

# ROUND THE STANDS AT OLYMPIA (See Page 157)

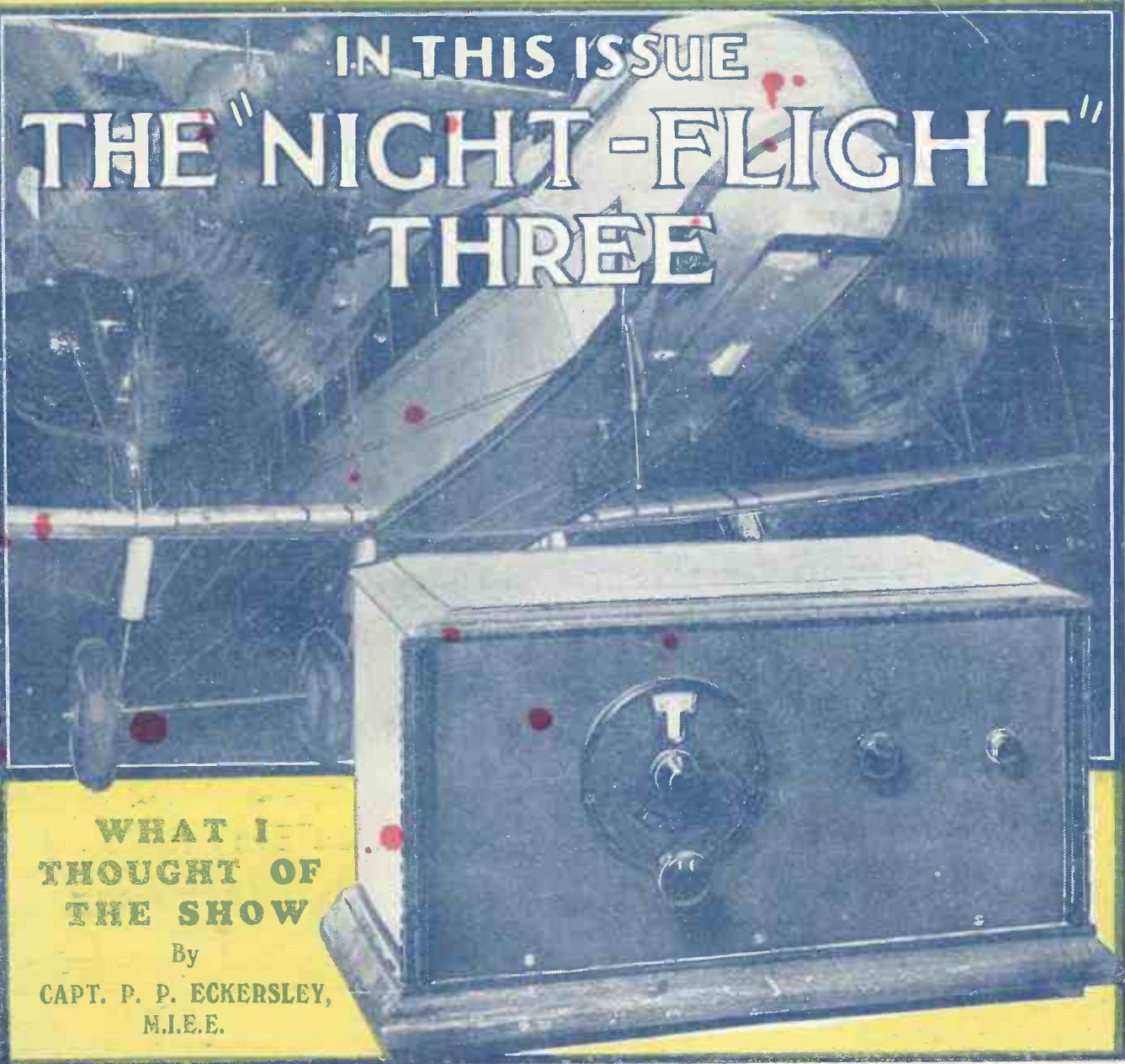
# Popular Wireless

Every Thursday  
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3d.

No. 435, Vol. XVIII.

INCORPORATING "WIRELESS"

October 4th, 1930.



IN THIS ISSUE  
THE "NIGHT-FLIGHT"  
THREE

WHAT I  
THOUGHT OF  
THE SHOW

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

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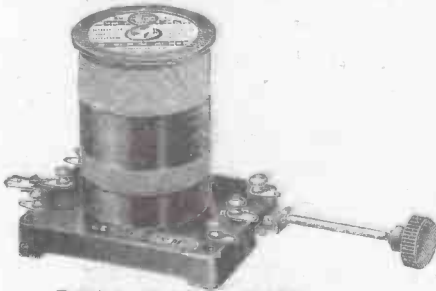


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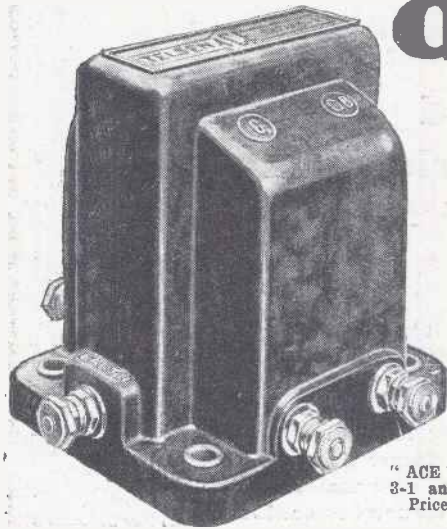
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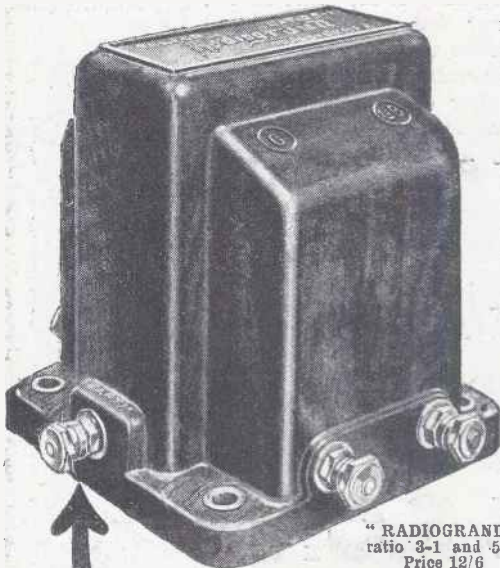
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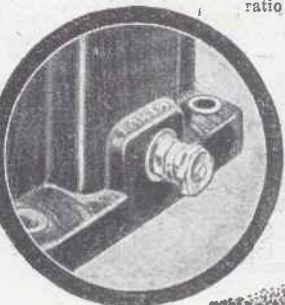


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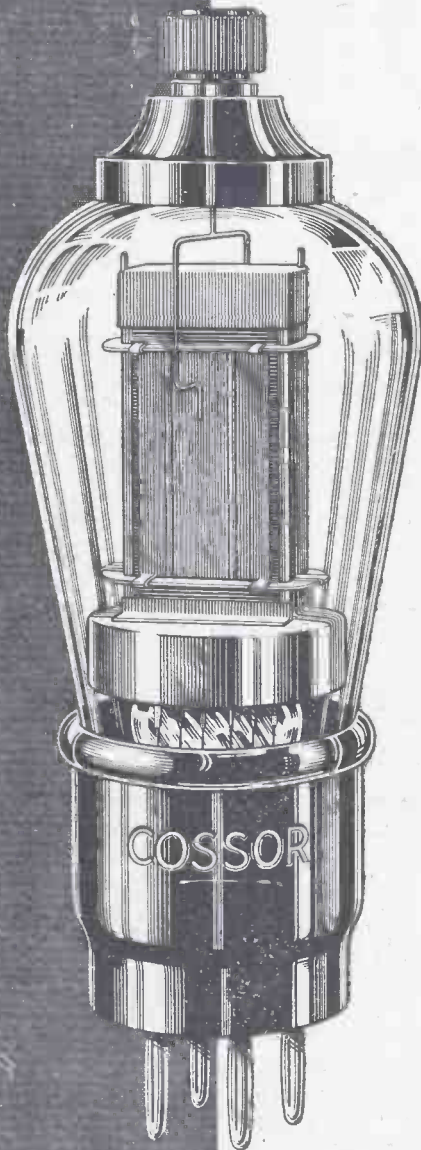
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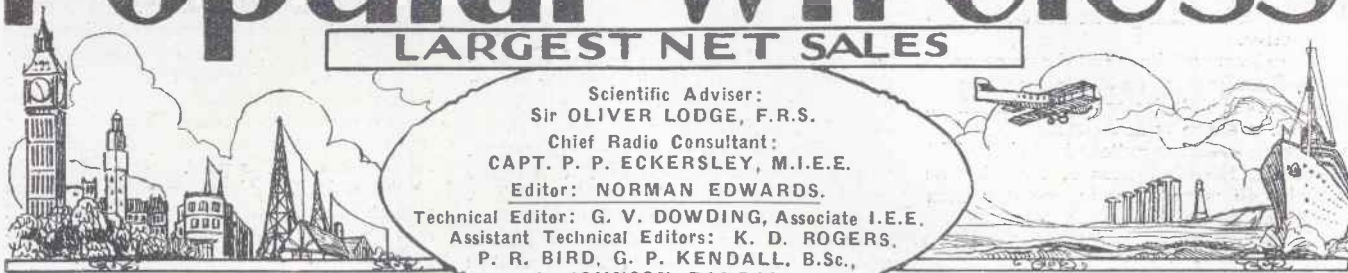
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A TRUE ONE.  
 DOWN BY THE RIVER.  
 RAYS & RAYS.  
 QUICK CHANGE STATION.

