, if the coupon on page iii of the cover is used before January 31. Ask for blueprint No. WM51.

three tuning condensers (and of small coupling condenser) should be made.

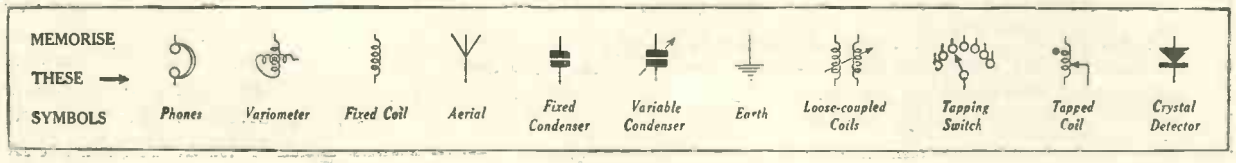
Sharp Tuning

Those who have done any short-wave work will know how sharp the tuning is on the low waves and how difficult it would be to search for a station with three critically tuned circuits, unless the receiver were already calibrated. This is why rough searching is carried out first should be received without difficulty, with one tuned circuit only. In some cases, it may even be necessary to use a vernier control on the right-hand tuning condenser.

It may take a few days to get the "feel" of the set, but once its operation has been properly mastered its range, with a good aerial and earth, will be almost unlimited. All the American short-wave broadcasting and it should also be possible to pick up Australia when conditions are anything like favourable.

Captain Round's Report

We shall be particularly glad to hear from constructors of this receiver what results they are able to get. Next month we shall publish the results obtained by Captain H. J. Round with our original receiver.



A Special Article by Capt. H. J. ROUND, M.I.F.E.

A Talk About Short Waves

LONG before normal broadcasting started hundreds of amateurs had receivers. I have a list by me now of those who wrote to us during the Chelmsford transmissions in 1920.* Some time after that date amateur transmissions started, and for some time their transmissions were the chief food for those with receivers only. I wonder how many remember the transmissions on Sunday mornings of 2OM, and the persistent, almost too persistent, testing of 2HY?

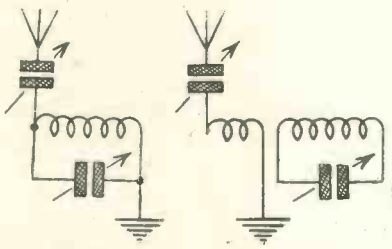


Fig. 1 Fig. 2

Figs. 1 and 2.—Two Aerial Tuning Circuits

At this later day thousands of amateurs have their receivers and dozens have their transmitters for the new short-wave all-world work, and we can reason by analogy that a universal broadcasting system is coming in the very near future.

It would be a pity if this all-world broadcast is done, in the main, by re-transmitting methods, because half the magic and interest goes when we receive in the easy, lazy way from our local station, and, in addition, one does does not get such clear reception usually.

Lack of Programmes

The chief trouble at the present time, just as in pre-broadcasting days, is the lack of programmes, for practically the only ones which are transmitted at all regularly are the American ones from KDKA, 2XAF, and 2XAD, and these would be more interesting if sent out earlier and on every night, but I suppose funds for running are a serious difficulty.

I believe it would be a good thing for the English-speaking countries to get together and devise some method of founding a constant short-wave service. In the British Empire it would not be so difficult to do, for most British centres have some scheme for collecting licence money, and some small proportion of the licence money in each country could be put aside for the short-wave service.

Britain, of course, would have to help its Colonies financially, and the argument one hears many times that we should not pay for world broadcasting falls to the ground, for we should be getting in exchange for our programmes and our money programmes from each British colony.

Canada, with no licences, would have difficulty in paying, and America might find certain difficulties in entering into the scheme.

Some modification of this idea is coming about in the next year or so, and I am not one to say let us hurry it, for every day we are finding out new peculiarities of the short waves, and stations we erect now might quickly be out of date.

Chelmsford will shortly start continuously radiating English programmes, but it is a pity the B.B.C. could not afford two short wave test stations, so that the study of reception in the Colonies could take place with transmissions on widely different waves simultaneously, such as 16 metres and 36 metres, instead of the present wavelength of 24 metres.

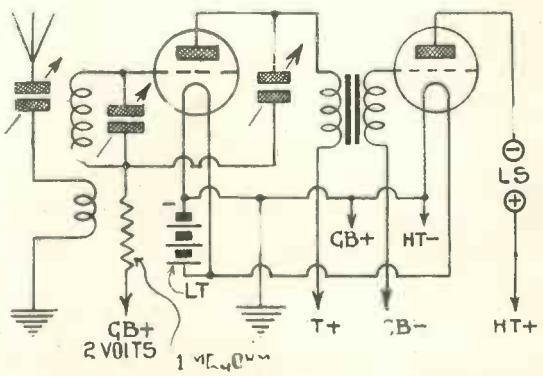


Fig. 3.—Basic Circuit for Short-wave Reception

Certainly a number of tests can take place on 24 metres, and then the wave can be changed, but conditions are changing so rapidly that the final choice of wave would still be in doubt. But no doubt very valuable information will come from this continuous running of Chelmsford, and only by such continuous running will the interest be kept up for those who are receiving in distant places.

Always in Readiness

Personally, I should keep my short wave receiver continuously in readiness for reception if the Americans ran 2XAD and 2XAF from early in our evening instead of starting rather erratically at such a late hour as 11 o'clock.

South Africa is one of the first places where a transmitter should be erected, for they could couple up with their ordinary programme instead of having to give us a special one at an unearthly hour as the Australians have to, and each night we could tap on to see if it was good enough to listen to.

It is an amazing feature of these short waves that they skip over the nearby territory and only come down at great distances. The skip is not quite complete; thus Chelmsford can be received in London, but I find his strength only about the same as 2XAF, and Americans state that in their country Chelmsford is stronger than 2XAF.

Some very fascinating scientific data has been recently obtained about this skipping. An ordinary wireless station can have its direction found by means of a frame aerial, but it has been found that inside the so-called skip distances, where signals are weak, the stations emitting short waves have no apparent direction on a frame aerial, but as soon as one gets in the regions outside the skip distance then the directions are quite definite.

(Continued on next page)

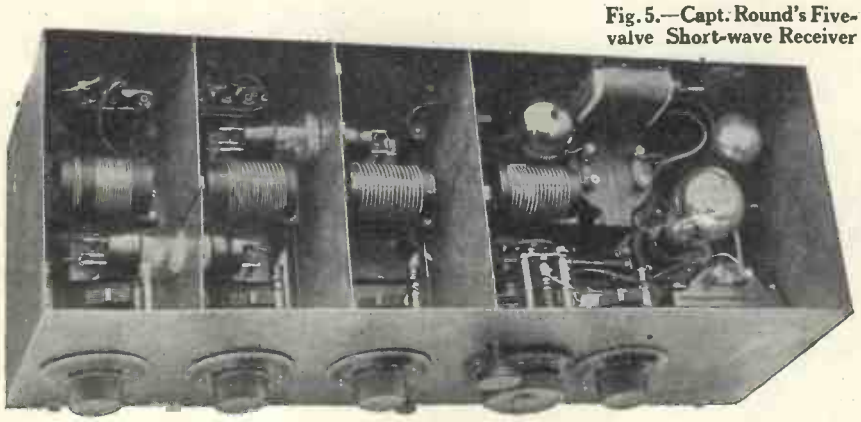
*This refers, of course, to the experimental transmissions made by Marconi's Wireless Telegraph Co., Ltd.

A Talk on Short Waves (Continued)

As an example of this the position of a certain ship fitted with a short-wave transmitter whilst in English waters could not be determined—the waves acted at the receiver as though they came from all directions at once.

But the ship went to the East, and after it passed outside 1,000 miles radius, its position could be measured quite well on the usual apparatus.

Fig. 5.—Capt. Round's Five-valve Short-wave Receiver



This effect may be a serious factor in the next war, for instead of knowing, as we did in the last war, exactly where each enemy's station was, we should be quite at sea as to their position, except when they are a very long way off.

Receiving Aerials

Unlike ordinary broadcasting waves, short waves do not seem to mind what sort of an aerial they are received on. Thus we have always been taught that a vertical wire is necessary for reception, but a horizontal one seems just as good for these short waves, provided it is well above the ground.

In consequence it is rather difficult to give advice as to what kind of aerial to use. I use my ordinary broadcast aerial, but I am not sure I should not get better results on some other one, but the experiment is too difficult to carry out without some theoretical basis to help one. Structures like the great beam aerials are, of course, beyond the amateur, so that in general it is good policy just to use what you have.

Tuning the Aerial System

Tuning the aerial is not an easy thing to do; in fact, even at the best it tunes very flatly, so that it is best to depend upon some type of circuit coupled to the aerial in an aperiodic way. One good way is to shunt the tuning coil (Fig. 1) with a tuning condenser and couple the aerial to this circuit with a very small condenser. But I rather like the old magnetic coupling, and with this arrangement a series condenser can be put in the aerial and positions found on it which give best signals.

Fig. 2 shows this arrangement for use with an ordinary broadcast aerial. It is, of course, quite an ordinary scheme, but the coupling can be fixed.

Coils can be bought for these short waves which, with a stipulated condenser, will give the required range of wavelength, but the most difficult thing in short wave reception is to get one's calibration. Once a station is found on your receiver immediately mark down its adjustment—you will regret it if you don't.

Condensers with very small zero capacities are a real necessity in this work, and I have my own preferences, but, of course, cannot state them here; also it is necessary to have a nice smooth gearing with no metallic teeth, otherwise disagreeable noises during adjustment will result.

Up to this point all receivers will be more or less the same, but we have now to decide what method of amplification and detection will be suitable.

In practice, there are two alternatives, one using reaction in the main to get the necessary magnification, the other using the super-het, and I have no hesitation in saying that the latter method—if expense is not to be considered—will give good results with greater ease than the first method, but there is no doubt the expense will be much greater and the disadvantage of the super-het is that it is not immediately useful to receive morse on, and at the present time one can get up a large interest in morse signals if one knows they are coming from the furthest quarters of the earth.

I have considered elsewhere what the probable magnifications of a simple reaction detector are, and with a screened-grid (H.F.) valve added, our H.F. magnification is liable to be from 200 to 500, which is, of course, a magnification easy to realise with a super-het.

I recommend beginners in this art to construct the simplest form of set first—such a set as described in this number by the Wireless Magazine Technical Staff, or even an arrangement without the screened-grid valve, and later on they may add a super stage to remove some of the difficulties of handling and make the receiver more of a family affair.

Fig. 3 shows the basic circuit for short wave reception, which works very well.

This circuit will enable morse stations all over the world to be received, and in the condition of "just not oscillating," 2XAF and 2XAD can be received on many occasions. There are several disadvantages in the circuit, however; first of all, it is a bad radiator when oscillating, and, secondly, any aerial swaying is apt to affect the tuning.

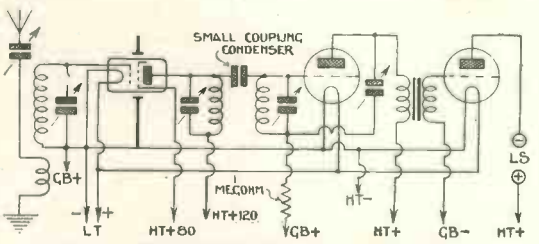
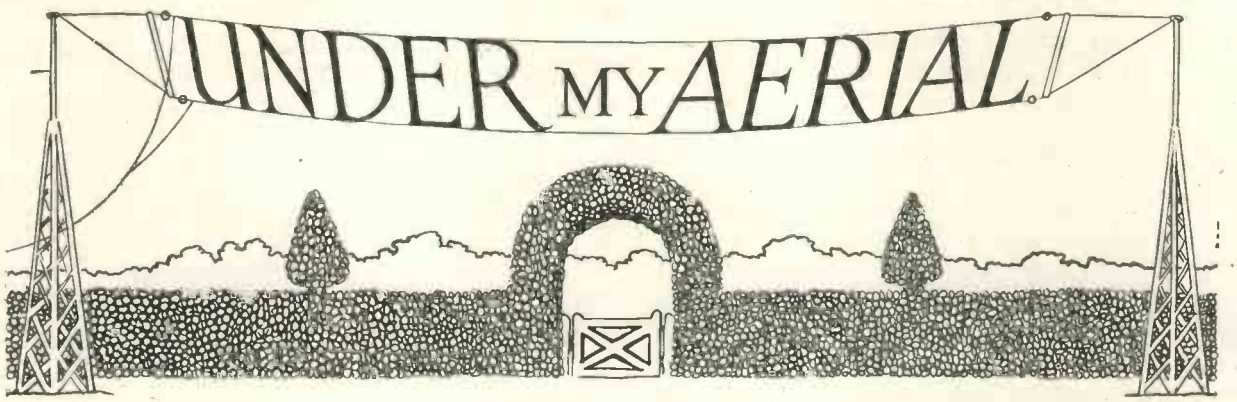


Fig. 4.—Three-valve Short-wave Circuit with Screened-grid High-frequency Valve

The addition of a high-frequency

(Continued on page 556)

HALYARD'S Chat on the Month's Topics — **Sketches by GLOSSOP**



The New Year

THIS is the third occasion on which it has fallen to my lot to wish readers of "Under My Aerial" a Happy and Prosperous New Year, and I pass on to you the good old-time wishes with greater pleasure than ever before.

A very happy New Year, everybody, and may 1928 prove to be a more successful wireless year than any preceding year.

It is usual, at the beginning of a new year, to make resolutions of various kinds. What wireless resolutions have you made for 1928? Have you made up your mind to give yourself and your friends better wireless by some means or other this next year? A good resolution, is that one, and I hope you will be able to carry it out.

I must tell you of the New Year resolutions made by certain of my wireless neighbours. One *big* wireless neighbour has resolved never again to lean over his wireless receiver with his watch-chain dangling freely from his waistcoat pockets. He has blown a couple of good valves in that way and his resolution is—never again.

Another wireless neighbour of mine

The New Year

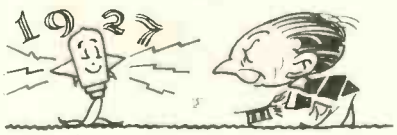
has resolved never to announce to his household again his successful reception of Sydney, Australia, until he is perfectly sure he is not on a Daventry harmonic.

As for George, my technical expert, resolution for 1928 is to be a veritable model of seriosity.

Wireless in 1927

What, in your opinion, have been the chief wireless features of the year 1927? Think things over carefully and jot down what are, to your mind, the outstanding wireless happenings of the past twelve months. Don't try to put the things on your list in order of merit.

List ready? Good. First item, opening of 5GB, Daventry Experimental, August 21. We agree over



Wireless in 1927

that. Glad you remembered the exact date.

Next, invention of the screened-grid valve. Got that? You have. Good again. Now where are we off to? Constitution of the British Broadcasting Corporation under Royal Charter, January 1, 1927. Come now, come now, we're not writing a wireless history book you know.

Broadcasting the Oxford and Cambridge boat-race. Have you really got that on your list? Excellent. Although I am a Cambridge man (or am I Oxford, like John Henry?) I never thought of that one.

Here's one from my list. Wireless telephony, Rugby-U.S.A. service commenced January 7, 1927. That scarcely concerns the broadcast listener, though. Here's another of the same kind. Opening of several high-speed short-wave wireless beam telegraphy systems between the Mother Country and distant parts of the Empire.

You've still got some pretty good items on your list, I expect. Never mind them, though. We have no need to quote any further to show that 1927 was an exceptionally interesting wireless year.

Somebody will have to do something pretty smart in 1928 if 1928 is to beat 1927 from the wireless point of view.

A New Era

Do you think we have now entered upon a new era in wireless, a short-wave era?

A year or two ago nobody ever dreamt of employing anything but long waves for long-distance work, in fact, the working rule seemed almost to be the longer the distance, the longer the wave. Very short waves, below a hundred metres say, were practically unheard of outside the laboratory of the scientist.

What is the position to-day? The world's greatest wireless engineers are carrying out short-wave experimental work, with feverish haste, one might almost say, and, wherever wireless enthusiasts got together, short waves very quickly become the

A New Era

chief topic of the conversation.

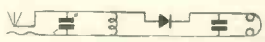
Don't you find your wireless friends far more ready to talk about short-wave work than anything else just now? I most certainly do. Two of my wireless neighbours, keen experimenters both of them, are doing nothing at all at the present time but short-wave work. They seem to be having a great time fiddling about

Under My Aerial (*Continued*)

with the coils they use in this fascinating work.

If you are ready to start off on a new piece of experimental work, there is nothing which holds out more promise in the way of repayment for trouble taken than the building of a short-wave receiver.

Short-wave enthusiasts are well catered for in the WIRELESS MAGAZINE you know. There have been descriptions of some excellent short-wave receivers in recent issues of this periodical,* and then, again, we have the great advantage each month of 5YM's notes on short-wave topics.



False Prophets

"Now then, George, out with it. I can see you have something weighty to propound," I said to my technical adviser the other evening after he had looked at me with serious intent a dozen times within the hour, and had used up half a box of matches trying to light a smoked-out pipe.

"I'm going to give you a piece of sound advice and you won't thank me for it," said George.

"But I always thank you for good

False prophets

advice, George," I said.

"You won't for this," was the reply.

"What is it then, George?"

"Don't prophesy this year."

"George, I——"

"Yes, it's just the time of the year when you and a few others we know try a hand at wireless prophesying. Funny how the prophetic mania always breaks out about the same time each year."

"But, George——"

"Take my advice, don't do it. PLEASE DON'T DO IT."

"Why, George, why should we not——"

"Because you make such a hash of it, all of you. Remember the wireless prophet who, at the end of 1923, said the point-nought-six ampere dull-emitter valve would abolish the accumulator. Abolish the accumulator——. Why! there were more folk then ever before taking their accumulators to the charging station at the end of last month."

"I know, George, but——"

"Consider the prophets who foretold the doom of the high-tension battery of 1924. What was the reply of the manufacturers of dry batteries to that prophesy?"

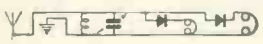
"Give it up, George."

"A bigger cell in batteries than before. What a cell! Do you know what I think the wireless prophet ought to be made to wear in public?"

"No, George, what?"

"Sac cloth an dashes."

George has quite put me off my usual plan of attempting to forecast the probable wireless developments of 1928. I don't think I had better say anything at all of that nature.



The Unstationary Station

Have you seen anything of the B.B.C. mobile transmitter in your district? If so, you might look upon it as a distinct possibility that, in the near future, the B.B.C. may decide to build one of the new regional broadcasting stations on your wireless doorstep, so to speak.

Just imagine how exciting that would be, my word. You would be able to get loud-speaker signals from the old crystal set and the new station would follow you all round the dials of the tuning condensers of your valve set.

According to an official description, this mobile wireless transmitter is fitted to a motor lorry. It takes an

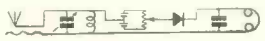
The unstationary station

hour for the engineers of this mobile station to "hook up," that is, to erect the masts and get the station going. Probably it takes considerably less than the hour to "hook off."

The power of this mobile station is about equal to that of 2LO, and it is worked in conjunction with a mobile receiver.

When some particular site for one of the new regional high-power broadcasting stations is under consideration, I suppose the mobile transmitter is sent to transmit from that site. The mobile receiver then, no doubt, tours the district round in ever widening circles, and takes accurate measurements of the received signal strength at each halting place. From the results obtained in this way, the suitability of the site can be determined.

Sounds rather an interesting business, doesn't it? Personally, I shouldn't turn my nose up at the chance of seeing the country from one of these mobile touring receivers.



A Narrow Escape

Do you happen to know The Chocolate Girl? If you do, then the next time you see her, have a good look at her for, this very morning that ever was, she gave me one of the worst shocks I have had in the whole of my wireless career.

The Chocolate Girl, you know, is a picture by Liotard, the original of which is in the Royal Gallery at Dresden. I have a fine reproduction

A narrow escape

of this picture and it hangs, or rather used to hang, by two vertical brass chains in a small recess in my reception room. In the same recess I have a small table on which stands the valve set I generally use for loud-speaker work.

When I first looked in my reception room this morning my Chocolate Girl was hanging in a most perilous position over the valve set. One of the picture chains had broken, the picture had swung on the second chain and, as luck would have it, one corner of the picture had lodged against the side wall of the recess.

It seemed an extraordinary thing that the picture had not fallen on to the set and smashed the valves. I was not long, I can tell you, in getting a chair and lifting the picture from its perilous position.

If you happen to have a picture

* An extra-special short-wave set is also described on page 480 of this issue.

Halyard's Chat on the Month's Topics

hanging above *your* receiving set in *your* wireless reception room, take a tip from me, have a good look at that picture and its supports. You would feel pretty wild, you know, if that picture fell on your set and smashed the valves.

Honk! Honk!

One of my oldest wireless friends has just bought a motor-car, and his [interest] in wireless has faded out ..dingly for the time being. I was ..ther surprised, for this particular ..iend has been one of the keenest

Honk! Honk!

..enters I have known the ..ew years.

..wever, I was greatly amused ... ..scription of his car, for he could not help bringing in a wireless expression now and then in his description.

"It's a four-valve set," he said, "with straight-line steering except round the bends. Fine panel in front of the operator's seat, beautiful gadgets on panel, ammeter, lots of switches that work, and a clock even. Twelve-volt accumulator, self-charging, my boy. Foot rheostat to control the juice and the loveliest big wheel to turn with *both* hands."

"How are you getting on with the actual driving of the car?" I asked.

"Splendid," he replied, "changing gears is no more trouble than changing coils."

"It's jolly cold weather though, for motoring," I remarked.

"Maybe it is," he replied, "but you see I've been well trained for it sitting up listening for America, where the cars come from. I don't feel the cold in the least."

I scarcely think my old friend will lose his interest in wireless, not a bit of it. Next summer he will fit a neat little portable set to his car, and take me out with him experimenting, or I'm a Dutchman.

Fading

I suppose you are fully aware that Sunday evening, between the hours of half-past five and eight o'clock, is the best time in the week for the reception of Continental broadcasting stations.

During that time our own British broadcasting stations are silent, and there is less interference from shipping than on a week-day. You can therefore carry out most interesting work on distance reception.

On a recent Sunday, after listening to the whole of the afternoon transmission of 5GB, I had a hunt round the Continent, and I very quickly got on to Hamburg.

My set was a three-valve set, and I was using a loud-speaker. For over half-an-hour I held Hamburg, and I had one of the most curious experiences of fading I have ever had.

At times the strength of Hamburg seemed to be quite the equal of 5GB, and at other times the signal faded away almost to nothing. A man was talking most of the time, and I was able to make some interesting observations with my watch.

Whenever the speech faded away to minimum strength, I noted the time

Fading

in minutes and seconds. I then worked out the intervals between successive fadings. These intervals varied from nearly four minutes down to half-a-minute.

Have you ever tried to do anything of this kind? It is most interesting work.

Word-building

George and I had been discussing the new screened-grid valve at great length and our conversation finally turned on the question of a short name for this epoch-making addition to the valve family.

"Somebody is bound to hit on a neat little name for this new valve sooner or later, George," I said.

"Yes, screened-grid valve is rather an earful, although it gives a good description of the valve," replied George.

"Probably we shall find ourselves talking about the S.G. valve before long, George."

"Daresay we shall. By the way,

Word-building

the new valve is a four-electrode valve. Isn't there a special short name for that type of valve?"

"Er—let me see now. The original Fleming valve was a two-electrode valve, filament and plate only, and it was called er—er—a biode, or was it a diode? Our present-day ordinary valve is a three-electrode valve; filament, plate, grid, and it is sometimes called a triode. Here's an idea, George, for getting at a name for the four-electrode valve. Listen, George, two wheels, bicycle, two electrodes, biode; three wheels, tricycle, three electrodes, triode. Your turn, George. What's the name of the vehicle with four wheels?"

"Motor-car."

"George——"

"Here's a better scheme, Mister Halyard. Three sides, triangle, three electrodes, triode; four sides, quadruped, four electrodes——"

"You mean quadrilateral, George."

"Very well, then. Four sides, quadrilateral, four electrodes, quadriode. Very clever of me, don't you think: I ask you?"

I am not sure if I do not like George's quadriode quite as well as the word tetrode which I happened to see later the same evening in one of the recent *Amateur Wireless* gift books.

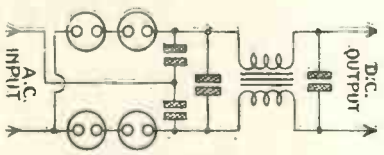
HALYARD

EVERY "W. M." READER CAN OBTAIN A FULL-SIZE BLUEPRINT OF ANY SET DESCRIBED IN THIS ISSUE FOR HALF-PRICE BY USING THE COUPON ON PAGE iii OF THE COVER.

Of proved utility to direct-current users, J. F. JOHNSTON'S special "Simpler Wireless" main's system has now been adapted for alternating-current supplies at very low cost and with very simple apparatus. It is too early yet to give complete constructional details in the pages of this issue of the "Wireless Magazine" as experimental work is still being carried out, but interested amateurs are recommended to watch the pages of "Amateur Wireless"

All-from-the-mains: New A.C. Syste

THE new system which was incorporated in all-from-the-mains sets described in the October, November, and December issues of the WIRELESS MAGAZINE has provided the ideal solution of the problem of working a wireless set *entirely* from



Circuit of Improved Electrolytic Rectifier for "Simpler Wireless" Receivers.

D.C. mains when the voltage is between 200 and 250.

Now J. F. Johnston, who invented the system, has designed a simple unit which enables any D.C. "Simpler Wireless" set to be used on an A.C. supply. Mr. Johnston will describe the construction of this unit very fully in an early issue of the WIRELESS MAGAZINE. Until then readers should *not* write to the Query Department asking for advance details.

Brief Description

However, as a matter of interest, the following brief description of the unit may be given. A "Simpler Wireless" set, to have *all* its H.T., L.T., and grid bias requirements satisfied, merely requires the application of a D.C. voltage of from 200 to 250 across it. To work such a set from an A.C. supply, therefore, it is merely necessary to provide a rectifying and smoothing unit which, with an A.C. input, will deliver to the set a D.C. direct current of 100 milliamperes at 200-250 volts.

There are several types of rectifier available which would do this, but many of them suffer from disadvantages of one kind or another, which prevent them from being suitable for general use. Some types are too expensive, for instance, while others involve the use of dangerously high voltages in order that the required output may be obtained.

But, after many months of continuous research, Mr. Johnson has designed a unit which enables an ordinary D.C. "Simpler Wireless" set to work from a 200-250 A.C. supply and which is inexpensive to build and perfectly safe in operation.

This unit involves the use of a very much improved form of electrolytic rectifier in which all the usual disadvantages of this type of rectifier have been entirely overcome. The rectifier itself, which can be purchased complete at a very low price, consists of four small cells neatly assembled, is quite as reliable in operation as a good accumulator and needs far less attention than the latter.

Unlike the accumulator, for instance, it does not require frequent re-charging. It must not, however, be compared with the usual L.T. accumulator as it not only replaces the latter, but does away with it and supplies the H.T. and grid bias as well. In fact it abolishes batteries and their troubles for ever when a suitable electric-light supply is available.

The circuit used in the complete unit (which, by the way, only costs £5 or £6 for components, including the rectifier itself) is shown in the diagram. The special method of connecting up the cells enables a higher voltage to be obtained across the D.C. output terminals than is applied across the A.C. input terminals, even though there must be some loss in any rectifier, however efficient.

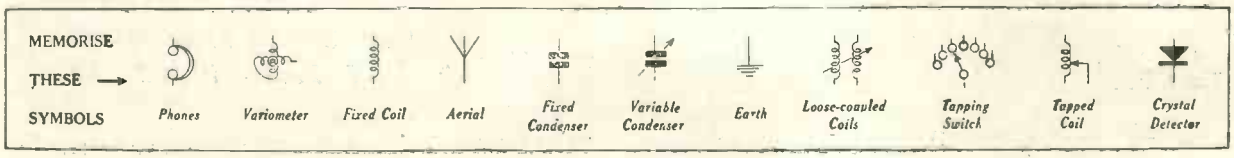
Thus, although the input volta may be only 200 a D.C. output of 100 milliamperes at 200-250 volts may be obtained from the output termin

SIR LANDON RO

—The Eminent Conductor

even allowing for the voltage drop across the smoothing choke. By this method, in fact, a step-up is obtained without the use of a transformer.

The choke used is of the double type, there being two windings on the same core. A large-capacity fixed condenser is connected across the output leads both before and after the choke windings. This smoothing circuit, in conjunction with the well-known "cancel-out" effect peculiar to the "Simpler Wireless" system, enables an absolutely silent background to be obtained to reception.



Specially Written by Officials at Savoy Hill

WHAT SIR JOHN REITH REALLY MEANT

NOT for a long time have the critics of B.B.C. programmes been better pleased than they were by the interpretation placed in some [illegible] on the remarks of Sir John [illegible] Director-General of the B.B.C., [illegible]ng the subject of "Broad[illegible] and the Public," at the [illegible]nchester Luncheon Club in [illegible]er.

[illegible]ful"

[illegible] Reith was reported to [illegible]d his audience not to judge [illegible]B.C. by the Children's Hour or [illegible] entertainments. "I know [illegible]e dreadful," the report con[illegible] "I have not much opportunity of listening-in at my own [illegible] there are occasions when [illegible] get across the room quick enough to turn the set off."

The Director-General spoke, as usual, without notes and it should not be supposed that his reference to the two particular items in the programmes was more than the substance of what he actually said. His meaning, if he had been quoted more fully, would have been seen to be as follows:

'The B.B.C. must not be condemned because of certain periodical programmes, or certain kinds of items. I myself dislike some of the items in an occasional variety or Children's Hour programme; but this is a matter of individual taste. Every listener will find his 'pet aversion' in almost every programme; but it were better to judge the B.B.C. on the basis of the whole programme service rather than on a mere part of that service. In doing much, it is the more surprising that the B.B.C. should fail in little.

Unbiased Opinion?

"Not only can broadcasting make the philosopher's formulæ practical and bring the affairs of the nation to the fireside; but it can propound principles of democracy and bring facts at first hand direct to the listeners without intervention of editorial opinion, or as it is becoming so much to-day, proprietorial opinion."

There is very little self-complacency about the staff of the B.B.C.; among the sternest critics of the programmes are they whose duty it is to arrange some section or other of those programmes and whose reputations rest upon the maintenance of public interest and goodwill. There are members of the staff who would, perhaps, curtail the amount of time given to opera or chamber music; others who would give less time to popular music; some who, if they were merely studying their own predilections, would omit many of the talks. But classical music is not necessarily unpopular, nor popular music necessarily bad. Talks maintained at a high standard are better than no attempt at all to be informative; a state of enlightenment is better than one of ignorance.

Levelling Atmosphere

The atmosphere of the broadcasting studio is a levelling factor; it is a humanising element and even the most dominating personalityis quickly subjugated by the stupendous thought of those listening millions of all creeds and classes. So far as it is humanly possible, the legitimacy of all tastes must be recognised and a balance must be sought so that the greater proportion may be satisfied. Neither within nor without the administration offices of the B.B.C. can any person say that the programmes entirely and consistently satisfy him. That would be expecting too much.

The significant thing is that criticisms are mostly individualistic. Take the criticisms of the Children's Hour. During the first ten months of this year the total received was fourteen, mostly anonymous; these must be balanced against 3,807 letters of appreciation. But other matters affecting the Children's Hour filled the postbag of the B.B.C., the total number of letters received in January-October being 28,126. At least sixty per cent. of these were from the youngsters themselves; but the sum total represents probably less than ten per cent. of the number of persons interested, but who do not write letters to say so.

Difficulties

The difficulties which beset the officials in framing programmes for an older generation are vividly emphasised in the work of deciding the elements which constitute suitable material for the receptive and sensitive child-mind. There was a story of a sweet little girlie nicknamed "Booloo," who was hovering between life and death, when a message came to Savoy Hill asking that one of the Uncles should call her by name. It was explained that her spirits had been sustained through a serious operation by the promise that when she was sufficiently recovered her wireless Uncle would speak to her.

The cheery wish that was broadcast to "Booloo," hoping that she would soon be well again, was, according to a subsequent report from her parents, the turning point that led to her recovery . . . an incident of small moment to many thousands who heard the message; but of tremendous importance to the anxious parents.

Recreative Material

This sidelight leads us on to a glance at the kind of material of general interest which is broadcast, mainly for recreative purposes. It includes tales about fairies, school life, adventure and animals; classical legends and folk tales; excerpts from famous books; simple talks on books, music, animals, railways, ships, aero-

What Sir John Reith Really Meant (Continued)

planes, gardens, the countryside, other lands and peoples, astronomy, hobbies and games. Songs and part-folk songs, including nursery rhymes, songs, songs of nature and animals, ballads and instrumental selections, chamber music and operatic music, help to familiarise the children with classical and modern compositions. Old and new verse is read.

Miscellaneous Items

The miscellaneous programmes include plays, competitions, concert party programmes, staff programmes, "My Programmes" and programmes simultaneously broadcast from other stations. There are also programmes "by children for children."

It is worthy of note that these features are to a considerable extent provided by the self-same artists and other prominent people who contribute to the evening programmes for grown-ups. Here are some names chosen at random: Ronald Gourley, Nellie Chaplin, Gordon Bryan, Maurice Cole, Sidonie Goossens, Laffitte, the Victor Olof sextette, Mrs. Beamish, "Toc H" Clayton, A. E. R. Gilligan, Mrs. Lambert Chambers, P. F. Warner, A. J. Alan, Harcourt Williams, Haydn Coffin, Ena Grossmith, Mavis Bennett, Dale Smith, Leonard Gowings, Percy Heming, Carmen Hill, Helen Henschel, Olive Kavann, Dora Labbette, Vivien Lambelet, Florence Oldham, George Pizzey, Megan Thomas, John Thorne, the Salisbury Singers, Kate Winter, Tommy Handley, Mabel Constanduros, and the Roosters.

The repetition of names is apt to become monotonous; but it should be obvious that to regular broadcasters such as these the preservation of a high moral tone is of paramount importance. They give of their best to children of all ages.

Not Circumscribed

In a very important respect the organisers of the Children's Hour have not been circumscribed in the same way as the organisers of variety entertainments. The entertainment industry early showed its resentment at not having been consulted before the B.B.C. was started. From the outset also there has been considerable trouble, as everyone interested in wireless knows, both in respect of artists' fees and obtaining suitable talent.

It is only when one comes to scrutinise music-hall turns from the strictly critical point of view of their suitability for broadcasting that it becomes apparent how few turns make effective broadcasts—the proportion is not much more than ten per cent.

The balance of useful and useless material can be allocated as follows:

Singers	Juggling
Instrumentalists	Conjuring
Speakers	Dancing
	Trick Cycling
	Performing Animals, etc.

The second column is made up, as will be seen, of items which appeal to the eye. Dancing, perhaps one of the most attractive turns on the music-hall stage, was tried for broadcast, a year or two ago, in radio revues, but with indifferent success. Sleight-of-hand is to be tried, but as it will obviously call for a deal of explanatory talk, much of its value as entertainment will probably be lost.

Managers' Penalties

The trouble is therefore not entirely due to differences over finance, as it is believed that variety artists in general are not averse from broadcasting, but are deterred through fear of penalty from their managers. The barring clause in artists' contracts, whereby they are not permitted to perform inside a certain area and within a certain period before and after each engagement, keeps off some artists who would be glad of the additional work which broadcasting provides, but who cannot get permission from the managers to appear before the microphone.

In spite of this embargo, some of the most eminent artists have accepted contracts and have proved their value in this new field. Others have accepted contracts and have broken them in face of a warning from the managers. The magnanimity of the B.B.C. in refraining from enforcing their legal rights in such cases is a story which has not yet been told.

In spite of the many obstacles strewn in the path of the variety organisers, the B.B.C. has had the help of well-[illegible] various [illegible] Charlot[illegible] staffe, [illegible] others [illegible] of their stage [illegible] the problem [illegible] presentation [illegible] audience who [illegible] without eyes.

Stage reputations [illegible] single performance [illegible] become well-known [illegible] times involved [illegible] work. The br[illegible] ever, is frequ[illegible] appearance; [illegible] casts from [illegible] successive n[illegible] into oblivi[illegible] memory is so [illegible] appearance is [illegible] all too soon [illegible]

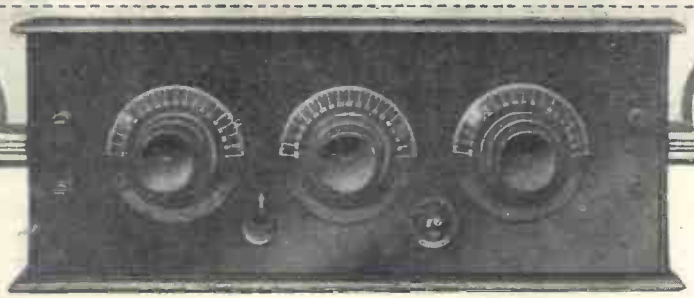
Prominent [illegible]

Nevertheless [illegible] permitted to [illegible] few of the pr[illegible] they have [illegible] include Sir Harry [illegible] Scott, Niel Kenyon, Will Hay, Bransby Williams, Nelson Keys, Angela Baddeley, Josephine Trix, Fred Duprez, Ada Reeve, Harry Hemsley, Cyril Shields, Wee Georgie Wood, Phyllis Titmuss, Julian Rose, Leslie Sarony, Walter Williams, Florence Smithson, Norman Long, Farran Souter, Ann Penn, George Carney, Tex McLeod, Alice Delysia, Nick Adams, Ed. Lowry, Melville Gideon, Ivy St. Helier, Edna Thomas, Gwen Ffrangçon-Davies, Dolly and Billy, Sydney Fairbrother, Lilian Braithwaite, Robb Wilton, Alma Barnes, Lawrence Anderson, Lee Morse, Betty Chester, Layton and Johnstone, A. W. Baskcomb, Norah Blaney, Davy Burnaby, Houston Sisters, José Collins, Teddy Brown, Ethel Irving, Dennis Eadie, Talbot O'Farrell, Bill Mayerl, Elsie Carlisle, Gertrude Lawrence, Lucille Benstead, Muriel George and Ernest Butcher, Topliss Greene, Bert Coote, Dick Henderson, R. A. Roberts, and Elsie Janis.

It has yet to be shown that any of these has suffered professionally through their connection with broadcasting, or that their work in broadcast variety can be bettered.

Listeners having need for a set employing two-pin plug-in coils and yet incorporating a really efficient and up-to-date circuit will be particularly interested in this article, in which J. H. REYNER, B.Sc., A.M.I.E.E., describes the construction of such a receiver. The circuit is one of the new "C.T." arrangements.

HE SIMPLICITY FOUR



By J. H. REYNER, B.Sc., A.M.I.E.E.

of Daventry ...e has been a ...ug-in coils ...e been surprised ...f stations which ...h comparatively ...t occurred to me ... the use of plug-in ...ible circuit might be possible in a receiver using one or more stages of high-frequency amplification. Various experiments have been conducted recently, therefore, on these lines with a view to finding suitable arrangements.

Efficiency

Now, a plug-in coil is admittedly less efficient than the usual solenoidal type of coil. In cases where one requires particular efficiency it is customary to use somewhat expensive coils wound with Litzendraht wire in order to reduce the high-frequency resistance and so to improve the gain of the circuit.

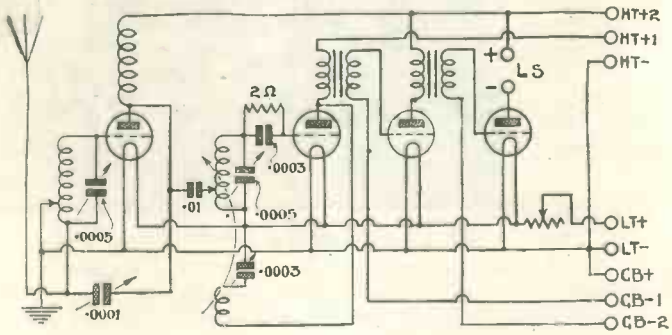
Thus, if we deliberately use a circuit having a high-frequency resistance which we know to be somewhat on the high side, the question arises as to whether really satisfactory amplification and selectivity can be obtained. With ordinary arrangements this is a matter of some doubt and it appeared that some special measures were necessary. Accordingly the problem was analysed and it may briefly be stated in the following terms.

We have to consider three principal effects :

1. *The Schrott Effect.*—This is an effect depending upon the use of thermionic valves for amplifying, it being found that there is a certain critical limit below which the valve will not amplify satisfactorily. In order to receive distant stations, therefore, it is necessary to apply the greatest possible signal to the grid of the first valve.

2. *Amplification.*—The actual amplification obtained from the high-frequency valve depends upon the type of circuit in use and, generally speaking, the more efficient the circuit the greater is the amplification. We have to find, if possible, a method of obtaining high-amplification with circuits not possessing a very high gain.

3. *Selectivity.*—It is necessary to adopt arrangements to minimise the effect of valve damping and to eliminate all possible sources of poor selectivity due to causes other than the actual tuning of the circuit.