NEEDLE NEWS.  
 "K. from the I. of M."  
 A MYSTERY MAN.  
 THE CAR CHASE.

## RADIO NOTES & NEWS

**This Week's True One.**  
**R**ADIO introduces the mass of the people to the world of music; it improves the musical taste or creates it where it does not exist. So say the radio critics, and I thought of it when last week at a small hotel this happened. Elderly matron, and very young mother entered lounge and switched on the radio set. Queen's Hall; Beethoven!

Plunged forthwith into two-way explanation of kids' ailments, with Q.H. as accompanist. Presently the opening of the great Fifth Symphony brought the elder out of her talking trance. "My dear," she said in an aggrieved tone. "one positively has to bawl against the wireless! Does one not? Sa-ow provoking!"

### Problem of Acoustics.

**T**HE lady should have lodged a complaint with local Town Council, who would have prohibited the playing of anything worse than the "Stein Song!" An American friend tells me that a report of the New York Noise Abatement Commission stated that a lion's roar could not be heard thirty feet in the centre of New York. A sceptic then inquired publicly how it was the lion's little cousin, the tomeat, can be heard so much farther! However, in order to aid New Yorkers to hear a lion roar—"if so disposed"—the Commission has stopped outdoor loud-speaker demonstrations by radio dealers.

### Down by the Riverside.

**R**ATHER amusing, is it not, that the B.B.C.'s great new National Orchestra and Chorus, over 200 artistes, are doomed to rehearse in a warehouse on the south bank of the Thames just below Water-

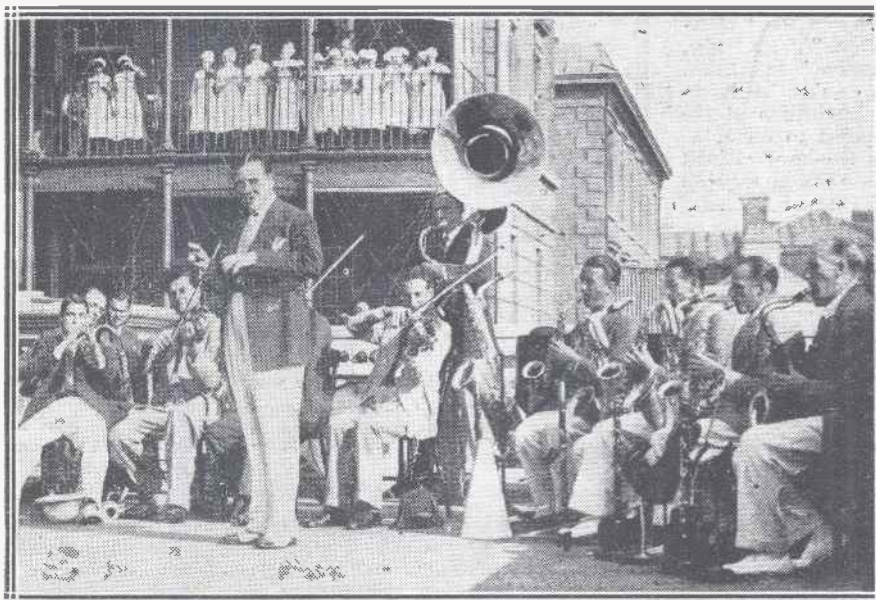
loo Bridge? I have no doubt that it has been arranged for the usual B.B.C. watertight and unassailable reasons, but it seems a rum go. Enough to damp the most ardent genius! A rat or two would create a priceless scene! And they may find W. W. Jacobs' night-watchman!

### American Criticism.

**T**HE late Mr. William Bolitho, who wrote so delightfully in the New York "World," wrote the following early

**No End to Listeners.**  
**T**HE steady increase, especially during the summer months when, one would naturally suppose, the minds of most people would focus on the garden and the greater freedom beyond the walls, is most surprising—to me. Somewhere about the beginning of the year the number of "live" licences exceeded three millions, yet during the first six months an increase of over 160,000 was made. I presume that most of the credit for this is due to the "trade," while some, unfortunately, goes to the Post Office sleuth vans.

## JACK PAYNE AND THE BOYS BRIGHTEN BRIGHTON



When Jack Payne took the Band down to Brighton they got him to play outside the hospital. It pleased the patients no end; and it simply delighted the nurses when Jack explained "How Maggie Caught a Cold Last Night!"

this year. "Berlin can hear, almost blushing, the clumsy and unpoetic rubbish of London's 'Children's Hour.' Rome can hear the chant, which lasts for hours, of Paris Bourse prices. The squalls of the tenors who never leave Rome clash and 'interfere' with the maudlin waltzes that Hamburg really hums."

This may be all right so far as it goes, but I should like to know what W.B. thought of American broadcast programmes!

they begin to have disastrous effects upon living tissues or organs.

### The Quick-Change Artist.

**W**HAT is supposed to be a record in quick wave-length changes has been set up by the Syracuse, (New York) station. Not many weeks ago, when the sun rose in the morning, Syracuse's wave-length was 200 metres, and after the station had finished giving out its morning news a

(Continued on next page.)

## RADIO NOTES AND NEWS

(Continued from previous page.)

letter arrived saying that the Federal Radio Commission had changed its wave-length to 333 metres.

The engineers got busy and the programme was well under way, on 333 metres, when a wire arrived: "Present wave-length a mistake. Change to 220 metres."

So when Syracuse switched off that night it had had the distinction of changing its wave-length more times in one day than most stations do in all their lives!

### Needle News.

S. M. F. (Dover), who definitely converted me from the use of fibre gramophone needles, has been kind enough to send me a few needles such as are used in "talkies," and I like them. They certainly cut down "surface" noise to a degree remarkable for metal needles, and they seem to have a way of sorting out the various instruments of an orchestra and giving them something nearer their true values than I have previously heard. I'll give them a prolonged trial. "Columbia Talkie" needles. S. M. F. asks why his det. grid leak burns out every few months. It must be because it leaks like blazes!

### "Alternative" Programmes.

THESE are not coming up to general expectations, and a current of complaint against them is already making itself apparent. A so-called "low-brow" — he is a B.Sc.—of Beckenham, points out that the B.B.C. drive him over to the "alternative" with the "Prom" broadcasts, and that on the "alternative" the B.B.C. repeats the main items, so that he has to switch off. Surely the institution of the "alternative" was supposed to solve the problem of high- versus low-brow claims! If so, I think that the solution requires carrying to several more places of decimals.

### "Selling" Week.

SUCH a disappointment I had the other week! One of the Technical Hounds rushed round and told me that Ever Ready's had sent me 18 H.T. batteries and 24 grid-bias batteries, and as I grabbed them with glee I realised—they were all hollow! They were just models illustrating the "Ever Ready Selling Week"!

Alas! they certainly sold me!

It was, however, a fine idea, that selling week. There was a total of £800 in prizes for dealers, and an "Ever Ready Man" whose little task in life was to dish out 180 £1 notes to purchasers of Ever Ready products. I didn't meet him, of course, but I hope that some of you did!

### "K from the Isle of Man."

M. C. K. (Laxey, I. of Man), having studied "P.W." for four years, concludes that I am interested in "readers' letters, wireless, gardening, and short-wave enthusiasts." Good for you, Sherlock! List correct but not complete. Hey! What about gramophones, music, baccy, money, non-motoring, trousers, kittens, the Tudor period, R. L. Stevenson, walking tours, newspaper "radio experts," murdering singers of the "Stein Song," non-gelting and all the rest? Ha! M. C. K. wants a "P.W." "Magic" Screen-Grid Three. If the

technical conspirators haven't got that on the list I'll disown 'em!