Circuit of the Simplicity Four

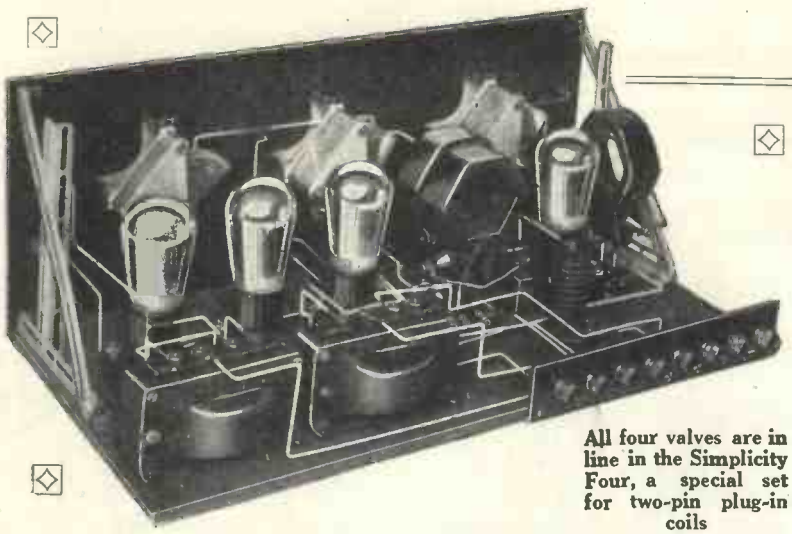
Experiments

As a result of experiments which have been carried out with these aims in view, a type of circuit has been evolved which, while not startlingly novel, possesses certain minor features the combined effects of which make for good efficiency. The present receiver is a four-valve model, incorporating these ideas, one stage of high-frequency amplification being used, followed by a detector and two transformers stages of low-frequency amplification. The L.F. stages, of course, are straightforward and could be replaced by other forms of coupling if the reader wishes to do so.

The first valve is neutralised by the use of a slightly different arrangement from the usual. Instead of using a Rice circuit in which the centre tap on the coil is taken to the filament, one end of the coil going to grid and the other through a neutralising

H.F., Detector and Two L.F. Stages: Two-pin Plug-in Coils

The Simplicity—



All four valves are in line in the Simplicity Four, a special set for two-pin plug-in coils

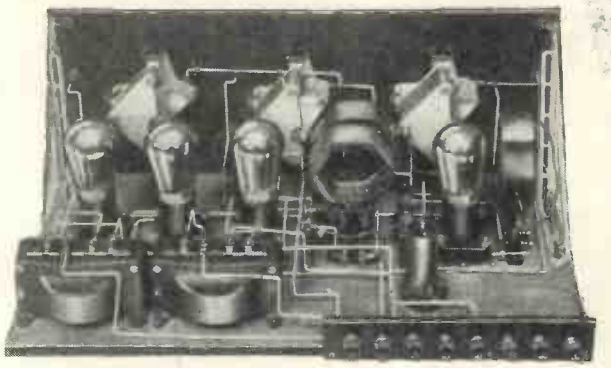
condenser to the anode, I have taken a tapping at about one-sixth of the way down the coil. In order to obtain neutralisation here it is necessary to use a larger value of neutralising condenser and actually a condenser of .0001 microfarad is employed.

Two Advantages

This arrangement has two advantages. In the first place five-sixths of the total voltage is applied across the grid and filament of the valve instead of only one-half as is in the case of the centre-tapped circuit. Secondly, it is possible by over or under neutralising to introduce a small amount of reaction into this first circuit, thereby minimising the damping, increasing the gain of the circuit, and so increasing the actual value of the signals applied to the first valve.

The aerial system is connected across the tapped portion of the coil, thereby reducing the aerial damping and increasing the selectivity. The use of an ordinary tapped aerial coil is quite satisfactory in either this position or in the high-frequency circuit.

The actual amplification of the valve is looked after by the use of a high-frequency choke in the anode circuit. By this means we always have a large impedance in the anode circuit, although the tuned circuit of the H.F. stage is virtually in parallel with this so that the impedance is reduced to some extent. This H.F. choke also serves to keep the high-frequency current out of the battery so that strong signals are not reintroduced into the detector stage as is the case if the circuits are connected directly to the H.T. battery. This is quite a common source of poor selectivity and is completely obviated by the present arrangement.



Rear view of the Simplicity Four

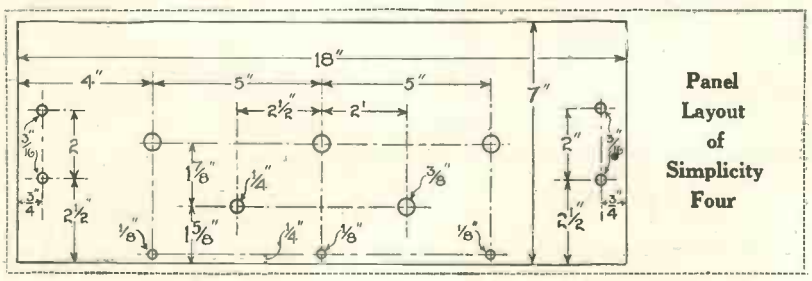
H.F. Currents By-passed

The high-frequency currents are by-passed from the anode through a large fixed condenser on to the secondary circuit. In order to obtain good selectivity, the voltage is introduced by tapping this coil towards the bottom end, which not only improves the selectivity but gives an actual step-up whereby the signal strength is correspondingly increased. Here again, a simple tapped coil is quite satisfactory.

Cumulative grid rectification is employed and a Reinartz reaction arrangement is provided so that the actual damping on the detector may be reduced until the circuit is at the point of oscillation. This, coupled with the fact that the aerial circuit is already in a sensitive condition, results in a lively and a reasonably selective receiver and quite interesting results can be obtained using standard plugin coils.

As has already been pointed out, the low-frequency stages are standard in every way, but in order to obtain the best results it is essential to have used two good quality transformers. A 2.5 to 1 ratio is used in the first stage, followed by a 4 to 1 in the second position.

No fixed resistors have been used, but a master rheostat has been included in the positive L.T. lead. This also serves as a switch to bring the set in and out of operation.



Panel Layout of Simplicity Four

Components Required

Following is a complete list of the components required for the Simplicity Four:

Ebonite panel, 18 in. x 7 in. (Becol, Will Day, or Raymond).
2 .0005-microfarad variable condensers (Utility, Ormond, or Dubilier).
.0003-microfarad variable condenser (Utility, Ormond, or Dubilier).
.0001-microfarad reaction condenser (Ormond, Peto-Scott, or Cyldon).
4 valve holders (Benjamin, Lotus, or W.B.).
3 single coil holders (Lissen, Lotus, or Peto-Scott).
.0003-microfarad fixed condenser (T.C.C., Dubilier, or Lissen).
2-megohm grid leak (Lissen, Dubilier or Mullard).
.01-microfarad fixed condenser (T.C.C., Dubilier, or Lissen).

Four (*Continued*)

2 low-frequency transformers, ratios 2 to 1, and 4 to 1 (Pye, Gecophone, or B.T.H.).

High-frequency choke (Wearite, R.I. and Varley, or Cosmos).

Terminal strip, 8 in. by 2 in. (Becol, Will Day, or Raymond).

15-ohm rheostat (Lissen, Igranic, or Gecophone).

12 terminals marked: Aerial, Earth, L.S.+, L.S.—, L.T.+, L.T.—, H.T.+1, H.T.+2, H.T.—, G.B.+, G.B.—1, G.B.—2 (Belling-Lee).

Short length of flex and spade terminal.

Junit or Glazite for wiring.

Panel brackets (Igranic).

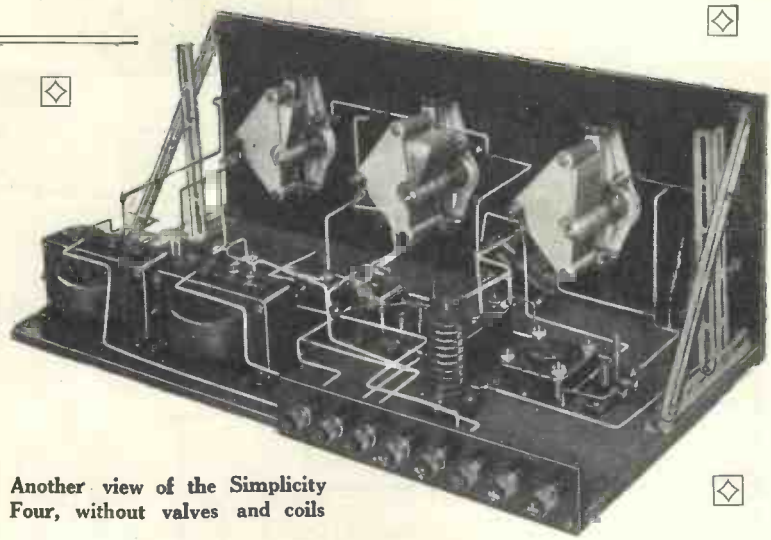
Cabinet and baseboard, 9 in. deep [illegible]d General Radio).

should be noted in each case [illegible]ticular components used in the [illegible]nd allowed for in the [illegible]mentioned first.

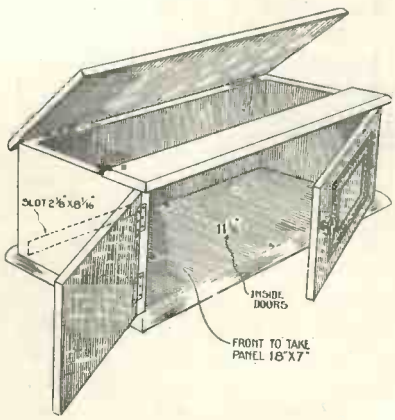
The layout has worked out very [illegible]aking the wiring up of the [illegible]n operation which occupies [illegible]e time and trouble. The [illegible]lders have been laid out [illegible]the middle of the baseboard all [illegible]straight line. The two low-[illegible]acy transformers are mounted at [illegible]back of the baseboard, in which po[illegible]ey are readily available for connection to their correct valve holders.

The two tuning condensers and the reaction condenser are mounted symmetrically on the front panel while the plug-in coils, three in number, are mounted on the left-hand side of the baseboard, where there is ample space to separate the circuits. Battery connections are taken from a terminal strip mounted at the back of the baseboard on the left-hand side.

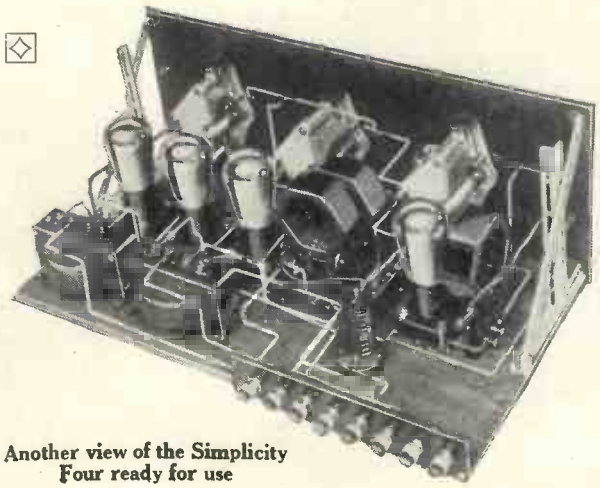
It will be seen that the aerial coil is placed at right angles to the two other coils. This is done in order to reduce the coupling between the circuits as far as possible. The coupling is not actually zero because there is always some capacity effect between the circuits quite distinct from the magnetic coupling. As the coils are well separated, however, this causes little trouble and the placing of the coils in the position shown enables satisfactory results to be obtained.



Another view of the Simplicity Four, without valves and coils



Details of Cabinet



Another view of the Simplicity Four ready for use

Suitable Coils for Use

A word may be inserted here concerning the actual connections to the coil holders. The circuit is wired up to suit Lissen, Lewcos and Atlas coils. The Igranic Company also make a coil having a one-sixth tapping, but this tapping is taken from the other end of the coil. In the actual receiver, the socket of the coil holder is connected to the grid in each case. Using Igranic coils, the connections must be changed over so that the plug of the coil holder is connected to the grid. It will also be necessary in such cases to alter the two connections to the reaction coil in order that the reaction winding may be in the right direction.

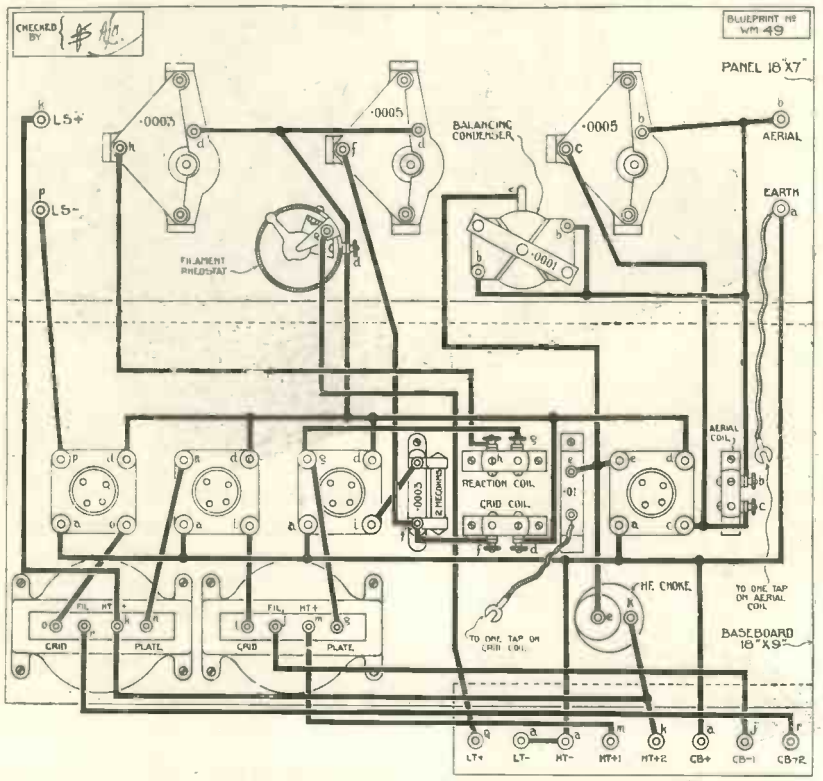
Mounting the Components

Having laid out the components on the baseboard in the positions shown, the various condensers, terminals and rheostat may be mounted on the panel, which can then be placed in position on the front of the baseboard. Two panel brackets have been used to support the panel at the two ends. The wiring up is straightforward and will present no difficulty.

Coil Clearance

There are two points, though, which have to be borne in mind. Make quite sure that none of the wires pass too near to the coil holders so that there is ample clearance for the coils when they are inserted in position. The terminals to the tappings on the Lissen X coils project slightly from the side of the coil and unless this point is borne in

The Simplicity Four (Continued)



This layout and wiring diagram can be obtained as a full-size blueprint (No. WM 49) for half price, that is 9d. post free, if the coupon on page iii of the cover is used before January 31

mind some of the wiring may foul the coil when it is in circuit.

Reaction Condenser

The second point relates to the reaction condenser. This is made with two sets of fixed plates and one set of moving plates. In order to obtain a capacity of .0001-microfarad it is necessary to connect both sets of fixed plates in parallel. This has been done on the wiring diagram but it is a point which is sometimes overlooked. If only one section of fixed plates is used the maximum capacity is .00005-microfarad, which is not quite high enough for the present purpose.

Wiring-up

When all the components have been fixed into position, wiring up can be started and this will be greatly facilitated by frequent reference to the full-size blueprint or smaller wiring diagram reproduced in these pages.

A glance at either will reveal the fact that each terminal point is marked with a small letter of the alphabet. All those points marked with like letters should be connected together, in alphabetical sequence. Thus, all those points marked *a* should first be connected with one wire or as few wires as possible; then all those points marked *b*; and so on, until wiring is completed. No difficulty at all should be experienced in wiring up this receiver.

Operating the Set

The operation of the receiver is simple. Choose two suitable coils for the tuning circuit. A No. 60 is a good value for the medium waves and a No. 200 for the long waves. Reaction coils of about 50 and 100 respectively will be suitable. Plug these into their correct positions. Make sure, of course, that the X coil is plugged in the correct holder on the detector valve, that is, do not confuse the tuned circuit and the reaction circuit.

Now connect the flex lead from the earth to the larger tap on the aerial coil and connect the flex lead from the fixed .01-microfarad condenser to the larger tap on the detector circuit. This will give the arrangement for best strength and is the most suitable arrangement for searching.

Increasing Strength

Place the panel-mounted neutralising condenser about half-way in. Manipulate the reaction condenser towards the minimum position and then set the two tuning dials approximately together. On rotating these dials together a number of stations will then be heard without difficulty, and they can be brought up to the required strength by an increase in the setting of the reaction condenser.

The value of the high-tension voltage on the detector valve should be adjusted until the reaction condenser gives a smooth and progressive

VALVES TO USE IN THE SIMPLICITY FOUR

Make	H.F. Amplifier			Detector			1st L.F. Amplifier			2nd L.F. Amplifier		
	2-v.	4-v.	6-v.	2-v.	4-v.	6-v.	2-v.	4-v.	6-v.	2-v.	4-v.	6-v.
B.T.H. ...	B21	—	B4H	B21	—	B4H	B22	—	B4	B23	—	B4
Cossor ...	Red Band	Red Band	Red Band	Red Band	Red Band	Red Band	Black Band	Black Band	Black Band	Green Band	Green Band	Green Band
Ediswan ...	ARDE H.F.	GP4	ES5 H.F.	GP2	GP4	PV8	GP2	PV4	ES5 L.F.	PV2	PV4	PV5
Marconi ...	DEH 210	DEH 410	DEH 610	DEL 210	DEL 410	DEL 610	DEL 210	DEL 410	DEL 610	DEP 215	DEP 410	DEP 610
Mullard ...	PM1 H.F.	PM3	PM5X	PM3 L.F.	PM3	PM5X	PM1 L.F.	PM4	PM6	PM12	PM 254	PM 256
Osram ...	DEH 210	DEH 410	DEH 610	DEL 210	DEL 410	DEL 610	DEL 210	DEL 410	DEL 610	DEP 215	DEP 410	DEP 610
Shortpath ...	SP18 G	—	DE50	SP18 R	—	DE50	SP18 R	—	SP55 R	SP18 RR	—	SP55 RR

An Efficient Set Using Two-pin Plug-in Coils

control of the signal strength, the circuit actually beginning to oscillate gently and without any plop. In this condition the receiver will be found to be most sensitive and reasonably selective.

Selectivity

Having obtained some idea of the handling of the set, the selectivity may be increased by reducing the tapping on the detector coil from the larger to the smaller tap. This operation is effected quite simply by changing over the flex connection to the other terminal. Similarly, if a still greater increase in selectivity is required, the flex connection from the earth lead may be taken to the other tapping on the aerial coil.

Both these adjustments will result in a slight decrease in signal strength, this effect being more particularly noticed when the aerial circuit is altered. In the latter case the setting of the panel-mounted neutralising condenser may require to be increased slightly.

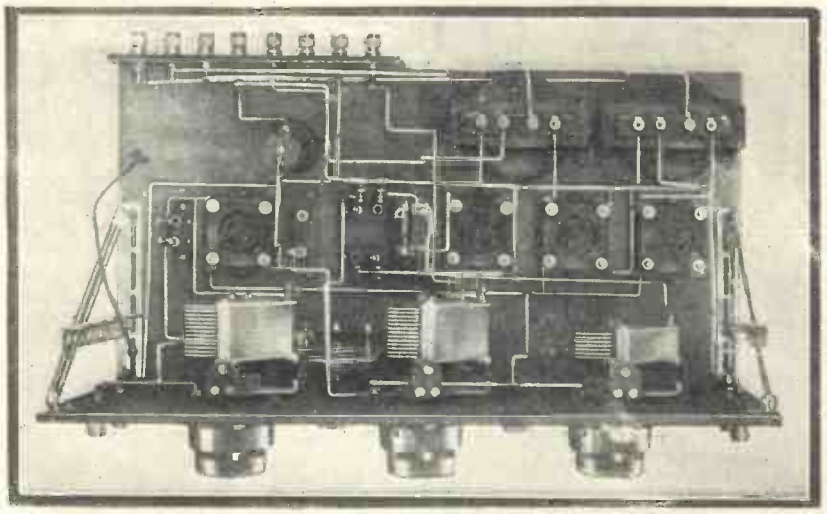
Edge of Oscillation

The setting of this neutralising condenser is not critical since, in the majority of cases, the detector damping rather tends to prevent the circuit from oscillating unless deliberate reaction is applied. It should be possible to tune-in a station and then to vary the setting of the aerial-tuning condenser through the tuning position without causing any "pull." This means that as the condenser is moved the signal strength rises to a maximum and then falls away again even when the detector circuit is adjusted to the edge of oscillation.

If there is any pull between the circuits, showing that the neutralising condenser is incorrectly adjusted, the variation on the aerial-tuning dial will cause the detector circuit to go in and out of oscillation, which is a condition of affairs detrimental to smooth operation.

Smooth Tuning

The setting of the neutralising condenser can be adjusted until both circuits tune in perfectly smoothly without any inter-action of this nature, when the receiver will be found to be capable of giving a considerable range without difficulty.



Plan view of the Simplicity Four, showing disposition of components

TEST REPORT OF THE SIMPLICITY FOUR

SHORT WAVES

Lissen 60X coil with No. 50 reaction; aerial on larger tap; H.F. on smaller tap. Setting on H.F. dial only given; aerial similar

Dortmund	35	*Stuttgart	72
Nuremberg	42	*Manchester	74
Newcastle	47	Glasgow	82
Breslau	51	Berne	84
Koenigsberg	53	Goteborg	86
Copenhagen	55	Frankfurt	90
*Prague	60	Langenberg	105
London	65	Daventry Experimental	114
		Brussels	122

*London heard in background.

LONG WAVES

Lissen 200X coil with 100 reaction. Setting as for short waves.

Hilversum	65	Daventry	135
Kalundborg	75	Radio Paris	158
Koeniswusterhausen	90		

The Crystal for the Purpose

THERE are three chief types of crystal available for ordinary receiving purposes, namely, Hertzite, carborundum and perikon.

"Ites"

Hertzite includes almost all crystals of lead sulphide which are sold under various fancy trade names, mostly ending in "ite," while two popular perikon combinations are zincite-bornite and copper-pyrites—bornite.

Carborundum, of course, is well-known to "old hands" as one of the first types of crystal used in commercial sets; its chief disadvantage, if it can be so called, is that it needs an applied potential for its effective working.

That each of the three types has special characteristics should be borne in mind by crystal experimenters. Carborundum has perfect stability as its salient point, though this is really gained at the expense of signal strength. Hertzite is possibly the most sensitive of all crystals, but it is rather unstable and needs fairly frequent readjustment.

Perikon Advantages

Perikon combinations have both advantages, being reasonably sensitive and quite stable in working. Most of the commercial so-called "permanent" crystals are of the perikon type.

X. Y. Z.

Half Hours with the Professor

11.—A CHAT ABOUT TUNING

"I say, Professor," cried the Amp one day, "what is the idea of tuning anyhow? I mean I quite understand that it is some use when you want to cut out one station and tune in another, but is it always necessary on a simple set?"

"That's quite a sensible question, my boy," said Megohm. "Of course, the real answer is because you won't get any signals unless you do."

Won't Work at All

"Oh, I know that Professor," was the answer. "I've tried to get signals with all sorts of hook-ups to get rid of tuning, but it does not seem to work at all."

"Oh, you have, have you? Well, then, you will appreciate that there is something about tuning which is essential to the proper reception of signals. To understand what this is, we shall have to discuss the fundamental property underlying all wireless transmission and reception—that of resonance."

Amp eyed the Professor apprehensively. He was rapidly getting into his lecture-room style and he was a little difficult to follow in such cases. He determined to keep a wary eye open in case the matter got any worse.

An Important Matter

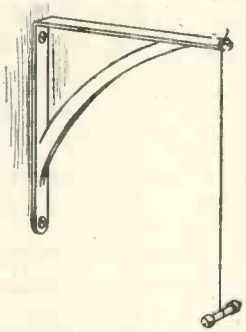
"This question of resonance," resumed Megohm, "is at the bottom of the whole matter and it is really rather important that you should understand it." He hesitated for a moment or so and looked around. "Perhaps," he continued, "I had better demonstrate to you mechanically, first of all."

Walking across the laboratory, he took down a reel of cotton from a shelf and then, glancing round once again, he finally picked up a grid leak which he tied on to the end of the cotton. Reeling off a length of about a yard, the Professor tied the top end to a projecting bracket in such a position that the pendulum thus formed was free to swing.

"Now, my merry buckskin," he said playfully, "we have an excellent mechanical analogy. This is a simple pendulum and as you will see, if I draw the 'bob' or weight at the bottom to one side and release it, the pendulum will swing to and fro."

He demonstrated this straightaway, at which the Amp nodded, getting interested in the turn of developments.

"Also notice," the Professor went on, "that the time of swing is exactly



The grid leak the Professor fixed to a bracket to make a simple pendulum

the same although the swing is getting smaller and smaller as the pendulum comes to rest." Here the Professor started the pendulum again and the Amp noticed that as far as he could see the time of each swing was exactly the same.

"Why does it come to rest, then, Professor?" he asked.

"Simply because of the air friction acting on the bob (and to a small extent upon the pendulum cord) as the pendulum moves through the air. The motion of the pendulum is what we called 'damped' by the air friction."

"Is that anything to do with the damping that one talks about in wireless work sometimes?" interrupted the boy.

"It is the same effect," was the reply. "In the first case we have actual mechanical damping, while in the electrical case we have an equivalent effect due to losses which are set up in the circuit, but we shall come to that shortly."

Swinging at the Same Rate

"Now," he continued, turning to the pendulum again, "there are several interesting things we can do with this pendulum in order to understand this idea of resonance. First of all you must understand that the pendulum of a given length always swings at the same rate. In consequence it has what we term a natural period or time of swing. We can alter this period by altering the length of the pendulum."

Here the Professor took a loop out of the cord, making the pendulum about a foot shorter. "Now you see," he said setting the pendulum in motion again, "the time of swing is very much shorter, so that we have a larger number of oscillations or swings in one second."

"In other words," interposed the Amp, maliciously, "the pendulum goes faster."

"Quite, quite," said the Professor, dreamily, completely oblivious of the Amp's sly thrust. "That shows that we can vary the natural period of an oscillating system such as a pendulum by altering the constants of the arrangement. In the simple pendulum, the shorter we make the pendulum, the quicker becomes the swing."

Circuit Like A Pendulum

"Then is a wireless circuit something like a pendulum?" the other asked.

"Yes, it is an almost exact electrical equivalent to a pendulum. We have, first af all, a condenser which we can charge to a certain voltage. Then we discharge this condenser through an inductance. Now the current flowing in the inductance coil pro-

duces a magnetic field, the effect of which is to keep this current flowing after the condenser has really become discharged."

The Puzzled Amp

Amp looked a little puzzled and was just about to speak when the Professor noticed and pulled himself up. "Look here," he said, "let us go back to the pendulum for a moment. If I lift up this bob," taking hold of the weight at the end of the cord, "and release it, it will fall towards the ground."

Amp nodded vigorously, more at home in this region of practical things. "What I do when I lift it," resumed Megohm, "is to give it some 'potential energy' or 'charge' as it were, so that when I allow it to discharge, it will do so by falling to the ground."

"Now actually this weight is attached to a pendulum and, therefore, its motion is not free, but is restrained. When I pull the pendulum to one side, I actually lift the bob weight a little bit. That is clear, isn't it?"

"Perfectly Professor."

Coming Nearer the Ground

"Very good. Now, when I release the weight, it falls to the ground or tries to. It cannot fall directly, however, but can only come nearer to the ground by moving along at the end of the cord, in other words, by swinging."

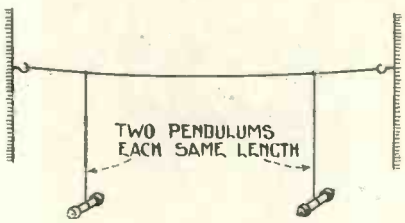
"Yes," replied the Amp, "I see."

"But," continued Megohm, "you notice that it does not stop when it gets to the bottom. Owing to the fact that it has already started to move it has picked up some momentum and therefore continues to swing after it has reached the bottom position. In doing this it actually lifts the weight again and is, therefore, storing up energy so that when the pendulum comes to rest at the end of its swing it is really in a corresponding position to what it was when I started it off, just like a charged condenser in fact, only that in this case it is discharged in the opposite direction."

Rather Interesting

"By Jove, Professor," exclaimed the boy, "That is rather interesting. I had never looked at it quite like that before."

"It is interesting," agreed the other, "only it is so common that we rather overlook it. Anyhow, you can probably see now the analogy with the electrical case. There we have a condenser charged electrically and it discharges just as the pendulum swings. Also in exactly the same manner it overshoots the mark. The momentum in this case is obtained because of the magnetic field set up by the current rush when the condenser is discharged and the result is that the condenser charges up in the opposite direction."



Two pendulums of equal length suspended from a common string

"Then I suppose it will go on charging and discharging just as the pendulum swings backwards and forwards?"

"Exactly, that is just what does happen and the current rushes backwards and forwards in and out of the condenser. We call it an oscillatory current for that reason."

The boy remained silent for a moment or two, and then said: "But what has this got to do with tuning, sir?"

"I am coming to that in a moment and you will see the connection when I do. Let me remark in passing, however, that just as the air friction brings the pendulum to rest so electrical friction or resistance will ultimately cause the current to die away in the electrical circuit."

Progressing Further

"Now," he went on, turning round to the pendulum again, "let us carry this experiment a little farther."

Here Megohm seized the cotton reel once again and carefully measured off another pendulum, exactly the same length as the first. On the bottom of this he tied another grid leak just as before.

"Must you have a grid leak there?" asked the Amp innocently.

"That's quite enough of that," said the Professor sharply. "You know as well as I do that any suitable weight will do at the end."

The Amp relapsed into silence with a grin.

Meanwhile the Professor measured off a length of about 4 yards of cotton which he proceeded to stretch between the two opposite points in the Lab. Then he tied the pendulums to this cord leaving about 6 or 8 feet between them. The boy watched interestedly, wondering what was going to happen next.

Ze Complete System!

"*Voila!*" exclaimed the Professor when the job was completed, "ere we 'ave ze complete wireless system. This," he exclaimed with a twinkle, "is the ether," pointing to the cotton stretched across the room. "Here," he said, indicating the first pendulum, "is the transmitting station, and the other pendulum is the receiving station."

Different Wavelengths

"Now," he went on, "first of all I am going to make the receiving station different in length from the transmitter." He walked over to the second pendulum and took a loop out of it so that it was only about two-thirds of the length of the other. "Now we will transmit," he said, and walking over to the first pendulum, he drew it slightly to one side and allowed it to swing.

The second pendulum bobbed and swayed slightly but beyond this nothing happened to it, while the first pendulum continued to swing from side to side in a regular fashion. Megohm drew the Amp's attention to this.

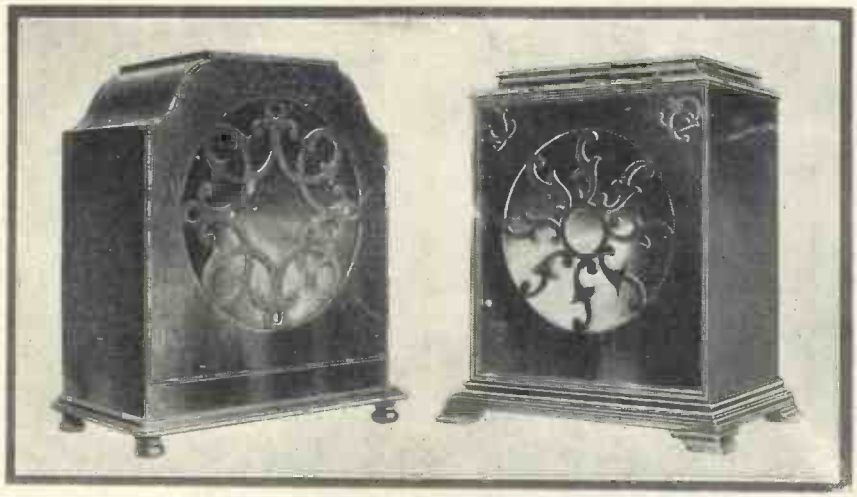
"You see," he remarked, "there is

THE LOST STATION

Seated one day at the radio,
I was weary with life's long trials,
And my fingers wandered idly
Over the much-used dials;
I knew not how I was tuning
As I skipped from land to land,
But I heard one brand new station
Like the sound of a heavenly band.
It burst on my ears with its trumpets,
Its clarion call from the skies,
And the sweeping glory of fiddles
With their leaping, surging rise;
And voices mingled throughout it
In triumphant glad refrain,
But all on a sudden I lost it—
And I've never heard it again.

—*L.W.A.B.*

Half Hours with the Professor (Cont.)



Modern loud-speakers are nothing if not artistic, as these photographs of two new Gecophone cone models show

little definite effect of the first pendulum on the second. That is because the second pendulum has a natural period, quite different from the first and therefore the two systems are not 'tuned-in' to each other.

"We will now tune them." So saying he took the loop out of the second pendulum, thereby restoring the pendulum to its original length which had been measured off to be the same as the first. "They are now of the same length, you see," exclaimed Megohm, "and the condition of affairs is quite different. Now watch the results."

Second Pendulum Swinging

Once again he walked over to the first pendulum and started it swinging quite gently without jerking the top suspension cotton any more than was possible. Almost immediately, the second pendulum began to swing and within a very short time it was swinging backwards and forwards just like the first.

The Amp gazed at the two swinging pendulums fascinated. "Is that difficult to set up?" he asked at length.

"Not a bit, my boy," answered the other. "You can do it yourself without any trouble. You want to keep the pendulums about six feet apart and the two individual pendulums must be the same length as exactly as you can measure them."

"Would it matter if they were not quite right?"

"No, you can hear your local station when you are not quite tuned in to it, can't you? Just in the same way this experiment will work if the two pendulums are not quite tuned and to get the best build-up you must have them the same length."

"Then this explains what tuning is, I suppose?"

"I hope it does," smiled Megohm. "You see although the impulses are transmitted through the ether, they have no effect until we tune our circuit to the same frequency. Then there is a building-up effect and the second circuit starts to oscillate in unison with the first."

"Then the signals are really received all the time, Professor?" asked the Amp.

Near the Local Station

"Yes, that is so. The receiving aerial picks up voltages from every station within range. Some, of course, are stronger than others, but, unless we are right up against the local station no appreciable response can be obtained until we tune our receiving circuit to the particular signal we want. When we do this, we obtain a building-up effect which is equivalent to an actual amplification of the particular signal we want so that we can pick it out of the whole selection of stations which are all affecting our aerial."

More Questions

"Well, Professor," said the Amp, "there is more in this than I thought and there are lots of questions I want to ask you, but I think perhaps that I had better leave those for another day."

"All right, my boy," answered Megohm, "we will certainly have another chat on this subject next time you come."

Test Report of the Exhibition Five

Station	Wavelength	Aerial Coil	1st. H.F.	2nd. H.F.
San Sebastian	297	28	78	79
Nuremburg	303	32	80	84
Belfast	306.1	38	85	85
Newcastle	312.5	40	86	86
Milan	315.8	45	90	90
Dublin	319	47	92	94
Bournemouth	326.1	50	94	96
Barcelona	344.8	68	100	102
Seville	357	70	102	104
London	361.4	80	115	115
Stuttgart	379.7	90	118	119
Radio Toulouse	391	94	120	120
Hamburg	394	100	128	128
Glasgow	405.4	110	130.5	136.5
Frankfort	428.6	120	142	142
Oslo	461	133	147	147
Langenberg	470	135	148	148
Daventry Experimental	498	140	155	156
Aberdeen	500	142	160	160
Brussels	508.5	144	161	161
Vienna	517.2	146	163	163

This additional test report is published at the request of many readers. The construction of the set was described in our October issue

In this article J. H. REYNER, B.Sc. (Hons.), A.M.I.E.E., (who will be remembered as the designer of the Solodyne receiver published a year ago, before he became Technical Editor of the "Wireless Magazine") gives further details of a new one-dial tuning five-valver, full constructional particulars of which were given in our previous issue.

More About THE PHOENIX FIVE

ALTHOUGH the details given in the last issue concerning the Phœnix Five were particularly complete as regards the operation of the receiver, there are, nevertheless, one or two additional matters which can be discussed with advantage. Perhaps one of the most important of these is that of the valves which should be used with the receiver. General notes on the selection of the valves were given last month, but some more detailed recommendations are desirable.

Selectivity

The high-frequency valves determine to a large extent the selectivity of the receiver. Generally speaking, the higher the impedance of the valve the greater the selectivity of the arrangement, but beyond a certain limit, the signal strength begins to fall off. This limit occurs with a value of impedance around 20,000 to 30,000 ohms, with an amplification factor of 15 to 20 corresponding. It is because of this effect that this type of valve has become known as a high-frequency valve and is generally used in H.F. circuits.

It should be emphasised, however, that in order to obtain amplification the "Mu" value of the valve must be reasonably high. Two valves having approximately the same impedance will give approximately the same selectivity in the receiver, but if one valve has twice the amplification factor of the other the net amplification in the receiver will be twice as much.

This is a point which should always be borne in mind. It affects the somewhat vexed question of 2-volt versus 6-volt valves. It is usually found that with 6-volt valves the mutual conductance can be made higher (assuming at any rate, that the filament current of the 2-volt valve is kept within the usual limits). This means that for a given value of impedance, the amplification factor of a 6-volt valve would be higher than for a 2-volt valve and in consequence the results will not be quite so good in the latter case.

This must not be taken to mean that 2-volt valves are unsuitable for use in the Phœnix Five. They can be used with excellent results, but owing to this effect which has just been pointed out, the efficiency will be slightly below that which is obtainable with the use of 6-volt valves. Similar remarks apply to 4-volt valves, but if the valves given in the table overleaf, or types having similar characteristics are employed, every satisfaction will be obtained from the receiver.

The detector valve is not critical and can be any medium-impedance valve having a fairly high amplification factor. The first L.F. valve in the receiver should be a power valve, although an L.F. valve having an impedance of 10,000 to 15,000 ohms can be used in certain circumstances. The volume delivered by the detector, however, owing to the large high-frequency amplification, is often such as to overload an L.F. valve of the ordinary type and the use of a power valve is preferable in this stage.

Super-power Valve Essential

The last stage in the receiver *must* be a super-power valve, owing to the very large volume which it will be called upon to handle. This should be given at least 120 volts, with about 15 to 18 volts negative grid bias.

The operation of balancing was explained in great detail last month and little more need be said about this. It should be remembered, of course, that if the aerial system is charged, it will be necessary to re-balance the aerial condenser on the receiver, although the other two condensers need not be touched once they have been balanced.

High Frequency Choke

The high-frequency choke is an important portion of the receiver and it

More About the Phoenix Five (*Continued*)

Valves to Use in the Phoenix Five

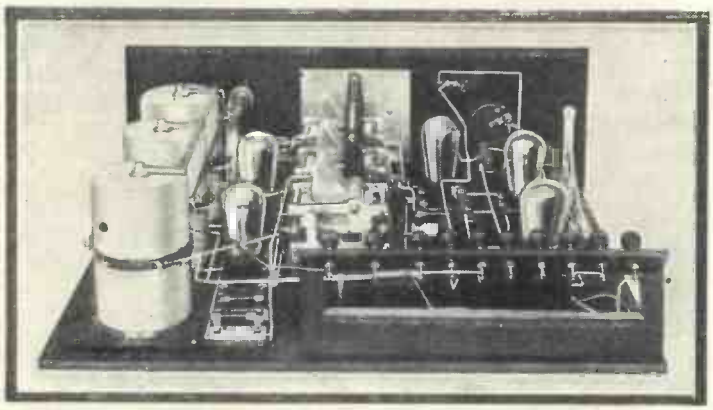
Make	H.F. Amplifiers and Detector			1st L.F. Amplifier			2nd L.F. Amplifier		
	2-v.	4-v.	6-v.	2-v.	4-v.	6-v.	2-v.	4-v.	6-v.
B.T.H. ...	B21	—	B4H	B22	—	B4	B23	—	B4
Cossor ...	Red Band	Red Band	Red Band	Black Band	Black Band	Black Band	Green Band	Green Band	Green Band
Ediswan ...	ARDE H.F.	GP4	ES5 H.F.	GP2	PV4	ES5 L.F.	PV2	PV4	PV5
Marconi ...	DEL 210	DEL 410	DEL 610	DEL 210	DEL 410	DEL 610	DEP 240	DEP 410	DEP 610
Mullard ...	PM1 H.F.	PM3	PM 5X	PM1 L.F.	PM4	PM6	PM 252	PM 254	PM 256
Osram ...	DEL 210	DEL 410	DEL 610	DEL 210	DEL 410	DEL 610	DEP 240	DEP 410	DEP 610
Shortpath	SP18 G	—	DE50	SP18 R	—	SP55 R	SP18 RR	—	SP55 RR
Six Sixty ...	SS 210 H.F	SS 4075 H.F.	SS 6075 H.F.	SS 210 L.F.	SS 410 P	SS 610 P	SS 215 P	SS 425 SP	SS 625 SP

must be of a reliable make, so that it will cover the whole of the broadcast band up to 2,000 metres without any falling off of any description. H.F. chokes are considerably better nowadays in this respect than they used to be, but this is nevertheless a point which still requires to be watched and the use of the components specified is to be preferred.

Triple Coils

A few words concerning the actual triple-screen unit may be of interest. These are actually tested at the manufacturer's works in a Phœnix Five circuit, and are balanced up individually so that their inductances are all identical, thus ensuring considerable ease of adjustment of the actual receiver and obviating any necessity for rebalancing when the receiver is switched over from the long to the short waves, or *vice versa*. After this is done, the instruments are sealed and if any difficulty arises, they should be returned to the makers.

The switching arrangement is sent out from the works correctly adjusted, but this may possibly require some slight alteration. This expedient should only be adopted as a last resort, if it is quite obvious that the switching is definitely at fault. The switch mechanism is carried on a portion of the framework, being held in position by two locking nuts. If these are slacked off, the whole switching mechanism can be moved backwards and forwards independently of the rotating drive which normally is in operation.