### Explanation of an Explanation.

THE radio expert of the "Evening World," in trying to explain why an outdoor aerial is better than an indoor one, writes "These little waves travelling along the surface of the earth are seeking for something on which to attach themselves as a quick means of travelling down to the earth." You can't get much nearer to the earth if you are on it, surely! Of course, wireless waves don't travel down the aerial and to "earth" via the receiver. As the waves pass through the house they are weakened by every conductor therein and so a weaker high-frequency current is induced in an indoor-aerial for working the receiver, though with a good valve set there's "not much in it."

### Composers Must Hustle.

IF you are thinking of earning money by composing music for the B.B.C., I fear that you are doomed to strict abstinence and economy, for any compositions submitted after the end of February will not be

## SHORT WAVES.

A kitchen set containing wireless apparatus with an enamelled-top table, which can be used for culinary purposes, is on exhibition at a London show.—"Evening Star."

But some of the programmes are pretty hard to digest.

"JACK HOBBS ON RADIO." He is sure to be a big hit.—"Daily Mirror."

### OBJECTIONS.

"Wireless brings other people's thoughts into your home," says a writer. Especially the neighbours'.—"Sunday Pictorial."

"There are sets built into luncheon baskets and set to give the programmes at eleven different stations in succession. The only thing that has not been attempted, apparently, is the grafting of wireless sets as monkey glands are grafted."—Bradford Telegraph & Argus."

A wireless set has been made that can be fixed to a hat. Of course, some people already claim that certain radio speakers talk through a hole in their hats.—"Glasgow News."

A seaside boarding-house advertises that every bed is equipped with wireless. A returned holiday-maker says that his bed was very wireless, judging by the lack of springs.

"I have a little attachment here for your wireless."

"Thanks, Smith. Let's have a look at it."  
"Well, it's just a rope and a brick, and the river's the second turning on the left."—  
"Daily Mirror."

performed until 1932, that is, supposing they are accepted. If you submit your work before February 28th, "it will receive careful consideration for inclusion in programmes of the following autumn and winter." This haste is most unseemly, but, as the Latin tag says, "Life is short but Art is long"!

### The Mystery Man.

HAVE you ever met one of those quiet, gentlemanly, knowing fellows who say very little till you draw them out, when you find they have been absolutely everywhere, and seen everything? One who knows the back streets of every foreign town you mention, but is always delightfully vague about what he was doing there? In other words, a real, genuine, pukka secret service man?

I got one talking the other day, quite by accident, and it shows what a common interest in radio can do when I tell you that just for a moment he let me peep behind the scenes of secret service activities.

### A Hidden Station.

THE scene, he said, was Palestine, and the mystery some Russian code signals, sent on an unusual wave-length from Komintern. So a mobile station with a frame aerial did a little bit of scouting in the desert and got a line on a certain shady little port.

Theoretically, there was no wireless station in the place at all. The frame aerial said there was, so it was decided to investigate further.

### The Midnight Raid.

IN the dead of night the Camel Police, supported by radio, descended silently upon a decrepit warehouse. This was rushed and the astonished operator was captured (before he could send out an alarm) complete with the latest transmitting and receiving Telefunken equipment and a host of Soviet propaganda for Arab disturbances.

All was quietly confiscated, the intruder was expelled, and peace restored in Palestine once again.

More I cannot disclose, but the above is an absolutely true instance of the unexpectedness that often lies behind listening-in.

### Short-Wave Conditions.

THE long-expected revival in the range of short-wave reception may be going to materialise but a good many of us are grumbling about it, particularly E.E.S., of Hull.

There is, however, a ray of cheer in his letter, for he says: "I may as well tell you that I am another "Magic" Three user, and I have received no fewer than 103 stations at great volume on the loud speaker—and this without using a wave-trap."

What that set will do when the autumn improvement in conditions takes place, I tremble to think.

### Investigating the Aurora.

THAT mysterious polar phenomenon, the Northern Lights, or Aurora Borealis, has again been attracting the attention of radio men. Polar expeditions have listened for it and much data has been collected, but it still remains very much a mystery. And now comes the news from America that one enterprising investigator has been chasing it in a car!

### The Car Chase.

THIS observer noted a particularly fine display and saw the heavenly light come down to earth. Here it started to break into sections and patches of light which looked like small clouds of phosphorus.

He says: "They were absolutely part of the Auroral display yet they came down still giving light until they rubbed out against the ground. We tried to run into one of them with the car, but they travelled much faster than we could go, although we could do sixty per hour easily."

He seems very definite about it, in spite of the common belief that the Aurora is a phenomenon of rarefied air which only takes place in the upper regions of the atmosphere. Will radio solve this mystery?

# What I thought of the Show

by

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

Our Radio-Consultant-in-Chief visited Olympia for the special purpose of recording his impressions of the Show for "P.W."



ONE may judge the excellence of a wireless receiver on two bases, performance and appearance. At Olympia one is inevitably denied any chance to judge the performance, and one is therefore driven to compare sets in terms of appearance.

This is true without qualification. The expert's eye might help him prognosticate this or that performance, but it would be a painstaking business to "run over" every set in the show in this way. So the show's the thing.

## Furniture, not Radio.

My main impression of the show is that public requirement seems to produce a monotonous sameness—a sameness which I could criticise if I alone were concerned, but which, in fact, calls up my sympathy for the manufacturer. There may be some startlingly original electrical circuits, but it's all been hidden behind acres of mahogany.

I suppose I am foolish to expect manufacturers to produce apparatus which looks as I would like it to. I am, I suppose, a little different in my outlook from the majority.

And the majority buy wireless sets; so, as I said before, bursting as he may be to do something original, the manufacturer knows that his set must not embarrass "art" linoleum, the aspidistra, and the "stained suite." There is, therefore, a furtive air about many sets which seems to say, "No, not really—not really a wireless set! I am a piece of furniture which emits noises."

## Hidden Scales.

My readers are mostly technical people interested in the art as such, and I am sure of their sympathy when I go on to point out that in consequence of this "furniture" technique the actual operation of the set becomes needlessly tedious. The manufacturer must find himself between the devil of appearance and the deep blue sea of easy operation.

Because, really, scales are being almost hidden—hidden down deep caves; one might almost believe that some of them were television sets so small is the aperture! Operating handles (looking like eruptions of smooth polished skin) seem to be made for the most ladylike operation.

I cannot say I would like to rake that far-

distant signal from the quivering ether with such a Lilliputian equipment. All goes to show how the problem of designing a set becomes terribly complicated when the basis is competition to achieve the level of the mind of the X.Y.Z. Furnishing Company.

This is all a generality. The MacMichael scale is generous; the condenser handles shown as components by the Ormond

crystal set was not ashamed to be one, and so on.

One was ever conscious at the Show that quality of reproduction has made great strides. British radio set manufacturers and broadcasters certainly lead the world in having a far higher general level of reproduction than one finds elsewhere.

## SHE SHALL HAVE MUSIC . . . .



Portable sets were in great abundance at the Show again this year, S.G. valves being used in most of them.

people were splendid; the appearance of the Graham-Farish loud speaker was original in its dignity and simplicity.

Armchair volume control of the Marconi-phone radio gramophone should help to bring the best out of the set with real convenience to the user; the Brownie

It has been the basis of B.B.C. development and the manufacturer has now followed the lead. Not that there might not be improvement. No one will deny that. But nowhere, in my slow and interested promenade, was I ever conscious of the raucous snarl that, for instance, assailed the public at Wembley seven or more years ago.

## Battle of the Cones.

The battle of the moving iron and the moving coil continues to engross me. Certainly the moving-iron cone type holds its own for the medium and cheap loud-speakers. There was a difficulty in judging which might be considered the best of them all.

It would be unfair, indeed, to give one's final judgment, one can hardly make a true comparison in the conditions obtaining at Olympia, although I hasten to say that this is not criticism of the arrangements as such; one cannot there expect to be able to compare rival makes on a change-over switch.

I found it difficult to judge any very definite "trend" in circuit design. The Americans excel in the high-frequency side, the Germans are great price cutters; we look most for quality. I saw only one 3 high-frequency ganged set, but this was exhibited by what is to all intents and purposes an American-owned firm.

Certainly I remarked a great deal of good value, but no prices so low as those

(Continued on page 196.)

## ANOTHER VALVE WAR?

There are marked signs that another valve patents fight is imminent, and that hostilities are commencing. The situation as it is at present is reviewed below.