Rear view of the Phoenix. A full size blueprint is available, of course. See full constructional details in the December "Wireless Magazine"

Adjusting the Switches

The simplest way of adjusting the switches is to slack the nuts well back, and to move the switches on the coil units by hand, at the same time rotating the normal operating rod in the correct direction. With the switch in its correct position and the individual switches well home, lock up the fixing nuts once again. Operating the switch should now change over the connections without any difficulty. When this has been tested, the lock nuts may be tightened up finally, when the receiver is completely ready.

Leave Well Alone

As was pointed out, however, this component should not be touched in the normal course of events and these few notes are only given in case, as is sometimes found, one of the circuits does not change over while the others do, indicating that the switch requires a slightly greater travel in one particular direction.

Revelation Four

To the Editor, "Wireless Magazine"

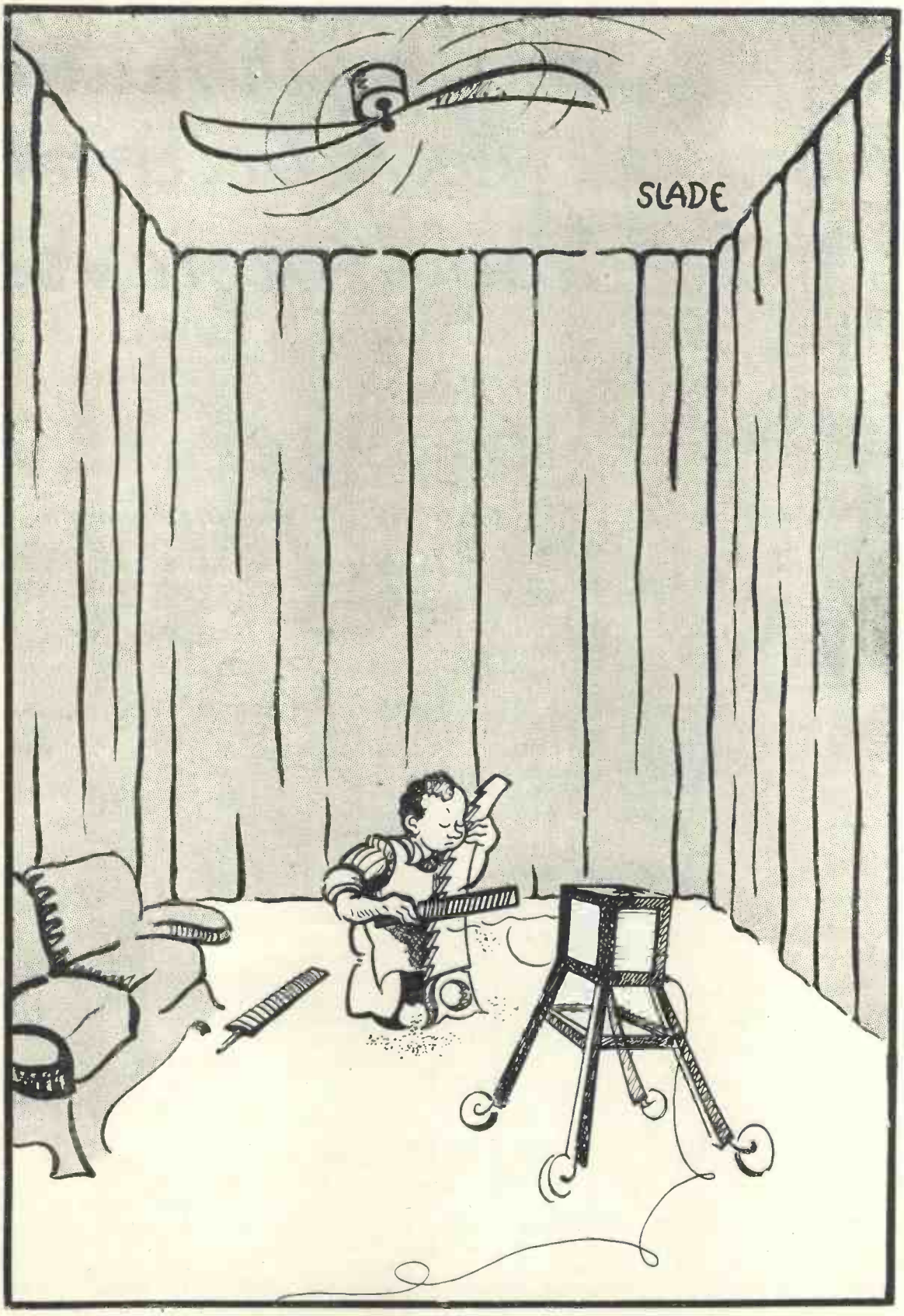
SIR,—I have built the Revelation Four and am highly delighted with it. It's great. A few evenings ago I tuned in twenty-three stations on the loud-speaker—they came in with perfect ease and all at good strength.

In view of the fact that I am a raw amateur the tuning-in of so many stations speaks volumes for the set. I had a friend in to hear it and he said that it beats to a frazzle one he had heard in London, which had cost many pounds more.

Furthermore, this area is not particularly good for wireless reception.—FRANK WALKER (Carmarthen).

READERS ARE REMINDED THAT ONLY BLUEPRINTS OF SETS DESCRIBED IN THIS ISSUE CAN BE OBTAINED UNDER THE SPECIAL HALF-PRICE SCHEME

A Broadcasting Secret Revealed!



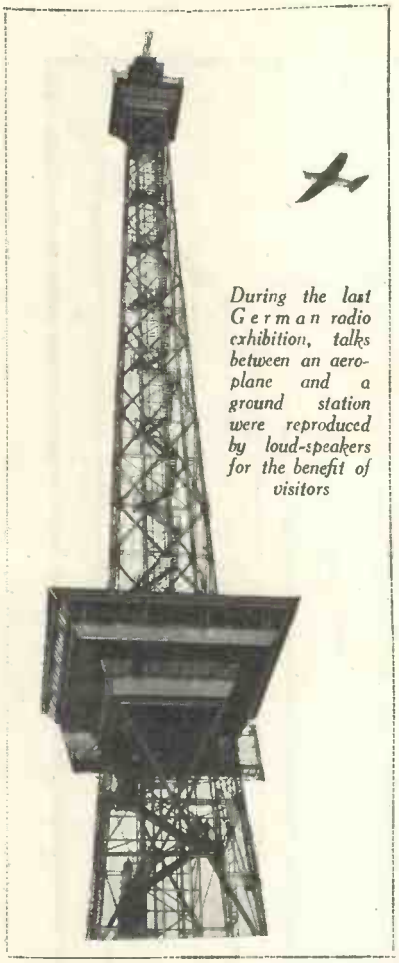
THE DEPUTY

Loyal B.B.C. workman saving the situation of jazz enthusiasts pending the arrival of the Wireless Dance Band

A Special Article That Will Interest Every Listener

Are Our Radio Exhibitions Good Enough?

By J. GODCHAUX ABRAHAMS



During the last German radio exhibition, talks between an aeroplane and a ground station were reproduced by loud-speakers for the benefit of visitors

OFFICIAL figures show that during the period of eight days the recent British Radio Exhibition was open to the public at Olympia (September 24 to October 1) 78,886 visitors passed through its turnstiles; from this number we should deduct a figure representing persons closely associated with the wireless industries and, possibly, a lesser number to cover repeated visits made by season-ticket holders.

Is the Result Satisfactory?

In view of the fact that this exhibition is an annual one, held in the largest city in the world, boasting of a vast population, can the result be considered satisfactory? I think not, for, taking all things into account, any comparison made with results attained in other countries is to our disadvantage.

In what way does our radio exhibition appeal to the general public? What steps have been taken to attract the visitor who, for the present, at least, has not evinced any interest in the reception of broadcast programmes? In what manner do the exhibits themselves tempt the complete stranger to adopt wireless reception as a pastime?

If invited to visit Olympia, what entertainment is provided to whet his appetite, or to impel him to construct his own set, or, alternately, to purchase a complete equipment of receiving apparatus?

If the radio exhibition organised by an association of manufacturers is but a trade fair, to which it is only desired to attract dealers or other persons closely connected with the industry, no doubt it achieves its object. I cannot believe, however, that this is the exhibitors' sole aim; for the steady and normal development of business it is essential that the general public should be interested in the wares displayed.

Mere technicalities are inclined to bore the man in the street who, similar to a child, on every occasion expresses the desire to "see the wheels go wound." It is precisely this lack of demonstrations, coupled with a magnificent display of dead exhibits, which stamps the exhibition as purely a technical trade fair, in which neither Tom, Dick, or Harry, unless already converted to radio, can sum up anything but a casual interest.

The public to-day needs every opportunity of hearing broadcast programmes of high quality; the average demonstration made by the local dealer, or for the matter of that, by the big stores, to the prospective buyer of expensive apparatus, in most instances, is but a poor copy of the original. An exhibition should afford these facilities; the visitor should be placed in the best position for hearing what the exhibitor's set will give him in his own home.

In the same way, if the radio fan is to be converted from the roughly-constructed crystal receiver with headphones to the multi-valver with loud-speaker, the advantages of this change should be conclusively proved to him.

Need for Sound-proof Rooms

Admittedly, such demonstrations could not be carried out in the main hall, with all the noise inherent to a large concourse of people, but there appears to be no adequate reason for which sound-proof rooms should not be constructed in the galleries of Olympia; such chambers are commonly used for the reproduction of gramophone records in West End and other establishments. Space for these small rooms was not lacking at Olympia; we must recognise that a dance floor, although, perhaps, an attraction to the minority, was not in keeping with the aims of the exhibition.

On a former occasion the B.B.C. actually broadcast music in the hall; at least, in that instance, a transmission of pure quality was heard by the visitors. In addition to this attraction the authorities exhibited a model studio which, notwithstanding the fact that it was on a small scale, gave the spectators some idea of the way in which radio programmes were transmitted. In the recent exhibition but little of general interest was contributed by the B.B.C., as the full-sized model of the Savoy Hill control room, although, no doubt, understood and appreciated by experts, conveyed but scanty information to the general public less versed in technical matters.

From an engineering point of view, it may have possessed considerable value, but the greater majority of the visitors only casually glanced at it,

realising, for the most part, that without an accompanying non-scientific lecturer, the installation was of a nature far beyond their simple comprehension.

Close Co-operation Essential

To ensure success it is essential that there should be close co-operation between the trade and the broadcasting authorities: this intimate association of manufacturers of receiving apparatus with radio-programme organisers and transmitters must inevitably result in the development of the broadcasting movement, which, I take it, is the aim of all parties concerned, and by which, as a logical sequel, each individually reaps a material benefit.

The radio exhibition cannot be run by manufacturers alone; the close co-operation of the B.B.C. is essential if a strong and effective appeal is to be made to the general public.

Although conditions obtaining in other countries in many respects are not quite similar to ours, when dealing with a survey of our exhibition it is impossible to refrain from comparisons with identical shows which have been given in other lands. Of these fairs, doubtless, those presented at Berlin and at New York are the most important, and it is interesting to study their organisation and to enumerate the special exhibits and entertainments provided for the attraction of their nationals.

The Case in Berlin

In Berlin, for instance, a large building, erected in 1926, is solely devoted to radio; it is a permanent hall of some considerable size, surrounded by gardens in a pleasant neighbourhood of the German capital. The annual exhibition is not housed "anywhere" according to what may be obtainable at the time; the radio fair has its fixed abode, a structure specially designed to suit its peculiar needs.

When there arose in the service the necessity for the installation of a new broadcasting transmitter, the German authorities logically decided that its only site was in the immediate vicinity of the Funkhaus (Radio House), and as an additional attraction, erected an aerial tower, on the first floor of which, reached by a passenger elevator, they installed a restaurant.

The station in this way did not remain a mere transmitter, but became *ipso facto* one of the sights of Berlin, and the tower and restaurant a regular rendezvous of interested trippers. The gardens themselves were not allowed to run to waste; their proximity to the city enabled them to be used for a "week-end" exhibition (the English "week-end" movement having spread to Germany) and the bungalows, huts, and other rapidly constructed shelters were utilised at the radio fair for daily demonstrations of receiving apparatus and loud-speakers.

Generally speaking, most of the exhibitors' stands were fitted with aerials, and in their immediate vicinity were to be found sound-proof boxes, in which apparatus could be examined at leisure and tested. In the main hall a giant loud-speaker was also provided for the diffusion of musical programmes as desired.

The exhibition itself was not a mere display of wireless receivers, their components and the multitudinous gadgets which go to make the average fan's equipment; models of new inventions were well to the fore. The German Post and Telegraph Authorities, who take considerable interest in the broadcasting movement, had contributed to the fair many interesting displays, one of which, the transmission of pictures or hand-written messages between two points of the exhibition, was available to the public. On payment of a small sum, the visitor could witness the actual transmission of a small black and white sketch or a few lines rapidly penned by him, which, at the receiving end, he could take away as a souvenir.

Cures for Interference

The State Authorities had also assembled a fairly complete collection of the various kinds of apparatus which daily interfere with the reception of the transmitted programmes; these included every description and all sizes of electric dynamos and motors, high-frequency instruments and massage apparatus as used in "beauty parlours" or medical institutions, models of lifts, usually installed in apartment mansions, tramway collectors, from the oldest to the most modern and improved types, vacuum cleaners, and disturbing "gadgets" in general, of which complaints had been frequently made in the technical journals. Not content with this, in almost every instance, the State engineers gave diagrams of "curative" circuits for the elimination of such interferences!

From the point of view of entertainments, variety was not lacking; the exhibition possessed both a lecture and a concert hall; in the latter daily visits were made by well-known orchestras, the performances of which were broadcast by the near-by Witzleben and the more distant Königswusterhausen transmitters.

Daily, again, experiments were made in two-way communication with an aeroplane sent up from the Tempelhofer Aerodrome which, hovering over Berlin in general and the Funkhaus grounds in particular, responded to orders sent to the pilot by wireless telephony from a cabin at the foot of the aerial tower. These cross talks were also broadcast by the Berlin transmitters and heard by visitors in the exhibition buildings.

A General view of the last Radio Exhibition held in Berlin

Are Our Radio Exhibitions Good Enough? (Continued)

Outside Co-operation

Personally, I cannot see why our exhibition organisers could not provide similar attractions for our British public; it is easy to realise that such entertainments must be of interest to even the most casual sightseer. In at least one of our technical museums there is to be found a very complete collection of apparatus demonstrating the various stages in the development of wireless telegraphy and telephony; such exhibits, without doubt, would be loaned for a short period. Moreover, the Army, the Navy, the Royal Air Force, the Air Ministry, as well as many private companies, could be appealed to, and I feel sure that if such steps were taken the response would be a satisfactory one.

Although Germany established her broadcasting service almost one year after our pioneering B.B.C. had been brought into being, she has rapidly progressed; her transmitters have steadily grown in both number and power, and every step in the way of propaganda for the extension of the movement is being undertaken by the organisers. The Berlin Radio Exhibition this year showed an increase of some 20 per cent. over the number of exhibitors who took part in it in 1926; the Radio House in September last displayed some three hundred and fifty separate stands, a figure far in excess of that shown by us at Olympia.

In New York

If we turn to New York for the Fourth Annual Radio World's Fair, which took place during the week September 19 to 24, at New Madison Square Gardens, we also find a programme from which much can be learnt to our advantage. It is true that many of the features of the show bordered on sensation, but in every instance they were based on a purely scientific foundation, displayed in such a manner as to attract the man in the street.

Trade hours were restricted from 11 a.m to 1 p.m., after which time only was the general public admitted. From that moment, throughout the day, special demonstrations were given, either in the Exposition Hall or the Theatre of Wonders. The exhibition possessed a studio from which broadcasts were effected at regular periods, and America's leading radio artists were constantly on hand to greet listeners in a reception room devoted to this feature.

In this article a well-known contributor to the "Wireless Magazine" makes some timely criticisms of the recent Radio Exhibition held at Olympia, details of which will still be fresh in readers' minds.

He does not stop at criticism, however, but makes some constructive suggestions which, if heeded by the authorities, will make this year's show stand out as an international success in the radio world.

From the daily official "program" I quote the following items, which, I feel sure, were they to possess a parallel on this side of the Herring Pond, would have considerably overworked the Olympia turnstiles:

Some Stunts!

Coolidge Cathode Ray Machine, which, using 350,000 volts at a velocity of 150,000 miles per second, causes cold and white mineral crystals immediately to become red-hot when exposed to its ray. Or again: *Transmitting power by radio by Bernays Johnson, who, defying the electric chair, allows five times the power used to run a street car and three times the current used in Sing Sing prison for electrocutions to go through his body. A bar of steel held between his teeth will become red-hot and melt. Tuning-in on the language of insects: measuring the charge of an electric atom: a spectacular liquid air display by which a cake of ice was made to burn up: magnifying the smallest sound some twenty million times: making flowers speak: the showing of a balanced photo-electric cell by which device the sun is used to control the lighting of streets, cities, lighthouses at sea, so that they light up as the sun goes down and automatically switch off as the sun rises* were all subjects of demonstrations given at the Theatre of Wonders.

Further, to the Radio World's Fair at New York, other than mere trade associations contributed; there were exhibits by the Boy Scouts of America, by the Radio Relay League, by college wireless clubs, and by the U.S. Army Signal Corps. Grand opera was presented to an audience on one day; on another a short-wave transmitting station was formally inaugurated; again, on others, a radio queen was installed, a reception was given to prominent actors and actresses who had previously broadcast, prizes were distributed to the winners of various competitions, and a presentation made to the most popular announcer in the United States.

Tempting Visitors

Generally speaking, it may be said that every step was taken to bring radio to the notice of the public, and many hours were devoted to publicity and other schemes which would tempt visitors to take an active interest in broadcasting programmes. Yet the New York Radio World's Fair is but one of the many exhibitions annually held in the United States by American manufacturers and dealers.

Finally, a last point: Why is so little interest taken in our radio exhibition by our railway companies? Surely it is to their advantage to encourage an influx of visitors, not only from provincial centres, but also from foreign countries.

In these lines I have endeavoured to draw up an impartial comparison between our recent radio exhibition and other similar foreign shows which have preceded it; I believe that I have succeeded in showing in what respects we have failed. We are now entering upon our sixth year of broadcasting; from small beginnings we have made vast progress, and in these years we have managed to establish a growing and flourishing industry.

Britain's 1928 Show

When the plans for the 1928 British radio exhibition are brought up for discussion, some of these points could be borne in mind. With a careful co-ordination of effort, coupled with a helpful co-operation by all bodies interested in the advance of broadcasting, next year's show should demonstrate to the world that it must look to Great Britain for the latest developments in the science of wireless telegraphy, telephony, and television.

J. Godchaux Abrahams.

Some Particulars of Iceland's New Broadcasting Station

Radio Farthest North!

A view of the harbour and hills of Iceland's capital, Reykjavik

ICELAND is the latest nation to equip itself with a radio centre. This island, which touches the Arctic circle on the north, but is made habitable by the warming influence of the Gulf Stream on the coast, is probably the farthest north in newborn radio enthusiasm.

A 500-watt transmitting equipment of standard Western Electric design has been installed at Reykjavik, the capital of Iceland. It was impossible to erect a new building and new aerial masts during the winter and the broadcasting station was, therefore, installed in spare apartments in the principal commercial wireless telegraph station at Reykjavik.

Novel Aerial Arrangement

This necessitated a rather novel arrangement of the new aerial, so that it would not conflict with the 600-and 1,800-metre aerials of the radio-telegraph transmitters. A sloping cage was swung from one of the masts to the station building.

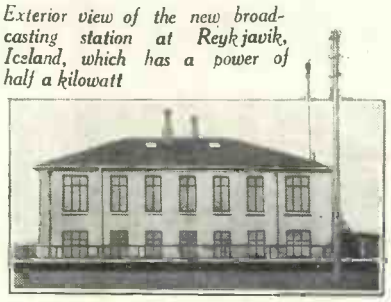
Iceland has only two cinematograph theatres, and a few choral societies and bands. The promise of the new broadcast entertainment aroused all the more interest for that reason.

Great Utility As Public Service

According to the engineer who installed the new plant, with all the disadvantages of severe climatic conditions, isolation of towns, difficulties of travel and lack of entertainments, it seems likely that broadcasting will become of greater utility as a public service in Iceland than in any other European country.

Iceland, however, has her own radio problems. The mountains and the glaciers of the interior and the frequent activity of the aurora borealis interfere with reception. In the summer there is almost uninterrupted daylight from June to August,

Exterior view of the new broadcasting station at Reykjavik, Iceland, which has a power of half a kilowatt



and consequent poor results in wireless broadcasting and receiving.

When the new station was ready for testing, no public announcement was made. But so rapidly does news spread in Iceland that everyone had heard of the tests within a few hours and more than a hundred crystal receiving sets were sold in Reykjavik the next day.

In the absence of professional artists, except for occasional visitors, the programmes are supplied by amateur talent. Reykjavik has two or three excellent male voice and mixed choral societies, and a number of talented soloists. On the instrumental side there are amateur brass bands and orchestras, and it is also proposed to broadcast dance music by the small orchestras playing at the chief hotel and cafe.

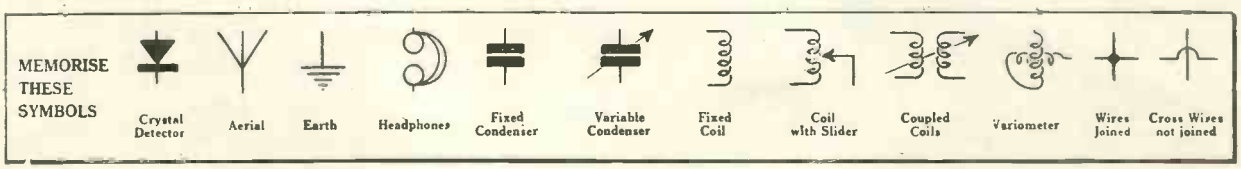
High Standard of Education

The level of education is extremely high and as a result lectures on subjects of real interest, by professors of the colleges, by members of Parliament and others, are assured of eager reception. Services at the cathedral are also now being broadcast regularly.

The annual service for those in peril on the sea was held in a church at Hafnarfjord, about eight miles from Reykjavik. Arrangements were made to broadcast this service for the benefit of the trawlers at sea and connection was made by telephone from the church to the broadcasting station. A large number of trawlers, up to a distance of three hundred miles, heard the service.

Financed by Trawler Owners

The Iceland Broadcasting Company was financed by six prominent trawler owners and business men of Reykjavik and by public subscription. Revenue is derived from an annual licence fee and a royalty on receiving sets and certain parts. The station was installed by the Standard Electric Atkieselskap of Oslo.



Great indeed is the fame enjoyed by the old 1927 Five receiver, but we have no doubt at all that the new 1928 Five will be yet more popular among "Wireless Magazine" readers. The set described in these pages is built on exactly the same lines as the 1927 Five, but a number of improvements (both in the circuit and in the actual construction) have been incorporated in this new design. Every owner of a 1927 Five should read the following article

A FAMOUS OLD SET REVISED AND BROUGHT RIGHT UP-TO-DATE.

COMPRISES TWO H.F., DETECTOR, AND TWO L.F. STAGES.

MILLIAMMETER INCORPORATED TO CHECK PURITY OF REPRODUCTION.

SIMPLER AND MORE EFFICIENT SCREENING.

MANY EXISTING PARTS CAN BE USED IN ITS CONSTRUCTION.

CHOICE OF FOUR OR FIVE VALVES BY MEANS OF SIMPLE SWITCHING.

REACTION HAS BEEN ADDED TO IMPROVE LONG-RANGE RECEPTION.

NO DIFFICULTY IN NEUTRALISING.

FULL-SIZE BLUEPRINT LAYOUT AND DRILLING GUIDE AVAILABLE AT HALF PRICE.

DESIGNED, BUILT AND TESTED BY THE "WIRELESS MAGAZINE" TECHNICAL STAFF.

NOTHING that we state here can be more convincing proof of the popularity and efficiency of the 1927 Five than the letters that have appeared in these pages from appreciative readers in all parts of the world almost continuously since November, 1925. The adjective "famous" can be justly applied to that receiver.

Neutralisation

But, although so efficient when once properly adjusted, in some few cases a slight difficulty did arise over the operation of the old 1927 Five, especially as regards neutralisation *if the valves specified in the original article were not used.*

This neutralisation difficulty arose from the use of a special form of balanced high-frequency circuit, which necessitated the use of special coils. When valves other than those specified were used, it was necessary in many cases to alter the windings slightly in order to obtain perfect neutralisation.

Partly because of this, and partly for the sake of simplifying the design generally (for many amateurs in all parts of the world are still sending for blueprints of the 1927 Five), we have produced this new receiver.

The special form of balanced high-frequency circuit is still retained, but the coil windings have been adapted so that neutralisation can be carried out without difficulty, no matter what valves are used.

At the same time we have not overlooked other minor improvements, and of these perhaps the most important is the provision of a better reaction control, which makes the 1928 Five even better than the 1927 Five for long-distance reception.

Reaction is incorporated by adding a reaction winding to the second high-frequency coil, and the amount of oscillation is controlled by a small variable condenser.

Improved Panel Layout

Thus it is not necessary to use one of the neutralising condensers as a fine control of reaction, and the panel layout is somewhat improved by mounting both "neut" condensers on the baseboard and the reaction condenser immediately below the milliammeter on the right of the panel.

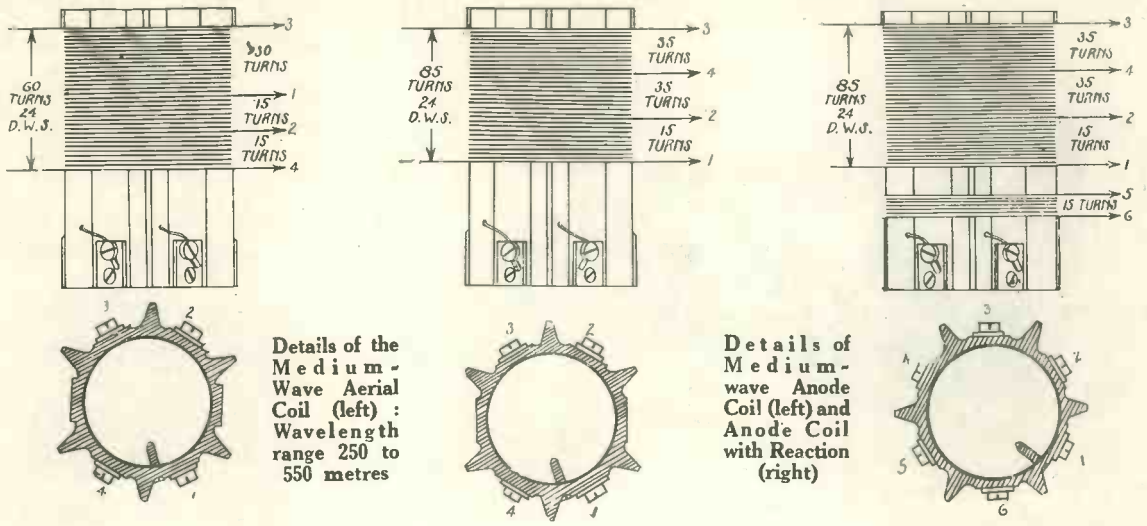
Since the original 1927 Five was first published, the powers that be who are concerned with the use and manufacture of ebonite panels (the WIRELESS MAGAZINE included) have adopted a range of nine standard panel sizes. The panel of the 1927 Five is not now a standard, and therefore in the 1928 Five we have utilised the nearest size, which is 26 in. by 8 in. No difficulty will be experienced in getting cabinets to accommodate this size of panel.

Easier Screening

For the sake of simplicity in construction, the panel is mounted perfectly upright, instead of at an angle. This makes the cutting of the screens much easier and, moreover, means that a suitable cabinet can be obtained from almost any dealer.

The screening of the 1928 Five is also more complete, and therefore more efficient, than that of the 1927 Five. Besides the two dividing screens, one is provided behind the panel, which effectively guards against any accidental body-capacity effects when tuning, and another is placed on the baseboard to prevent coupling between the bottom ends of the three coils.

As far as possible, components of the same type as used in the 1927 Five have been again utilised in the 1928 Five. The most important difference is the substitution of a six-contact former for the second high-frequency coil (to accommodate an extra reaction winding).



Details of the Medium-Wave Aerial Coil (left) : Wavelength range 250 to 550 metres

Details of Medium-wave Anode Coil (left) and Anode Coil with Reaction (right)

Improved Coil Formers

All the formers, moreover, are of a new improved type, that is, they are four- and six-*contact* coils instead of four-*pin* coils. More precisely, the new formers have no pins at the bottoms, but special contacts placed around the periphery. In this way the leads from the coils are well separated and greater efficiency is obtained. Those who have the old-type four-pin formers can still use them, of course (with the addition of a six-contact coil in place of the second high-frequency coil), but it is strongly recommended that the new type of former be used.

These are provided with a guide fitting into a slot in the base, so that they can be put into position merely by turning them round until the contacts "bed" home—a great convenience if the set is used in a dark corner.

So far these remarks have been addressed mainly to those who are already familiar with the old 1927 Five (and we have evidence that they number thousands), and it may at this stage be advisable to say a few words for the benefit of new WIRELESS MAGAZINE readers.

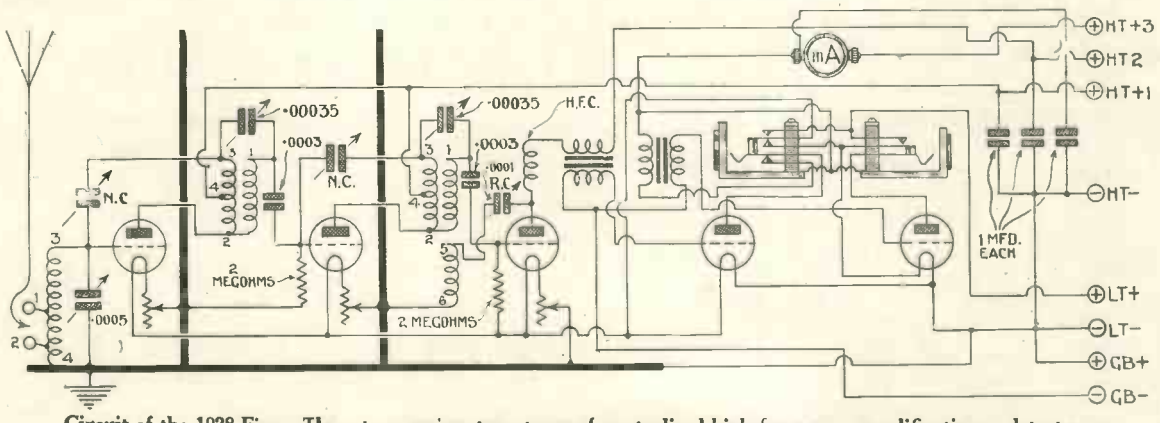
The 1928 Five represents an efficient and powerful receiver following the best and most up-to-date practice in design. It comprises two high-frequency amplifiers, connected together by means of a specially efficient balanced coupling (which is "tuned anode" and not "transformer" in type), a detector with capacity-controlled reaction, and two stages of transformer-coupled low-frequency amplification.

Home-wound Coils

The use of the special high-frequency circuits means that the constructor must wind his own coils. Jack switching is provided, so that either four or five valves can be used at will; and a milliammeter is incorporated, so that a real check can be kept on the purity of reproduction.

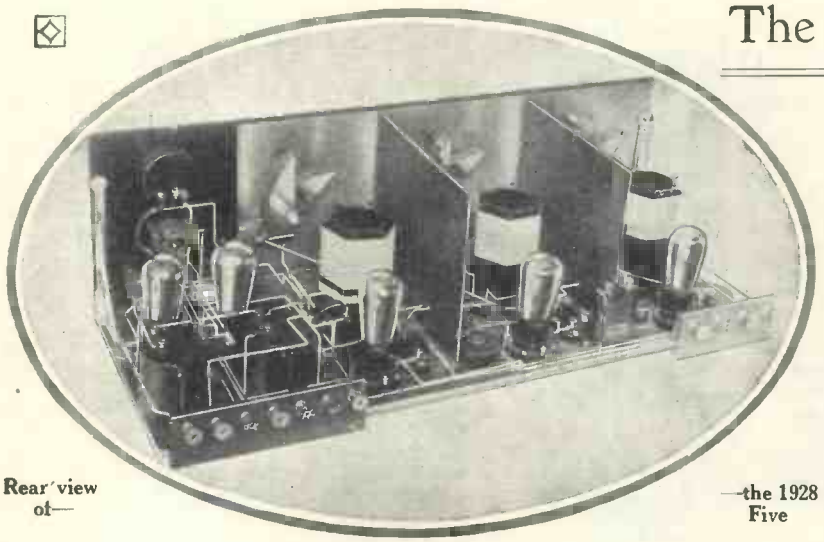
The chief differences between the 1928 Five and the Exhibition Five are set out below :

1928 FIVE	EXHIBITION FIVE
Home-wound high-frequency coils for special balanced circuit.	Standard six-pin split-primary coils, obtainable from all dealers.
Switched for four or five valves	Switched for three or five valves.
Two stages of transformer-coupled low-fre-	One stage of resistance capacity and one stage of



Circuit of the 1928 Five : The set comprises two stages of neutralised high-frequency amplification, a detector, and two stages of transformer-coupled low-frequency amplification

The 1928 Five (Continued)



Rear view of—the 1928 Five

quency amplification.

transformer amplification.

N.B.—Both sets incorporate capacity-controlled reaction, both have three tuning controls, and both are efficiently screened. The 1928 Five incorporates a milliammeter to check purity.

Choice of Three "Fives"

Thus readers of the WIRELESS MAGAZINE now have the choice of three excellent five-valvers, for the Phoenix Five must not be forgotten. This set has only one tuning control, but none of the valves can be switched out separately. Full-size blueprints of all three sets are, of course, available. The price is 1s. 6d., post free, but up to the end of January blueprints of the 1928 Five *only* can be obtained for half price (that is, 9d., post free) if the coupon on page iii of the cover is used. After that date the full price will be charged. Address all inquiries for blueprints to Blueprint Department, WIRELESS MAGAZINE, 58-61 Fetter Lane, E.C.4.

Complete List of Parts

Following is a complete list of all the parts required for building the 1928 Five :—

Ebonite panel, 26 in. by 8 in. (Becol, Will Day, or Raymond).

2 .00035-microfarad variable condensers (Igranic-Pacent S.L.F.)

.0005-microfarad variable condenser (Igranic-Pacent S.L.F.).

4 four-contact coil formers (for long and short waves), with two bases (Becol).

2 six-contact coil formers (for long and short waves), with one base (Becol)

4 oz. No. 32 gauge double-wound silk-covered wire (Lewcos).

1½ oz. No. 30 gauge double-wound silk-covered wire (Lewcos).

4 oz. No. 24 gauge double-wound silk-covered wire (Lewcos).

5 antimicrophonic valve-holders (Lotus, Benjamin, or Whiteley Boneham.)

2 neutralising condensers (Peto-Scott or Wearite, Ormond).

3 6-ohm baseboard-mounting rheostats (Lissen, Igranic, Peerless, or Ormond).

.0003-microfarad fixed grid condenser (T.C.C. type SP, Dubilier, or Lissen).

2 2-megohm grid leaks (Lissen, Dubilier, or Peto-Scott).

2 low-frequency transformers, ratios approximately 2.7 to 1 and 4 to 1 (Marconiphone Ideal, Gecophone, or Pye).

.0003-microfarad fixed condenser (T.C.C., Dubilier, or Lissen).

.0001-microfarad reaction condenser (Peto-Scott, Cyldon, or Ormond).

3 1-microfarad fixed condensers (T.C.C., Dubilier, or Lissen).

0-20 milliammeter (Sifam).

3 slow-motion dials (Igranic, Ormond, or Formo).

11 terminals, marked : Aerial 1, Aerial 2, Earth, H.T.+1, H.T.+2, H.T.+3, H.T.−, L.T.+, L.T.−, G.B.+, G.B.− (Eelex).

No. 66 5-spring jack (Igranic).

No. 56 3-spring jack (Igranic).

Loud-speaker plug (Igranic).

High-frequency choke (Igranic, Wearite, or Raymond).

Cabinet and baseboard, 9¾ in. deep (Carrington, or Pickett's).

Panel brackets (Carrington).

Copper screen (Camden Engineering or home-made).

Glazite for wiring (London Electric Wire).

2 terminal strips, 5 in. by 2 in. and 7 in. by 2 in. (Becol, Will Day, or Raymond).

It should be noted that in each case the particular component tested in the original set and allowed for in the lay-out is mentioned first.

Rebuilding 1927 Five's

It has already been pointed out that the 1928 Five has been designed so that readers already possessing 1927 Five's can adapt their old sets to the new design with the minimum of trouble.

The old four-*pin* coil formers can be used, but it is recommended that

TEST REPORT OF THE 1928 FIVE

Medium-wave Stations Only

Name of Station	Wave-length	Aerial Cond.	1st Anode Cond.	2nd Anode Cond.	Name of Station	Wave-length	Aerial Cond.	1st Anode Cond.	2nd Anode Cond.
Bordeaux ...	238.1	3	11	10	Barcelona ...	344.8	58	57	57
Munster ...	241.9	10	21	21	London ...	361.4	60	60	60
Montpellier ...	252.1	17	20	20	Toulouse ...	391	65	65	65
Dortmund ...	283	22	23	23	Hamburg ...	394.7	66	66	66
Radio Lyon ...	291.3	27	27	28	Frankfort ...	428.6	69	70	70
San Sebastian	297	34	35	36	Rome... ...	450	78	77	76
Nuremburg ...	303	38	39	39	Langenberg ...	470	83	82	82
Belfast ...	306.1	40	42	42	Daventry Experimental	491.8	85	85	83
East Pittsburg (KDKA) ...	315.6	51	51	52	Aberdeen ...	500	88	87	86
Dublin ...	319.1	53	53	53	Brussels ...	508.5	90	89	89

All these stations were at very good loud-speaker strength during a period of two hours' listening at a distance of 1½ miles from 2LO.

A Great Set!

the new four-*contact* should be utilised, and these are included in the following list of *essential* new parts needed by those who are converting their 1927 Five's to 1928 Five's:

Additional Components

Ebonite panel, 26 in. by 8 in. (Becol, Will Day, or Raymond).

4 four-contact coil formers (for long and short waves), with two bases (Becol).

2 six-contact coil formers (for long and short waves), with one base (Becol).

4 oz. No. 32 gauge double-wound silk-covered wire (Lewcos).

1½ oz. No. 30 gauge double-wound silk-covered wire (Lewcos).

4 oz. No. 24 gauge double-wound silk-covered wire (Lewcos).

3 6-ohm baseboard-mounting rheostats (Lissen, Igranic, Peerless, or Ormond).

2 2-megohm grid leaks (Lissen, Dubilier, or Peto-Scott).

.0001-microfarad variable condenser (Peto-Scott, Cyldon, or Ormond).

High-frequency choke (Igranic, Wearite or Raymond).

Cabinet and baseboard, 9¾ in. deep (Carrington, or Pickett's).

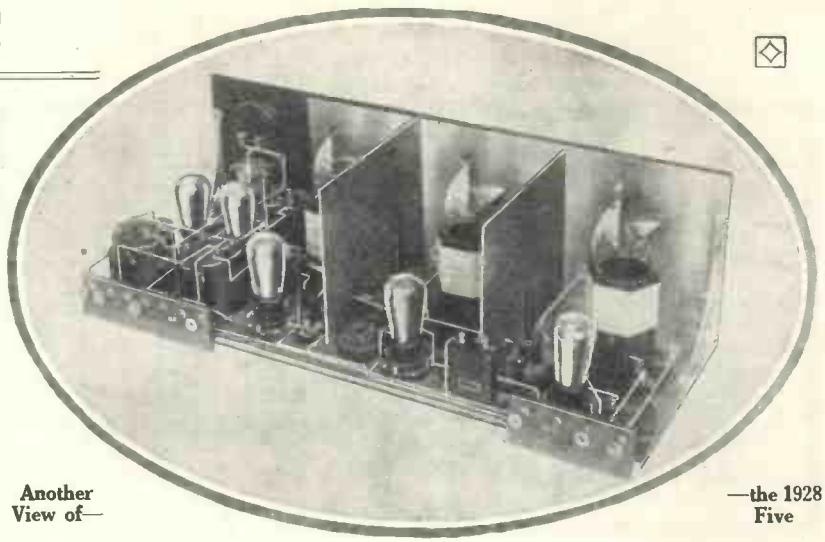
Copper screen (Camden Engineering or home-made).

Glazite for wiring (London Electric Wire).

2 terminal strips, 5 in. by 2 in. and 7 in. by 2 in. (Becol, Will Day, or Raymond).

It will be evident that the following constructional details apply equally for the building of the 1928 Five from entirely new parts or for the revision of the old 1927 Five. In either case it is desirable to get together all the components before beginning any of the constructional work. A full-size blueprint which, as explained previously, can be obtained for 9d. up to the end of January, will greatly facilitate the laying out of the receiver and will also be of particular value in wiring up the set.

Perhaps the best part of the construction to tackle first is the copper (or aluminium) screen, if this is not bought already assembled. The dimensions are clearly shown in one of the sketches reproduced in these pages and the actual cutting and assembling presents little difficulty. Clean copper sheet is very easy to solder.



Another View of— **—the 1928 Five**

Insulating the Condensers

It should be especially noted that only the aerial-tuning condenser (that is the one on the extreme left looking from the front of the panel) is earthed to the screen and care must be taken that neither of the other two condensers does make contact; large clearing holes are provided to make certain that there is no electrical connection.

When the screen has been assembled both it and the panel should be fixed to the baseboard and the panel components mounted first. These include the three variable tuning condensers, the small reaction condenser, two jacks and the milliammeter.

Before finally screwing the first three into position it should be noticed that they are so placed that when the vanes are fully out of mesh they do not foul the dividing screens (this applies especially in the case of alternative condensers for those specified).