By OUR SPECIAL CORRESPONDENT.

THE Radio Industry has in the past experienced more than its fair share of tribulation in connection with patent disputes. Readers will no doubt remember the famous Marconi versus Mullard case, which went the full round from High Court to the House of Lords before finality could be reached.

More recently the Marconi Company came to grips with the Brownie Wireless Company on the vital question of the royalties payable in respect of valve receiving circuits. Following this action (in which the honours fell to the Marconi Co.) came a welcome reduction from 12s. 6d. to 5s. in the royalty payable by accepted trade licensees of that Company.

### The Opening of Hostilities.

The stage now seems to be set for another legal set-to between certain well-known valve manufacturers.

Hostilities are opened in an advertisement published by the Mullard Radio Valve Co., Ltd., in which they warn the Trade that they have secured a perpetual injunction, together with the payment of damages and costs, against a specified wireless trader for importing and/or selling Tungfram valves and Dario Radio valves.

Not to be outdone, Messrs. Mullard's example is followed by the Triotron Radio Co., Ltd., who—vigilant to protect their own patent rights—advertise the fact that they, too, have secured a High Court injunction directed against a London firm in which the offenders were restrained from infringing the Triotron patent and ordered to pay an agreed sum by way of damages and costs.

So far, so good! The first blow in defence comes from Impex Electrical, Ltd., who are concerned with the Dario valves. They advertise the fact that they are not satisfied that their valves infringe the Mullard Company's patent rights.

### The Opposing Movements.

In fact, they go further and announce that they are prepared to indemnify any person who may be sued by the Mullard Co. in respect of the Dario valve, provided that the threatened person will give them an immediate opportunity of defending the case. To emphasise their stand, Impex Electrical, Ltd., inform the world that they have deposited at their bankers a large sum of money to be devoted to the practical fulfilment of this promise.

A similar attitude is next taken up by the Tungfram Electric Lamp Works, Ltd. Strong in the righteousness of their cause, they also offer to fight the battle of any of their customers handling Tungfram Barium valves who may be threatened by the Triotron Radio Co. for infringement.

The gloves now being fairly off, the Mullard Co. move first into action, for we find the Tungfram firm announcing that "the

opportunity is now being afforded us by Messrs. Mullards of testing in open court the question of the alleged infringement by our valves of certain patents, and at the same time of contesting the validity of these patents."

Messrs. Tungfram add that they intend to do all in their power to ensure a speedy trial of the questions at issue, and repeat their former offer of an indemnity to any firm who may be threatened with an action for infringement arising out of the sale of Tungfram Barium valves.

Here the matter rests for the time being. The ground has been cleared, and the contestants are presumably straining at the leash in order to get into the legal arena and "go for each other" with as much ferocity as a proper respect for the decorum of the Court will permit.

Meanwhile, the ordinary broadcast listener will keep calm and wait patiently until the

big guns go off and the verdict is given. In matters of patent litigation, most of the spoils go to the victor—after counsel and solicitor have had their dues. It is not often that any scraps of comfort come the way of the poor consumer, though in the long run he generally has to foot the bill.

### IMPORTANT LITTLE POINTS.

Some small items which can have big effects.

A spare fixed condenser (.001 will do) fitted between the aerial terminal and the aerial lead is a worth-while precaution on valve sets which take their H.T. from D.C. Mains.

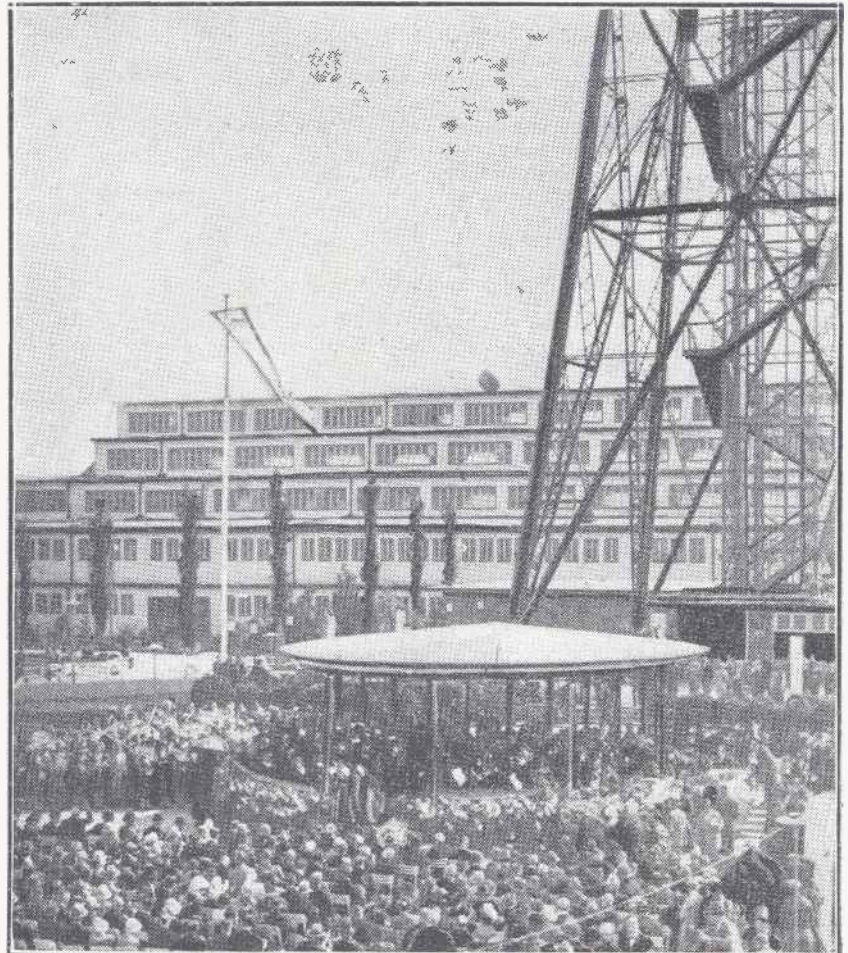
Common causes of instability in an H.F. amplifier are inefficient screening and stray couplings between the various battery leads.

Although a small hole or two in a screening-box is comparatively harmless, an imperfectly fitting lid or bad joint along one edge of the box destroys much of its efficiency.

When using a choke filter for the loud speaker and employing only one fixed condenser for this, it is a good plan to insert a fuse in the circuit in case of an accidental breakdown.

The reversal of coil-holder connections may seem quite unimportant, but a wrong connection of this kind will often prevent a set from operating properly.

## THE BERLIN RADIO EXHIBITION

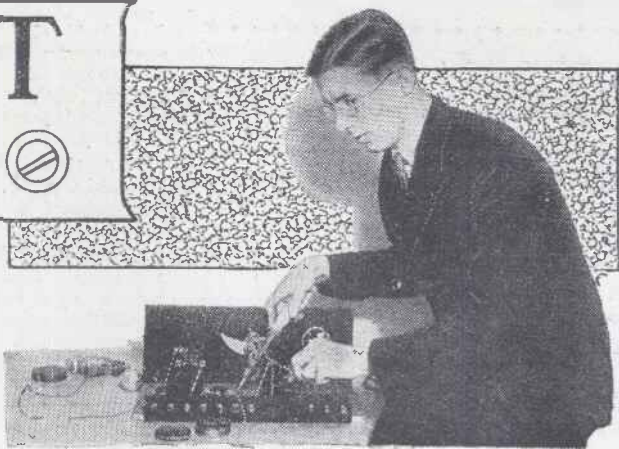


A choral and orchestral concert being held outside the show in connection with the German Radio Exhibition in Berlin.

# FOR THE SET BUILDER



"P.W.'s" Chief Draughtsman tells you how to use "P.W." diagrams to their very best advantage, and gives you some valuable hints and tips of a general nature in connection with radio set assembly.



A TECHNICAL diagram is, or should be, something more than an illustration. It should never be purposeless or unnecessary, and should be kept as simple as possible with due regard to the incorporation of all essential details. Ambiguity is in no circumstances permissible where this type of drawing is concerned.

A good diagram, properly interpreted and understood in conjunction with the reading matter which it accompanies, is a real help, especially to the home-constructor.

### Easier to Follow.

The newcomer to wireless will probably wonder why a theoretical diagram is always included with practical instructions on how to build a set. If he wants to make the set he will ignore it, and turn to the diagrams which he can understand, namely, the panel-drilling diagram, and the back-of-panel and baseboard wiring diagram.

The temptation will be always to ignore the theoretical diagram and, as the more experienced reader will realise, this would be a great mistake.

To learn the meaning of the symbols which constitute a theoretical diagram is well worth the trouble.

To the experienced eye, any particular circuit or combination of circuits can more

easily be followed in theoretical form than from a pictorial wiring diagram or, where complicated circuits are employed, the actual set. There are surprisingly few theoretical symbols which need be memorised before the average theoretical diagram can be understood.

Those which are most frequently used in connection with wireless telephony receivers are shown in Fig. 1.

Comparisons between the theoretical and the back-of-panel and baseboard wiring diagrams of any set illustrated in POPULAR WIRELESS will materially help the amateur to visualise the actual components by glancing at their theoretical counterparts.

### When Wires Cross.

The wiring shown in theoretical diagrams can easily be understood and followed. Where two wires cross without electrical contact, a "loop-over" is shown. Where two wires are joined in circuit, the joint is indicated by a small black circle. In the back-of-panel and baseboard wiring diagram, a different method is employed. No "loop-over" is shown where wires cross, but a black "square" indicates all joints.

A glance at Fig. 1 will make the difference between the two methods quite clear.

When following a theoretical diagram—and this is particularly important when apparatus is being wired up from the theoretical diagram—carefully check up the battery connections both low and high tension. Polarity is important, and a reversal of polarity in the wiring may be attended with dire—and expensive—results.

### American Practice.

In dealing with battery connections, it is as well to remember that certain American technical magazines often reverse the battery symbols for "positive" and "negative"; that is, a short, thick stroke is drawn for the "positive" pole, and a longer and thinner stroke for the "negative" pole. This, of course, is exactly opposite to the English practice of making the short, thick stroke to indicate the "negative," and the long, thin line, the "positive."

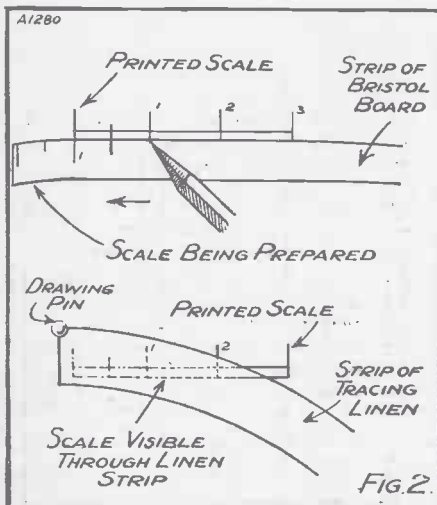
Fortunately, the use of

the "plus" sign for "positive," and the "minus" sign for "negative," is standard in both countries, so that no difficulty will be experienced with circuits thus marked.

American theoretical circuits, however, which do not bear the polarity signs, should carefully be considered in conjunction with the text before wiring is commenced.

To return to the diagrams published in "Popular Wireless," the back-of-panel and baseboard wiring diagram always incorporates a small scale applicable to the drawing. This scale, properly utilised, can

### USING THOSE SCALES



You can transfer the scales appearing on "P.W." wiring diagrams to "Bristol" board or tracing linen, using the result as a rule.

often be of assistance to the home-constructor. By its aid, any required dimension can be found, or the position of any component on the baseboard or panel ascertained.

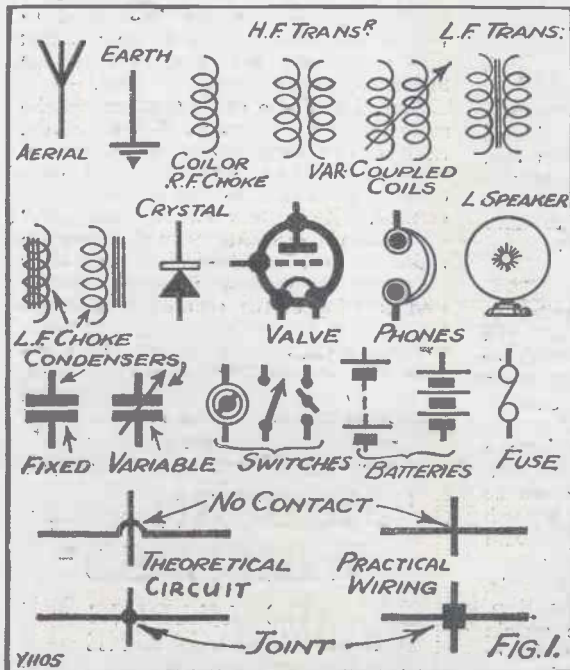
### Extending A Scale.

The scale as published is necessarily very short, only three or four inches being given, but a suitable scale of any length can be made quite easily, without disfiguring the paper. Obtain a strip of "Bristol" board, stiff "cartridge" paper, or white cardboard about a foot long, and about 1 in. wide, making certain that one of the longer edges is absolutely straight.

Place this straight edge against the printed scale as indicated in Fig. 2, and mark off the divisions. When the end of

(Continued on next page.)

### REMEMBER THESE SYMBOLS



Having memorised these symbols, you will find it easier to read and understand practical and theoretical diagrams.

**FOR THE SET BUILDER.**  
(Continued from previous page.)

the small scale is reached, move the strip to the left until the last mark on the new scale lies exactly under the first line of the printed dimensions. Then proceed to mark off another few inches. A scale of any length can thus be obtained.

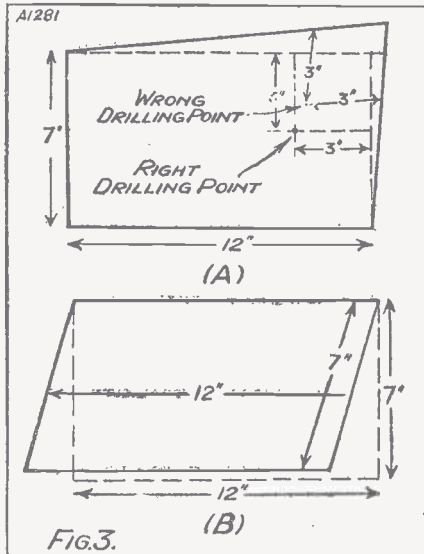
An alternative method is to pin a strip of tracing linen or "detail" paper over the scale, and carefully trace over the dimensions, moving the tracing to the left as before, until the scale is traced to the desired length. The tracing should then be pasted to a strip of stiff cardboard and, when thoroughly dry, inked over, and cut to shape. Fig. 2 illustrates both methods.

**Don't Mix the Measurements.**

Do not make the error of applying this scale to the apparatus under construction. It can only be used on the drawing, and the required measurement, once obtained, a true rule must be substituted for finding that distance on the board or panel. On actual material work in actual inches. The panel layout diagram, in addition to giving an idea of how the completed panel will look when mounted, shows just where the drilling points are to be made.

It is a perfectly simple matter to scribe and drill any panel from this diagram, always provided that the panel is the right shape and size when drilling is commenced. Look at Fig. 3A, representing a panel supposed to be 12 in. x 7 in., but which

**YOU MUST START RIGHT**



Those panel-drilling diagrams will be no good to you unless you first get your panel absolutely square.

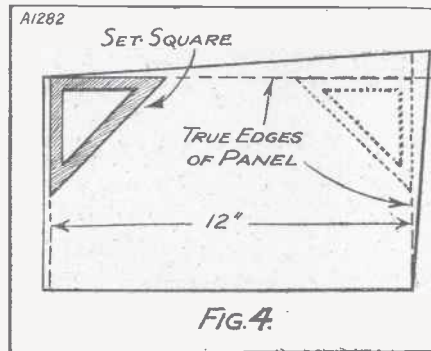
has been carelessly cut. The diagram purposely exaggerates the faulty shape. As the illustration shows, it would be quite easy to scribe and drill such a panel incorrectly.

If you have any doubt about the shape of your panel, do not attempt to check it with a rule alone. Fig. 3B shows why it cannot be done. Your panel might measure 12 in.

x 7 in., and yet not be square. Make your check by the method shown in Fig. 4. Take a set-square and place the right-angle against each corner of the panel until you find the corner which shows the least error. Then project the necessary lines, as shown, squaring the other top corner at the 12-in. mark.

Measure 7 in. down the side of the panel and use the square again. Once the panel is square it is not difficult to scribe and drill it without the risk of making holes which will later have to be plugged—something to be avoided if a smart finish is required.

**PREPARING THE PANEL**



Use a set-square to check the panel shape—a rule alone is useless for this job.

**IMITATION INSULATORS.**

IT is obvious that many constructors have the idea that pretty well everything that is not a metal or a fluid is an insulator. This is very far from being the case. It is true that most woods, earthenware, and fabrics are very good insulators, but the insulating quality of any such material can be ruined by a coating of conductive varnish or paint.