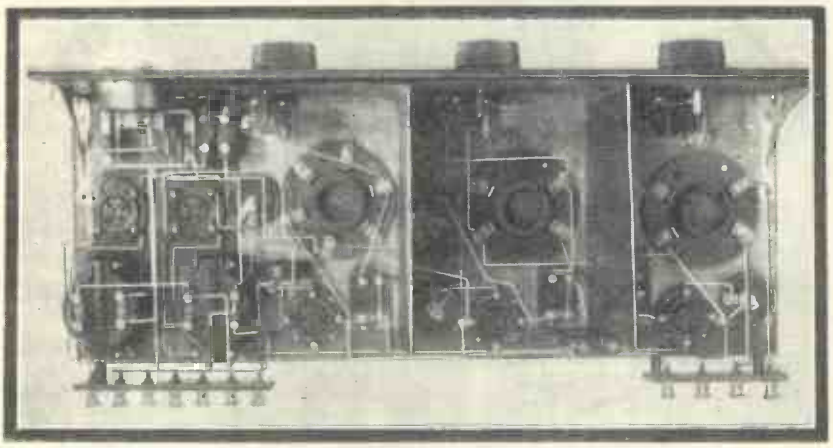
Omitting the Milliammeter

If it is desired to omit the milliammeter, and this can be done without in any way impairing the efficiency of the receiver, the reaction condenser and the two jacks should be laid out to make the panel arrangement symmetrical. The milliammeter is incorporated only as a very fine check on the quality of reproduction and does not in any way affect the actual results obtained.

VALVES TO USE IN THE 1928 FIVE

Make	H.F. Amplifiers			Detector			L.F. Amplifiers		
	2-v.	4-v.	6-v.	2-v.	4-v.	6-v.	2-v.	4-v.	6-v.
B.T.H. ...	B21	—	B4H	B22	—	B4	B23	—	B4
Cossor ...	Red Band	Red Band	Red Band	Black Band	Black Band	Black Band	Green Band	Green Band	Green Band
Ediswan	ARDE H.F.	GP4	ES5 H.F.	GP2	PV8	ES5 L.F.	PV2	PV4	PV5
Marconi	DEH 210	DEH 410	DEH 610	DEL 210	DEL 410	DEL 610	DEP 240	DEP 410	DEP 610
Mullard	PM1 H.F.	PM3	PM5X	PM1 L.F.	PM3	PM5X	PM 252	PM 254	PM 256
Osram ...	DEH 210	DEH 410	DEH 610	DEL 210	DEL 410	DEL 610	DEP 240	DEP 410	DEP 610
Shortpath	SP18 G	—	DE50	SP18 R	—	SP55 R	SP18 RR	—	SP55 RR
Six Sixty	SS 210 H.F.	SS 4075 H.F.	SS 6075 H.F.	SS 210 L.F.	SS 410 P	SS 610 P	SS 215 P	SS 425 SP	SS 625 SP

The 1928 Five (Continued)



Plan View of the 1928 Five, showing disposition of the components

Baseboard Components

When the panel components have been arranged satisfactorily, attention can be turned to the baseboard-mounted components. Here it is important to note that the tuning coils (the formers should be placed in the sockets when the parts are being laid out) do not foul the variable condensers; if a full-size blueprint is used the layout indicated on that can be followed exactly.

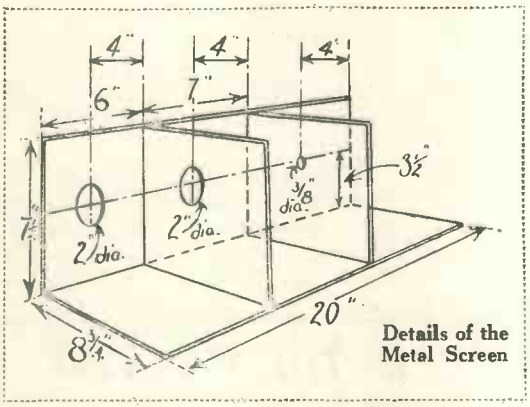
Not only does the use of a copper screen increase the electrical efficiency of a receiver, but it also simplifies constructional work to some extent. For instance, all those terminal points that eventually go to earth can be soldered direct to the screen and, as a matter of fact, there are ten such direct connections indicated on the layout.

Self-contained Sections

In this way each screened compartment is kept almost entirely self-contained; there are only two leads going through each dividing screen. In this case the four holes can be made with some sharp-pointed instrument during the wiring of the receiver.

There is one point to which the attention of constructors may be drawn with advantage. With some makes of valve holders and neutralising condensers there is a liability for some "live" part connected with an improperly countersunk screw or metal surface in the base to make contact with the copper screen. Any such risk can be obviated by placing underneath these components a small piece of mica sheet, which will effectively prevent any trouble.

No difficulty will be experienced regarding the wiring of the receiver if the full-blueprint or wiring diagram reproduced in these pages is followed. It will be observed that each terminal point is marked with a small letter of the alphabet and all the points marked with like letters should be connected together with one wire or as few wires as possible.



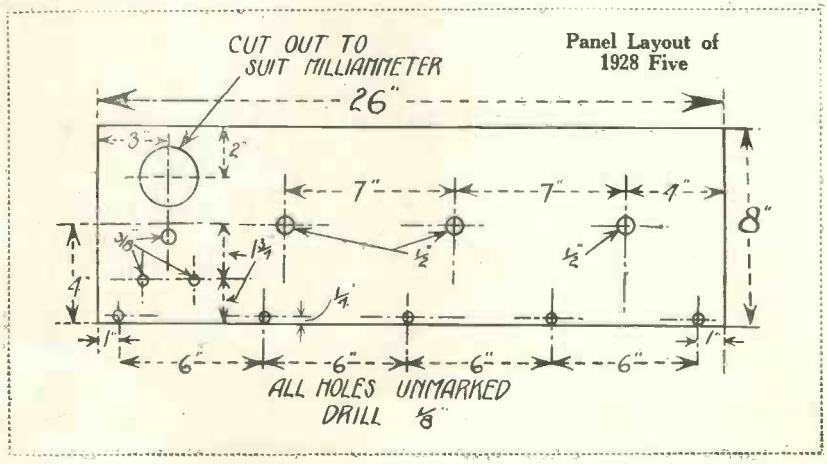
Details of the Metal Screen

Lettered Connections

Thus all those points marked *a* are first connected together; then all those marked *b*; and so on through the alphabet. When the points marked *z* have been connected go on to *aa*, *bb*, etc. It is important that wiring should be carried out in alphabetical sequence, so that it is built up from the bottom; awkward crossings are avoided in this way as the blueprint is lettered after the construction of the original WIRELESS MAGAZINE receiver.

When the wiring has been completed the work of winding the coils can be tackled. In each case the winding is different and three different amounts of wire are needed on each coil. The method of winding all three coils will be clear from the diagrams reproduced on page 507. Each tapping point on every coil is numbered and it is of the utmost importance that these leads should be connected to the contact at the bottom bearing the corresponding number.

As has already been mentioned the new type of coil formers used are provided with a pin fitting into a guiding slot in the base, and the former and base contacts are numbered in relation to the position of this pin and slot. The diagrams show the contacts as seen looking at the bottom of the former in each case. On each former No. 1 contact is immediately on the right of the guide fixed



Panel Layout of 1928 Five

Another Fine "Wireless Magazine" Receiver

inside. Holes are already provided near the contact pieces for connecting up, but it will be necessary to drill other holes higher up through which to lead off the tappings as they are made.

Winding New Coils

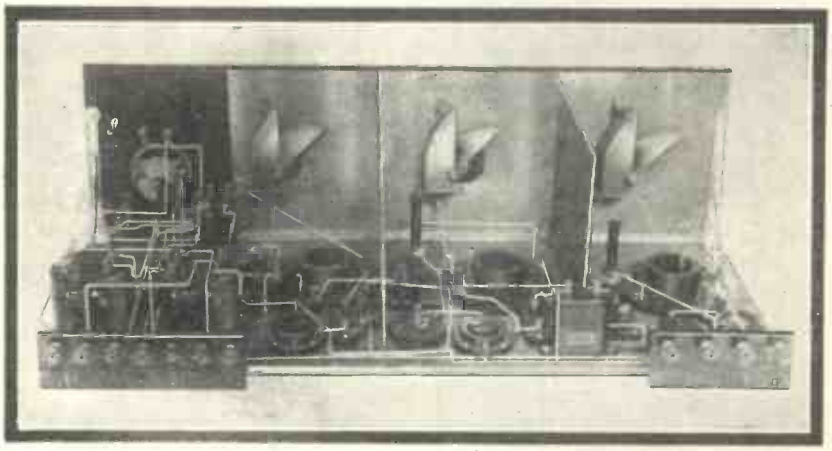
It is recommended that readers who already have 1927 Five's in use should make these new coils as the slight modification to the high frequency circuit will give better stability. But it should be noted that it is not possible to use these new coils in an old 1927 Five receiver—the old set must be rewired in accordance with the circuit of the 1928 Five before the new coils can be utilised.

In any multi-valve receivers the choice of suitable valves is a matter of some importance, if the very best results are to be obtained. The new coil windings used in the 1928 Five eliminate any possibility of neutralising difficulty and operators need not hesitate to use any of the valves recommended in the table reproduced in these pages.

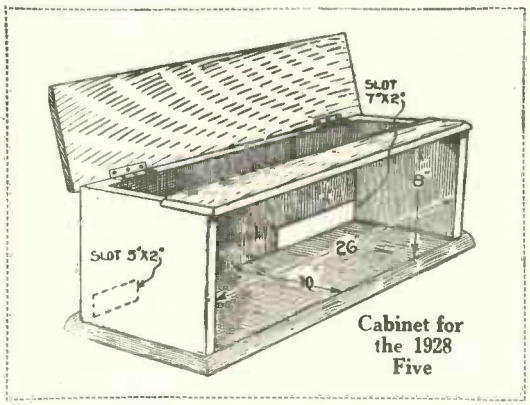
Both high-frequency valves should preferably have an impedance in the neighbourhood of 20,000 to 30,000 ohms; the detector an impedance of, say, 15,000 ohms; and the two low-frequency amplifiers should be valves of the power type with impedances of 8,000 ohms or less. Two-, four-, or six-volt valves can, of course, be used.

When both construction of the receiver and of the coils has been completed, a rough test of the receiver can be carried out.

See that the baseboard-mounted rheostats are in the "off" positions, place the "neut" condensers half-way in, and keep the plates of the reaction condenser right out of mesh. Insert the necessary coils in their respective holders and also place the valves in position. Now connect up the aerial, earth, and necessary batteries.



Rear view of the 1928 Five ready for connecting up



Cabinet for the 1928 Five

Applied Voltages

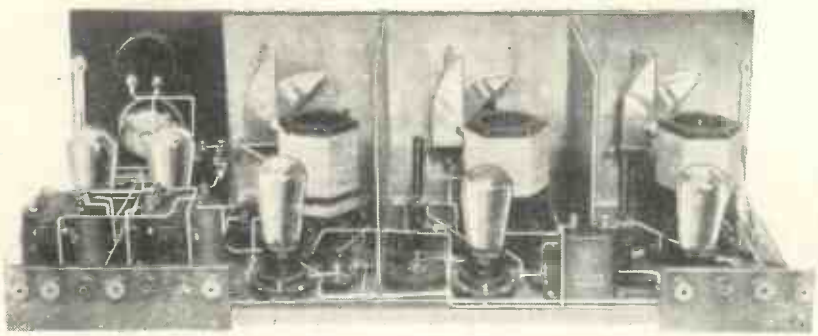
To H.T.+1 (which supplies the two high-frequency amplifiers) apply about 30 to 50 volts, to H.T.+2 (which supplies the detector) about 60 to 100 volts and to H.T.+3 (supplying the low-frequency valves) 120 volts or even more if possible. The grid-bias should vary between about 9 or 12 volts, depending upon the actual valves used.

Plug the loud-speaker into the right-hand jack and switch on all three rheostats. Now tune the two right-hand condenser dials until the local station is heard, after which the aerial condenser can be adjusted. Unless the "local" station is some considerable distance away it will not be necessary to use the reaction condenser at all.

Neutralising the Valves

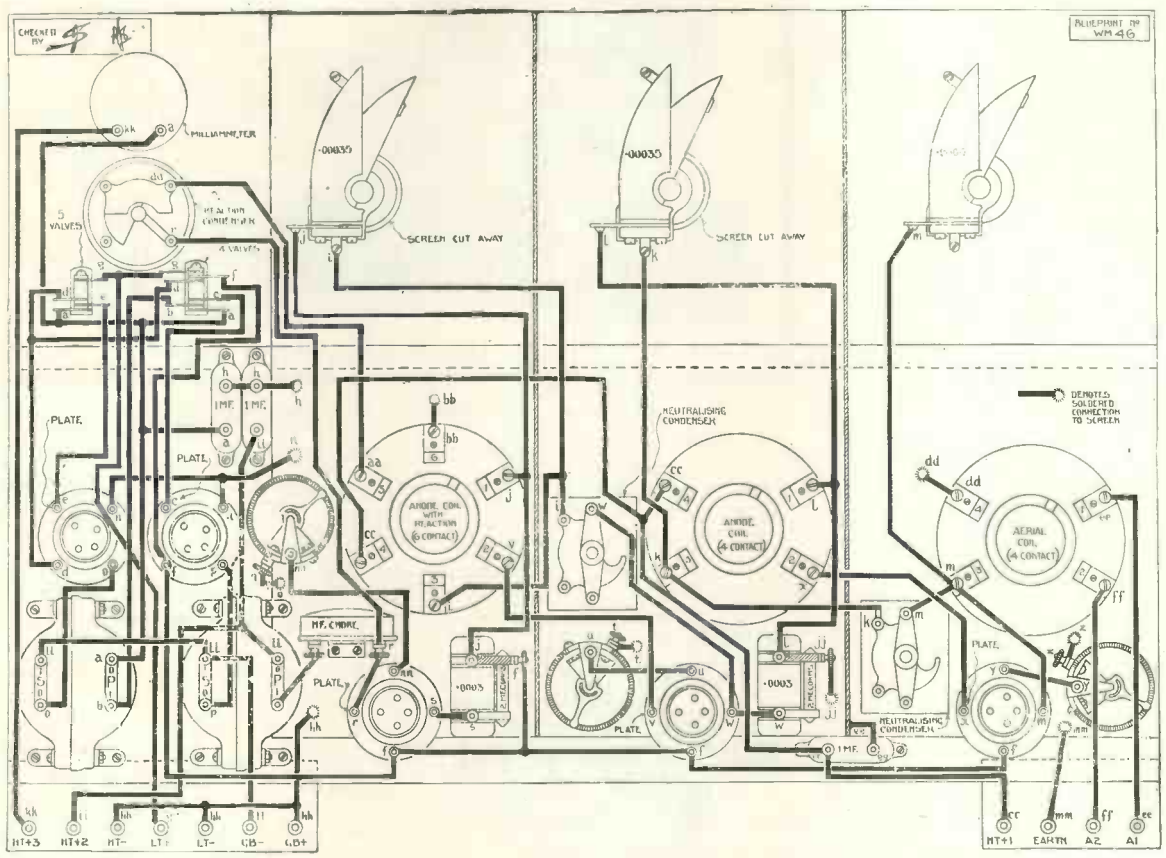
Next the two high-frequency valves should be neutralised. Switch out the first by means of the rheostat and manipulate the neutralising condenser until signals become quite or almost inaudible; the valve is then neutralised and no feed-back is occurring. Switch this valve on again and repeat the process with the second valve.

When the valves have been properly neutralised a general readjustment of all the applied voltages (except that applied to H.T.+1) should be made, this time with a keen eye on the milliammeter. Things should be so adjusted (particularly the grid-bias



This photograph of the 1928 Five clearly showing the appearance with the valves and coils in position. Note the reaction condenser mounted immediately under the milliammeter, on the left

The 1928 Five *(Continued)*



This layout and wiring diagram can be obtained as a full-size blueprint for 9d. post free if the coupon on page iii of the cover is used before January 31. Ask for No. WM46

on the last two power valves) that the needle of the milliammeter does not flicker more than one or two divisions either side of its normal reading.

Cutting Out Distortion

If it does flicker distortion is taking place, but a little patience should enable one to adjust the receiver so that only the very slightest flicker occurs when even the loudest orchestral passages are being received.

As the grid bias is increased the normal milliammmeter reading is decreased, but this does not mean that any power is being lost. The application of a high value of grid bias improves the quality of reproduction and reduces the high-tension consumption considerably.

When only four valves are required, the loud-speaker plug should be placed in the left-hand jack; this automatically switches off the unused valve.

Such, then, is the new 1928 Five. We have every confidence that it will even surpass the results achieved by the 1927 Five—and that is saying something, as the letters that have appeared in these pages from appreciative listeners prove. Start 1928 well with the 1928 Five!

FURTHER HINTS CONCERNING THE 1928 FIVE (INCLUDING THE CONSTRUCTION OF LONG-WAVE COILS) WILL BE GIVEN IN OUR NEXT ISSUE

Revelation Four

JULY, 1927

To the Editor "Wireless Magazine"—

SIR,—I have built your Revelation Four from "W. M." July issue and I understand now why it has become famous. Instead of two L.F. stages, I made one, transformer-coupled, and there are very few stations I don't get on my cone loud-speaker. My friends have wondered how it is possible.

I have built my set very compact: 12¼ in. by 6 in. by 6 in. The longest connection in it is 3½ in.

I hope to make it capable to catch the 150-metre band. Now I can reach Luxemberg (217 metres) with difficulty, but it is possible when I take off the metal screen from the split-primary H.F. transformer.

I thank you very much for the "Revelation" idea, hoping the Girdle Two which I intend to make, will be also such a marvellous one.—L. DEBLE'COURT (Holland).

A Special Article by Dr. W. REISS

"VALVES" AS COMPLETE AMPLIFIERS

This is the last of two articles on Loewe multiple valves by a recognised German authority

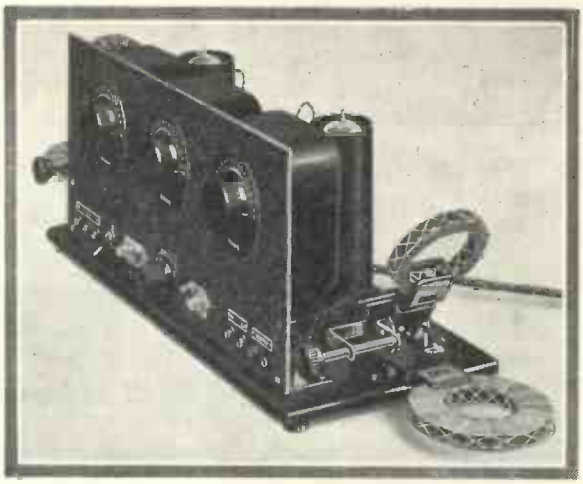


Fig 18.—Set incorporating a "long-distance" and a "three-stage" valve

AFTER having mentioned the general precautions which must be observed when experimenting with multiple valves we can now discuss an efficient circuit for long-distance reception, as illustrated by Fig. 17. In order to obtain sufficient selectivity a loose-coupled aerial tuner is employed and a loose-coupled high-frequency transformer is also utilised. The aerial is itself tuned by means of a variable series condenser. It will be observed that Fig. 17 represents a "long-distance" valve and a "three-stage" valve respectively as separate valves.

Electrode Voltages

The outer plate of the high-frequency valve has applied to it a potential of 50 to 90 volts, the inner grid having a potential of approximately 22½ volts. Instead of using five separate valves as shown in Fig. 17 an equivalent circuit can be obtained by using only two multiple valves, which means that the whole assembly of the receiver is very much simpler.

Figs. 18, 19, and 20, show a finished multiple-valve receiver built up on these lines. It will be noticed that the tuning condensers are shielded by metal screens, as also are the two multiple valves themselves. The panel is of metal.

So that interference cannot occur between the loose-coupled aerial tuner and the loose-coupled H.F. transformer these units are placed at opposite ends of the receiver so that they are at the greatest possible distance one from the other. These photographs show the comparative simplicity of the external wiring compared with that of an ordinary five-valve receiver. No rheostats are provided since the filaments are run straight off a 4-volt accumulator.

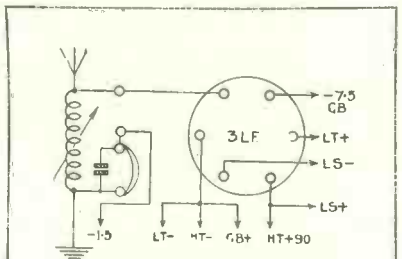


Fig. 21.—Circuit for a "three-stage" valve

Using an average outdoor aerial, loud-speaker reception can be obtained from most European transmitters, but even with a smaller aerial, perhaps indoors, good results can be obtained. For instance, a Berlin observer who used the lighting mains as an aerial was able to hear twenty-five home and foreign stations on a loud-speaker. Another listener, using as an aerial a short wire laid along the floor, received every station within a radius of approximately 300 miles, while yet another listener in Prague heard, while the transmitter in that city was working, the stations at Budapest, Birmingham, Vienna, Zurich, Berlin, and Langenberg on a loud-speaker using a frame aerial. When the Prague transmitter closed down he heard all the main European stations at loud-speaker strength.

Adding a Multiple Valve

Many owners of small valve sets will wonder whether it is possible to increase the efficiency of their present receivers by adding multiple valves. The answer is that generally the "long-distance" valve can be connected in

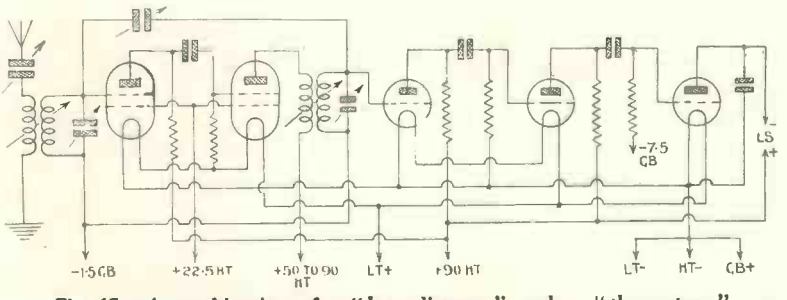


Fig. 17.—A combination of a "long-distance" and a "three-stage" multiple valve shown as separate valves

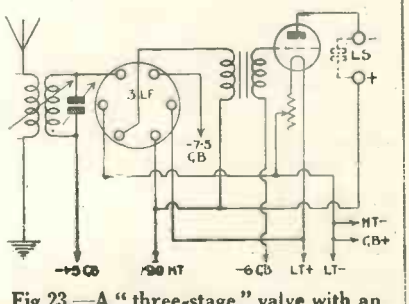
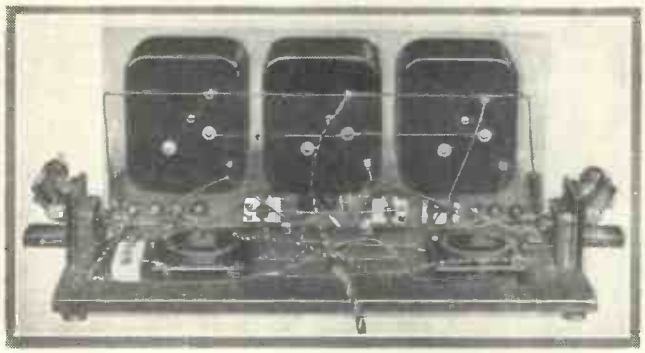
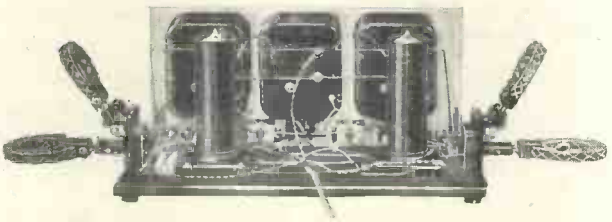


Fig 23.—A "three-stage" valve with an additional L.F. amplifier

"Valves" As Complete Amplifiers (Cont.



Figs. 19 (left) and 20 (below)—Inside view of a set comprising one "long-distance" valve with one "three-stage" valve.



series as a high-frequency amplifier and the "three-stage" valve connected in parallel as a low-frequency amplifier, provided the number of valve stages altogether in use does not exceed six.

In order to use an ordinary detector valve set for loud-speaker reception it is necessary only to remove the detector and connect the "three-stage" valve to the detector output, as indicated in Fig. 21. Another method is to use a three-stage valve coupled to an ordinary low-frequency amplifier by means of a transformer of approximately 1 to 4 ratio, as indicated by Fig. 22. Fig. 23 shows the connections for adding a "three-stage" multiple valve to a detector set which incorporates reaction.

Acoustic Reaction Effect

In this case it may happen that an acoustic reaction effect occurs between the loud-speaker and the valves. This can be overcome by mounting the detector in an antimicrophonic holder or by damping the secondary of the low-frequency transformer by a parallel resistance of 5,000 to 20,000 ohms; a further method is to bridge the transformer windings by a blocking condenser of .0005 to .002 microfarad capacity, its exact size depending upon the ratio of the transformer.

The reception of long-distance stations can be carried out with a combination of a "three-stage" valve with a high-frequency amplifier preceding it as shown in Fig. 24. It will be noted that the high-frequency valve is controlled by means of a potentiometer. A more efficient arrangement of the same type is shown in Fig. 25, where two neutralised stages of high-frequency amplification precede a three-stage valve. The selectivity of this arrangement is considerable when once adjusted.

Perhaps the most important circuit for which the "long-distance" valve can be employed, in conjunction with a single-stage valve, is to connect it as an aperiodic high-frequency amplifier in series with a detector with or without magnetic (Fig. 26) or capacitative (Fig. 27) reaction. By means of two tuned circuits great selectivity results and excellent reception of long-distance stations can be carried out with headphones.

Super-het Circuit

Another most interesting circuit is the connection of a double-grid valve in series with a "long-distance" valve as shown in Fig. 28. The double-grid valve acts simultaneously as an oscillator and as a detector, and the whole arrangement comprises a simple super-het receiver. Immediately after the "long-distance" valve is connected a "three-stage" valve which acts as the second detector and also gives two stages of low-frequency amplification. With this circuit very good reception has been obtained near the Langenberg station from most other European stations with the aid of a frame aerial alone.

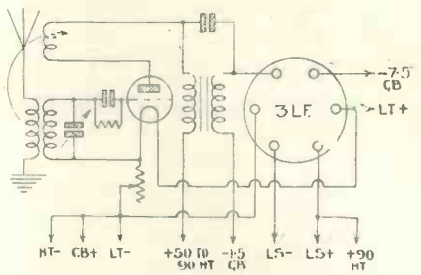


Fig. 23.—Detector with magnetic reaction and a "three-stage" valve.

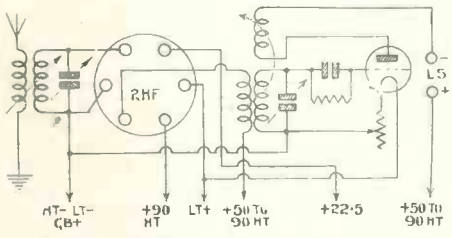


Fig. 26.—"Long-distance" valve and detector with reaction.

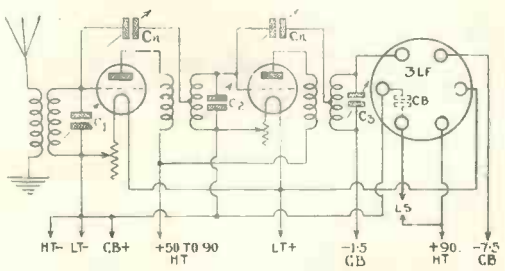


Fig. 25.—Two H.F. stages and a "three-stage" valve.

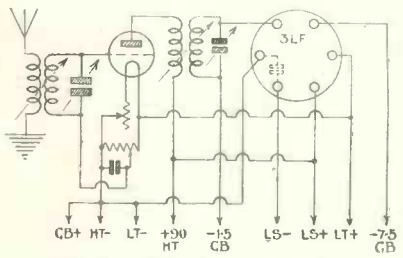


Fig. 24.—H.F. amplifier and a "three-stage" valve.

"Valves" As Complete Amplifiers (Continued)

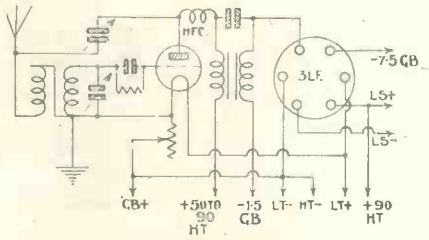


Fig. 27.—"Long-distance" valve and detector with capacity-controlled reaction.

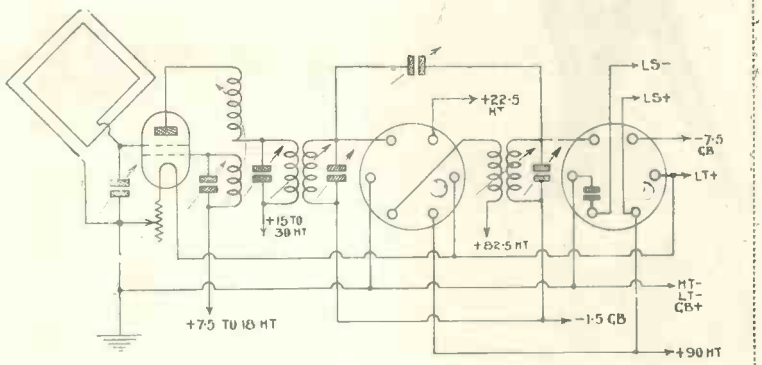


Fig. 28 (right).—Two-grid valve, "long-distance" valve and "three-stage" valve coupled as a super-het.

Mr. Ignoramus

VERY seldom does a man buy a motor car unless he knows something about its mechanism; he has learned to drive it, to say the least. Oftentimes, I have met a possessor of a wireless set who knows little about wireless. A gentleman who lives in our neighbourhood is one of these. As a matter of fact we have nicknamed him Mr. Ignoramus.

As a wireless bore he is unequalled. When you are most busy or are settling down to an evening's entertainment, in he comes begging of you to come and help him as his set has gone all wrong.

He cannot understand what's the matter with his set, why it causes him more trouble than the average set causes the average listener. It always goes wrong. The manufacturer and the agent must have combined not only to give him a bad set, but to rob him of money, time and patience.

Some time ago when I was enjoying a Prom. he was ushered into the room. "Do come and have a look at my set," he pleaded. "It went all right last night. But to-night it will not go at all, and my wife and children were looking forward to this evening's concert."

So was I. But that never entered his head. With real reluctance I went with him through the wet. I had done the same thing many times before for nothing, for something he should have mended or found out for himself. The accumulators had run down on more than one occasion, and he did not know it; the valves had burnt-out two or three times by carelessness only; and on all occasions I had gone there to discover some trivial fault.

This evening when we were half way down the street he was pouring forth his praise of me for the many kindnesses I had shown him. When we arrived at the house his wife and children were also most gracious.

"Awfully sorry to disturb you a night like this," said his wife most politely. "But really our set is awful."

I looked at the set. I tuned-in. I switched on and off. No, not a sound.

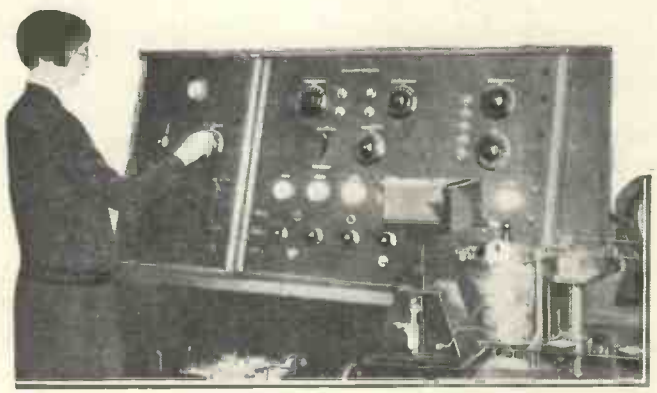
"When were your batteries charged?" I asked.

"They were returned this morning," came the answer of satisfaction and delight.

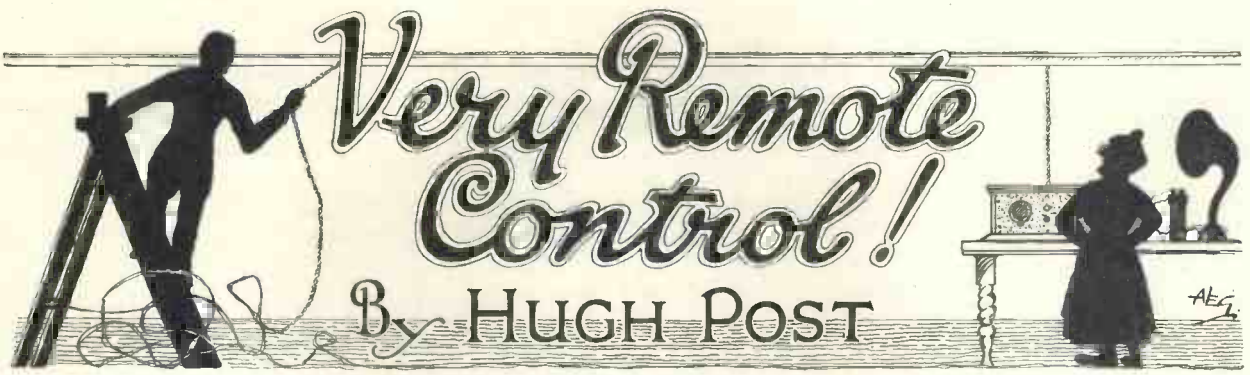
I looked at the batteries and there were the ends of the contacts waving in the air. The batteries had been returned, but had not been connected, although the empty ones had been taken away.

E. B. R.

A SET FOR THE LADY!



This giant receiver is in the Bureau of Standards Laboratory at Washington



Very Remote Control!

By Hugh Post

AUNT GERALDINE is one of those very efficient housewives who believe in doing things thoroughly and doing them often. Spring cleaning, for example, is an affliction that befalls her menage not merely when the birds begin to sing, but about once every two and a half months. And on each occasion Uncle Archibald's three-valve set has to face a disapproving eye, while Uncle invents reasons why it should not be tidied up or removed to the cellar.

To begin with, Aunt Geraldine used to do a little tidying up herself, but on the first occasion she tried to lift the set by taking hold of two little brass things which she imagined were knobs. They happened to be the earth terminal and "loud-speaker positive," and Uncle's H.T. was in good order.

Aunt vowed the terminals were red hot before she was able to let go of them, and she talks still of what it feels like to have a thousand volts (or was it ten thousand?) trickling through the muscles of her arms.

On the next occasion she left the set alone, and merely dusted round about it. She says she is certain that the glass jar thing was not lying on its side for more than five minutes; and, anyhow, Archibald had not said anything to her about acid. A new hearthrug had to be bought nevertheless.

Thereafter Uncle's set was touched by nobody but himself, and as he has a theory that the more a set is left alone, the better it works, it is not surprising that Aunt Geraldine at last decided that it must go.

"Archibald, I've been reading about a set that can be kept in the attic and operated by touching a button wherever you happen to be sitting."

"Yes, dear," said Archibald. "I've been thinking for some time that the old set ought to be scrapped. One of the newer types, at about twenty five guineas——"

"Twenty-five guineas!" Aunt echoed. "What on earth do you buy wireless papers and magazines for, if you can't manage a simple improvement like that? All you need is a kind of electric-light plug fastened to the loud-speaker, and socket things in the lounge and the dining-room, and in the bedroom, in case anyone is ill, and in the kitchen, for the maid, when we are out, and somewhere down the garden fence so that

A thousand volts trickling through her arms

we can take the loud-speaker down the garden in the summer."

"Yes, dear," said Archibald, a little doubtfully.

"That would get rid of all the mess, and all these dangerous appliances in the lounge."

"Yes, dear," Archibald repeated.

"And it would keep you from sitting in the corner there with your mouth open and that silly look on your face when you are trying to tune-in Gibraltar and Vancouver."

"The attic would be a bit chilly in the winter——" Uncle began, but a glance silenced him and his D.X. ambitions.

Next evening he brought home a hundred yards of flex, and set out to obey orders. It was rather nice covered flex, one strand red and one black. But Aunt's views on colour schemes and decoration did not run to red and black, and Uncle had to persuade the dealer to change it for dark blue.

On the second evening he spent two weary hours going over that flex with fingers separating the strands to make sure that the piece of wire connected to "positive" on the set would be attached to "positive" on the loud-speaker plugs. Both the strands of the double wire looked alike, and every time he got half-way along his finger slipped, or someone spoke to him and made him loose count, and he had to start all over again.

He was just beginning for the fourth time when his neighbour Puddick called in to remark how strange it was that there hadn't been any oscillation that evening.

Uncle agreed that it was strange, and Puddick pretended not to notice that Uncle's set was disconnected. But he could not help noticing the blue wire entanglements in the hall, and before they had finished their first glasses (Aunt Geraldine being out) Uncle had confided his little difficulty.

Puddick entered into the spirit of the thing, and the two of them took off their coats and started in the middle of the length of wire, working in opposite directions. In half an hour they had both reached the end of the wire.

"Better tie a knot in the negative, so as to identify it," said Uncle, and they both knotted one strand of the wire.

"By Jove!" exclaimed Puddick,

"my negative end has got a thin red thread in the rubber. That would have saved all this bother."

Uncle said something under his breath.

"I wonder whether it would," he commented. "The red thread is in my positive!"

"Perhaps it doesn't matter so much which way the loud-speaker is connected," Puddick suggested helpfully, and they left it at that.

Uncle had worked it out that there would have to be four lengths of wire round two sides of the lounge, across the hall, up the staircase, round the landing, up the stairs again, and into the attic. That would account for one point, at any rate. He spent a third evening drilling holes through door-frames, and tacking the wires neatly along skirting boards and picture rails.

Half way through the job Puddick looked in again. They adjourned to the dining-room.

Aunt, hearing voices, came down to greet the visitor. In the dusk she did not see the coil of wire at the turn of the stairs, and she got to the bottom rather quicker than she had intended. But as Uncle explained after the doctor had gone, dark blue had not been his choice of colour.

That settled the remote-control idea and Puddick spent another evening helping to pull down the wires and fill up the holes in the door-frames.

Then Puddick had a bright idea. Why not disguise the set to look like something else—a bookcase, or a china cabinet, or something of that sort?

Aunt Geraldine was not much impressed at first. But her eye fell on the elaborate and ornamental coalbox that had been given to them as a wedding present nineteen years before and never used.

"Would it fit into that?" she demanded.

Uncle produced a two-foot rule, and after many calculations he and Puddick agreed that it would.

For the best part of a week the two of them worked with chisels and screwdrivers. The batteries were accommodated under the set, the coalbox pushed against the wall, and nothing was visible but a short neat wire connecting the beautiful set to the loud-speaker.

The two of them started in the middle of the length of wire

She got to the bottom rather quicker than she had intended

Aunt was charmed, and Puddick began to consider himself an expert set designer. Uncle was so proud of the appearance of the thing that he forgot that he had ever wanted to pick up America.

"Now wasn't it a good idea to get rid of all those untidy wires and batteries?" Aunt demanded.

"It was, dear," he assented.

But in this changeable world, nothing stays perfect for long. The next morning happened to be chilly, and the maid, newly engaged and zealous to do everything that might be expected of her, decided to have the fire ready to light if necessary. She saw the coalbox, and in the dim early light she did not stop to peer into its depths. It was clearly not quite full of coal. So she filled it up.

Every reader can obtain a full-size blueprint of any set described in this issue at half price by using the coupon on page iii of the cover.

Bass Matters

UNTIL distortionless resistance-capacity amplifiers and full-tone-range cone and moving-coil loud-speakers came into vogue it was always thought difficult to obtain good reproduction of the lower musical frequencies. This is quite a fallacy, though it is often said that the low notes never "come through" at all on a loud-speaker, and the reason is as follows:—

Low-frequency transformers and horn-type loud-speakers both have a fairly marked natural period of resonance, usually high up in the musical scale, with the result that the low notes suffer when amplification is great.

On the other hand, a properly arranged resistance-capacity amplifier has no appreciable natural period, and deals impartially, therefore, with the full-tone scale—or should do if battery and condenser values are correct.

Good cone and moving-coil loud-speakers have a natural period of vibration far removed from audible frequencies. In fact, in the case of moving-coil reproducers arrangements have to be made to prevent the low vibration period of the cone from unduly accentuating the *low* notes and literally swamping out the higher tones.

This rather dispenses with the popular notion that the true test of a receiver is that "it brings out the low notes well." K.B.

WHAT STATION WAS THAT?

The Editor of the "Wireless Magazine" has made arrangements to assist readers who are in difficulty over the identification of broadcasting stations they receive.

Each query should give as many particulars as possible (such as time, date, wavelength, language, and distinctive call or signal) and should be accompanied by the coupon on page iii of the cover and a fee of one shilling (postal order or stamps).

Address each query to "Station Identification," "Wireless Magazine," 58-61 Fetter Lane, London, E.C.4.

Marconi's Double Wavelength Trick!

THE AUSTRALIAN AND INDIAN BEAM SERVICES

Marconi beam transmitting station at Kirkee, India, 75 miles East of Bombay

AS you enter the transmitting room at the Post Office beam wireless station at Tetney, near Grimsby, you see on your left a row of frameworks containing valves and coils and copper screens—panels you might call them, though giant meat safes is more truly descriptive.

For Australia and India

On your right is another row, exactly the same, except that there is one more "meat safe" than on the left. This is because the left-hand row is the transmitter which links England with Australia, while the other row is the transmitter to India and the latter uses two wavelengths. Hence the extra panel, one for one wavelength, one for the other.

They only use one wavelength at once, of course. One is for night-time transmission and the other for use when there is daylight over the route of the wireless waves thrown across Europe and Asia in a beam to the receiving station at Kirkee in India, 75 miles east of Bombay.

Only Difference

This matter of the Indian transmitter having two wavelengths and the Australian transmitter one is practically the only difference between the two sets of apparatus. The two transmitters are accommodated in quite a small room. It is considerably smaller than the transmitting room at 5XX, the B.B.C.'s Daventry station.

And yet from this little room are tapped forth simultaneously two rapid streams of dots and dashes, recorded almost instantaneously away in India and, still further across the world, in Melbourne!

The Australian transmitter has been working most successfully for several months, and now the Indian set has begun its working in the hands of the Post Office engineers, who have taken it over from the Marconi company, and the two sets work merrily side by side. A bomb on this room would instantly cut Britain off from the instantaneous touch which she now enjoys, thanks to beam wireless. with India and Australia!

The Australian service started operations first largely owing to delay in the erection of the stations at the Indian end—the receiving station at Kirkee and the transmitter at Dhond, 48 miles from Poona. The beam from the latter is received in this country at the reception station at Skegness, which also receives from Australia.

Part of the delay was due to a lizard, which got mixed up with the apparatus and was for some time a mysterious cause of poor signals! Now the service is in operation, however, and the Post Office estimates it to be capable of dealing with 180,000 words to and from India each day.

During a recent visit to the magnificent station at Tetney, which is actually a few miles south of Grimsby, in Lincolnshire, I was most fascinated by this matter of wavelengths.

The provision of two wavelengths for the Indian transmitter is a dodge to defeat a little trick of Nature's. It is, moreover, the direct outcome of experiments carried out by Senator Marconi in his yacht *Elettra* during the past few years, while he has been studying short waves and beam wireless.

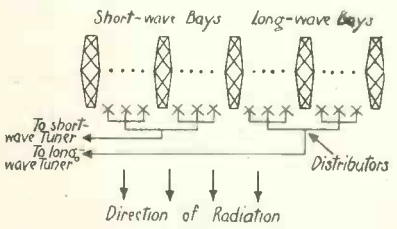


Fig. 2.—A plan of the aerials at Tetney, near Grimsby, for transmission to India. The cross-pieces are each 90 ft. long, and are 260 ft. above the ground, the masts supporting them being of lattice construction, 10 ft. square and 650 ft. apart

Marconi and his assistants discovered that although very short waves travelled better over long distances during daylight than long waves, they did not travel at all well at night, if they were shorter than about 20 metres. During the day, therefore, 16.216 metres is the wavelength for transmission to India. But to obtain good results at night a wavelength of 34.163 metres, over twice as long, is used.

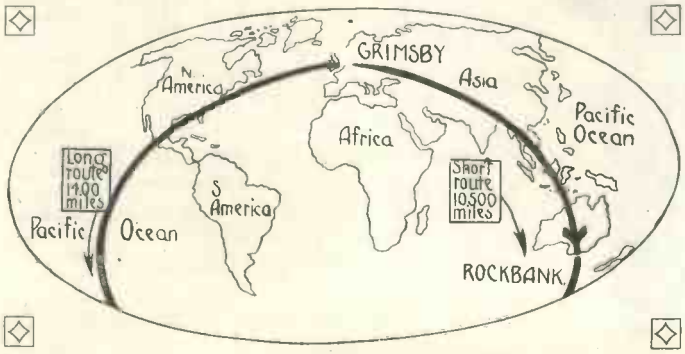


Fig. 1.—The two routes, one going eastwards and the other westwards, used alternately for the beam wireless transmissions to and from Australia

When the transmitter at Tetney changes over from one wavelength to the other a similar switch-over is made at the Kirkee receiving station, of course, where there are two receivers, one for 16.216 metres, and the other for 34.163 metres. Similarly, two wavelengths are used for the transmission in the opposite direction, from India to Skegness. By this device Nature is defeated and a continuous service is provided.

Changing Wave Direction

But why, you may ask, are not two wavelengths used for the Australian service? Simply because there is a simpler dodge for defeating Nature in this case. Australia happens to be almost on the opposite side of the globe to Britain. It does not matter much, therefore, whether the signals go to Australia westwards round the earth or eastwards, but in beam wireless it is possible for the engineers to put their signals round the world which way they like.

In ordinary wireless transmission the waves are radiated in all directions—hence the word "broadcast." But in beam wireless the waves are concentrated in a beam, just as the mirror behind a motor-car head-lamp concentrates the light waves from the lamp.

Now any schoolboy will tell you that when one side of the globe is in daylight, the opposite side is in darkness. By altering the direction in which Tetney's beam goes round the world it is possible to keep the beam always on that side of the world which is most in darkness.

So the Australian transmitter radiates constantly on 25.906 metres, but its beam goes westwards, across the Atlantic, America, and the Pacific, from midnight to midday (our time), when most of that route is in darkness; and from midday to midnight it is concentrated eastwards, across Europe and Asia, for by now the westward hemisphere has turned itself to the sun.

Fig. 1 shows the approximate journeys over the two routes. One is slightly longer than the other and so they are called the "long route" and the "short route" respectively. The change over from one wavelength to the other is made at Tetney by transferring the aerial current from an aerial on the eastward side of the reflector (similar to the mirror in a headlamp) to an aerial on the westward side, or vice versa.

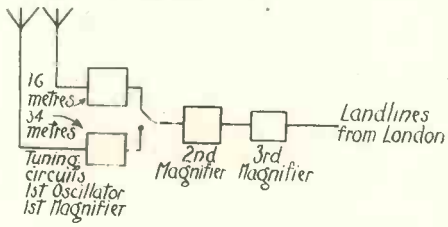


Fig. 3.—The layout of the Indian transmitter at Tetney

As India is not so conveniently placed on the earth's surface two wavelengths have to be used. The necessary aerial arrangements are illustrated by Fig. 2. This is a plan of the Indian aerial at Tetney. The masts are **T**-shaped and the crisscross arrangements show what the cross-pieces at the top would look like from an aeroplane. They are arranged in a line and from their centres hangs a curtain of wires, indicated by dots.

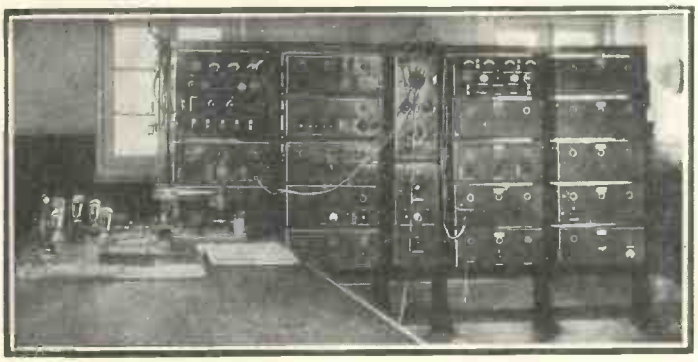
This is the reflector, and it is exactly at right angles to the "Great Circle" path round the world to Kirkee, India. On the Kirkee side of the reflector is hung another curtain of vertical wires, from the ends of the cross-pieces. These are the aerial wires, indicated in the sketch by crosses.

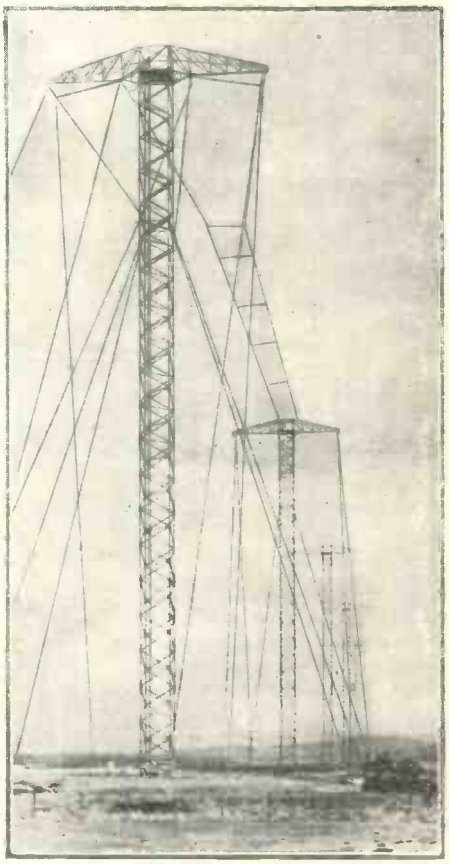
Two Aerials

There are really two aerials. The wires between the first, second and third masts are connected together and to the 16.216 metres tuning circuit of the transmitter (in one of the "meat safes"). This aerial is used during the day. The wires in the other two "bays" are energised at night and transmit on the 34.163 metres wavelength, being connected to the second tuning circuit, which gives the Indian transmitter an extra "meat safe" compared with the adjacent Australian transmitter.

Thus, to change over from one wavelength to the other it is merely necessary to throw over a switch transferring the aerial current from one aerial to the other and energising the appropriate "meat safe."

These "meat safes," as I have called them, are sections of the transmitter. The first section—nearest the aerial—is the tuning circuit, with the oscillator or "drive," and





Above is the Marconi beam receiver, which is situated 48 miles east of Poona. The beam aerial system at Kirkee is seen on the right

Marconi's Double Wavelength Trick! (Continued)

the first magnifier. The Indian transmitter has two of these, one for each wavelength.

Transmitter Layout

The layout of the transmitter, very much simplified, is shown in Fig. 3. The main oscillator valve is totally enclosed in a copper box, and is supplied with a low-tension current of 7½ amperes at 12½ volts and high-tension of 85 milliamperes at 2,000 volts. This oscillates constantly on the wavelength in use.

It is coupled to the first magnifier, which is simply a buffer circuit to prevent the steadiness of the oscillations being affected by the variations in the second amplifier, which comes next, whose plate supply is controlled indirectly by the telegraph key in London.

The second amplifier uses two valves in parallel, taking L.T. current at 12½ amperes 17 volts and H.T. at 150 milliamperes 5,000 volts. Between this stage and the landline from London is the third magnifier. This uses two ten kilowatt oil-cooled valves—the previously mentioned valves are all air-cooled.

The telegraph currents which, as stated, interrupt the anode supply of the second amplifier, are conveyed over landlines to Tetney from the Central Telegraph Office in London, whence both the Tetney and the Skegness stations are controlled. Similarly the telegraphing and recording instruments in India are all at Bombay.

Total Power Consumed

The total power consumed by the Indian transmitter at Tetney is about 100 kilowatts, an extraordinary force compared with the smallness of the transmitter in size, dwarfed as it is by the gigantic masts outside. The Australian transmitter uses the same power, all of which is obtained from the Grimsby Corporation at 6,300 volts and transformed down.

The Indian transmitter calls with the sign GBI and the Australian set with GBH.

L. W. A. B.

Miss MABEL CONSTANDURAS

The Child Impersonator who Broadcasts so Successfully

Miss Unable-to-tune-in

THE bore is omnipresent. There is no sphere where he, or she, is not found, so it is not surprising to find him in wireless. On one of those evenings when one is invited out to dinner or to supper at a friend's house, and when after our arrival everything seems to be going well, the bore of the evening becomes apparent.

This time she is Miss Unable-to-tune-in. "Have you heard our wireless set?" she asks. You say that you have not and would like to very much.

"Which station would you like?" she then asks. "Daventry is so boring, don't you think? And London is the same always."

You agree or disagree as the case may be, but you ask for Moscow or New York according to the mood you are in.

"You like Moscow! So do I. So wonderful those Russians."

She then consults her chart. "Moscow should be—yes, just here. How unfortunate! I can never get a station when I want to. Last night I could get any station. Cork came over easily. Milan was perfectly clear. I can't get anything tonight."

Seeing her discomfort you tell her not to bother; that any station will do. Cork would be a change certainly.

"Cork! How wonderful! I was just thinking that myself. Such a sweet station Cork. The language that is not English they speak is simply wonderful. The announcers are so Irish, too."

She looks at her chart again; makes a little mathematical calculation; turns three knobs, if not more; looks at the valves; looks at the accumulators and then exclaims, "How silly of me. I should have changed the coil for Cork, of course. I can't think for the moment which coil it is. Here it is. No it isn't. Yes, it is."

She changes the coil and she changes that one again, but she cannot get Cork.

The visitor offers his help, but that is politely refused. Her brother asks her to give it up as she knows nothing about wireless. But she has pluck. She goes on trying.

"I'm determined to get Cork. So silly of me not to be able to get it. Last night and every other night I've got it so easily."

At last a station is tuned-in. A clock is chiming.

"There's Cork at last," she exclaimed joyfully. "I knew I'd get it by persevering. Isn't that a wonderful tone. What do you think of it?"

"Cardiff calling," came the announcement. "Now we are to have a talk on 'How to Tune-in'."

E. B. RARD.

Microphone Politics

How Broadcasting Will Be Used in the Next United States Election

IT is symptomatic of the very different conditions prevailing in broadcasting on the other side of the Atlantic and those here that radio will be extensively employed in next year's political campaign preparatory to the Presidential election, both before and after the great national party conventions at which the candidates will be chosen. Already careful preliminary investigations are being made and plans discussed.

Styles Analysed

Even the different styles of speaking of possible candidates are being analysed and appraised with reference to their effectiveness on the ether, and it is asserted that later each will be coached in the technique of speaking at a microphone. They will be warned against common faults like excessive changes in the volume of the voice, which may be harmless in a public meeting or even a powerful aid to impressiveness by conveying emphasis, but are fatal to clear audibility in broadcasting.

Governor Smith, a likely candidate, is described as "nearly the perfect radio orator," except for one defect, but that is a serious one. He has a habit of frequently moving his head to either side, so that the distance of his mouth from the microphone varies and his words are sometimes faint as a whisper or else sometimes indistinct bellows. Apart from this, "his husky, crackling voice has marvellous individuality and power over the radio, a certain roughness and growl in his tones taking exceptionally well."

Barking at Voters !

Evidently voters in the States like to be barked at, and the silver-tongued orator's day is over.

President Coolidge wins the approval of the broadcasting managers not only because "his firm, even monotone is perfectly adapted to the microphone," but also because his speeches are "meaty, sensible, free from flowers of rhetoric." Governor Smith, it is reported, has recently been paying attention to radio elocution, in order to achieve a smoother delivery.

If and when broadcasting enters into political campaigns in this country, a new terror will be added to the candidate's ordeal. He will not only have to learn how to kiss the baby and pat little Willie's head gracefully to ingratiate himself with "the missus" for her vote. He will also have to have his voice combed and his tongue trained for microphonic performances.

Microphone Contrasts

Other Presidential possibilities who have frequently been on the ether are Herbert Hoover, the Secretary of Commerce, and Senator Borah. They are a complete contrast when speaking at a microphone. Mr. Hoover enunciates clearly, faces the microphone at the proper distance, never moves his head or alters the volume of his voice, though the tone constantly and agreeably fluctuates, rendering his speech both agreeable to listen to and easy to follow. Absolutely perfect reception can be obtained.

But there is a fly even in Hoover's ointment. He lacks "punch." So far he has delivered only addresses conveying information. What American listeners like, apparently, is a hot and strong discourse, "meaty" like President Coolidge's and with a sauce of "roughness and growl" like Governor Smith's. So now candidates know the style to affect and can straightway begin to practise their epigrammatic barks. Listeners in this country would consider an election enough of a bother, without the invasion of radio, which had best soothe them with symphonies or jolly them with jazz amid the spate of propaganda.

One of the Worst Speakers

A contrast with Hoover, Senator Borah is one of the worst of speakers, from the point of view of microphone technique. He has a trick of throwing his head this way and that, and even of wandering about as he warms up to his theme, cheating the microphone of half his phrases. Yet because so much of his fiery eloquence gets across, notwithstanding his deplorable behaviour to eager listeners, he always attracts large radio audiences. In fact, half a bark from Borah is better than a smoothly flowing stream of lucid enlightenment from Hoover.

Experiences in the campaign of 1924 threw much light on the management of a radio political campaign, especially on the difficulties to be surmounted and mistakes to be avoided. It is estimated that next year there will be more than eight million receiving sets in use in the forty-eight States, compared with about half that number in 1924. Some fifty stations will be included in the radio relays, as compared with sixteen in the Coolidge-Davis campaign.

Experts' Advice

The experts of the American Telephone and Telegraph Company have made an elaborate survey of the 1924 campaign with a view to avoiding its troubles and disappointments, and their advice will be at the disposal of broadcasting concerns and campaign committees. In 1924 there was

frequent confusion about dates and conflicting arrangements because plans were not made sufficiently in advance.

No Straying from the Mike !

Experiments in 1924 showed that on the platforms of party convention it will be necessary to have an enclosure fenced in to prevent the speaker wandering away from the microphone. In 1924 a square was marked in chalk, but speakers in their excitement continually stepped beyond it out of range. Some, like Mr. Bryan, were uncontrollable. Now all speaker will be corralled. They may gesticulate but they cannot roam. All on the platform will be emphatically warned against "asides" and whispered comments.

In 1924 millions of listeners overheard one man on the platform mutter "shut up," followed by an approbrious epithet. The sensitive microphone will sometimes perversely pick up the unintended.

There are two outstanding features in the broadcasting in connection with the campaign of 1924. One was a fifteen-minute address by President Coolidge, heard by millions, which produced a profound impression. It was on the eve of the election and listeners eagerly tuned-in. Everyone expected a rousing campaign oration. Instead he refrained from pleading his own cause. He devoted the opportunity to urging every citizen, irrespective of party, to do his duty and go to the polls, and whichever side he voted for, to obey his sincere convictions and vote honestly. It was a fine thing, finely conceived and finely done.

The other was the broadcasting of the long-drawn-out Democratic convention, a grave error of judgment which damaged the party. "The long deadlock," it was asserted, "with its quarrels, would have been annoying to the country years ago, when all the information would have been received through the newspapers, but the radio exaggerated it and rubbed it in."

Created Prejudice

Those who know what a long-winded convention is like—a crass exhibition which magnifies some of the glaring defects of American politics—will not doubt that the broadcasting of the proceedings must have created prejudice in the public mind.

In this, as in other matters, the campaign committees will know better this time. Strategy in radio propaganda, technique, organisation every aspect is being carefully studied in preparation for the fight.

A.C.

Broadcast Drama

THE reports that the B.B.C. intends to build and equip a new theatre for the broadcasting of plays will no doubt attract many more actors and actresses to the wireless drama. But there is no doubt that the legitimate stage actor has a lot to learn before he can hope to be successful in front of the microphone.

Recognising the Villain

A stage villain in melodrama can be recognised immediately by the deceitful way in which he beetles his brows and curls the ends of his waxed moustache; but when he is broadcasting, there is nothing to distinguish him from the hero except his sinister, mirthless chuckle at the back of his throat; unless of course, the author has considerately given him a self-revealing name such as Jasper.

Then again, the conditions are so different. Apart from a few rather restless coughs and sneezes and the noise made by the scrimmage for coats and hats towards the end of the last act, the ordinary actor can rely on a more or less fair hearing.

The unfortunate performer in front of the microphone is by no means so privileged. At the back of his mind, when he is declaiming his tender passion for the beloved Ermyntrude, he knows that he is in competition for the attention of his audience with a multitude of children playing scales in neighbouring houses, a host of wives washing up crockery noisily in adjoining kitchens, a riot of roaring motor-bicycles, shrieking trains and thundering lorries and the howls of all the perverted oscillators of the district. It must be very disturbing.

Fortunately, it has been recognised that the broadcast play has a technique of its own and some of the dramatic schools are already giving special courses in this subject. On the practical side a very high standard is aimed at.

At Its Worst

When criticising the students' efforts, the judges sit not in the theatre itself but in another part of the building, where they listen in on an inferior crystal set while a battery of typewriters and pneumatic picks gives the correct local colour.

Technical difficulties have been overcome with great ingenuity. Stage meals, without which no modern comedy is complete, presented a difficult problem; but this has been solved by limiting the menu to dishes with a good broadcasting value, such as tomato soup, melons, oysters and spaghetti, and teaching the actors to forget the normal restraints of convention.

Society plays, which depend so much for the effect of the beautiful clothes worn by the actresses, have hitherto not been very successful when broadcast, but by using only dresses which strike a really distinctive note and attiring the men in loud check suits, it has been found possible to transmit a good impression of the appearance of the different characters.

Searching Examination

The theoretical examination which all students take when they have completed the course is very searching as the following questions taken from a recent paper will show :

1.—What is the correct pronunciation of Featherstonehaugh, Marjoriebanks, Beauvoir?

2.—Explain why an actor with a deep, manly voice is unsuitable for the part of the villain

3.—Give an estimate of the probable number of ear-drums shattered by coughing near to the microphone, and show how to prevent an impending sneeze without undue contortions

4.—Explain why the following features are undesirable in a broadcast actor : (*a*) dislocated epiglottis, (*b*) walrus moustache, (*c*) badly fitting false teeth

5.—"The absence of limelight is detrimental to the true interests of the profession." Discuss this statement

6.—How is it possible to write a problem play without making any controversial statements?

F. J.

Many amateurs who have small sets that are perfectly satisfactory as regards range have need for more power to operate a large loud-speaker, and in this article the "Wireless Magazine" Technical Staff describes the construction of what is really a two-stage amplifier, although three valves are used (the last two of the three are used in parallel to get the best possible "power" effect).

The True-tone Amplifier

A Unit Designed by the "W.M." Technical Staff for Use with Any Receiver

This amplifier can be used in conjunction with almost any receiver, either valve or crystal.

POWERFUL loud-speaker results are the need of the amateur to-day, and there is no necessity to give any further explanation for describing the construction of a power amplifier (which can be attached to any existing receiver) in the pages of the WIRELESS MAGAZINE.

Controlling Volume

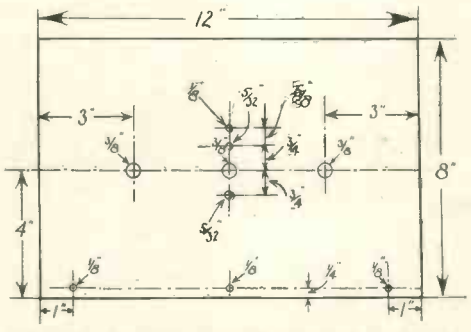
A very great advantage of the True-tone Amplifier is that the volume obtained from it can be controlled within reasonably wide limits and that it gives quality of reproduction far above the average. It can be used as a "medium" amplifier for louder headphone reception for a crystal set or as a real "power" amplifier for loud-speaker work.

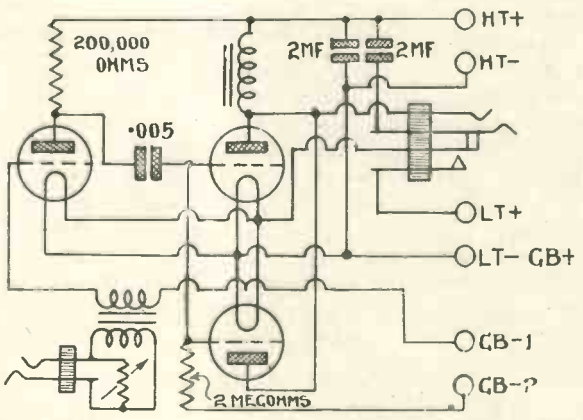
Normally, the amplifier makes use of three valves—a first stage coupled by the resistance-capacity method to two following valves arranged in parallel. By omitting one of the parallel valves the unit can, of course, be used as an ordinary two-stage amplifier, but in this case the quality of reproduction will be lowered, although it will still be up to the standard of all normal receivers.

Nearly every reader of the WIRELESS MAGAZINE will know that to actuate a powerful loud-speaker large *current* fluctuations are required in the output circuit, and such fluctuations can only be obtained by the use of power valves in the last stages. A really "powerful" power valve requires an anode voltage in the neighbourhood of 300 volts or more, but almost equivalent results can be obtained by using two ordinary power valves in parallel and applying a voltage of 120 or so to each anode.

Meeting a Need

The advantage of this system, from the amateur's point of view, are obvious, and the WIRELESS MAGAZINE Technical Staff believes that this amplifier will meet a definite need among readers for a unit that can be used in conjunction with any receiver that is not giving sufficient volume at present.

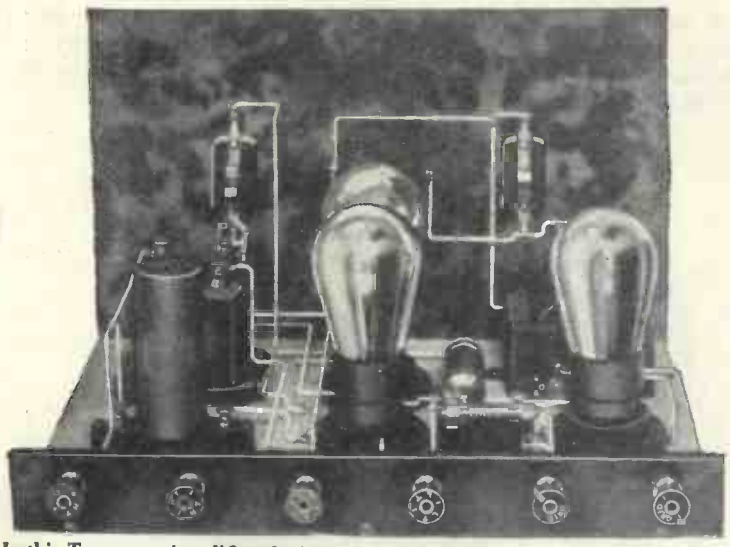




(Above).—Panel Layout of the True-tone Amplifier

(Right).—Circuit of the True-tone Amplifier; it should be noted that the last two valves are in parallel.

The True-tone —



In this True-tone Amplifier the last two valves (seen on the left in the above photograph) are arranged in parallel to give the effect of a super power valve that would normally need several hundred volts high tension

A glance at the circuit diagram will show that across the primary of the input transformer is connected a variable resistance. This is mounted on the panel and can be used to control the volume according to the type of matter being received.

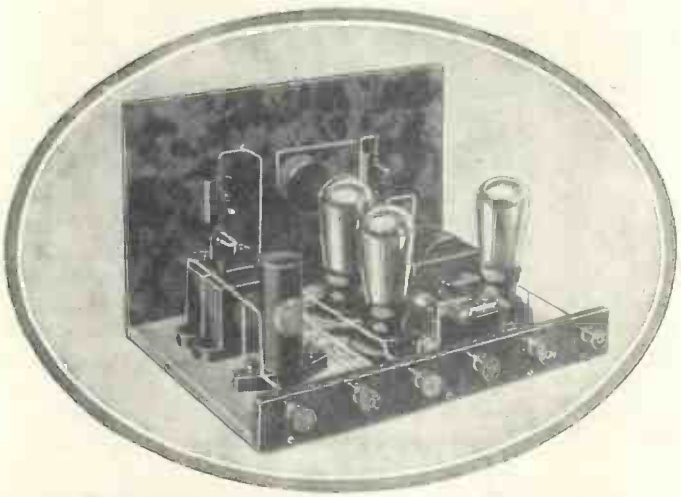
Coupling

The first valve is connected to the succeeding two valves through a resistance-capacity coupling consisting of a 200,000-ohm resistance and a .005-microfarad condenser. It will be seen that the last two valves are connected directly in parallel.

So that the constant anode current flowing even when signals are not being received shall not pass through the loud-speaker winding and possibly demagnetise it, a choke-capacity device is included in the final output circuit; in this way only the current fluctuations produced when signals are actually being received affect the loud-speaker winding.

It should, perhaps, be emphasised that when three valves are used in this way the resulting amplifier gives extremely good tone; if an amplifier giving only ordinary quality is required, one of the "parallel" valves can be omitted.

From the photographs reproduced in these pages it will be seen that jacks have been used for convenience in connecting the input and output leads. These jacks are mounted on the panel, one on each side of the volume control, which is mounted in the centre of the panel. On the left is the input jack and on the right is the output jack.



Rear View of the True-tone Amplifier with valves in position

A glance at the photographic plan view will give a clear idea of the layout. Nothing is cramped and there is no difficulty about the construction. Looking down at the baseboard with the panel nearest one there is the low-frequency input transformer on the left and behind it the holder for the first valve.

On the right of this are the coupling resistance, condenser, and grid leak for the succeeding two valves, the holders of which are mounted in line with the volume-control resistance in the centre of the panel. On the extreme right of the baseboard are a low-frequency choke and two 2-microfarad fixed condensers.

Components Required

For the construction of the True-tone Amplifier the following component parts will be required :

Ebonite panel, 12 in. by 8 in. (Raymond or Becol).
Single filament jack (Lotus).
Single circuit open jack (Lotus).
2 plugs (Lotus).
Variable volume-control resistance (Marconiphone, Dubilier, or Igranic).
Low-frequency transformer, ratio approximately 4 to 1 (C.A.V., Gecophone, or Formo).
3 valve-holders (W.B., Lotus, or Benjamin).
200,000-ohm wire-round anode resistance (Precision, Dubilier, or Mullard).
.005-microfarad fixed condenser (Dubilier, T.C.C., or Lissen).
2-megohm grid leak (Dubilier, Mullard, or Lissen).
2 2-microfarad fixed condensers (Lissen, T.C.C., or Dubilier).
Low-frequency choke (Lissen, Formo, or Igranic).
Terminal strip, 12 in. by 2 in. (Raymond or Becol).
6 terminals, marked : H.T.+, H.T.—, L.T.+, L.T.— (or G.B.+), G.B.—2, G.B.—1 (Eelex).
Cabinet and baseboard, 7¾ in. deep (Raymond)
Junit for wiring.

It should be noted that in each case the component mentioned first is that used in the original receiver.

Blueprint Available

As is the case in every WIRELESS MAGAZINE receiver, a full-size blue-

— Amplifier (Contd.)

print of the True-tone Amplifier is available. This combines a drilling guide, layout, and wiring diagram in one sheet, and can be obtained for half price, that is 6d., post free, up to the end of January, if the coupon on page iii of the cover is used. After the end of January the full price of 1s. will be charged. Ask for blueprint No. W.M.47, and address your inquiry to Blueprint Department, WIRELESS MAGAZINE, 58-61 Fetter Lane, E.C.4.

Building the Set

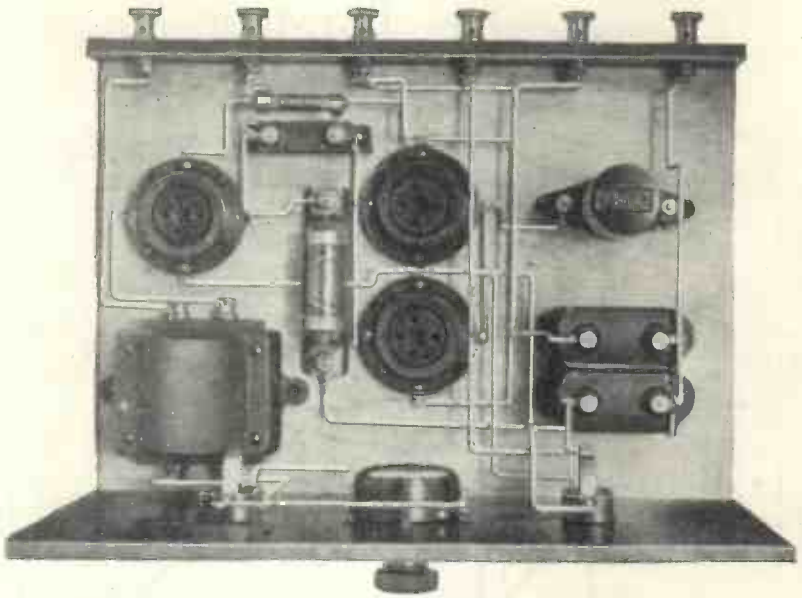
There is little to be said about the actual construction of the receiver, as all the details must be perfectly clear from the photographs and layout. It should be noted, however, that clips are required for holding the grid leak in position.

When all the components have been fixed in position, the receiver can be wired up, and at this stage the blueprint will save time and trouble. It will be noticed that both on the full-size blueprint and on the reduced wiring diagram reproduced in these pages each terminal point is marked with a small letter of the alphabet; these letters indicate which points should be connected together and in what order.

Like Letters

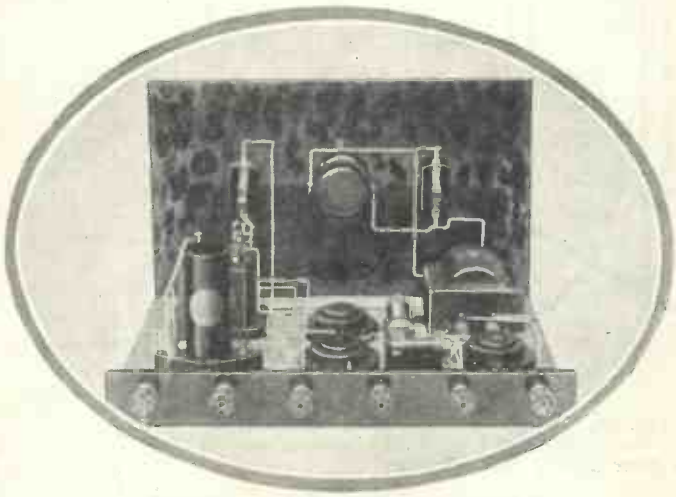
All the points marked with like letters are connected together with one wire or as few wires as possible. Thus, first connect all those points marked *a*, then all those marked *b*, and so on through the alphabet.

The question of suitable valves is of some importance, from the point of view both of quality and volume. As the first valve is coupled by the resistance-capacity method, it can have a moderately high impedance, say something in the neighbourhood of 10,000 or 15,000 ohms. The last two valves, however, must be of the power type, and should be of very low impedances, say 5,000 ohms or less. It is most desirable that the last two valves should be of the same type.



Plan view of the True-tone Amplifier showing disposition of components

To use the amplifier, place valves in the holders and connect up the necessary batteries. To H.T.+ apply a voltage of 120 volts *or more, if possible*; to G.B.—1 a voltage of 6 to 9 volts; and to G.B.—2 a voltage of 9 to 18, according to the particular valves used in the last stages.



Another view of the True-tone Amplifier

To one of the plugs attach two leads going to the phone or loud-speaker terminals of the preceding receiver (which can be either valve or crystal), and insert this in the left-hand jack on the panel. To the other plug attach the loud-speaker and insert that in the right-hand jack; that operation automatically switches on the valves and puts the loud-speaker in circuit.

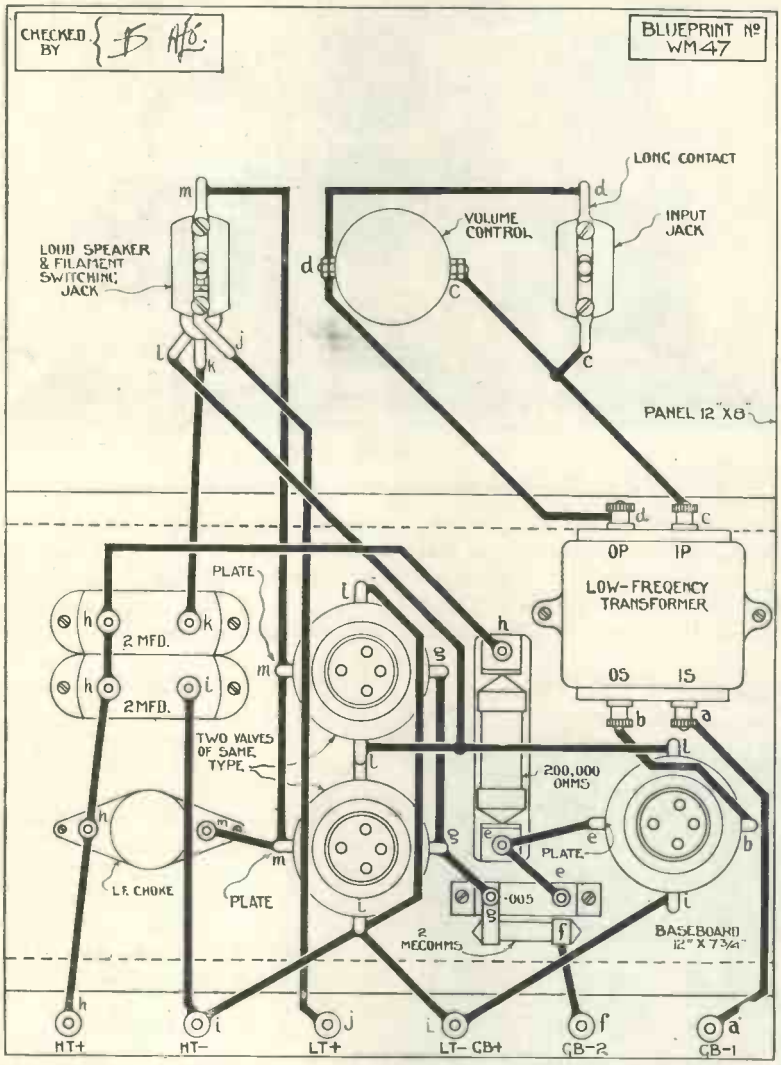
Keep the volume-control knob turned to O (in its maximum resistance position), and adjust the grid bias until the very best quality is obtained. After this has been done, the volume control can be used as desired.

Cone Speakers

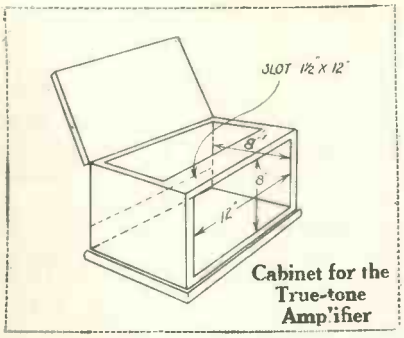
The users of the cone-type loud-speakers will particularly appreciate this amplifier because of the extraordinary fine quality of reproduction it gives. This is due to the fact that the use of two power valves in parallel is equivalent to a large power valve (one of the type costing 30s. or more), with a very low impedance.

A LAYOUT AND WIRING DIAGRAM, DETAILS OF CABINET AND TABLE OF SUITABLE VALVES WILL BE FOUND ON THE NEXT PAGE

The True-tone Amplifier—(*Cont.*)



This layout and wiring diagram can be obtained as a full-size blueprint (No. WM47) for half-price, that is 6d. post free, if the coupon on page iii of the cover is used before January 31



Cabinet for the True-tone Amp'ifier

Revelation Four

To the Editor "Wireless Magazine"

SIR,—I have just received the November issue of WIRELESS MAGAZINE and was interested in reports from readers *re* Revelation Four. So far I have not seen any reports from Scotland so I thought you or your readers would like to know how the stations come in.

We are just two miles from the local station and my aerial is of the standard length, single wire, 25 feet high.

I enclose herewith list of stations received on the loud-speaker, no phones being used for tuning-in, together with dial settings (anode condenser). Stations marked * were really loud on the speaker :—

	Anode Condenser
*Aberdeen	157½
*Daventry Experimental	154½
Berlin	151
*Langenberg	147
Barcelona	146
Oslo	145
Rome	139
Brunn	136
*Frankfort	131½
*Glasgow	122½
*Cork	120
*Hamburg	118½
*Toulouse	117
*Manchester	114½
*Stuttgart	113
*Madrid	111
*Bergen	109
*Leipzig	107½
*London	106
*Cardiff	102½
*Prague	101½
*Barcelona	99
Paris	97½
*Bournemouth	92½
*Breslau	91½
*Dublin	90
*Newcastle †	87
*Nuremberg †	83½
San Sebastiant	80½
*Edinburgh	77½
*Dortmund †	75½
*Cassell †	70½
*Malmo †	66

† Indicates interference from Edinburgh.

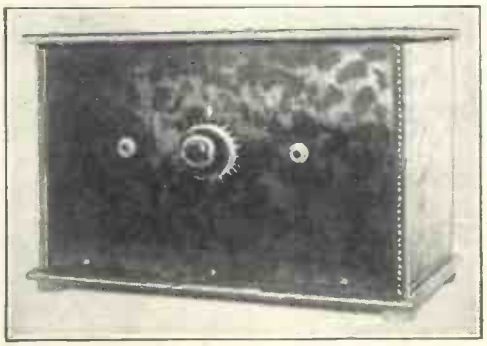
Another ten stations, not shown on list, have been received, but not identified.

I presume a double-tapped coil would help in cutting out Edinburgh. C. G. M. HARROWER (Edinburgh).

Valves to Use in the True-tone Amplifier

Make	1st L.F.	2nd & 3rd L.F.	Make	1st L.F.	2nd & 3rd L.F.
B.T.H.	B4	B4	MULLARD	PM6	PM256
COSSOR	610 L.F.	STENTOR SIX	OSRAM	DEL 610	DEP 610
EDISWAN	E.S.5 L.F.	PV5	SHORTPATH	SP55 P	SP55 RR
MARCONI	DEL 610	DEP 610	SIX SIXTY	SS 410P	SS625 SP

These are all 6-volt valves: equivalent 2 and 4-volt valves can be used



Front view of the True-tone Amplifier : in the centre is the volume control

Every Listener Should Read this Article on—

Making the Most of the Two D's

"I don't like this," says the listener. "Wonder what's on at the other station." Five minutes spent in searching for the programme in the evening paper; ten minutes wasted in making a choice and in tuning the set; five more minutes, and the desired alternative is over.

THAT is the way to make the very least use of alternative programmes.

Now that the "regional" scheme conceived by the B.B.C. is progressing it is possible for many listeners in the Midlands and the south of England, if not in other and less populous parts, to have a choice of programmes simply by tuning-in either to their local station or to Daventry Junior.

Choice of Three Stations

Some, indeed, are fortunate enough to have a choice of three stations without serious interference, but in the large majority of cases it is only possible to tune-in two stations at anything like the same strength. And unless two stations are received *without any difficulty, and at very nearly the same strength,* one can hardly be regarded as an alternative to the other. So much for the technical aspect.

Have you never thought what an almost super-human task is the arranging of programmes for the "alternatives"?