It is surprising how conductive some colouring materials are. Readers will have no doubt noticed, some few weeks ago, that a correspondent experienced trouble through an American cloth table-cover which, when tested, was found to have a quite high degree of conductivity.

**Watch That Varnish.**

The same kind of thing applies to cabinets. If a cabinet is stained, and you are not certain that the stain, varnish, or paint is by itself a good insulating material, keep leads and metal parts well clear of the wood.

Quite rightly speaking, if you have a cabinet that is covered with some conductive material, that material should be earthed in the same way that you earth a metal panel or screen or metal baseboard covering in order to achieve stability.

If this is not done, hand-capacity effects, etc., may trouble you. It is obvious, then, that it is much better to make certain beforehand that the stain, varnish, or paint, or whatever other colouring substance is applied to the wood of a cabinet, is a good insulator.

Also, do not improvise insulators without being absolutely certain that the material, whatever it is, is, in fact, capable of offering a high resistivity to current.

Beware of the odd bit of cardboard or wood, etc., that you may be tempted to employ to separate two conducting surfaces or to keep a live lead away from some point of danger. It is a very good plan to hold a stock of small pieces of scrap ebonite, mica and pure rubber for any such jobs of insulation that may crop up in the course of your set construction experimenting.

**PICK-UP INSTABILITY.**

CONSTRUCTORS who have built radio-gramophone outfits, or who have attempted to use pick-ups with their ordinary sets, have probably noticed, especially where mains units are used, how much more prone to instability and hum the pick-up side seems to be.

The reason for this is that the connection to the pick-up generally constitutes an extension of the grid lead of one of the valves. Indeed, the pick-up itself is often "alive."

Obviously, then, it is advantageous to keep the pick-up lead short. Where all the usual remedies fail, and a howling or tendency to howl or bad hum still remains, try using lead-covered wire to connect the pick-up to the set.

**Lead-covered Wires.**

Twin-parallel flex, lead-covered, such as is used for light power wiring, can be obtained at any electrician's. The lead covering should be connected to earth. You do not want to use more than two or three feet of such wire, because its capacity will be somewhat high, and you will find that after about four feet, at least, the high notes will tend to be by-passed.

You should also earth the gramophone motor and the carrier-arm of the pick-up. In fact, any metal structure or piece of metal of any size at all that is not already directly connected to the set, should be earthed. And when we say "earthed," we mean via a fixed condenser where the mains are used for H.T. or L.T., or both.

Connect the various things, such as the lead covering of the connecting wire, the pick-up arm, gramophone motor, and so on, to the earth terminal of the set. They will then find earth either through the mains or via a large fixed condenser to the usual water-pipe or buried metal.

**"MODERN WIRELESS"**

IS THE LEADING RADIO MAGAZINE

Price 1/- - - MONTHLY.



## ROUND THE STANDS AT OLYMPIA.

(Continued from previous page.)

during the past few hundreds of years. One wondered what the original owners of these iron suits would have said were they suddenly replaced within them!

Some of the stands were huge affairs, and that occupied by Varleys filled the whole of one end of the balcony—and filled it very interestingly, too. But many firms had quite tiny accommodation. Doubtless much of this could be attributed to the luck of the ballot for stands, that takes place before the exhibition.

In cases, little attempt seemed to have been made to make the best of small spaces. Many appeared to have been quite content merely to arrange their wares in some more or less symmetrical manner on fabric-covered tables and counters.

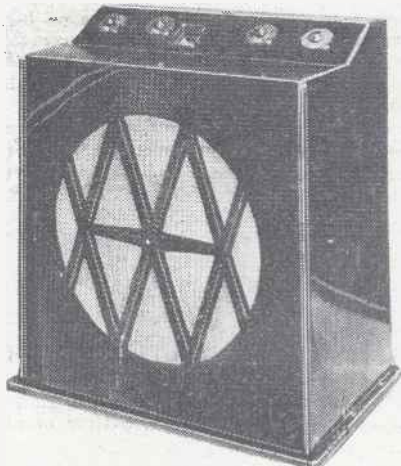
On the other hand, I thought that a few of the exhibitors did marvellously in the way of making the most of limited space. For instance, Watmels had their stand in the form of a neat little drawing-room.

Garnett Whiteley again, backed up some of their receivers with large aluminium reflectors. A simple, but very effective scheme. The Lotus stand, I must mention, was fairly large.

### Stands that Stood Out!

The Bullphone concern distinguished itself by showing a two-valve all-electric set contained in a bright green casing. Obviously there must be people who like such colouring or you wouldn't have seen it at Olympia. I don't, anyway. The same fine little set was available in cases of other shades, and the green ones certainly drew attention to the stand.

Mullards seem to be rather more subdued



Portables again held a strong position at the Show. Here is the Murphy.

this year, although the illuminated pearl pillars and the effect of masses of turned metal on their stand must have had great pulling power.

Marconiphones had a huge valve on view, the National Accumulator Co. an outside in accumulator cells, Lissens a thin commissionaire with long hair, "Lewcos" an attendant with an arm in an enormous sling, the Standard Battery Co. very few batteries but a large show of mains sets. You noticed such things because they stood out, and whether accidental or pre-arranged, they did their job in attracting notice.

### Is Olympia Too Big?

A valuable job, too, because never before was there an exhibition more inclined to bewilder and give one mental indigestion. After all, the modern radio set is becoming so simple in design that there is little room for absolute novelty in form. And having pored over the contents of twenty or so stands, you could hardly expect to discover immense diversity at the remaining two hundred or so.

Personally, I think a little more could have been done to create interest in individual stands. But there, I suppose every firm thought its products sufficiently "different" from all the rest to constitute all the individuality needed. Doubtless, they would have done in a smaller exhibition. But at Olympia!



Visitors were able to see the "unspillability" of this C.A.V. accumulator demonstrated.

For this reason, I was glad to note that the G.E.C. at their Osram stand had their Pentodes under illuminated microscopes so that visitors could note "the accurate spacing between the five electrodes and the rigid construction of the three grids."

### More High Lights.

E. K. Cole exhibited mains sets and units built into glass cases so that you could examine the "works." And they also had their loud speakers on view, and I, personally, learnt of this new activity of "Ekco's" for the first time.

You will gather from all this that my tour of Olympia was tending to become somewhat superficial and that I was pulled to this or that point by something out of the way. But I imagine all visitors found themselves doing the same sort of thing—religiously passing every stand, but stopping for any reasonable length of time only when a high light shone out. To have lingered

over every exhibit would have necessitated many visits.

However, something of an unusual character was to be seen at the Dubilier stand in the form of a huge fixed condenser for high voltages. This colossus had been



The Lamplugh people strongly supplemented their component show with sets and their new Inductor loud speaker.

tested at no less than 220,000 volts! It looked like a huge porcelain insulator, of tubular structure, standing on end (some seven or eight feet high) and banded with bright metal.

The Regent Radio Co. undoubtedly "got over." They have only one mains set to show and they made the most of it.

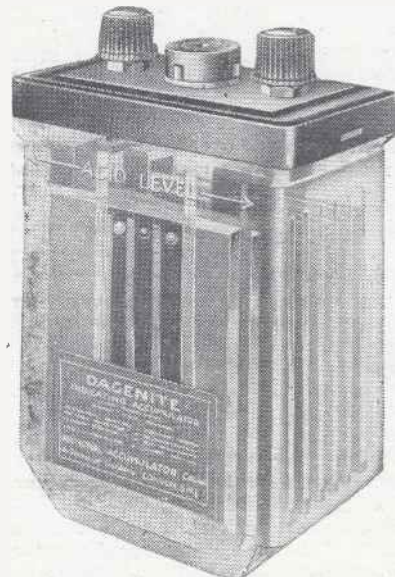
Juveniles and grown-ups, too, assembled in crowds to see the scale model of a submarine at the Chloride Electrical Storage show. And here we learned that the accumulator a "sub." carries weighs one hundred and fifty tons—some battery!

### The Empire Hall.

British General scored a distinct hit with a range of their components enamelled white and labelled "The Cream of Radio." And I fancy R.I.'s achieved a distinct bullseye with their new mains units which set off the Madrigal sets very well indeed.

J.B.'s huge variable condenser, glittering with polished metal fittings, was a "taking" sign on one stand, while a young girl rapidly assembled "Osram Music Magnet Fours" a few yards further along.

(Continued on next page.)



The accumulator that "speaks for itself" was shown. The three coloured "beads" indicate the condition of the cell.



## ROUND THE STANDS AT OLYMPIA.

(Continued from previous page.)