How hard it must be to provide two good alternative programmes; not for one hour, but for at least nine hours a day, and every day in the year. Despite inveterate grumblers, the programme people at Savoy Hill don't do their work so badly, when their extreme difficulties are taken into consideration. Do our sets do their work justice?

If you are not satisfied with the alternatives it means that either you or your set are not making the best of things. Your set might be at fault in many ways. Here are some examples.

Changing over from one station to the other should not necessitate complicated retuning and adjustment of reaction, and so forth. If the set is not of a rather complicated nature in regard to its tuning arrangement it might be possible to provide separate tuners for each alternative station, each being switched in as required by a simple double-pole change-over switch operated by one knob outside the panel: a pleasing change from the clumsy coil-plugging and rewiring which some people have to effect before they can hear their alternative station!

Even if it is thought unnecessary to have two tuners in one set, the most that should have to be done to change from one station to the other is simple manipulation of not more than two dials; by "simple" I mean, literally, so that a child can do it. Paterfamilias may not be always at hand when the kiddies want a change from the local station's ideas of what bedtime stories should be!

If critical tuning adjustment and tricky reaction control is needed to bring in local broadcasting, your set needs an overhaul; bad sets cannot get good programmes properly.

Is interference, mutual or otherwise, your *bete noir*? To make the most of two stations they should be receivable under the same conditions; but don't blame the B.B.C. if this doesn't always work out right in practice.

Inefficient Tuners

Possibly your set has an inefficient single-circuit tuner which is quite incapable of cutting out interference over a wide range of condenser readings; a simple "cut-out" or wavetrap will cure the trouble. A good wavetrap specially designed for the job was described in the October issue of WIRELESS MAGAZINE.

Here is another idea. If your set is working quite as it should, why not have alternative receivers for alternative programmes? It may happen that somebody wants to hear a talk from station "A" while the rest of the family wish to dance to station "B." Haven't you experienced that dilemma, and haven't you had a hard time to explain the ignoramuses that they can't have education and jazz *simul ac*?

A simple crystal set, strung up to its own aerial (an indoor one might do) and to the earth of the main receiver would have restored once more the family peace.

The crystal set would also come in handy as a stand-by while the big set's batteries are being charged and in case of a breakdown. Most people keep a simple reserve set for this very reason; but how many have thought to keep the reserve set in use for alternative programmes? Very few, I imagine.

Watching the Programmes

One more suggestion. Can you tell at a glance what is happening at both alternative stations? You may say there is no need to know, and that in any case it is only necessary to touch the change-over switch to find out instantly.

That is not the point. Other listeners will not welcome your curiosity if you break into the middle of an interesting transmission and switch on the alternative station for even a few seconds just to see what part of their programme they have reached.

It is quite a good plan to make out a weekly list of the items to be transmitted from your two stations, placing names of the items in vertical columns on ruled paper. This programme list will save a deal of time-wasting hunting, the alternative transmissions at any hour being instantly obvious. Don't leave selection to chance if you want to enter a wider world of study and entertainment through the medium of alternative programmes.

Remember that it is far better to be a mezzo-brow than to be bigotted; and do not, therefore, confine your selection solely to high- or low-brow items. Making the most of two stations means hearing the most in *quality* and the least in *quantity*; so choose your alternative programmes with this in mind. QUEUE.

Sandy—the Inimitable Scot—Has a Further Radio Adventure

Maggie and High Tension

YE ken this wireless fair flummoxes a body, unless the body's like me which has a guid wife like Maggie which learns ye to be no' a bit surprised at onything which eventuates. Ay, it's a wunnerfu' thing wireless. It is that. The things *I've* learnt since I became a wireless expert!

Ye'd hardly believe it, ye would. How slugs feeds their young, for example, e.g., and how yer blow danders a' up and doon the wee wiggley bits o' a trombone afore it expires as music and . . . Och, but it's amazin', it is. In fact, I'm jist becomin' a repository o' knowledge, that's a place where they store things, ye ken, like . . . ay, like a tin or a box.

Ay, ay. And noo it's the Charleston I've jist become a master o'. Think o' that. Ay, but it's me's got the bonny knees for it. Ma conscience, it is. Folks, folks, I wish ye'd been there to see them poke oot a wee bit and in again. "*Take yer finger oot o' yer mouth.*" Ay, that was the tune they played and ma knees was awfu' harmonious.

Mind ye, I'm a modest man, I am, but I was fair surprised the bonny way they went oot and in. Och, it was fine.

Ye see, they said some celebrated dance man was to gi'e a lesson over the wireless and I thought Maggie and me might jist as weel learn it when there was nae extra charge, ye ken. Besides, nae doot ye mind that I'm general proveesion merchant o' Clumtochty, and I worked it oot that if the inhabitants o' Clumtochty kennt that Maggie and me was sae up to date that we could Charleston they would imagine that what I sellt them was the maist up to date in general proveesions. Which, o' course, they are. At least, generally. But it's the effeck ye've got to consider.

"Maggie," says I enterin' the hoose wi' a trippin' gait, "prepare for the dance. At 7.15 prompt by the alarum clock, M. Castoff Blasti will instruct ye in the Charleston."

"What's that?" says she.

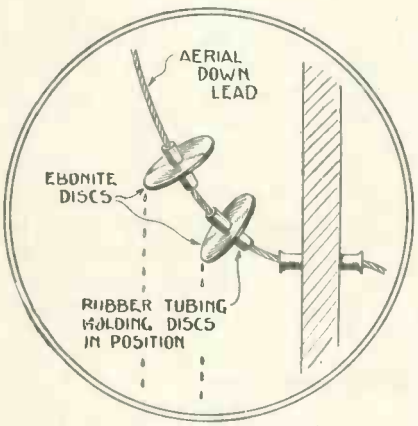
"Ye heard me," says I polite.

"Charleston?" says she. "And what in the name o' Jumidoses is the Charleston?"

"Withoot commentin' on yer terrible ignorance," says I, magnanimously, "the Charleston is the latest dance imported frae U.S.A. That's short for America." I adds, wi' an easy smile.

PROTECTING THE LEAD-IN

Rain leaking into a room through a lead-in tube may cause considerable annoyance and in the sketch is shown an easy means of overcoming the trouble.



Two ebonite discs are placed round the lead-in wire where it curves so that the rain running down collects on them and drips off before reaching the lead-in tube. The discs are held in position by means of small pieces of rubber tubing, over which they fit tightly.

A.P.

"What? Anither o' they indecent nigger contortions. Ye'll no' catch me tryin' to imitate indecent niggers wi' nae clothes on."

"It's a vera genteel and highly modified form," says I wi' magnificent nonchalance. "But if ye want to gang to the kirk socials etsaytera and see Miss McCosh and Mistress McAndrews and Mistress McWhaupple a' daein' the Charleston and sayin' to themsels jist loud enough for *you* to hear: 'Poor Mistress MacNab, she canna Charleston, ye ken, for why she's got bow legs and she canna get the right wobble,' weel, I'll no' be awfu' vexed. I'm no' really awfu' keen masel."

"What time did ye say it was, Sandy? I'd better gi'e ma face a bit dicht first and change ma shoes."

Wumman's gey queer when mixed in equal quantities wi' wumman.

Weel, we pushed the table oot o' the kitchen into the lobby and I had a maist interesting ten meenits nailin' doon a piece o' the linoleum which had wore badly. Hooever, at 7.15 prompt, by the alarum clock, we was ready for the instruction o' M. Castoff Blasti, the celebrated dance expert. I tellt Maggie that, though personally *I'd* never heert o' the body afore. But wumman, specially Maggie, likes bein' learned by a celebrated body.

I switched on the wireless, and Maggie and me took up oor poseetions viz a viz, as ye might say.

"One," said the voice in a vera distinct foreign accent, "you bend the knees *verra* slightly—so."

I didna see the "so" bit at a', no' bein' present wi' M. Castoff Blasti, but I put it doon to his ignorance o' the English language. I bent ma knees oot and kept them there, an awfu' uncomfortable poseetion. Then I heard a terrible crack.

"Och," cries Maggie, "that's ma rheumatisms again. I canna dae it. Ma knees is gaun to crack if I've to bend like this."

"Weel," says I, "exercise'll nae doot dae them a power o' guid. But if ye canna dae it ye can aye explain to Mistress McWhaupple that it's jist the rheumatisms and no' bow legs."

"Two," says the voice, and I observed Maggie in a bent poseetion wi' her ear attentive, "stretch the knees at the same time moving the right leg to the right."

Folks, it was easy as easy. Even Maggie did it first time correct.

"Three," says voice, "bend the knees slightly as *before*."

Weel, I dinna ken if it was Maggie and me took over big steps to the right wi' the right foot but it looked fair awfu' us standin' there wi' oor knees bent like anæmic dromedairies. Ay, there we stood and stood. The meenits passed into obscurity and I was gettin' gey uncomfortable. Maggie's knees was sinkin' doon, doon to the floor.

"Dae ye imagine," says I jocularioously, "that ye're a dromadairy aboot to assuage its thirst at the oasis wi' palm trees a' round?"

"I ken that I'm feenished wi' this daft Charleston if the man's no' quick wi' his 'Four,'" says Maggie wi' ire in her voice.

Sae I went over to ma set and found the high-tension plug had falled oot. Sae I put it in and we was jist in time to hear the man say it a' ower again quick.

"Straighten the knees and bring the left foot up to the right."

Which we did, Maggie and me, jist easy as easy.

Then he gied us music.

"Bend-move right bend-move left bend-move left-bend move, right-one-two-three-four, one-two-three-four—tum-te-tum-tetum-te-take you fing-er-out-of-your-mouth."

Ma knees poked oot and in, oot and in maist melodiously and I was awfu' pleased wi' masel. And then I observed Maggie. Och, ma conscience, folks, if ye'd seen her. Oot wi' her knees, oot wi' her knees and every time her knees cam oot sae did her tongue.

"Maggie," I cries dissolvin' into subdued mirth, "that's fine. Keep it up. Ye're a real comic, ye are. That's the maist comical thing I've seen for mony a day."

Wi' that she stopped her contortions.

"It's daft," she says, "and you're daft, tae, and I'll see masel dead afore I dance that indecent dance."

"Maggie," says I conciliatory. "I think ye're right—aboot it being daft, I mean. But I hope Mistress McWhaupple learns it. Dae ye ken, after seein' you daein' it, I'd rather see her daein' it than gang to the pictures?"

"Ay," says Maggie, no' sae full o' ire.

Sae it ended. But I was a jist a wee bittie vexed. If ye'd jist seen the bonnie way ma knees poked oot and in, oot and in.

Mr. Multiple Set

HE lives a few doors away from me and to his credit it should be said that he is a gent. He gives advice and help freely, especially to those who are beginners in the noble art of radio; he charges my accumulators sometimes free of charge; he finds out the latest gadgets that are of any value in his estimation and, having tried them, tells me whether they are of any value to me or not.

Reliable and Trustworthy

In brief, Mr. Multiple Set is reliable, honest, trustworthy, trained in the technicalities of radio and all the other things we state on a wireless testimonial when we give one to the applicant for a wireless post.

But Mr. Multiple Set is a bore nevertheless. Not that I mind him. It is the neighbours who are complaining all the time. I like to hear him say that he had Venice easily last night; and that the American stations came through on his set just as clearly as London does. I love to hear him talk of his eight-valve set and the ninth that he is going to add before the week is out; it is a delight to me, as I have said, to hear these marvellous things.

But the neighbours ! !

There are no adjectives or adverbs or exclamations in the lower half of the English language that are not bad enough to attach to his name. His eight valves are lit in the early hours of the morning. But that would not be a cause of complaint. It is that he has his loud-speaker blazing forth as long as London permits him to do so, and then he gets some Continental stations that blaze forth just as badly as London until two or three in the morning.

Recently, I woke up with a start at one o'clock one morning thinking it was thundering. It was dance music from the open window of Mr. Multiple Set's front room. Of course, dance music sends me to sleep at that time of the morning and it did not really matter. I imagined for a moment that I was engaged with a partner in dancing the Black Bottom and I was asleep again.

But the neighbours ! ! !

That morning at eight o'clock the policeman was called to my neighbour's. There had been bad tempers and cross words for hours, so I was told. These neighbours of mine objected to dance music at one o'clock; —they dete ted it, as a matter of fact; it kept them awake, and a young married couple got out of bed and danced at that unearthly hour and the husband slipped in the bedroom and grazed his shank.

His Own Master

Mr. Multiple Set said there was no law in the universe that could stop him from using his wireless set when he liked, as long as he did so in his own home. He had a wireless licence, certainly. Is not the Briton a master in his own home? Every man lives unto himself.

I don't mind in the least what happens to Mr. Multiple Set.

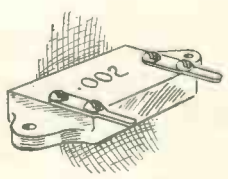
But the neighbours ! ! !

E. B. RARD.

Things to Know About

FIXED CONDENSERS

CONDENSERS, while they will not allow direct current to flow through them, will permit the passage of alternating current with more or less facility. The higher the frequency and the greater the capacity of the condenser, the more easily can the current flow unobstructed through the circuit.



For this reason fixed condensers of the type shown in the illustration are often used when it is desired to block the way for D.C. while allowing alternating or oscillatory current to flow freely, or to permit the passage of oscillatory current while not allowing low-frequency alternating current to flow to any appreciable extent.

5YM, the Well-known Experimenter, Discusses—

THOSE AMAZING SHORT WAVES!

THE difficulties in providing anything like an adequate Empire link by means of short waves is becoming very apparent to those who are earnestly experimenting in this direction. The Chelmsford short-wave station 5SW is putting in a lot of very useful work and the famous amateur station 2NM is continuing with its very low power.

Wrong Idea

My own opinion is that the short-wave link idea is a wrong one. We all know that it is possible to receive, very well indeed, the American and Australian short-wave transmissions, on very simple apparatus, when conditions, as regards atmospherics and fading, make the re-broadcasting of the programmes on normal wave-bands quite out of the question.

Probably it will be found reasonably easy to exchange programmes between this country and the United States, if such an exchange is worth while; but it is not the United States in which we are interested. What we want to do is to enable Canadians, Australians and those of our race who live in India, to say nothing of the hundreds on hundreds of small colonies and dependencies, to listen to voices and music from home.

Their Own Short-wave Sets

I think that listeners in these distant parts should be encouraged to build, or buy, short-wave receiving apparatus of their own. Then they would be able to get something like a fifty per cent service from the British short-wave station. A two-valve short-wave receiver is so simple to operate and so cheap to keep going that no one who is interested need be without one.

* * *

There still seems to be a good deal of controversy about the best method of aerial coupling for short-wave work. There are those who favour direct coupling on to some part of the coil removed from the grid end. It is said that the load on the valve can easily be adjusted by this method, that atmospheric interference is reduced and that it is very flexible in every way.

Others like a fixed position coil, varying the number of turns by plugging in from one to four turn coils as required. They claim that their method does not interfere with the calibration of the tuning-condenser scale, which it is perfectly true that any method of variable direct coupling does do. They say that such a fixed coil is just as flexible as any other method and that the load on the tuning arrangements and the detector valve can be adjusted once and for all with a little experiment to give the most favourable results. My own idea is that this method is the best; but I am open to conviction that it can be beaten.

Swinging Aerial Coil

A third party favour the swinging aerial coil. This is fixed as regard the number of turns, usually three or four; but is hung on some form of hinge so that its position with regard the grid coil can be varied. Personally I do not like this method. Any form of swinging coil means that leads are constantly being moved.

Braided or multi-strand leads must be used for this purpose and if only one of the strands breaks it can make a most appalling noise in a short-wave set—like the very worst atmospherics ever heard. And a movement of the listener is quite sufficient to set the noise going.

The flexible-lead difficulty is one of the reasons why nearly all short-wave listeners have definitely abandoned the variable reaction coil in favour of some form of condenser-controlled reaction. The other is that when this is properly applied to the low potential end of the grid coil it hardly varies the tuning at all. Anyone who has attempted to tune in telephony at about 14 metres with swinging-coil reaction will appreciate what this means.

On Verge of Oscillation

Of course, the receiver has to be just on the verge of oscillation and one touch of a hair when it is in this condition will send the tuning to smithereens. The station has to be found all over again. With condenser control the reaction can be adjusted to a nicety with hardly any adjustment of the grid-tuning condenser.

* * *

Receivers capable of working much below 10 metres seem to be very rare in this country, but they are booming in the United States and in France. Some official tests are being run in America this winter on five metres and a certain number of amateurs in this country are taking part. The difficulties of reception on five metres are considerable, but they are not nearly so great as many folk imagine. The trouble is that there is so little to listen to that it is difficult to run any proper tests unless you happen to be a transmitter with a licence to work on this wavelength.

Advantage of a Car

If you are also a motorist you can set your transmitter going with an automatic key or get someone to work it for you and run about the country listening to your own signals. This is the method usually followed in this country. I hope that the R.S.G.B. will soon take up this question of 5-metre work and organise definite programmes. Until something of this nature is done we are not likely to get much experimental work done on this fascinating wavelength.

Your Radio Library

A Special Article by An Experimenter

EVERY wireless enthusiast should get together a small library, and he will find it advisable to break it up into several different sections. In the present article a few notes are given on what I consider are the very best books for certain sections at the present time, but, owing to limited space, it will not be possible to mention all items, while the range of sections again has also to be limited for this reason.

Broadcasting

The first section in every wireless enthusiast's library should, in my opinion, be one of a general nature, entitled "Broadcasting." Among the best books for this I suggest "The Broadcasting Time-Table and Reception Log," most ably compiled by R. Grierson. I am familiar with the fourth edition of this, which was published in 1925 by Chapman & Hall, Ltd.

To follow this include "Radio, Beam and Broadcast," by A. H. Morse, in which the author deals partially with patents, published by Ernest Benn, Ltd., in 1925, and "Broadcast Over Britain," by J. C. W. Reith, published by Hodder and Stoughton, Ltd., in 1924.

Construction

An important section for every wireless man's library is that which is concerned with construction. In the present instance, on account of limited space, we must limit our attention to four. First of all, I suggest "Wireless Construction," by J. L. Pritchard and E. W. Hobbs. This is published by Blackie & Son, Ltd., and contains over 260 pages, and a number of excellent plates. There is also "Wireless Components and How to Make Them," by Cassell and Co., Ltd.

A smaller book, but one which nevertheless contains numerous valuable hints, is found in "The Home Constructor's Easy-to-Build Wireless Sets," by F. H. Haynes. Messrs. Iliffe & Sons, Ltd., published this in 1925, the edition with which I am familiar containing just over sixty pages. "The Wireless Man's Workshop," published by Cassell & Co., Ltd., should also be included in this section.

Crystal Sets

Following the constructional section, it is well, I think, to devote a whole section to the subject of crystal sets. A great many pamphlets, etc., have appeared on these; but, limiting our attention to books, I suggest the following :—

First of all, "Loud-speaker Crystal Sets," most ably edited by B. E. Jones, may be considered to be an essential addition. This is described as being "a practical handbook on building the most efficient crystal sets," and was published by Cassell and Co., Ltd., in 1925. The same firm also publish "Crystal Receiving Sets and How to Make Them." Following this readers should include "Crystal Receivers and Circuits," by P. J. Risdon, published by W. Foulsham & Co., Ltd., in 1925.

Maintenance and Management

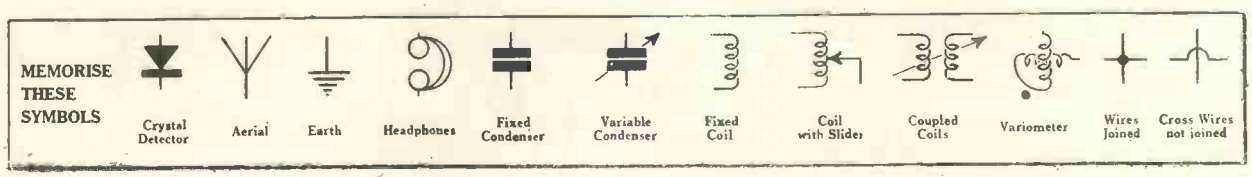
A section in the wireless enthusiast's library comprising works covering maintenance and management topics seems very desirable for many reasons. Here again a large number of pamphlets have appeared, but limiting our attention to books, and selecting a few of those of outstanding merit, I suggest the following :—

First of all, "Wireless Faults and How to Find Them," by R. W. Hallows, published by the Radio Press, Ltd., in 1925. Following this, "Tuning Coils and Methods of Tuning," ably written by W. James, and published by Iliffe & Sons, Ltd., in the same year. Thirdly, "Wireless Working Hints for Beginners," a very useful and well-written book by A. Williams. This was published by P. Marshall & Co., the edition with which I am familiar being that of 1924, which contained nearly one hundred pages.

Miscellaneous Manuals

Some wireless enthusiasts will dislike having a miscellaneous manual section in their library, but my experience shows that it is almost essential. If we don't like grouping books together under the heading "Miscellaneous," there is, of course, one way out, namely, to increase the size of the reference section, next to be discussed, and include them in it.

Assuming, however, that you decide to have a miscellaneous manuals section, a number of books are available, and the inclusion of as many as possible is desirable. Among extra good items I recommend "Wireless," by C. R. Gibson, published by Blackie & Son, Ltd., in 1925, the edition with which I am familiar containing about eighty pages. Then, after this, it is obvious that few wireless enthusiasts would be willing to



Your Radio Library (Continued)

do without "Talks About Wireless," so chattily and ably written by Sir Oliver Lodge, and published by Cassell & Co., Ltd., in 1925; while two other splendid books are found in "Radio Engineering," by J. H. Reyner, published by Ernest Benn, Ltd., and "Wireless," by P. J. Risdon, containing nearly 400 pages, and published by Ward, Lock & Co., Ltd., in 1924.

"Wireless-controlled Mechanism," published by Cassell & Co., Ltd., might also find a place under this heading.

Radio Reference Books

A section comprising items which are mainly reference books will be found exceptionally useful in every wireless enthusiast's library. Most wireless workers, unless they are experts, are confronted with problems at pretty frequent intervals, and these can be solved rapidly by turning to the reference section of the library.

Among notable books for this section the "Admiralty Handbook of Wireless Telegraphy," so ably prepared by Capt. W. G. H. Miles, should certainly be included. The publishers of this are H.M. Stationery Office. After this I suggest "A Textbook of Wireless Telegraphy and Telephony," by W. Greenwood, published by the University Tutorial Press, Ltd., in 1925. The edition of this, with which I am familiar, contains nearly 270 pages, its size being the convenient crown octavo.

Two excellent books are "The Short-wave Handbook" and "The Practical Wireless Data Book," both published by Cassell & Co., Ltd.

"Wireless Questions and Answers" is described as being "an explanatory and instructional handbook." Its author and publishers, however (the author being P. J. Risdon and the publishers W. Foulsham & Co., Ltd.), might well have called it "The Wireless Worker's Encyclopædia," and possibly its name may be changed to that if they are able to enlarge it at a later date. The edition with which I am familiar was issued in 1925, and contained nearly one hundred pages.

Two other excellent reference books are the "Wireless Annual for Amateurs and Experimenters," published by the Wireless Press, Ltd., and the "Year-book of Wireless Telegraphy and Telephony," published by Iliffe & Sons, Ltd. In both cases I am familiar with the 1925 edition, which in the case of the first-mentioned book contained over two hundred pages, and in the case of the second nearly nine hundred.

Valve Receivers

Some of us have given up crystal sets and have installed valve sets instead. Two excellent books for a valve receiver section which should certainly be included in every wireless worker's library are found in "Wireless Valve Receivers and Circuits in Principle and Practice," by Bangay and Ashbridge, published by Iliffe & Sons, Ltd., in 1925, and "Valve Receivers and Circuits," by P. J. Risdon, on whose several other books I have already made comment, published by W. Foulsham & Co., Ltd., in 1925.

Cassell & Co., Ltd., also publish two books which might well find a place here, namely, "The Practical 'Super-het' Book" and "Perfect Broadcast Reception."

A large number of pamphlets of varying size and, as a rule, of an interesting character have also appeared dealing with valve receivers.

Wireless Sets

Some wireless workers may prefer not to have separate sections in their library for books discussing crystal sets and valve receivers, but to group them together in a section entitled "Wireless Sets." If they do, this makes the present section rather a large one, but possibly in that case readers may not get all the books I have already briefly commented upon in addition to the following three.

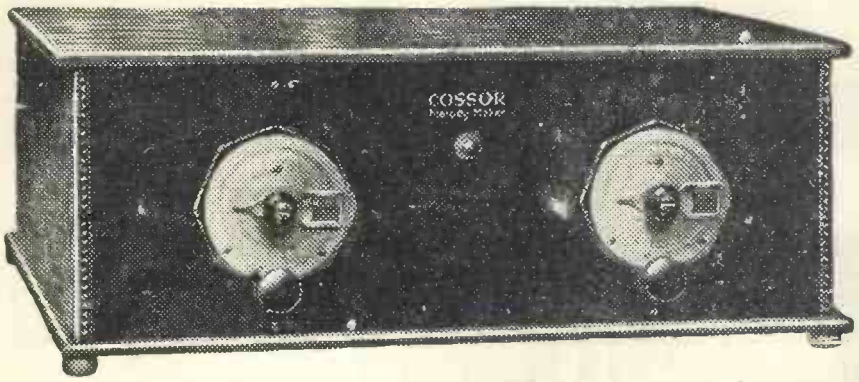
I suggest first of all for the wireless sets section a very interesting book entitled "All About Your Wireless Set," by Capt. P. P. Eckersley. Hodder & Stoughton, Ltd., published this in 1925, the edition with which I am familiar containing nearly 250 pages.

After this, be sure to include "Six Simple Sets," by S. G. Rattee, published by the Radio Press, Ltd., and containing over seventy pages; while for a third item "Wireless Receiving Devices," by P. J. Risdon, which explains the functions of this in simple language, and which is published by W. Foulsham & Co., Ltd., may be said to be an indispensable item.

By the way, every radio library should include Capt. Round's new book, "The Shielded Four-electrode Valve," which has just been published by Cassell & Co., Ltd.

LOUD-SPEAKERS INSTEAD OF SIGNALS

Shunting operations in a Toronto (Canada) passenger coach yard are controlled by a "signalman" through the medium of twenty-five loud-speakers



THE "Melody Maker" OWES ITS SENSATIONAL SUCCESS TO ITS Cossor VALVES

NOT since Broadcasting began has there been such an astounding success as the wonderful Cossor "Melody Maker." Tens of thousands have already been built—manufacturers of components specified are all working at top speed to keep pace with the phenomenal demand. Many shops have a waiting list of customers wanting to buy the parts for the Cossor "Melody Maker." It's the sensation of the season. And a large share of this success is due to its Cossor Valves. Without Cossor Valves there could have been no Cossor "Melody Maker." No matter which type of Set you are using you'll get better results with Cossor Valves.

FREE Send a postcard for a copy of the full size chart "How to build the wonderful Cossor "Melody Maker." As simple as Meccano. No soldering. Every wire shown full size, numbered and bent to shape. Impossible to go wrong. Success guaranteed. Build it in an evening. Gets Broadcasting from six countries. Mark your postcard Dept. W.M. A. C. Cossor, Ltd., Highbury Grove, London, N.5.

FOR YOUR POCKET'S SAKE, DEMAND

Cossor

—the valve which serves you longest

9904

Although more selective than the average crystal receiver the set described in this article is no more expensive to construct and it will meet the need of many amateurs who want a simple "radio" at low cost. Constructors who have need of one can obtain a full-size blueprint at half price, that is 3d. post free, if the coupon on page iii is used before Jan. 31

THE CENTRE-TAP CRYSTAL SET

Designed, Built and Tested by the "Wireless Magazine" Technical Staff

THERE is a large number of people who are within range of the high-power low-wavelength station at Daventry (5GB), and who are also able to pick up a local station. In many instances difficulty is experienced in separating the two transmissions on an ordinary crystal set, so the WIRELESS MAGAZINE Technical Staff has produced a simple receiver which is considerably more selective than the usual type to meet this need.

Simple Arrangement

In wireless it most frequently happens that the simplest arrangement works the best, and in designing this receiver it has only been necessary to make use of a simple centre-tapped aerial coil in order to obtain the desired degree of selectivity for ordinary purposes.

A glance at the circuit diagram will show that the receiver consists of a centre-tapped coil tuned by a .0005-microfarad variable condenser in parallel, together with a special crystal detector of the semi-permanent type and a pair of headphones.

Of course, by substituting various sizes of coil, it is possible to adapt the set for reception over any desired band of wavelengths.

The size of coil required for the lower broadcast band (including 5GB) depends upon the wavelength of the local station, and if in any doubt the constructor is recommended to consult the lists of ranges published by various coil manufacturers, remembering that it is tuned by a .0005-microfarad condenser in *parallel* or *shunt*. With any ordinary aerial-earth system a No. 200 coil is suitable for the reception of Daventry.

The photograph of the completed set shows its neat appearance. In the centre of the panel is the dial of the aerial-tuning condenser, while immediately below it is the knob of the semi-permanent crystal detector.

Components Required

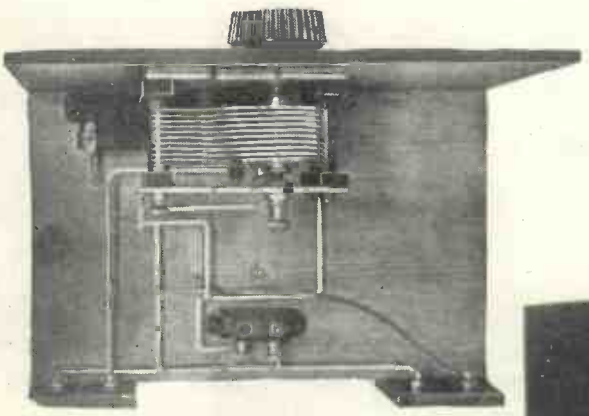
For the construction of the Centre-tap Crystal Set the following components will be required :—

Ebonite panel, 9 in. by 6 in. (Becol, Will Day, or Raymond).
.0005-microfarad variable condenser (Ormond, Peto-Scott, or Formo.)
.001-microfarad fixed condenser (Graham Farish, Dubilier, or T.C.C.).
Single coil-holder (Lissen, Lotus, or Peto-Scott).
Semi-permanent crystal detector (Red Diamond).
2 terminal strips, 2 in. by 2 in. each (Becol, Will Day, or Raymond).
4 plugs and sockets (Lectro Linx).
Cabinet and baseboard, 5½ in. deep (Ready Radio).

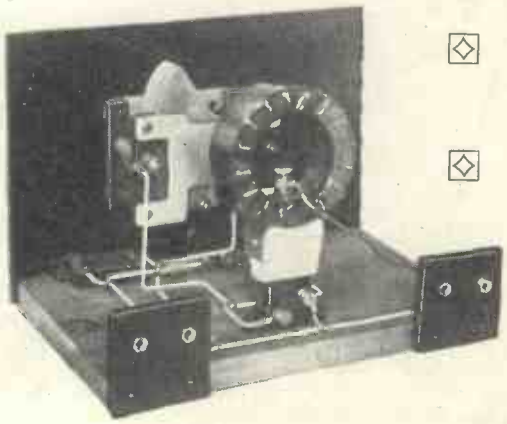
It should be noted that in each case the component mentioned first is that used in the original set and allowed for in the layout.

(Continued on page 536)

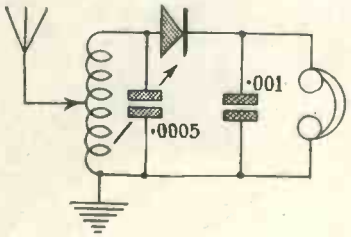
(Right).—Plan view of the Centre-tap Crystal Set.

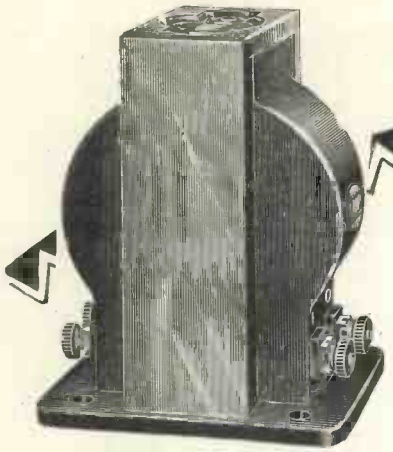


(Right, below).—Rear view of the Centre-tap Crystal Set.



(Below).—Circuit of the Centre-tap Crystal Set.





IGRANIC "G" Type L.F Transformer

Buy by the name—

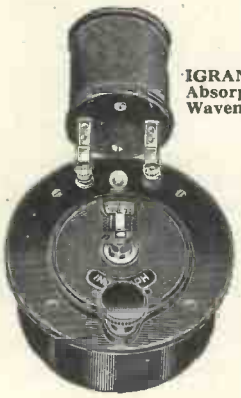
IGRANIC

Sometimes a name is more than a mere word, it is a symbol which carries an assurance of dependability. So it is with "Igranic." It is a name which carries an assurance of the best workmanship, the highest quality materials, and the highest standard of technical perfection in all radio components with which it is associated.

If you want your set to be just as good as it can be, then see that the name "Igranic" is on every component, for remember that the performance of any set cannot be good unless the components put into it are good.

The range of Igranic Radio Devices is the most complete that exists —there is a device for every purpose and every one attains the same high standard of perfection.

Here are a few which will interest you, but for particulars of the full range send for List No. J365, which will gladly be sent by return.



IGRANIC Absorption Wavemeter

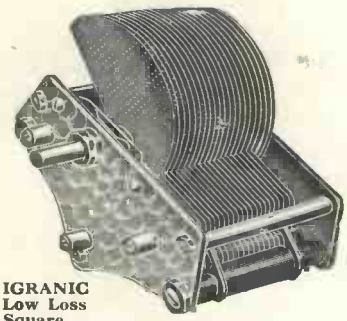
L.F. Transformer, Type "G"

Sets a new standard in transformer design. Substituted for an old transformer it will give new life and unequalled tone range to a wireless set. Two ratios.
3.6 : 1 for first and single stages.
7.2 : 1 for second stages and for values of low impedance. Price **30/-**

Absorption Wavemeter

Enables all stations received to be quickly identified. It also makes an efficient wave trap. An invaluable accessory to any wireless set. Price **£2/13/6**, without coils.

Coil A	15— 55 meters	...	Price	**10/6**
„ B	50— 157 „	...	„	**10/6**
„ C	160— 600 „	...	„	**14/-**
„ D	550—2000 „	...	„	**£1/1/-**



IGRANIC Low Loss Square Law Variable Condenser

Low Loss Square Law Variable Condenser

Britain's most famous condenser. Used by all discriminating set designers in the most successful sets.

.00015 mfd.	...	Price	**12/-**
.0003 „	...	„	**14/6**
.0005 „	...	„	**17/6**
.001 „	...	„	**22/6**

Filament Rheostat

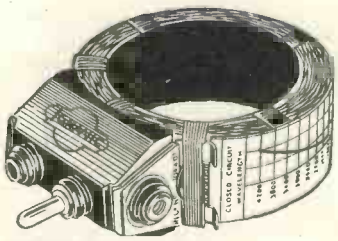
A Rheostat that has stood the test of time. At its reduced price it offers exceptional value.

Price **2/-**

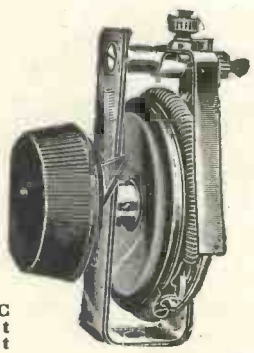
Tapped Triple Honeycomb Coil

Provided with centre and aerial tappings, it has a large number of uses in modern circuits.

No. 1	...	Price	**3/9**
„ 2	...	„	**4/3**
„ 3	...	„	**4/9**
„ 4	...	„	**5/6**
„ 5	...	„	**6/3**



IGRANIC Tapped Triple Honeycomb Inductance Coil



IGRANIC Filament Rheostat

COMPANY
IGRANIC
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149 Queen Victoria St.
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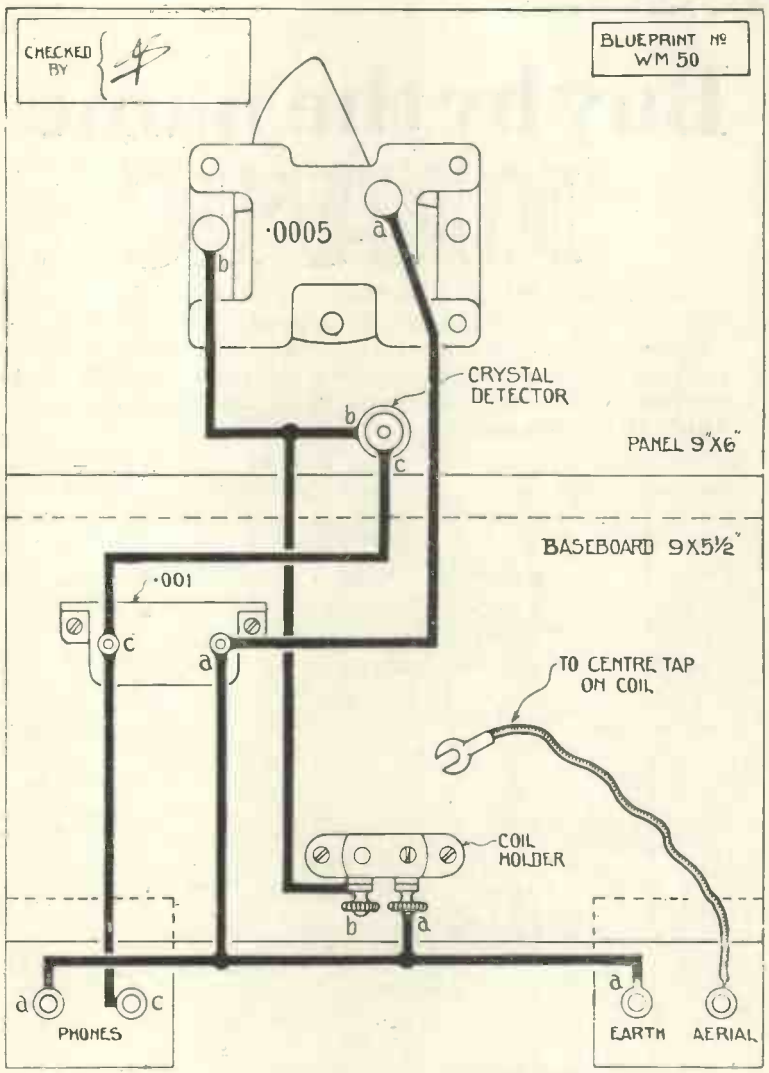
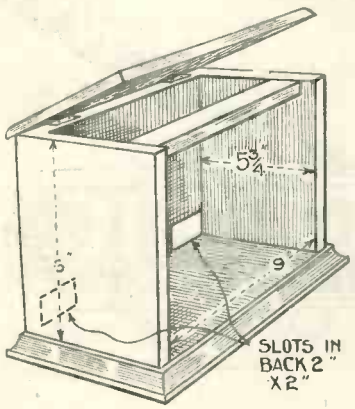
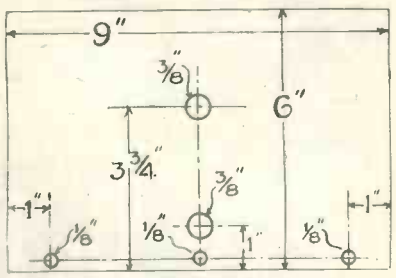
Branches : BIRMINGHAM, BRISTOL, CARDIFF, GLASGOW, LEEDS, MANCHESTER, NEWCASTLE-ON-TYNE

The Centre-tap Crystal Set (*Continued*)



This layout and wiring diagram can be obtained as a full-size blueprint for half-price that is 3d., post free, if the coupon on page iii of the cover is used before January 31





(Above).—Panel layout of the Centre-tap Crystal Set

(Left).—Cabinet of the Centre-tap Crystal Set

Construction of this receiver will be greatly facilitated for many amateurs by the use of the full-size blueprint layout, drilling guide, and wiring diagram that can be obtained for half price, that is 3d., post free, up to the end of January, if the special coupon on page iii of the cover is used. Address your request for a copy to Blueprint Dept., WIRELESS MAGAZINE, 58-61 Fetter Lane, E.C.4, and ask for No. WM50.

Essential Details Given

It is not, of course, essential to use a full-size blueprint, and all the necessary details are given in these pages.

The first step in construction is the drilling of the panel. There are five holes to be drilled right through the panel (three required for fixing the panel to the baseboard are not indicated).

When this has been done the components are to be fixed to the panel. The condenser and detector are one-hole fixed, and the mounting of them is a few minutes' work only.

Wiring the Receiver

Wiring can next be started, as indicated by the wiring diagram. It will be seen that each terminal point is marked with a letter of the alphabet; this indicates the order in which wiring should be carried out. All those points marked with the same letter should be connected together with one wire or as few wires as possible. Thus, first connect all those points marked *a*; than all those marked *b*; and so on until the wiring is completed.

Suitable Coils

To test the set, place a No. 40 or 50 centre-tapped coil in the holder. Now place the set in the cabinet and connect up the aerial, earth, and headphone leads. Connect the centre-tap on the coil to the aerial terminal by means of a flexible lead.

Pull up the detector plunger and allow it gently to return to its original position, at the same time turning the condenser dial until signals are heard.

To change over to the other band of wavelengths it is necessary only to substitute another coil.

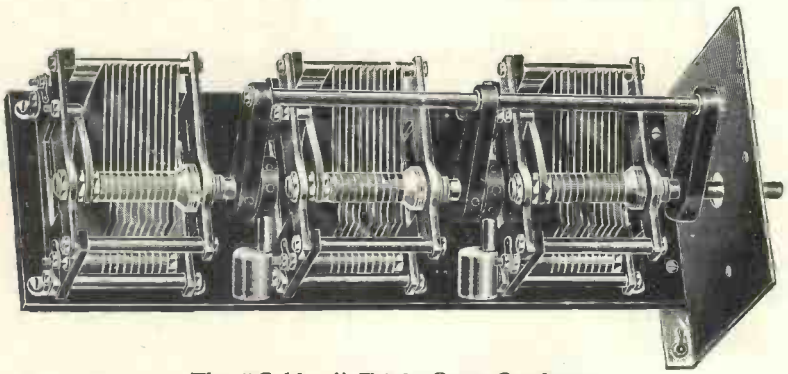
(Continued on page 542)

Build Your "Phoenix V" with

CYLDON

As specified by the Designer

The "Phoenix V" receiver promises to be one of the most popular circuits of the day. Designed by J. H. Reyner, Esq., B.Sc. (Hon.) A.M.I.E.E. of "Solodyne" fame, it is only necessary for you to use the best components to ensure success. The following "Cyldon" condensers were used, and are specified by the Designer.



The "Cyldon" Triple Gang Condenser

THE "CYLDON" TRIPLE GANG LOG MID-LINE CONDENSER

consists of .0005 Mfd Cyldon Log Mid-Line Condensers coupled together by means of ebonite arms, counter balanced and braced together at the extremity in such a manner that absolute rigidity is assured. A Nickel plated brass weight opposes the weight of the ebonite arms and bracing rod.

The condenser units are far apart, so that no interaction can take place.

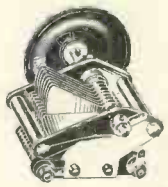
Each condenser is entirely separated electrically. A copper aluminium anti-capacity plate is supplied, and Independent adjustment is provided on each Condenser.

PRICE:

Without dial. G3. Three-Gang .0005 £3 10 0

THE "CYLDON" BEBE CONDENSER

This Cyldon product is the accepted standard for use in Reinartz circuits, for Reaction and balancing stray capacities. It is specified for the "Phoenix V." The vanes are shaped true square law.



PRICES:

List No. BB1 .0001, 7/6.
List No. BB15 .00015, 8/-.
List No. BB2 .0002, 8/6.
List No. BB25 .00025, 9/6.
List No. BB3 .0003, 11/-.

Write at once for the new "Cyldon" Booklet which gives full details and illustrations of all "Cyldon" equipment required for your "Phoenix V."

"CYLDON" TEMPRYTES

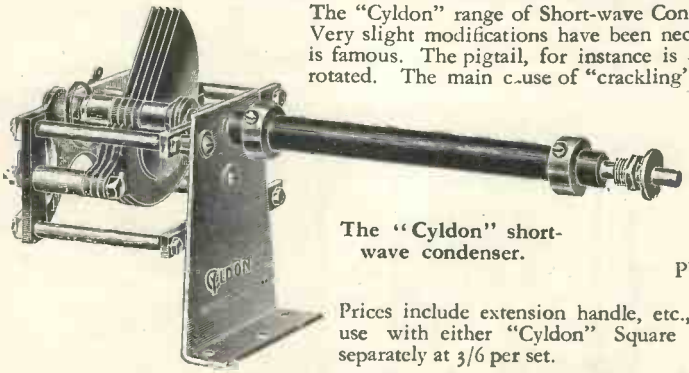
For efficient filament control, no matter what make of valve you employ, "Cyldon" Tempryte will give the best results on your "Phoenix V." Write now for the "Tempryte" Valve Chart showing the particular "Temprytes" you require.

PRICES:

List No. T1 Temprytes, 1/6
List No. T2 Mounts, 1/-
List No. T3 Shorting Pluga, 6d.

Write for the "Cyldon" Tempryte Chart to-day.

"CYLDON" CONDENSERS FOR THE NEW "SHORT-WAVER"



The "Cyldon" short-wave condenser.

The "Cyldon" range of Short-wave Condensers is the result of exhaustive research and experiment. Very slight modifications have been necessary to the many features for which our standard range is famous. The pigtail, for instance is air-spaced so that it will not touch its own turns when rotated. The main cause of "crackling" noises is thus entirely eliminated. The frame is widened out considerably so that the vanes are spaced much further from the end plates than in the ordinary standard condensers. The "Radion" dielectric is right outside the electrostatic field as in all standard "Cyldon" models. The Assembly includes a long bronze bearing with ¼-inch diameter Thrust Face, precision ground spindle and thick skeletonised end-plates.

PRICES: (Complete equipment as illustrated).
.00015 15/- .00025 16/- .0001 14/6 .0002 15/6

Prices include extension handle, etc., Extension rod, bracket panel bush nut and spindle (for use with either "Cyldon" Square Law or Log Mid-line Condensers) can be supplied separately at 3/6 per set.

SYDNEY S. BIRD & SONS, LTD.

Cyldon Works, Sarnesfield Road, Enfield Town, Middlesex

Telephones: "Enfield 2071-2." Telegrams: "Capacity Enfield."

Contractors to the B.B.C., H.M.R.A.F., H.M.O.W., and all the leading manufacturers of quality receivers. Sole Australian Agents: E. V. Hudson, 55-57 Charlotte Street, Brisbane, Queensland. Sole Indian Agents: Bombay Radio Co., 73-75 Queens Road, Marine Lines, Bombay 2.

Goodall Advt

Ada Reeve, actress

Spence Malcolm, actor

Richard Hayward, ballad singer and speaker

Betty Elsmore, actress

BROADCAST MUSIC of the MONTH

Reviewed by STUDIUS

VARIETY has certainly been the keynote of the month, and although many people still hold that plays and operas are not suitable material for broadcasting, one of the best of the latter was the choice of the famous comic opera, *The Rose of Persia*, by Basil Hood and Arthur Sullivan. It formed one of the last of the Carl Rosa operas.

Contrast

Contrast was provided by the performance, relayed from the Victoria Rooms, Bristol, of Sir C. Villier Stanford's opera *The Travelling Companion*, in which many well-known broadcasters took part, including Miss Louise Trenton, Steuart Wilson and Dorothy D'Orsay.

Quartet and four-part singing has been exploited abundantly, some considerable contrast being provided; the great Russian Kedroff Quartet were again announced, the Zaaloff's, another Russian group, the Four Admirals a new American combination, and the Southern Three, who had not been heard in the studio for over eighteen months.

There is no doubt that the cult of negroid music has become a broadcast obsession, for hardly a week has passed without the inclusion of either negro performers or music, the most recent being the recital of plantation songs by the Wireless Chorus under Stanford Robinson—rather a waste of good performers.

Apart from the big concerts which have been held fortnightly at the Queen's Hall and the People's Palace, there have been several outstanding orchestral concerts, beginning with the visit of Sir Henry J. Wood to Leamington Spa where, from the Pump Room, the Birmingham Studio Symphony Orchestra of sixty-five performers, with Mr. Harold Williams as soloist, gave an interesting programme.

Herbert Parker, singer

Doris Hitchener, singer

On December 11, at 2LO, Sir Hamilton Harty conducted the Wireless Symphony Orchestra, when the programme included Granville Bantock's *Song of Songs*, with Dorothy Silk, Trefor Jones and Norman Allin as soloists.

The art of the vocalist has been most prominent, however, and songs of all countries, ages and composers, have been heard One must still deplore the predominance of German songs, and question the taste of singing modern German music by a German artist on Armistice Sunday; although perhaps it is late in the day to complain, this broadcast was surely open to criticism.

Bournemouth

Bournemouth has certainly stood out this month, if only for its ninth of the series entitled *The Wings of Song*, devoted to the songs of Sir Hubert Parry and Sir Edward Elgar, with that fine singer Leonard Gowings as soloist.

Another singer, but one not heard frequently enough, is George Parker. He will be remembered for his recent performance in the song-cycle by John

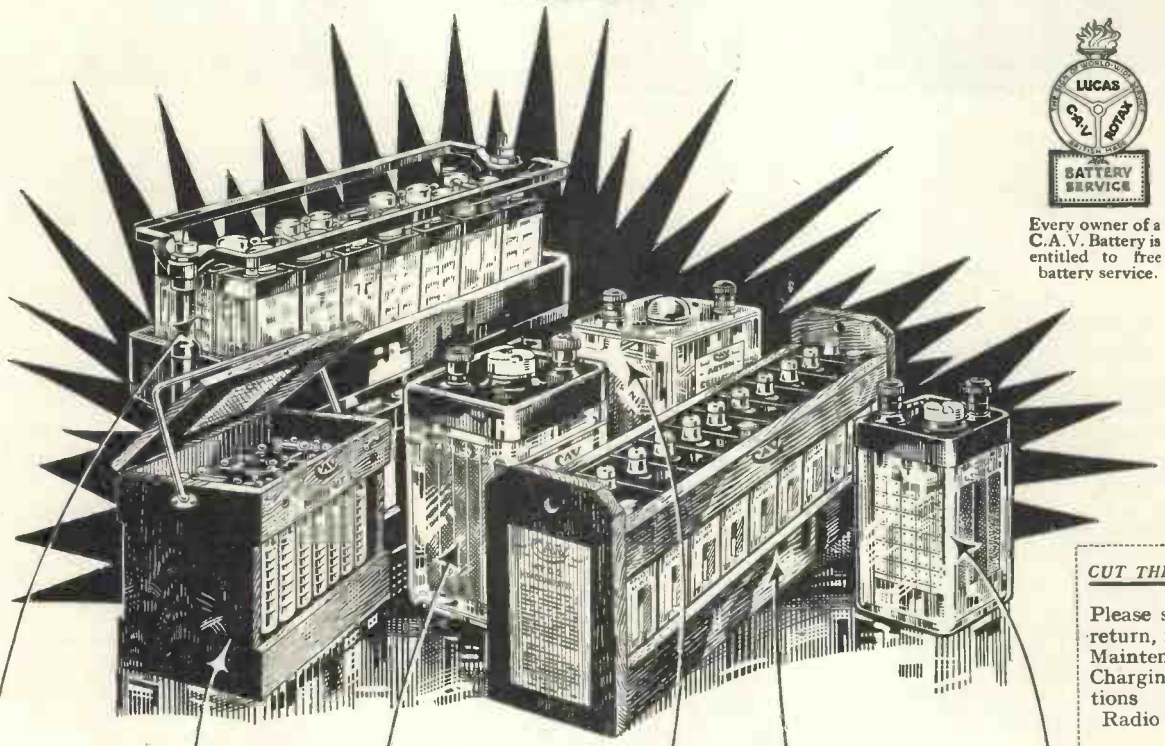
(*Continued on page* 540)

Charles True, violinist

Louise Trenton, singer

Your Choice

C.A.V RADIO BATTERIES



LUCAS C.A.V ROTAX BATTERY SERVICE

Every owner of a C.A.V. Battery is entitled to free battery service.

CUT THIS OUT

Please send me by return, free copy of Maintenance and Charging Instructions Book for Radio Batteries.

Dept. O.

THERE IS A TYPE FOR EVERY RADIO USER

60-volts. **H.T.3.** *2500 Milliamp hrs.*

The original H.T. Accumulator of compact design. Every cell air spaced and embedded in hard wax. Tappings can be taken from any cell. Obtainable in 30, 60 and 90-volt units.

60-volt. Fully charged. **£3 : 0 : 0**

42-volts **H.T.18.** *5000 Milliamp hrs.*

A large capacity battery of sound constructional design. Suitable for large receiving sets, public address systems and small transmitters.

£3 : 17 : 6

ACTON CELLULOID.

Supplied in all capacities, this range of low tension batteries is offered at competitive prices, while the quality is in every way representative of our 36 years experience in battery manufacture.

2-volt. 30 amp. actual. **13/6**

ACTON GLASS.

The "Acton Glass" low tension range provide an alternative to the celluloid cased battery, and is also suitable for tropical climates. All capacities supplied.

2-volt. 48 amp. actual. **16/-**

A.G.M. MASS PLATE.

This 20 amp. 2-volt mass plate cell is ideal for Sets not taking more than ½ ampere The charge can be spread over months without danger of sulphation.

Supplied dry charged **5/-**

20 volts **H.T.G.2.** *2500 Milliamp hrs.*

The ideal High Tension supply for the average Broadcast Receiver. Any voltage obtained by coupling a suitable number of units. A 10-volt tapping point provided.

Supplied dry charged **15/-**

Our Radio Catalogue of Sets, Components, H.T. and L.T. Accumulators, etc., will be forwarded free on application.

C.A.Vandervell & Co.'s Ltd.
ACTON, LONDON, W 3

Depots at BELFAST, BIRMINGHAM, BRISTOL, COVENTRY, DUBLIN, GLASGOW, LEEDS, MANCHESTER & NEWCASTLE.
Service Agents throughout the Country.

Broadcast Music of the Month (Continued)

Philip H. Harper, actor

George Parker, singer

Geoffrey Dams, singer

Ireland, "The Land of Lost Content."

Another good provincial broadcast was the Community Singing Concert of the British Sailors' Society, relayed from Cardiff on December 14. The audience was composed entirely of sailormen. Cardiff again provided a unique programme in *The Invisible Host*, the songs in which deal with the appearance and intervention of angels. Mr. Walter Glynne, in items from *The Messiah*, and Miss Margaret Price and the Mountain Ash Girls' Choir carried out the theme of the programme with very suitable excerpts.

Other Singers

Besides many other artists may be mentioned Miss Doris Ashton, a fine soprano singer, Miss Doris Hitchener, Herbert Parker, Richard Hayward, a speaker and singer of Cardiff, and Geoffrey Dams.

The theatrical element, too, has been well represented, amongst the actresses being Miss Lillian Braithwaite, who made a special series of what she calls *Kiddielogues*, written by Eileen de Mancha, Miss Ada Reeve, who appeared in several of the variety programmes, and A. C. Astor, the American star, being among the broadcasters.

Clever Actress

A clever actress, too, is Betty Elsmore of the Manchester station stock company, who has played in nearly every one of their productions.

Liverpool station has been greatly in evidence, and its special series of programmes covering a wide range during Liverpool's Civic Week in October gained special success, due in no small measure to the work of Edward P. Genn, the Dramatic Producer, and Mr. William Armstrong, the Director of the Liverpool Playhouse. He will be remembered also for his own performance of *Faust*, when it was performed during the same month.

Variety has had its full share of honours, though there is still a tendency to insert too many syncopated turns.

Child Impersonators

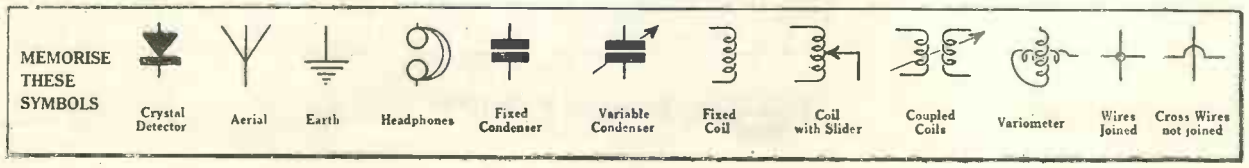
Mona Grey, whose child impersonations seemed to please a great many people at the last Royal Command performance, made a re-appearance before the microphone early in the month.

Welcome figures have been Helena Millais, Tom Clare, the original of the sketch *Cohen on the Telephone*, Yvette, who appeared at Bournemouth, Tommy Handley and Mabel Constanduros. I note, too, that Robert Pitt and Langton Marks, the earliest of broadcast entertainers, have been heard at 5GB under their old pseudonyms of Uncles Mutt and Jeff.

Soloists

It is, however, in the choice of instrumental soloists that the last few weeks have been made memorable. Going back as far as the National Concert at the Queen's Hall

(*Continued on page* 542)



Not Necessary to Buy a Tungstone Twice in a Lifetime

Because Standardised and Interchangeable renewable Die Cast and Machine Pasted Plates PERPETUALLY replace a set of Used Plates. Dry Plates partially first charged are ready for immediate use. Can be stocked for unlimited period in dry place. Spare Plates sold at reasonable prices with allowance of 4d. per lb. for returned disused Plates. Anyone can quickly and easily slip Set of New Plates into the Indestructible Guaranteed Metal Containers in use.

TUNGSTONE'S "REVOLUTIONARY" SCIENTIFIC "DISCOVERY" COMPLETELY & RELIABLY REVERSES WORLD'S BATTERY PRACTICES AFTER 50 YEARS' STAGNATION

Without Cost to Purchaser, all Plates when made at the Works, are Fully Formed also given a Partial First Charge. All Plates are made chemically and electrically safe. Mechanically secure. Absolutely sure Preventative against damage to Plates on First Charge or shortened future Working Life. Also highest possible ratio of Storage Capacity is secured during working life. British Government's World's Record Test at 96% Amp. Hr. 88% Watt. Hr. are fully maintained.

ALL THE WORLD'S MAKERS DISPATCH THEIR PLATES IN AN INCOMPLETE DELICATE UNRELIABLE MANUFACTURED CONDITION

Some are ONLY slightly formed. NOT all completely formed. NONE are Partially First Charged at the Works as Tungstone without cost to Purchaser.

ALL THE WORLD'S MAKERS "PASS ON" TO THE PURCHASER

the many serious risks of Forming, and giving the First Full Charge, also the increased cost of a necessary and exceedingly long first charging period extending from 24 to 72 hours and longer.

First Charge Only 4 Continuous Hours

FOR ANY TUNGSTONE STORAGE BATTERIES RATED FROM 6 TO 5,000 AMPS.

On Car or Bench Portable Batteries, charging rates from 6 to 30 amps. based on rated amp. hour House Lighting Works Central Station Batteries can be discharged for light ONLY during the first charging period.

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112 Pages Battery Pocket Guide containing Special Illustrated Articles on—

MODERN BATTERY FAILURES

Ask Local Wireless and Motor Dealer or send Name on Postcard

The Independent Battery of the British Empire.

Tungstone Accumulator Co., Ltd., 3, St. Bride's House, Salisbury Square, London, E.C.4

Broadcast Music of the Month (Continued)

Left: William Armstrong, Director of Liverpool Playhouse.

Right: Irene Brooke, pianist.

on November 28, Guilhermina Suggia was announced as the solo cellist. This instrument has also been heard in the hands of Arnold Trowell, C. Warwick Evans, the principal of the Queen's Hall Orchestra, the London String Quartet and of many solo recitals, W. H. Squire, player and composer, too, and Cedric Sharpe, another early broadcaster.

Amongst the violinists must be mentioned Isolde Menges, who joined forces with the pianist Harriet Cohen. Louis Godowsky was heard at Newcastle; we also liked Arthur Catterall, Albert Sammons, Leonard Hirsch, Mr. Charles True of the younger school, and Spence Malcolm.

The solo pianists of recent recital include Miss Irene Brooke, the sister of another clever pianist, Miss Una Trueman. Their recitals, both as soloists and duettists, have met with much enthusiasm, especially in the provinces, where they have been the means of early introducing some of the great classical concertos.

Special Programmes

Special programmes have, of course, been prepared for the Christmas season, and an interesting announcement was that of the attempt to broadcast to the Empire from 5SW, the short-wave station at Chelmsford, the carol concert held at the Royal Albert Hall on the December 17.

It remains now to be seen what 1928 brings us in the form of brighter programmes. Let us have less "dull spots" and please give us more popular music!

STUDIUS.

When Signals Are Too Loud

THE crude methods employed by many listeners to cut down volume when required are out of all comparison with the great pains taken to ensure perfect purity at full volume. Very often the volume-control devices used cause considerable distortion when signal strength is cut right down.

Few Ways of Reducing Strength

In an average set there are, in fact, few ways of reducing signal strength without affecting results in some other way, unless, of course, a proper volume control is incorporated. Detuning may mean a loss of selectivity, reducing filament current or H.T. is almost certain to introduce distortion, and switching by means of which one valve is cut out does not give fine control over volume.

Possibly the best way to regulate loud-speaker output is to shunt a variable high resistance, as used in some R.C. amplifiers, across the primary of the first L.F. transformer, or across the anode resistance if one be used.

This variable resistance acts simply as an adjustable "short" across the impedance in the detector-valve circuit, and has no appreciable affect on purity.

B. F.

It matters not whether your knotty problem is a theoretical or a practical one—in either case the Technical Staff of the "Wireless Magazine" is ever ready to help you out of the difficulty.

Just write your query out on one side of a sheet of paper (this small point saves us time and enables us to send an answer quicker) and send it with the coupon on page iii of the cover, a stamped addressed envelope and a fee of 1s. (postal order or stamps) to:—

Information Bureau,
"Wireless Magazine,"
58-61 Fetter Lane, E.C.4.

The Centre-tap Crystal Set

(*Continued from page* 536)

Once signals from a station have been received the condenser-dial setting should be noted for future reference, so that subsequent operations of tuning-in will be as simple as possible.

Care in Adjusting Dectector

The results obtained from such a receiver as this depend very largely on the efficiency of the aerial-earth system and the operator's care in adjusting the detector (once the best sizes of coils have been determined.)

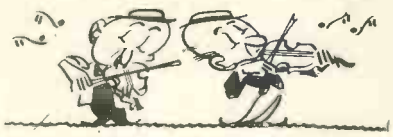
Good Aerial and Earth Needed

It is worth while taking trouble to see that the aerial and earth are as good as they can be under the circumstances, while a light touch should be cultivated for adjusting the crystal detector to its most sensitive point.

Fiddling Jobs

HAVE you seen to it that the light, electric or gas as the case may be, in your wireless workshop is in as good condition as possible?

You know that there are some fiddling jobs to be done in wireless work and that there is nothing more



Fiddling Jobs

trying about such jobs than to have to do them in a poor light.

Of course, daylight is far and away the best light to work in when soldering up a set or when doing one of the numerous odd jobs one has to do from time to time in connection with wireless. But we do not get much daylight in winter. In fact, it is frequently necessary to employ artificial light in the middle of the day during that season of the year.

Hence it seems to me that, just now, it is worth while seeing to it that the light in one's wireless workshop is at its best.

Your Most Fiddling Job?

Speaking about fiddling jobs in wireless makes me wonder what is the most fiddling job you have lately undertaken in your favourite pastime.

I can easily tell you my most fiddling wireless job of the last few weeks. It was connecting up a set of forty-eight small Leclanche cells to make a wet high-tension battery.

I had to solder connecting wires from the zinc plates to the brass tops of the carbon rods in the sacs. By the time I had got to number forty-eight connection, I was very tired of the job.

Have you ever tackled the same kind of fiddling job? If so, I wonder how you held the sacs. I held mine in one of those candlesticks with a spring clip.

AERIAL.

A Place for Everything —and Everything in its Place!

"THE best position for a set is that in which both aerial and earth leads are short, the loud-speaker is well placed in regard to the acoustic properties of the room, and the batteries will not be subject to excessive damp or heat."

How It Should Be Placed

"Oh, yes," said Mr. Obadiah Fazakerly, closing his wireless text book, "that's just how my set should be placed."

He cast a glance of severe disapproval at a small loud-speaker outfit neatly arranged on a table in an out-of-the-way corner. His gaze wandered round the room in search of a more suitable site, where "the batteries will not be subject to excessive heat or damp" and so forth.

The book-case, dumb-waiter, gramophone cabinet. . . . Ah! On the mantelpiece: the very thing! In less time than it takes to put the H.T. across the filaments O. Fazakerly had whipped clock, ornaments, and ash trays from the chosen site, the wiring to the set on the table had been disconnected and already the set itself was in his hands and O. Fazakerly was in a precarious position on a chair, mounting the set on the edge of the mantelpiece. Meet Mrs. Fazakerly!

"Obadiah! What are you doing with the wireless?"

"My love—er—I'm just putting . . . putting the set in a better place."

"I'll have you understand that my motto is: 'A place for everything and everything in its place.' And the place for the wireless is *not* on the mantelpiece. Put it back at once."

"All right, my love."

His Blue Pencil

O. Fazakerly is not an editor, but later he might have been seen crossing through with a blue pencil in a very editorial manner a particular paragraph in a certain wireless text book!

K. B.

Origin of Call-signs

IT is always interesting to speculate on the meaning of the letters in the call-sign of a broadcasting station. Sometimes the significance of those letters is very obvious. At other times it is difficult, or perhaps impossible, to suggest a satisfactory interpretation of the letters in a call-sign.

Obvious Significance

As an example of a call-sign the letters of which have a very obvious significance, we may quote 5SW, the call sign of the B.B.C.'s new experimental short-wave transmitter at Chelmsford—S for short, W for wave.

A call-sign more difficult of interpretation perhaps, is 5GB, Daventry Experimental. One might, however, reasonably suggest that the letters GB are the initial letters of Great Britain, the country of origin.

The call-sign of the older Daventry, 5XX is one which does not appear to admit of explanation, unless it be that the originator of this particular call-sign wished to convey an indication of the strength of the transmitter on a scale familiar to those of us who have a suitable cellar capacity.

What will be the call-signs of the new regional high-power, medium-wavelength broadcasting stations about which we hear so much? Will those stations take over the call-signs of existing stations or will they be given new ones?

Scots Station

If there should be one high-power station in Scotland, the call-sign of Glasgow, 5SC, might be retained since these two happen to be the first two

Call-Signs

letters of the word Scotland. Similarly, the Cardiff call-sign, 5WA, in which the letters are the first two letters of the word Wales, might be passed on to a high-power Welsh station, should there happily be one.

With regard to the new stations to be erected in England, one might do worse than make up call-signs from the old, historical names of the districts covered.

AERIAL.

FLUXITE

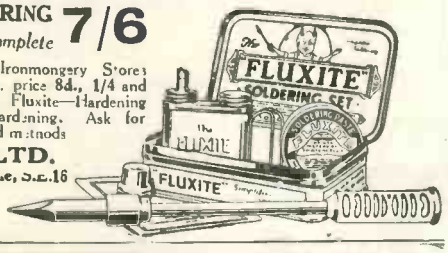
UNITES

IT SIMPLIFIES SOLDERING

FLUXITE SOLDERING SET - - Complete 7/6

All Hardware and Ironmongery Stores sell FLUXITE in tins, price 8d., 1/4 and 2/8. Another use for Fluxite—Hardening Tools and Case Hardening. Ask for leaflets on improved methods

FLUXITE LTD.
Dept. 33a/ Rotherhithe, S.E.16



1928 GREETINGS

A happy New Year for all listeners who enjoy the perfect reception ensured by Sifam Radio Meters.

NEW MODEL
Pocket Voltmeter.
High Resistance.
Heavy Nickel plated case. **9/6**

RESOLVE !

Resolve NOW ! to take the one step that immediately converts your set into a modern super-efficient receiving apparatus. Leave behind all the disappointments of spoiled programmes, howling distortion, and the expense of over-discharged battery repairs.

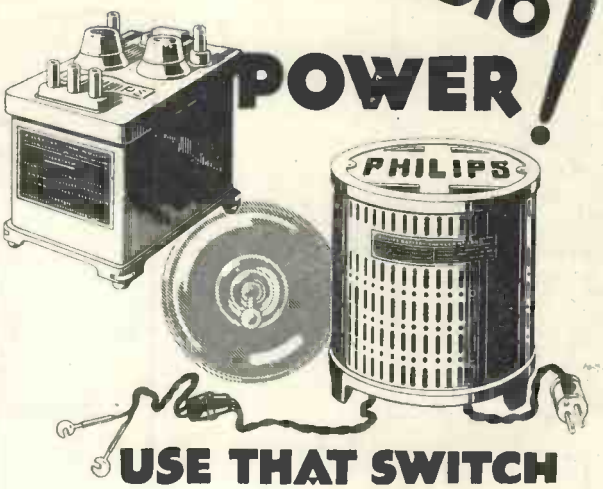
Start right in 1928—take out a life insurance on your set—install a Sifam Radio Meter. Your dealer will supply or write direct to Dept. M.

Sifam Electrical Instrument Co. Ltd., 10a Page Street, Westminster, London, S.W.1

TEST YOUR SET TO-NIGHT WITH GUARANTEED RADIO SIFAM METER
And it won't let you down tomorrow!

M.D.43

FOR YOUR RADIO POWER !



USE THAT SWITCH

A perfect supply of radio power can only be ensured by using that switch the Philips way.

By Philips Units your electric light mains will give that constant, unfailing supply of power upon which perfect reception so much depends.

Power from the mains—used the Philips way—is cheap, reliable and safe.

IN PLACE OF H.T. BATTERIES

Philips H.T. Supply Units

A.C. Model, price complete, £7 10 0
D.C. Model, price complete, £5 0 0

FOR CHARGING BOTH H.T. AND L.T. ACCUMULATORS

Philips Battery Charger Type No. 1009.

A.C. only, price complete, £6 10 0

PHILIPS
For Radio

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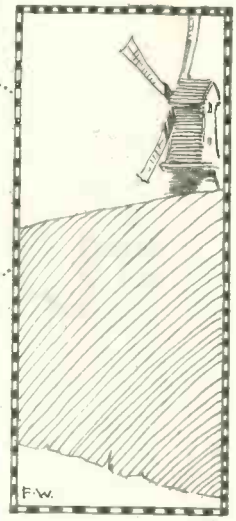
Queer Uses for Aerials!



The "Fence" That Frightened the Boys : How Puss Hanged Herself : An Improvised Clothes Line

THE other day I paid a visit to my father-in-wireless, a man of many and ingenious methods in the use of radio parts. His set was what I had expected him to have, the very latest. Going to the garden I could not see his aerial anywhere. This baffled me as he had told me that he had an outdoor aerial. When he came out I asked him: "Where's your aerial?"

Frightening the Boys

"There," he replied, pointing to some wires which formed the fence between his garden and his neighbour's. "I wanted a fence in a hurry, the wind having blown down the wooden one we used to have here, and I had nothing to hand except my aerial. It works well. And," he continued in a whisper, "it frightens the boys next door away, as they think the wires are live."

Recently I read of an aerial being used as a tight-rope by a squirrel, and on another occasion a cat managed to convert a low aerial into a gallows.

In My Absence

On one occasion—the one and only occasion, too—my wife or the maid broke the clothes-line with the inevitable result of dirty clothes. The aerial being situated in a good position, it was lowered to reasonable reaching distance and used as a clothes-line. When I came home to tea I found that not a note or a sound came through my set.

For over an hour I tested the valves, the accumulator and the joints, but to no good purpose. Thinking that something might have happened to the aerial I went out into the garden to find a clothes-line. My wife swears she will put up with wet clothes or even dirty clothes before she uses the aerial as a line again. So say I.

During some recent festivities in our town the children of a neighbour wanted to put out some bunting, like all the other children, only they wanted to do the thing in much better style. They secured the flags and banners, lowered the aerial and on it placed in due order all the decorations they could possibly find. It looked about the best show during that day, but neither they nor their parents have had any wireless programmes since.

When the Dog Barked!

A Welshman in the early days of radio beat all this. His dog was a real barker—that meant a real house-dog—but kept on disturbing all the people that approached the house. At last he tied the dog by his collar to the aerial, thinking it would be out of the way of visitors. He swears that he heard nothing but dog barks through his loud-speaker for a fortnight afterwards.

E. B R.

MISS JOSEPHINE TRIX

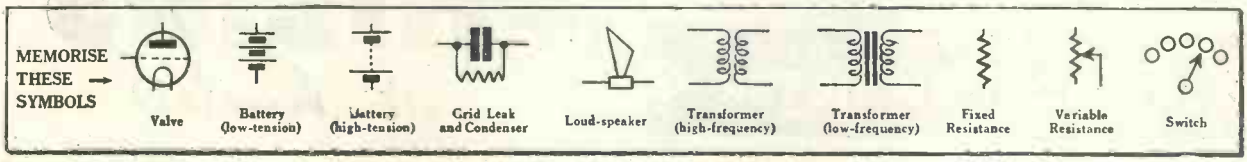
Frequenty heard in B.B.C. variety

Cutting Out 2LO— *AT 200 YARDS!*

THOSE of us whose lives have been plagued with an unselective receiver must often have wondered how Selfridge's wireless department manage to receive any station other than 2LO, when the latter's aerial is actually situated on their building.

Three kilowatts let loose at a range of 200 yards is an experience which few distant-reception enthusiasts would care to encounter; yet Selfridge's have overcome the difficulty,

(*Continued on next page*)



as the following excerpt from a report of them to the General Electric Co., Ltd., shows :—

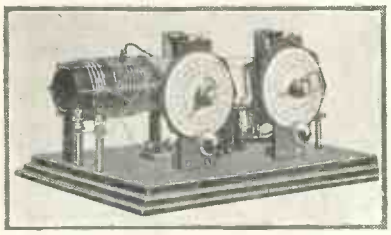
We have installed this set with a 20-ft. aerial on the roof, the total length, including down-lead, being about 20 ft., in our radio annexe at 101 Wigmore Street, W.1. The set, therefore, is working within 200 yards of 2LO.

We are able to receive during daylight hours, *even when 2LO is working*, 5GB, Langenberg, Hilversum, Radio-Paris and Daventry at full loud-speaker strength without any sign of interference from 2LO.

Such a performance under the shadow of 2LO's aerial is, in our opinion, really remarkable.

The set used is the Gecophone Six-valve Stabilised Receiver.

"Girdle Two" Results



To the Editor, "Wireless Magazine"

SIR,—I have made up the Girdle Two short-wave set of your September issue, and enclose a photograph which I thought might be of sufficient interest for publication.

I have adhered more or less to your original layout, although the condensers are .0003 microfarad and the grid coil has only 8 turns and reaction 6 turns.

KDKA, on 62.5 metres, comes in well on the eighth turn with the condenser full in. I have also received 2XAF and 2XAD at good strength. PCJJ on 31 metres, of course, roars in, also amateurs.

At present I am using my ordinary broadcast aerial, and I find that I get just as good results using no earth as with one.

This is the first short-wave set that I have constructed and I must say I am very satisfied indeed with its performance. I should like to add that I can get the carrier waves and faint signals from America—using no aerial or earth. Wishing your paper the best of luck.—MALCOLM H. WATSON (Saffron Walden).

YOU CAN GET A FULL-SIZE BLUEPRINT OF ANY SET DESCRIBED IN THIS ISSUE FOR HALF-PRICE BY USING THE COUPON ON PAGE iii OF THE COVER

Why Valves Become Paralysed

PRESENT-DAY dull-emitter valves, for the most part, have so-called thoriated-tungsten filaments, the action of which, even at this late date, is not fully appreciated by the average listener. The electronic emission of the thoriated-tungsten filament, according to the chief engineer of the Radiall Company (of America), depends upon the presence of a layer of thorium atoms on the outer surface of the filament.

Thoriated-tungsten

It will be noted that, unlike the oxide-coated filament found in some valves, the thoriated-tungsten filament is not merely thorium-coated, but it is permeated throughout its entire mass with the rare element thorium. During the normal operation of such a filament, the thorium on the outer surface is gradually evaporated, reducing the emission current and, if permitted to continue, rendering the valve short-lived.

However, while the heat of the filament serves to evaporate the thorium particles on the surface, it is also boiling fresh thorium particles out of the mass and up to the surface. Thus the surface is being continually replenished. Just so long as the filament voltage is not increased beyond 10 per cent. above the rated value, this evaporation and replenishing process continues at an equilibrium rate, so that a constant layer of thorium is maintained on the surface.

When subjected to an over-voltage on the filament, however, the evaporation becomes excessive, so that the valve accordingly becomes more or less paralysed. Operating these valves at sub-normal voltages is also liable to paralyse them slowly, as the filament temperature is then so low that the process of boiling out the thorium from the interior of the filament becomes abnormally retarded.

Need for Filament Control

Hence it is important that the thoriated-tungsten filament valves be operated strictly at their rated voltage, by means of hand rheostats with an accurate voltmeter, or, better still and simpler, perhaps by means of self-adjusting rheostats such as Amperites.

The WORLD'S BROADCASTING

Wavelength in Metres	Station	Call Sign
24	Chelmsford	5SW
158	Beziers	—
200	Biarritz	—
222.2	Strasbourg	—
223.9	Leningrad	—
236.2	Stettin	—
238	Bordeaux	—
241.9	Munster	—
250	Gleiwitz	—
252.1	Bradford	2LS
	Bremen	—
	Montpellier	—
254.2	Kiel	—
260	Toulouse	—
263.2	Bratislava	—
268	Strassburg	8GF
	Cassel	—
	Danzig	—
	Klagenfurt	—
	Nottingham	5NG
272.7	Sheffield	6FL
273	Limoges	—
275.2	Dresden	—
277.8	Leeds	2LS
278	Grenoble	—
279	Rennes	—
	Bordeaux	—
280	Oirdeo	—
283	Dortmund	—
287	Lille	—
288.5	Edinburgh	2EH
291	Radio Lyon	—
294.1	Stoke-on-Trent	5ST
	Swansea	5SX
	Dundee	2DE
	Hull	6KH
	Innsbruck	—
297	Liverpool	6LV
	Radio Agen	—
	Hanover	—
	San Sebastian	EAJ8
300	Koscice	—
	Cartagena	—
303	Nuremberg	—
305	Radio Vitus	—
306.1	Belfast	2BE
309	Marseilles	—
312.5	Newcastle	5NO
315.8	Milan	—
317	Almeria	—
319.1	Dublin	2RN
326.1	Bournemouth	6BM
329.7	Konigsberg	—
332.6	Breslau	—
333.3	Naples	—
337	Copenhagen	Radio-raadet
340.9	Paris	Petit Parisien
344.8	Barcelona	EAJ1
	Posen	—
348.9	Prague	—
353	Cardiff	5WA
357	Seville	—
	Graz	—
361.4	London	2LO
365.8	Leipzig	—
370	Paris	RadioLL
370.4	Bergen	—
375	Helsingfors	—
	Madrid	EAJ
379.7	Stuttgart	—
384.6	Manchester	2ZY
391	Toulouse	—
394.7	Hamburg	—
400	Aachen	—
	Cork	6CK
	Cadiz	EAJ3
	Madrid	Radio Espana
	Mont de Marsan	—
	Plymouth	5PY
405	Salamanca	EAJ22
405.4	Glasgow	5SC
408	Reval	—
411	Berne	—
418	Bilbao	EAJ11
422	Gleiwitz	—
423	Notodden	—
428.6	Frankfort	—
434.8	Freidriksstad	—
	Seville	—
438	Bilbao	EAJ9
441.2	Brunn	—
448	Rjuken	—
450	Rome	—
461.5	Oslo	—
462	Barcelona	—
454.5	Stockholm	SASA
463	Paris	—
468.8	Langenberg	—
476	Lyons	—
483.9	Berlin	—
491.8	Daventry Experimental	5GB
500	Aberdeen	2BD
	Cracow	—
508.5	Brussels	—
517.2	Vienna	—
535.7	Munich	—
545.6	Como	—
556	Budapest	—
566	Augsburg	—
	Saragossa	—
577	Freiburg	—
588	Zurich	—
675	Moscow	Popoff
680	Lausanne	—
760	Geneva	—
1,000	Leningrad	—
1,100	Basle	—
1,060	Hilversum	HDO
1,111	Warsaw	—
1,153	Kalundborg	—
1,180	Stamboul	—
1,250	Königswusterhausen	LP
1,320	Motala	—
1,450	Moscow	RDW
1,600	Bucharest	—
1,604	Daventry	5XX
1,750	Paris	CFR
1,760	Kharkov	—
1,804	Angora	—
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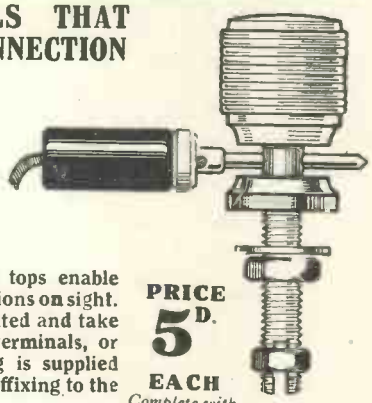
THE TERMINALS THAT TERMINATE CONNECTION ERRORS

"CLIX" "RAINBOW" TERMINALS



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THE FORMO Co., Crown Works, Cricklewood Lane, N.W.2 Phone: Hampstead 1787.

WHEN I first told the Editor about it he didn't believe me. I was not surprised, for indeed, no man shows a profit in his own country, but after I had given half-an-hour's practical demonstration, I saw his hand go furtively to the cheque book. Ten minutes later he was offering me fabulous sums to write an account for his readers.

If I Went to Chicago

Of course, as I pointed out, Mr. Tex Rickard had already guaranteed that, if I would go to Chicago—— however, to cut a long story short, I agreed to let you all into the secret.

And what a secret! As Shakespeare says on page 53 of Hamlet, "indeed, yes." Listen then. I am the most wonderful inventor of the age! Marconi, Edison, Bell, Record, yes, all those have done something towards earning the right to inscribe their names on the scroll of fame.

Yet I am sure that the rust of forgetfulness, the tarnish of familiarity, will have obliterated their memories when mine is revered and honoured by a thankful world.

I have invented the Thunkometer! You didn't see it at Olympia, because it wasn't there. I could take pages in the description of how the great thought came, the failures and disappointments, the years of toil and heartburn. But what matters it? As they say in Paris, sa sooffee.

Principle of Operation

Briefly then, the principle is as follows: Every time a thought is thunkt—this is a correct scientific word, and no error on my part—a whole series of waves is propagated in the aether. This, of course, is no new theory; it has in fact, been known right from the time of Epictetus, the discoverer of Mustard Gas, and those eminent research workers, Gilbert and Sullivan, did much good work on the subject also.

But then the thought presents itself, if these waves go out into space in all directions, what eventually becomes of them?

W. Sykes showed that undulatory propagations travel much farther, and with less loss of energy when the wavelength is small. Now, thought waves are infinitesimally small. About as big as . . . . yes, no larger, in fact less if anything, so you will quite realise that they are very diminutive little chaps.

Well, why should not these waves go on for ever? That was the thought that illuminated my intellectual horizon and begot conjecture after conjecture until I finally proved with the aid of a slide rule and Mercator's projector that they not only go on indefinitely, but are capable of being interpreted at any time of their career. They are, in other words, thought comets whose orbits are always within our electrical reach.