Up in the gallery I give most points for novelty to T.C.C., with their illuminated signal which commanded you to "STOP" and look at the T.C.C. products. And, of course, for size and dignity Varleys were a distinct success.

Passing from the gallery to the first floor of the Empire Hall, I stopped awhile to watch the dancing that was taking place in the appropriate enclosure to the strains of moving-coil music. A couple of tired-looking pairs were jadedly dancing for the edification of a hundred or so very bored-looking spectators. That part of the Exhibition, I decided, was not a success. I hurriedly passed on.



P.R. valves were well to the fore.

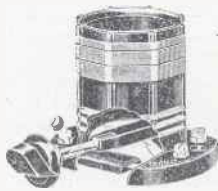
its actual exhibitors, had the great main hall been swallowed up by the earth and only the gallery and the new Empire Hall remained.

### Component Comparisons.

And to show you that the Empire Hall was no annexe for smaller fry, here it was that the B.B.C. had its display. Great interest was shown in the original London transmitter. And how amateurish, it does look! Grimy little bits of gear screwed on to grimy wooden shelves and panels; you could hardly credit the fact that at one time that apparatus carried practically the entire weight of British broadcasting on its ragged shoulders.



The Watmel tapped choke.



A Colvern dual-range coil.

As a comparison, components such as figure in the Brookmans station were displayed.

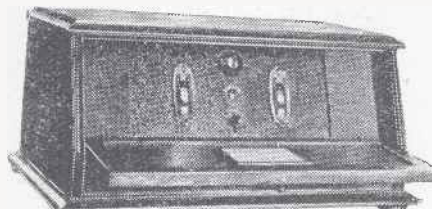
In a glass-walled room tended by a mechanic and cooled by a whirling fan, stood the one-and-a-half kilowatt amplifier loaned by the B.B.C. to operate the three hundred loudspeakers at Olympia.

The valves used in this amplifier were not ordinary "receiving" type valves, but transmitters, and not particularly small ones at that! They glowed at a red heat under their burden of 3,400 volts H.T. and 55 amperes at 20 volts L.T.

In the Empire Hall one also saw at the same spot the largest set model and the smallest set shown. Messrs. Hustler, Simpson and Webb had a simply tremendous version of their extremely neat little "Double Two," attracting much attention.

The biggest demonstration room was, I think, that one leased by Ediswans. It was styled the "Ediswan Theatre," and in it moving pictures supplemented the set and loud-speaker demonstrations. A large audience, reluctant to budge, showed how greatly this Ediswan scheme was enjoyed.

I spent quite a bit of time in the demonstration rooms and consider it time very well spent. The standard of performance of the commercial sets is undoubtedly very high this year, and one does not realise to the full just what the industry is doing until



A Dubilier set that attracted much attention.

one avails oneself of such an opportunity of hearing just what it is that the manufacturers are doing in the way of realistic reproduction.

Scores of visitors walked out of one demonstration room convinced that "nothing could beat that one," only to discover that the next, too, sounded absolutely like the real thing!

Now for a very brief summary of impressions I gained.

### A Tip for Next Year.

I felt that the show was a trifle too big, that it had grown too immense for housing beneath one roof. I am the more convinced of this as the design of sets and loudspeakers is tending to develop along standardised lines; at least in certain respects.

If you go to next year's show—which may be even larger—I would advise you to wander around haphazardly for an hour or two, looking at anything that strikes your attention and then to return to your starting point and make another round,

examining in detail the products of those firms you have judged from your catalogue to have the most representative displays of the various items.

Don't attempt to examine in detail the products of every exhibitor unless



The well-known Bullphone L.S. Unit.

you can go to Olympia a good many times. But if you can do this, you will receive ample reward in the knowledge gained of current radio.

Electric sets were vastly superior in numbers to battery-operated models. But that does not indicate that vastly more mains sets are used than battery sets. In the nature of things, it is obvious that manufacturers concentrated on mains apparatus in view of the fact that such are more "showy" in their simplicity and happen to form the subject of a pretty big demand.

Moreover, it is also obvious that a great percentage of the immediate future of radio is bound up in the direction of mains working.

There were fewer novelties this year than at any preceding exhibition but the fare was more substantial.

I did not go to Olympia with the object of selecting a new set; I do not envy those that did. As a matter of fact, I can think of nothing more difficult, than picking out the best receiver in any class at such an exhibition. One might almost say that there was no best. The standard all round was high.

### A Vast Variety.

There must have been at least a hundred three-valvers, for instance; and who is there to say which of these is definitely better than all the others? At a motor exhibition the prospective purchaser has his choice contained, right at the start, within certain fairly fixed price limits. He may know, for example, that his means forbid his even thinking about anything above £350. At the same time, he won't consider a car costing much less than his arbitrary maximum.

With a radio set

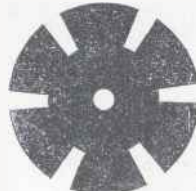
it is a very different matter. With certain exceptions prices for sets of a definite character do not range over a wide scale. Added to this, there is less difference in form than with a car, and there are vastly more varied makes.

However, there is the consolation that whatever you buy these days you are moderately certain to get pretty good value for money. The day of the opportunist junk merchant seems now to be right over.

I was surprised at the few, or comparatively few, radio-gram outfits on view. From the home constructor's point of view, this last exhibition was a great advance over last year's. You will remember that last year components were very few and

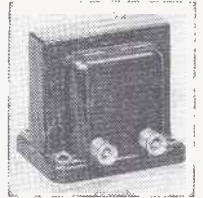
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### BECOL CHOKE FORMER.



No. 7B.

All sorts of choke and coil formers were displayed by the British Ebonite Co., Ltd.



Burton's had an interesting display. Here is their L.F. transformer.



A handy carrier is a feature of the Oldham accumulator.

## ROUND THE STANDS AT OLYMPIA.

(Continued from previous page.)

far between, and every firm seemed to have gone all out for complete sets.

Many inferred from this that the day of home-construction was nearly over. The



A booklet that was being given away at the Regent Radio stand.

wise ones thought differently. They held the opinion that the industry was making a great mistake in not giving a lot more prominence to parts for sets.

This year many more stands had a range of component parts of some kind or other on view. Kits of parts for the assembly of definite set designs were ex-

hibited in large numbers. Even so, I think the trade is still making the mistake of under-estimating the importance of home-construction. You could see that by the crowds that assembled whenever components were shown.

### A Multi-Valve Myth.

There was no indication at all that big multi-valvers are getting more popular. Another prognostication of last year was, if you remember, that we should gradually fall into line with the Americans with sets using up to nine valves.

I noticed very few sets having more than four valves. There were five-valvers, but I cannot remember more than one receiver employing six valves or more. On the other

## THE OLYMPIA OF BERLIN



Germany's great radio show beat our Olympia exhibition in size, but it took in gramophones and "talkie apparatus." Above you see a general view of the main hall.

hand, there were quite a few two-valvers and a whole horde of threes.

Surprisingly enough, most of the two-valvers were all-mains sets. I say that this was surprising, for the simple reason that when one uses the mains there is absolutely no need for H.T. or L.T. economy, and the structural difference between a two and three is not vast.

However, a two-valver using A.C. valves

can give results approaching the best that can be done with three battery valves.

I saw one horn-type loud speaker and dozens of moving coils.

### Many a Slip!

A home recorder was on view at Stand 18 and this attracted some considerable attention. I was amused by the efforts of the attendant to explain how the device worked. "You use a microphone?" asked a visitor. "Yes," answered the attendant. There followed a polite exchange of words and then: "You join a 2-volt battery in series in parallel with the microphone," said the attendant!

Seeing that any ordinary microphone will have a fairly low resistance, you would want some battery! But slips like that were, I must regret to report, quite commonplace during my tour. I asked this question at one stand:

"Has this mains unit got really efficient smoothing chokes in it?"

"Yes, there is one connected across each tapping," was the astonishing reply.

"Is this set economical?" I inquired at another point.

"It only takes 150 volts H.T.," was the illuminating answer.

However, I must add that there were some very slick and very expert salesmen.

### Ganged Tuning.

I was surprised by the number of gang-type variable condensers having drum drives that were in evidence. One might almost say that the majority of commercial receivers having more than two tuned circuits now incorporate such devices.

The old type of multi-dial receiver seems to be quite obsolete from a trade point of view, except in certain special cases.

And it is in this that there seems to be a quite sharp distinction between commercial and home-constructor designs.

From an operating point of view, ganging is, of course, very advantageous. Where each unit needs to be balanced, however, much of the advantage is lost. Without such balancing there must

tend, in the ordinary way, to be a certain amount of sacrifice in sensitivity.