Wandering Thoughts

The next move was, of course, to invent an instrument to cope with the situation, and so I came to the Thunkometer. By its means it is possible to tune-in these wandering thoughts even though they were produced thousands of years ago.

The instrument is a triumph of ingenuity and mechanical skill, and is jewelled in every movement. A short description will have to suffice for the present, but I may say that it is impossible to beat the 11.4 model at the price.

Roughly, then, it consists of a long box with nobs on (Lat. nobo, nobere, nobiti, nobbut summat). An oatmeal box does very well, with the coupon cut out. In the left-hand corner there is a camelhair brush, and running down the centre is a rhomboidal super-structure, with a lattice-work diagnosis to catch any electrons that might escape the other port-holes. It is distressing to have to be so technical, but we scientists are like that. Quite.

When standing upright it resembles a home-made set, only more so. It is self-contained and complete in every detail, even to a spare wheel, and there is a bit more under the ledge.

Pp Eck Principle

Tuning is by means of several dials, so arranged as to eliminate all interference. These are so designed that oscillation is impossible, for incorporated on the front is a small gadgetometer, working on the well-known Pp Eck principle. Thus, for example, suppose I wish to obtain the views of Oliver Cromwell on Disestablishment. I turn one dial to O, another to C, a third to his age at death, a further one to the number of times he was married (to receive Henry Tudor, and others, a special loading coil is necessary), another to the number of letters in his name, only one Christian name being allowed, and all aces, kings, queens, and knaves counting ten.

Then, on depressing the clutch and lubricating the externals, Oliver's voice is heard in a loud-speaker. He will then answer any questions one cares to put or take, and if he gets abusive, merely a slight turn of a dial and he is sent back into the past.

Enormous Advantages

The advantages of this invention from scientific and historical standpoints are enormous. Questions over which century-old controversies have raged can be settled. The secret of the Bacon-Shakespere dispute is already as clear to me as is the riddle of the Sphinx. I know the regions to which the domestic fly departs during our cold season, and why summer roses fade. In a word, my invention makes man super-man. With one of my super-seterodyne thunkometers you may step from a mundane world into Arcade.

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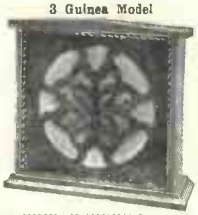
3 Guinea Model



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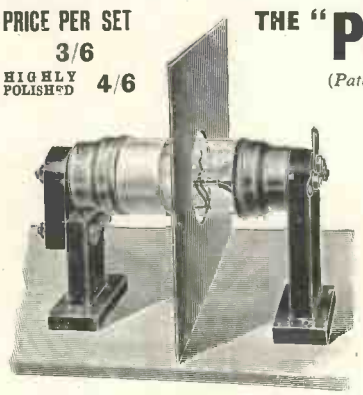

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The B.T.H. Loud Speaker provides the key to the problem of Christmas giving. The ideal gift must combine good appearance with utility. The B.T.H. Loud Speaker has both. It is a gift of which the giver may be proud, because it bears witness to his own good taste and discrimination. It will provide enjoyment for many years and will be a constant reminder of the giver. Start your Christmas shopping well by selecting a gift that is sure to please

Price £2 10s. 0d.

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The above price is applicable in Great Britain and N. Ireland only.

B T-H TYPE C2 LOUD SPEAKER

The British Thomson-Houston Co., Ltd. 2878

Cupid on the S.B. Wires!

A GERMAN newspaper, the *Frankfurter Zeitung*, protests that a new microphone which can be hidden in a vase of flowers and will make lovers' whispers audible in the next room is "an abuse of science."

A Romantic Story

This recalls an amusing story of the early days of the Leeds-Bradford broadcasting station. It is certainly a very romantic story, though it may not have seemed so amusing to the characters in it when they came to know of the trick that had been played upon them.

They were that most ancient of combinations, a man and a girl. The man was a B.B.C. engineer at Leeds, the girl a telephone operator at the London headquarters of the company.

It fell to the lot of the man to take regular duties "on control" at the Leeds-Bradford station. This is a monotonous occupation, but a duty of the greatest importance, as the engineer has to listen on a receiving set and check the quality and tone of the broadcasting. He is the guardian of the people's broadcasting.

The "stuff," as he calls it, comes along a land-line from London. He passes it on, through amplifiers, to the Leeds and Bradford transmitters, and sees that all is well with it. Usually the line is not "noisy," the "stuff" comes over all right, and, apart from his task of continually listening, the engineer is idle.

The Lady in the Case

Now our hero accidentally got into conversation on one such evening with the young lady telephone operator at 2LO. There is a spare line, in addition to that on which the "stuff" travels, and over this they talked. The engineer found it an enjoyable way of whiling away the hours—and so, apparently, did the girl.

So on evenings when the people's broadcasting was behaving itself the engineer would sit in the control room at Leeds, one earcap of his headphones to one ear (even at this stage he was not forgetful of duty) and the telephone to the other, talking to a lady whom he had never seen and who was 200 miles away.

The people's broadcasting went in one ear and his lady's voice in the other. So good are the B.B.C. lines, that he would talk in a whisper, so that anyone who entered the control room should not hear; and so they whispered sweet nothings across England for many nights.

But, alas! little did they dream that their whispers were being amplified and listened to by the vastly amused engineers in London.

Getting to know what was happening, these scamps "tapped" the line and connected it, through an amplifier, to a loud-speaker in another room at 2LO! There they listened and laughed.

There only remains the sequel. The valiant engineer, unabashed at the trick played upon him, went to London to see the girl whom he knew so well in the voice, but not at all in the flesh.

He asked her to marry him, obtained a transfer to 2LO, and in London they were married and lived happily ever after.

L.

A Serious Matter

GENERAL satisfaction is expressed by people who really matter at the considerable extension of the educational side of broadcasting, which the institution of alternative programmes has rendered possible. For too long has this new science been regarded simply as a vehicle for amusement, a mere device for whiling away the interval between dinner and bedtime.

The dossiers of the National Council for Uplifting Benighted Lowbrows are filled with the tragic records of characters undermined, homes destroyed and crimes encouraged, all of which can be directly traced to the baneful influence of broadcasting.

There is, for example, the sad case of William Nexus of Little Hiccough, who became so enthralled with the impassioned nightly recital of Rates of Exchange that he lost all interest in his job as butcher's roundsman and now does nothing but wander about the village all day asking himself and passers by such knotty problems as "How many zlotys make a chervonetz?"

Even more distressing was the effect of a month's dissipation in weather forecasts last summer on an insurance clerk named Woosnop of Wallops Magna. One evening when he was listening for the tenth time that month to the record of a depression approaching from Iceland, his wife tripped over the lead-in wire and shook the needle off the crystal.

Relieving His Feelings

Half surprised, half annoyed, he relieved his feelings by calling her a clumsy isotherm; whereupon she burst into tears and departed to her mother's, where she still remains.

But there is hope for the future. At the present rate of progress, educational programmes will soon put an end to the orgy of levity and undisciplined amusement which has wrought such harm. The note of seriousness must be reintroduced into our home life. Good, solid instructional matter without unnecessary trimmings is what is wanted to restore our national prosperity.

Corrective Programme

Fortunately the N.C.U.B.L. is in the field and arrangements have already been made for a special corrective programme to be broadcast from Daventry Experimental next month as follows:

7 p.m.—Informal gossip by Herr Watt Erbohr of the University of Blumendull on the Occurrence of Epizootic Mange among Canary Fanciers in Uraguay.

7.30 p.m.—Miss Black's entertaining Historical Chat "Sidelights on the Black Death."

8 p.m.—Chairman's speech at the Annual General Meeting of the Undertakers, Gravediggers and Mutes Friendly Society.

8.30 p.m.—Health Hints by Doctor Hatter. "The Toxic Effect of Laughter on the Epiglottis."

9 p.m.—Fashion Talk by Mlle. Commeilfaut: "Mourning Wear à la Mode."

9.15 p.m.—Song cycle by Mr. Chumpe: "Schedules Four are We," illustrating the differences between the various Schedules for Income Tax Assessments.

9.30 to 11.30 p.m.—S.B. to all stations. Special dramatised version of the Books of Euclid in Six Acts, featuring the world-famous characters, "Isosceles Triangle, Parallelopiped, and Square on the Hypotenuse."

Note:—The scene is laid in a place known as Three Dimensions and the time is Pre-Einstein.

IRVINE FOSTER.

THE high-power station of Kalundborg is not only a boon to the bulk of Danish broadcast licence-holders, but also a great asset to listeners in the United Kingdom; as its transmissions are well received in most districts of the British Isles, it gives us frequent opportunities of hearing what the Copenhagen studio offers to its subscribers in the way of radio programmes.

Lovers of Music

The Danes, generally, are great lovers of music, and possess in the capital a first-class State-owned opera house, a municipal orchestra of distinction, and several musical associations which place their classical and popular concerts at the disposal of the broadcasting station.

Many of these entertainments are given in the Great Hall of the Odd Fellows' Institute in Copenhagen. But it appears that the listener in these isles captures the transmissions of the Kalundborg station at a later hour, and especially on those evenings when relays are effected of dance music from either the *Wivel* or *Nimb* restaurants, both of which boast of very up-to-date orchestras, in no way inferior to the best heard in the London metropolis.

On most occasions the latest blues, fox-trots, one-steps, and Charlestons will be heard from Copenhagen, and the chorus of each item, if of British or American origin, is invariably sung in English.

Copenhagen's Chimes

Unlike our own stations, the late Copenhagen dance transmission does not conclude with, but is interrupted by, chimes and the time signal at 11 p.m., G.M.T., after which the broadcast is resumed for a further thirty or forty-five minutes. These chimes (as are those at 7 p.m.) are relayed from the Civic Hall Tower (Raadhustornet) situated on the Raadhuspladsen or City Hall Square, into which opens the *Stroget* or principal shopping centre—the Regent Street of the Danish capital.

The Kalundborg transmitter possesses no studio, and consequently no individual call; it limits its activities to the relay of the Copenhagen transmissions. Its name, however, is coupled with the announcement as follows: "*Her Kjobenhavns radiofonistation og Kalundborg Radio*," and as an opening signal a gong is struck thrice. When closing down, the last words might well be mistaken for English, and are easily understood, namely, "*God nat, god nat.*"

On dance nights, however, it frequently happens that when the "time is up" the transmission is suddenly switched off without any warning. I take it that the final call is cut out, and only given by the capital station on the shorter wavelength, but I have never been able to change over so quickly to Copenhagen to confirm this assumption.

Try for It

Try for Kalundborg at an early opportunity; it is a powerful station with a good signal, and the quality of its transmissions will always repay a search.

* * *

According to army traditions, Mademoiselle from Armentières played an important rôle on the Western Front during the Great War; according to reports from France, there is a strong possibility of her voice being heard again—on this occasion over the ether!

Surely, if the Lille station is transferred to her native city it is only meet that her appointment as studio announcer should be promptly ratified.

All this may not be mere rumour, for since the advent of the Lille and Rennes transmitters the Northern districts of France, which up to that time depended entirely on foreign transmissions for their daily wireless menu, seem to have gone "crystal" mad.

In the three towns, Lille, Roubaix, and Tourcoing — to which the PTT du Nord broadcast programmes are destined—almost every shopkeeper has added some wireless component to his ordinary stock of goods.

Miners' Odd Hours

The mining district of Lens, too, is well within the range of the transmitter, and as the only charge made for listening to the concerts is the modest tax of one French franc as registration fee, most daddies, "when they don't go down the mine," spend their odd hours in rigging up pit-props for the support of crooked aerials, and rush to the nearest *Marchand de T.S.F.* for a supply of coils and the latest "double-distance-five-power-crystal" with names ending in -ite!

"To make some T.S.F.," as the French call it, is now the latest craze for many miles around Lille and Rennes, and although for the present the programmes are still in an embryonic stage, there is no doubt that whatever entertainment is given, whether it be a transmission of worn gramophone records or a relay of a very second-rate concert from an outside café, considerable pleasure is derived by many thousands of new devotees to King Radio.

Not Impressed

Personally, I have not been impressed by the transmissions emitted by the new PTT station; no doubt I have been spoilt by the programmes arranged for me by our home studios. Lille possesses a carrier wave as little silent as the Scotch Express blowing off steam, intermingled with the noise of a generator which can only be compared to a noisy and very angry beehive.

In their anxiety to reach out as far as possible, the local engineers trouble but little about modulation, and on most nights on which I have listened to its outside broadcasts fading has been so pronounced and so rapid that, had I not known otherwise, I could have sworn that I had bridged the Atlantic.

(*Continued on page* 556)

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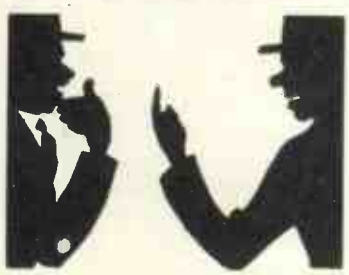


LOWEST LOSS SHORT-WAVE COILS

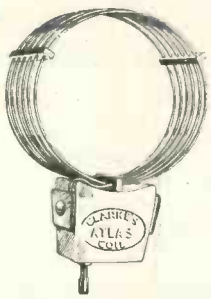
JUST ONE POINT

about the "Wireless Magazine" 3-valve Short-wave Receiver described in this issue, Whatever else you do INSIST on using the coils recommended.

"CLARKE'S ATLAS"

SHORT-WAVE COILS

simply have no equal for distance and volume. Anti-capacity mounts; wound with tinned copper wire, of stout gauge.



Manufacturers:

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Atlas Works, Old Trafford, MANCHESTER

PRICES

Size 2	2/6
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MAKE YOUR OWN CONE SPEAKER

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YOU'LL BE SURPRISED!

The New Wonder "Nightingale"
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AS FITTED TO OUR CABINET CONE

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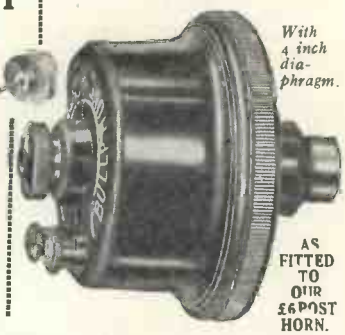

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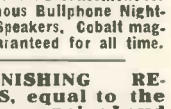

16 x 3½" and make a hole 2⅜" dia. in centre, this will carry the unit. Fix strip to board as shown.

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NIGHTINGALE SPEAKERS
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Continental Notes (*Continued*)

Generally speaking, the quality of the French PTT transmissions is far inferior to that of broadcast stations in neighbouring countries, and the reason for this failing is not far to seek; the PTT relays do not possess up-to-date plant.

Interesting Fight

At present in France a very interesting fight is taking place between the Ministry of Posts and Telegraphs and individual broadcasters. Although the law passed at the end of 1926 grants a monopoly to the State, the French governing body has not been able to enforce it.

It is endeavouring to control wireless telephony in that country by erecting some eighteen transmitters to relay the Paris Ecole Supérieure programmes, and by so doing starve or freeze out individual enterprise. And this brings me to Mademoiselle from Armentières.

Extending Its Influence

In the Lille and Rennes district the State has not met with competition, and for this reason wishes to extend its wireless influence in Northern France. The enthusiastic reception given to the Lille relay will induce the Posts and Telegraphs to increase the power of the transmitter, and with a view to developing its service there is a strong probability that it will be transferred to Armentières, a city which possesses a better site, if the transmissions are to be heard in Roubaix, Tourcoing, Lens, Valenciennes, Douai, Arras, Cambrai, and possibly Hazebrouck, Boulogne, and Dunkirk.

There is no doubt that if the service can be made a useful one it would also be of great benefit to the Belgian towns of Mons, Tournai, and Courtrai. And so, as I said, or meant to infer, Mademoiselle would again come into her own and her voice would be heard over some of the historic battlefields.

Rennes, for the present, is still very much in its infancy; it restricts its "output" to a relay of news bulletins from Paris and broadcasts from Lille. On two nights weekly it rests on its laurels, keeps off the air, and allows its listeners to seek their pleasures elsewhere.

Good Items Wanted

From all accounts, the French radio listener is thirsting for good wireless entertainments; in the main, he cannot get them from the provincial stations. If he possesses a multi-valve set he is at liberty to turn to Paris, but one station only in the capital to-day runs a satisfactory programme. Possibly by the time these lines are in print, Radio Paris —the most enterprising of the French transmitters—may have carried out its long-cherished plan, that of broadcasting on high power. At the time of writing I hear that it has, at last, been authorised to do so.

Plant Already Erected

The necessary plant has been erected, and it is quite likely that a 20-kilowatt station in the French capital may now be an accomplished fact. But from the French PTT, with its chain of small and weak relays, the average listener in France should not expect too much. Neither will he get it!

JAY COOTE.

A Talk on Short Waves (*Continued from page 484.*)

valve between the aerial and the detector, one form of which arrangement I show in Fig. 4, removes both these troubles, and produces a wonderfully stable receiver which, on telephonic signals, gives considerably stronger stuff than the original two-valver.

"W.M." Short-wave Receiver

A receiver with this arrangement is being described this month by the WIRELESS MAGAZINE Technical Staff.*

I have not tested the particular design given, but will endeavour to do so during the coming month and, if possible, will give a report on its action and suggest improvement if necessary.

In my own receiver, which is rather an elaborate affair (a photograph of which I show in Fig. 5), one extra high-frequency valve and one extra low-frequency valve are added to the circuit of Fig. 4, and this is sufficient to give really good loud-speaker reproduction from 2XAF and 2XAD.

Testing Against a Super-het

I have so far not had the opportunity of testing against this five-valve receiver a good super-het, but shortly I propose to do so, and it will certainly be interesting to see which method pans out the best for easy long-distance reception of telephone signals.

Every reader can obtain a blueprint of any *one* receiver described in this issue at half-price if the coupon on page iii of the cover is used.

* *See "The Screened-grid Short-waver" on page 478*

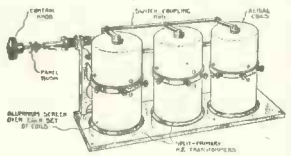
Tested by J. H. Reyner, B.Sc., A.M.I.E.E., in his Furzehill Laboratories

Novelties and New Apparatus

Lewcos Dual Coils

THE problem of switching over from one wavelength to another has always been one of difficulty, especially in neutralised H.F. circuits. The new Lewcos "double-decker" tuners utilise a novel method of doing this by mounting the transformers for low and high wavelengths both inside the same screen, the formers themselves being fixed to a central vertical spindle. Switching from low to high wavelengths is accomplished by rotating this spindle through about 30 degrees, which changes over all the connections internally.

A number of tests made on these coils in our laboratories indicated that the electrical efficiency is high and that the high-frequency resistance of the new coils is actually lower than that of the normal interchangeable type.



Lewcos Dual Screened Coil

In the multi-coil unit, each unit is carefully balanced and the switches are linked on to a common operating mechanism. Thus, having tuned in and made the necessary adjustments on the low wavelengths, it is possible to switch over directly to the high wavelengths and to remain correctly balanced for reception.

Practical tests confirmed our theoretical experiments as excellent results were obtained with single dual and triple units. The aerial coil has been tapped for various degrees of selectivity.

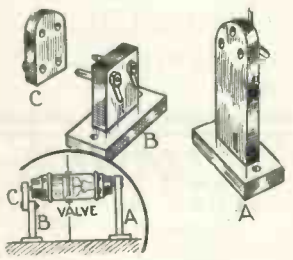
Lewcos components are made by the London Electric Wire Co., and Smiths, Ltd., of Playhouse Yard, Golden Lane, E.C.1.

Parex Valve Holder

ONE of the difficulties with the new screened-grid valve is that of the holder. For technical reasons the grid and filament pins are kept at one end of the valve while the connections to the screening grid and anode are taken at the other end. Although the spacing of the pins is such that they will fit an ordinary valve holder, yet obviously this cannot be used as it stands.

The Parex valve holder is made in two portions. One portion contains the grid and filament sockets spaced in the normal manner, while the other contains the two remaining sockets for the screen grid and the anode.

In order to insert the valve, the second socket is made in two portions, the top portion being fixed to the bottom portion by means of two plugs. It is thus possible to withdraw the top portion, insert the valve in the necessary horizontal position and replace the second portion of the holder which connects the outer grid and anode pins to the holder proper.



Parex Screened-grid Valve Holder

This is a simple arrangement and is suitable for incorporating in the usual type of screened-grid valve set.

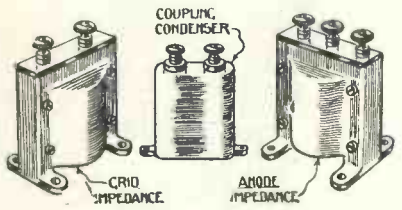
It is made by E. Paroussi, of Featherstone Buildings, High Holborn, W.C.1.

Formo Dual-impedance Coupling

DUAL-IMPEDANCE couplings are in general use in America, where their merits have been thoroughly examined and proved. It should, therefore, not be long before the use of such a coupling becomes popular in England. The advantages are briefly that the ratio of input to output voltages in the coupler approximates more closely to a constant value than with other types of intervalve coupling. This means that the crescendos and diminuendos in music and speech are reproduced in a more realistic manner.

The normal dual-impedance coupling gives an amplification equivalent to a low-frequency choke coupler: in the Formo arrangement, however, a voltage step-up of 2 to 1 is obtained on the choke whilst the inductance of the winding is sufficiently high to ensure obtaining the corresponding amplification at all frequencies down to values below 100 cycles.

We took some specimens of the results obtained with this coupling and compared them with the results from normal choke, transformer and resistance-capacity amplifiers. The results indicated that the Formo True-Scale Coupler gave a truer proportionality in its amplification at various input strengths. When tried in an actual receiver the tone of the



Formo Dual-impedance Coupling

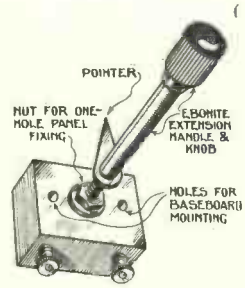
music and speech was noticeably good. A further advantage is that the couplers do not cause a heavy drop in anode potential.

True-Scale Couplers are made by the Formo Co., of 22 Cricklewood Lane, N.W.2.

Wearite Neutralising Condenser

THIS is an ingenious component having a large capacity range coupled with a low minimum capacity. The operation of the condenser follows somewhat novel lines: the distance between two metal plates is varied by means of a rotating cone, which is actuated by an ebonite knob. With this method, the variation becomes greater as the capacity increases and thus the neutralising of a valve, which often requires only one-third of the available capacity, can be easily carried out with this system.

The plates are completely enclosed in a neat rectangular ebonite container, and a circular engraved ebonite dialshows



Wearite Neutralising Condenser

the position in conjunction with a pointer attached to the ebonite knob. Provision is made for mounting the component direct to the panel by drilling a single hole, but it may also be fixed to the baseboard, and in such circumstances the small ebonite knob may be replaced by a longer one supplied with the component.

(*Continued on page 560*)

Novelties and New Apparatus

(*Cont. from page 558*)

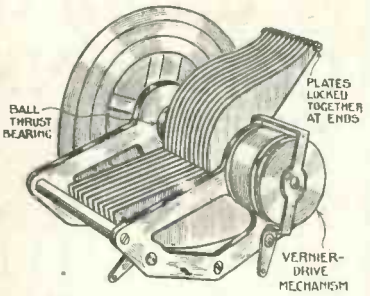
The makers claim a range of from 2.5 to 25 micro-microfarads and our test indicated that these figures were approximately correct. This neat and useful component should make a wide appeal to readers.

The manufacturers are Wright and Weaire, Ltd., of 740 High Road, Tottenham, N.17.

Dubilier K.C. Condenser

THE Dubilier Condenser Company, have always been famous for the high quality and finish of their products. It was, therefore, with great interest that we examined and tested their new K.C. condenser, which has just been placed on the market complete with slow-motion dial at a price of 12s. Inspection of this component shows that outward neatness has not been obtained at the expense of mechanical or electrical efficiency.

The slow-motion device is distinctly ingenious: it relies for its action on the regular slip of a steel ball when pressed between two metal rotating surfaces. The motion thus obtained is smooth, whilst a reduction gear of approximately 240-1 is obtained depending slightly on the pressure existing between the revolving metal discs.



Dubilier K.C. Variable Condenser

Efficient metal end plates ensure against the effects of frame distortion, whilst a very satisfactory tuning range is obtained when used in conjunction with good quality tuning inductances.

Tested on our precision capacity bridge the capacity range was found to extend from 21 to 500 microfarads, due to the bearing surfaces on the rotor, a constant and smooth motion is obtained.

The address of the Dubilier Condenser Co. (1925), Ltd., is Ducon Works, North Acton, W.3.

The Interdyne Receiver—

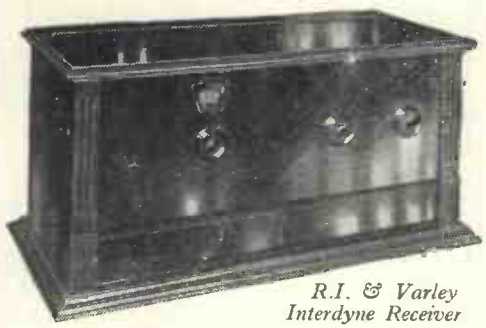
and Our Impressions of Its Performance

MAKING use as it does of two of the new Robinson "self-neutralising" valves, the R.I. & Varley Interdyne is a particularly interesting receiver, and we were glad to avail ourselves recently of the opportunity of testing it under actual working conditions.

As can be seen from the photograph reproduced on this page the set, which is a five-valver, has only one tuning dial, this operating a three-gang condenser. The central knob is for a small reaction condenser, while the right-hand knob acts simultaneously as a volume control (altering the filament current of the high-frequency valves) and an on-off switch.

Each of the "interdyne" valves is mounted directly on top of a shielded box containing the high-frequency coils; in this way external wiring in the high-frequency circuits is reduced to a minimum and perfect stability is assured. In the low-frequency side of the receiver two of the special R.I. and Varley straight-line-frequency transformers are used.

On test (at Wimbledon, seven miles from 2LO) we found the receiver to be as pleasing in performance as it is in appearance. Tuning is remarkably smooth, and adequate control of sensitivity and volume is obtained by manipulating the reaction condenser and volume control. Even so close to the London station it was possible to separate Leipzig from 2LO by lifting up the lid of the receiver and manipulating the disc-verniers on the gang condenser very lightly with the tips of the fingers.



R.I. & Varley Interdyne Receiver

The address of R.I. & Varley, Ltd., is 103 Kingsway, W.C.2. Two models of the Interdyne are made. Prices £25, £42.

Catalogues and Pamphlets

HOW to build eliminators, power amplifiers, and battery chargers with Burndept parts is the subject of a booklet Burndept Wireless, Ltd., of Bedford Street, Strand, W.C.2, have sent us.

◆ ◆ ◆

Of interest to constructors is a set of leaflets giving particulars of fretwood, plywood, turnings, and wireless cabinets, etc., which have been sent in to us by Hobbies, Ltd., of Dereham, Norfolk.

◆ ◆ ◆

A. H. Hunt, Ltd., of H.A.H. Works, Tunstall Road, Croydon, have sent us a number of leaflets relating to their electric hand-lamps and to Hellesen dry batteries.

◆ ◆ ◆

A very attractive booklet is being issued by the British Thomson-Houston Co., Ltd., of Crown House, Aldwych, W.C.2, on the subject of their cone loud-speaker (Model R.K.).

◆ ◆ ◆

The characteristics of Marconi valves are detailed in a useful little booklet from the Marconiphone Co., Ltd., of 210-212 Tottenham Court Road, W.1.

◆ ◆ ◆

The above company are also issuing at sixpence each two booklets giving constructional details of two receivers—the T1 four-valve and the T2 five-valve receivers. Blueprints are included.

◆ ◆ ◆

Particulars of Red Diamond valve holders, coil mounts, terminals, etc., are given in a leaflet from the Jewel Pen Co., Ltd., of 21-22 Great Sutton Street, London, E.C.1.

◆ ◆ ◆

The General Electric Co., Ltd., of Magnet House, Kingsway, W.2, have sent us an attractive leaflet descriptive of Gecophone loud-speakers.

◆ ◆ ◆

Polar receiving sets are described in a booklet from Wingrove & Rogers, Ltd., of Arundel Chambers, 185-189 Strand, W.C.2.

◆ ◆ ◆

Fixed condensers for radio transmitting and receiving sets are the subject of a leaflet being issued by the Camden Electrical Co., of Stanley Chambers, Runcorn.

WE are asked to draw attention to two slight errors which appeared in Wingrove & Rogers' advertisement in our December issue.

Reference was made to a "change-over" switch. This is a feature of the Polar III set only, although a separate coil unit can be supplied with coils for Daventry Experimental at a cost of 9s. The price of the complete Polar II set should therefore be £6, and with the extra coil unit £6 9s.

"WIRELESS MAGAZINE" SERVICE

Full-size Blueprints

By using the coupon on page iii of the cover, every reader of the WIRELESS MAGAZINE *can obtain a full-size blueprint of any receiver described in this issue up to the end of January for HALF PRICE. After that date the normal prices will be charged, namely, (1) crystal sets, 6d.; (2) sets up to three valves, 1s.; (3) sets with more than three valves, 1s. 6d. These prices include postage in each case, whether the blueprint is bought under the half-price scheme or not.*

Information Bureau

TECHNICAL QUERIES

A charge of 1s. is made for answering technical queries; not more than three should be asked at once. The coupon on page iii of the cover and a stamped addressed envelope should be sent with the query.

BUYING RECEIVERS

This service also covers advice regarding suitable proprietary receivers to suit the particular conditions and needs of readers. The rules above outlined apply in this case also.

Station Identification

Arrangements have been made with the leading authority on foreign broadcasting matters in this country to answer questions relating to the identification of particular transmissions. As many details of the reception as possible should be given. Each query should be accompanied by a fee of 1s., a stamped addressed envelope, and the coupon on page iii of the cover.

ADDRESS:

58/61 Fetter Lane, London, E.C.4

"Wireless Magazine" REFERENCE SHEETS

Compiled by J. H. REYNER, B.Sc., A.M.I.E.E.

Month by month these sheets can be cut out and filed—either in a loose-leaf folder or on cards—for reference. The sequence of filing is a matter for personal choice. In a short time the amateur will be able to compile for himself a valuable reference book.

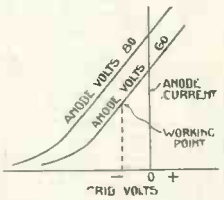
WIRELESS MAGAZINE Reference Sheet — *No. 41*

Mutual Conductance

THE mutual conductance of a valve is a measure of the merits of the particular sample. The conductance of a device is the reciprocal of its resistance. Thus a low resistance means a high conductance and vice-versa.

The unit of conductance is the mho, this being the conductance of a circuit having a resistance of one ohm. A micro-mho is one-millionth part of this unit and is more suitable for wireless purposes, where the conductances are much smaller.

Curve illustrating Mutual Conductance



The effective conductance of a valve depends not only upon the value of anode voltage, but upon the size and type of the grid electrode and the grid voltage. In valve circuits we apply voltages across the grid and filament and we are interested in the change of current which takes place in the anode circuit.

The factor which determines this is called the "mutual conductance," since it depends upon the mutual effect of grid voltage and anode voltage upon the resulting anode current. A typical valve characteristic is shown in the figure from which the change in anode current for any given change in grid voltage can readily be seen.

The greater the change in the anode current, the steeper will the characteristic curve become, and the greater will be the mutual conductance. Hence this property can readily be determined from a valve characteristic by noting the slope of the curve at the particular working point. Assuming the curve is practically straight at the particular point, note the increase in the anode current for one volt increase in the grid voltage. If the anode current is in milliamperes, multiply this change in current by 1,000 and this will give the mutual conductance in micro-mhos.

The better the valve the better is the mutual conductance so that this factor is one of considerable importance alike to the valve designer and user.

WIRELESS MAGAZINE Reference Sheet — *No. 42*

Power Transformers

THE design of power transformers is of interest to-day owing to the increasing use of H.T. supply units intended to work off alternating-current mains. For such purposes, it is customary to interpose a transformer between the mains and the eliminator, partly for the purpose of avoiding any direct connection between the receiver and the electric-light mains, and also in order to step-up or step-down the voltage as required.

Where a closed iron circuit is used, so that the magnetic coupling between the primary and secondary winding is tight, the laws governing the voltages on the two windings are comparatively simple. If N_1 is the number of turns on the primary winding and N_2 is the number of turns on the secondary winding, then we have the simple expression

$$\frac{\text{Secondary voltage}}{\text{Primary voltage}} = \frac{N_2}{N_1}$$

The principal factor in the design is the determination of the number of turns which is to be placed on the primary winding. When the winding is connected across the mains a magnetising current will flow (see sheet No. 31) and in consequence a certain back E.M.F. will be induced in the winding. The primary winding will act, in effect, as a simple choke coil. The magnitude of the back E.M.F. depends upon the magnetisation and, in practice, the transformer adjusts itself so that the back E.M.F. is exactly equal and opposite to the applied voltage.

We have to arrange that under these conditions the transformer is working correctly and the iron is magnetised in accordance with what we know to be good conditions. We assume a certain value for the magnetic field strength, which is represented by B. Then the number of turns on the primary winding can be deduced from the expression

$$E_1 = \frac{4.44\ BAfN_1}{100{,}000{,}000}$$

E_1 = applied voltage of mains.
B = magnetic field strength.
A = area of iron core (sq. cms).
f = frequency of supply.
N_1 = number of turns on primary winding.

Suitable values of B for ordinary small power transformers are 10,000 to 15,000 and, from this knowledge, the design can be worked out.

WIRELESS MAGAZINE Reference Sheet — *No. 43*

Battery Feedback (Elimination of)

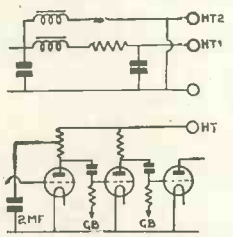
BATTERY feedback arises in multi-stage resistance—or impedance—coupled amplifiers when all the anode circuits are connected to a common battery. If the battery has any appreciable resistance voltages are thus transferred from the output end of the circuit back to the input end with the result that a reaction chain is formed and continuous oscillations of a very low frequency may be set up.

The conditions are such that as a rule the frequency of this oscillation is very low giving a distinctive popping noise so that the phenomenon is often called "motor boating."

One method which is sometimes of assistance is the reduction of the size of the coupling condensers in the amplifier.

The second method is to use different batteries with the last stage or in the case of mains units to feed the last stage of the amplifier through a special tapping taken direct from the reservoir condenser of the system as shown in the diagram (*a*). This ensures that the currents in the last stage do not pass through the common resistance of the battery feed in the previous stages and the trouble is completely eliminated if this method is resorted.

A third method is illustrated in figure (*b*) which is sometimes of use in resistance-coupled stages. The detector valve is usually supplied with a lower anode voltage than the L.F. valve. This voltage is not obtained in this instance by using a separate tapping, but by inserting a resistance in series with the normal coupling



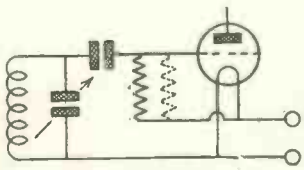
Methods of Overcoming Battery Feedback

resistance in order to break down the voltage to the required value. The junction point on these two resistances is shunted through a large condenser of 2 microfarads or thereabouts down to the negative.

WIRELESS MAGAZINE Reference Sheet — *No. 44*

Grid Rectification and Quality

THE method of obtaining rectification in a valve by connecting a condenser in the lead to the grid is one of considerable popularity owing to its simplicity. The system depends for its action on the cumulative charge built up on the condenser by the incoming signal and in order to allow this charge to leak away it is



Circuit with Grid-leak Rectification

necessary to connect a high resistance across the condenser or between the grid and some suitable point on the filament (see sheet No. 1).

It is often considered that this method of detection gives rise to poor quality owing to the fact that the impedance of the condenser varies with varying frequencies. Consequently the voltage build-up on the condenser at low audio frequencies where the impedance of the condenser is very high is rather greater than at the higher frequencies so that the system tends to accentuate the lower tones. As a palliative the size of condenser may be reduced, or the leak may be made much smaller, in either of which cases the rectification is impaired in one way or another.

It is customary, however, to connect the grid leak to the positive side of the filament battery or to a point having a distinct positive potential so that an appreciable grid current flows. In such circumstances, the resistance of the grid-filament path is quite low and this is virtually in parallel with the grid leak across the circuit. This is done in order to obtain good rectification efficiency for, unless this current is allowed to flow, the limiting voltage to which this condenser can build up is somewhat small.

W. Van B. Roberts has recently shown (Proc. I.R.E., Vol. 15, No. 9) that under the conditions where the grid leak is connected to positive the combined resistance of leak and grid-to-filament path of the valve is so low that the rectification efficiency on low and high notes is practically the same and hence there is no undesirable loss of quality.

WIRELESS MAGAZINE Reference Sheet — *No. 45*

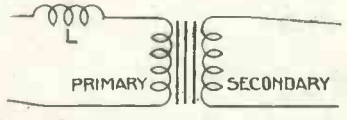
Leakage Inductance

A LOW-FREQUENCY transformer as used for audio amplification carries two windings, a primary and a secondary, which are both wound on a common iron core. Thus the magnetic field produced by the primary winding passes almost entirely through the secondary winding, giving a very tight coupling.

There is, however, a small percentage of the magnetic field produced by the primary winding which does not link with the secondary and vice-versa. Some of the primary current is thus wasted in producing magnetic fields and is not directly useful in transferring energy to the secondary circuit. This effect can be represented by considering a small inductance in series with the primary winding as shown in the diagram.

This inductance is known as the "leakage inductance." There is a primary and secondary leakage inductance, each one of which represents the leakage effect in the primary and secondary windings respectively. It is possible to simplify the arrangement somewhat by representing all the leakage as appearing in either the primary or the secondary winding, whichever is desired. The actual value of the equivalent leakage inductance depends upon the ratio of transformation in the instrument and can easily be worked out mathematically.

In practice the equivalent primary leakage inductance is of the order of 1ooth of the actual normal inductance of the primary winding and



Circuit Representing Leakage of Inductance in Primary

it is not an unmitigated disadvantage. In fact its presence is definitely beneficial in obtaining a good transformer curve. It must not be too high, however, for when two or more transformers are used in cascade there is a tendency to self-oscillation and the higher the leakage on the individual transformers, the greater will be the tendency to howl. Thus a good transformer must have a fairly low leakage inductance if it is to be suitable for use in multi-stage amplifiers.

Questions Simply Answered

Which End of An Aerial Should Be the Higher?

Q.—For best results, should the flat-top portion of an aerial be exactly parallel to the surface of the ground? If the top portion cannot be exactly horizontal, which end is it better to have higher?—C. A. N. (Dorchester).

A.—As far as signal strength alone is concerned, the best possible aerial would be a perfectly vertical wire. There is, therefore, no object in purposely making the top portion horizontal. As an absolutely vertical aerial would generally be impracticable, it is preferable to have the end of the top portion farther from the downlead higher than the other end.—G. N.

Resistance of Phones for Crystal Receiver

Q.—I am using a crystal set with phones of 2,000 ohms resistance. I am told that 8,000- or 12,000-ohm phones would be more sensitive. Is this the case?—R. P. N. (S. T. D. (Liverpool).

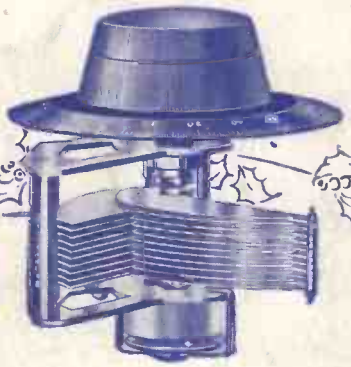
A.—With a high-resistance crystal such as carborundum there might be some slight advantage in using phones with very high resistances, but even then it is doubtful whether the increased sensitivity would be worth the expense of such phones.

If you are using an ordinary crystal of the prepared galena type, such as is used almost universally in crystal sets nowadays, there would probably be a decided decrease in signal strength if very high resistance phones were used.

Best results are obtained with a crystal set when the resistance of the phones is equal to the resistance of the crystal contact. With the crystals in use at the present time 2,000- or 4,000-ohms phones will generally be the most suitable.—G. N.

Index to Advertisers

Some acceptable gifts



The Dubilier K.C. Variable Condenser, 200 to 1, slow-motion drive, low loss, maximum capacity 0.0005 mfd. One-hole fixing, price **12/-**

Broadcast Toroid, 230 to 600 metres, complete with terminal base, price **10/6**

Long-wave Toroid, 750 to 2,000 metres, complete with terminal base, price **10/6**

YOUR wireless friends will appreciate a present selected from the Dubilier range of products. They will take it as a compliment that you considered only the best obtainable to be a suitable gift.

If your friends are constructors, you cannot do better than to give them a K.C. variable condenser or a pair of the wonderful Toroid "fieldless" H.F. Transformers that make screening unnecessary.

Perhaps they have electric light, in which case the appropriate model of Dubilier H.T. Supply units will rid them of the annoyance of replacing or recharging H.T. Batteries.

If they wish to add to the volume of their sets for dancing this season, present them with a Dubilier Resistance Capacity Coupling Unit.

Ask your Dealer to-night for a Dubilier Catalogue (or drop us a post card) and you will have a wide selection of acceptable gifts for all your wireless friends.

Dubilier R.C. Coupling Unit, complete with Dumetohms, price **7/-**

Dubilier H.T. Supply Units. Models for A.C. or D.C. Prices from **£4-12-6**

DUBILIER
REGISTERED TRADE MARK

Advt. of the Dubilier Condenser Co. (1925) Ltd. *Ducon Works, Victoria Rd., North Acton, W.3* T.C. 74

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