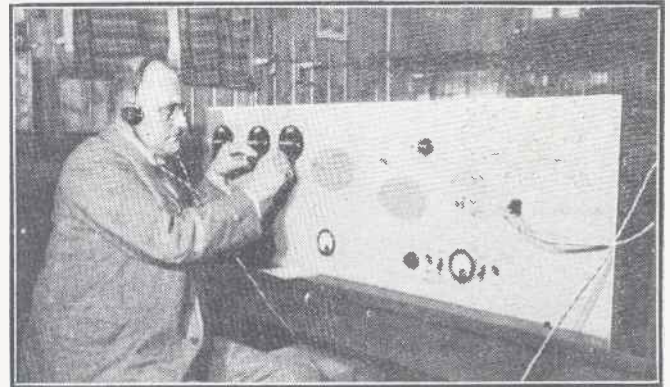
I have the opinion that the home-constructor does not like to sacrifice too much merely for the sake of control simplicity, and that he would prefer to acquire the little extra skill needed to work two or three independent controls and be certain that he was getting the very most out of his outfit.

Again, ganging is an expensive and complicated business, and generally means the provision of special screening arrangements.

So if the home-constructed receiver may not always compare too favourably with commercial sets in appearance, it is certain that there is, nowadays, an even greater gain in regard to inexpensiveness as well as performance.

In cases, it is only fair to add that schemes are introduced where all the objections

## SOME SHORT-WAVER!



This is the giant short-wave receiver the German broadcasting authorities use for picking up distant programmes for relaying.

other than those raised on the grounds of simplicity of design and construction are met in the commercial production.

With the simple two- and three-valve sets I am inclined to believe that the home-constructor holds a very definite advantage over the manufacturer. The sets of this kind I have heard at Olympia and elsewhere have not the power plus selectivity of anything like the degrees attained in the latest "P.W." designs.

But then, you see, a manufacturer can move forward only in spasmodic jumps. When he places a design in production he is more or less bound down to that for a fair period, or he cannot make his business a profitable one. The home-constructor, on the other hand, can take advantage of improvements almost as soon as they are discovered or invented.

### "A Great Success."

Nevertheless, I must say that the trade sets shown at this year's show are far from being imitations of last year's home-constructor designs. They do show up well in appearance if in nothing else.

But to revert to the visit I paid—I fear I have allowed myself to go further into generalities than is legitimate upon this occasion. Olympia was a great success, and despite the enormous number of firms exhibiting there is ample proof to hand that individuals booked immense business. The total orderings must have amounted to several million pounds, and it is a notable fact that hundreds of tons of British radio gear has now been ordered for abroad as a direct outcome of the show.

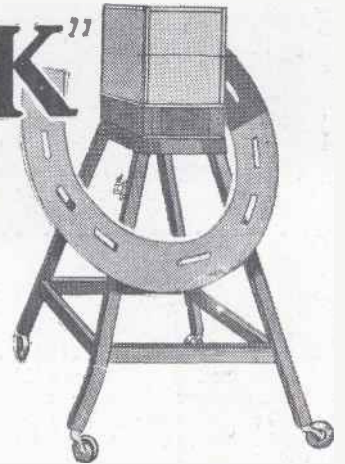
**TWO SHILLINGSWORTH OF  
BLUE PRINTS FREE**

**Don't miss next week's 'P.W.'**

# "MY RADIO LUCK"

Some of our leading radio artistes tell you how good fortune came to them through their wireless work.

Arranged by S. HOWARD JONES.



That the position which I now hold in the entertaining world is due to the radio, I do not doubt.

Albert Sandler.

I WELCOME this opportunity of publicly acknowledging the great luck that the radio has brought me. It is only lack of space which prevents me from filling the whole of this magazine with the many instances of good fortune which have come my way through my wireless work.

## ALBERT SANDLER



Famous for those violin solos on Sunday evenings.

would not be proud to possess such a wonderful instrument? But for the success I had in broadcasting, I should never have been able to afford the £1,500 which it cost me.

Then, again, it was luck that led me to the Grand Hotel, Eastbourne, from whence I made my first broadcast. A director of the hotel chanced to hear me playing at the Trocadero, and offered me a new contract.

Strictly speaking, this luck was not actually produced by the radio; but since it laid the foundation of my wireless career, I think it may be fairly classed as radio luck.

But perhaps the greatest luck I have had in broadcasting is the luck that has brought me something far greater than mere material gain. It is this: that I have been the means of entertaining hospital patients, cripples, and poor and aged people. Even my Stradivarius violin cannot compare with this.

Helena Millais.

No spectacular luck has come my way through broadcasting.

Alas! no West End manager has offered me a good part in his next production, no booking agent has "discovered" me. But, then, I am not a lucky person.

Still, broadcasting has not been *unlucky* to me. It has given me friends in all parts of the country, and, judging from letters I have had from Norway, Denmark, and many other countries, it has given me friends abroad. This would not have been

possible if I had never broadcast, and makes me feel I am a small link between them and the Homeland.

It is nice, also, to appear in a strange town and get a good reception on one's first appearance. But how much nicer it is to realise, when your work is finished, that the people who were previously mere acquaintances have become friends. Wireless makes one acquainted, but, as in everyday life, further knowledge means stronger ties or complete disillusionment.

Of course, wireless has been lucky to me, because it means a job of work, and to a woman earning her living in a profession full of clever people, one is lucky to get work at all.

Ronald Gourlay.

Since that far-off day when I first faced the microphone in the old B.B.C. studio I have never looked back. Before then,

## RONALD GOURLAY



Known to the children as "Uncle Ronald."

of course, I had done a good deal of concert work, but the publicity I have gained from broadcasting has caused my concert bookings to increase by leaps and bounds. Where before I was known to a single person, I am now known to hundreds. That is the luck the radio has brought me.

Nor must I forget that wireless has exploded the idea that my "affliction," as some people are pleased to term my blindness (I need hardly say that to me it is anything but an affliction), must of necessity be a serious handicap to my entertaining ability.

People who have heard me broadcast have sometimes booked me for platform work, and have been staggered by the fact that my blindness was not noticeable. I owe much to the wireless in dispelling the quaint notion that a blind entertainer must be something of a freak.

But not the least pleasing part of my radio luck is that the children seem to like me. I am always delighted when I learn they have given me plenty of votes in their annual ballot.

## LEONARD HENRY



"That chap with the infectious laugh."

Leonard Henry.

I have had the luck—

To be thanked for cheering up thousands of charming people whom I have never seen, and probably never shall see.

To have my complete range of faults pointed out, together with suggestions for my early and speedy elimination from the ether.

To meet the B.B.C. staff, who, in spite of criticism, incredibly long hours, and the preparation of ten-hour programmes for seven days a week, still have a smile and a cheerful word for their artistes.

To survive all the alarms and excursions so likely to happen in this world of high-speed entertainment where, to the waiting listener, a second's pause sounds like an eternity.

To avoid "dropping a brick" and saying something awful, thus being cut off in my prime—to avoid kicking the mike, blasting, or breaking any of the many B.B.C. commandments.

To be given a real chance not only as a comedian, but as an author-composer.

To thoroughly enjoy broadcasting, and to conjure up an optimism that I really *do* feel, in spite of the cold-bloodedness of the surroundings.

To hear myself on records, hear myself broadcast from Hilversum, and see myself on the talkies. (This one is open to argument; no challenges accepted.)

To have nearly four years' run without being found out.

To be asked to write this.

## MAVIS BENNETT



Who gained popularity, a husband, and lots of friends through broadcasting.

(Continued on page 193.)

# SINISTER RADIO.

We don't usually think of Radio as a terrible menace, but an apparently serious attempt to put forward this remarkable view is described below.

By THE EDITOR.

AN article appeared in a certain newspaper a few days ago which we read with interest and astonishment. Astonishment is perhaps not the right word—"amazement," or "incredulity," would be more appropriate.

The heading of the article was as follows: "Who Knows Full Power of Marconi?" and if that great Italian should chance to read the article, we hope he will also notice the sub-head. It is too rich to quote in part; we reproduce it in full: "Master of the world! A solitary individual vested with the powers of life and death and in a position to dictate to the Powers! . . . Fantastic? Well, think over the following."

## Hardly Credible.

Sounds quite thrilling—what? Read on!

It is hardly credible, but there seems to be no denying the fact that some people—even in this age of education—are still ignorant of the elementary principles of physics, and that an idea still persists that Marconi, and others, have untold and mysterious scientific "powers" at their command which, if used ill-advisedly, could "wreck the world."

There may be some grain of truth in this idea when we consider the great advances made by chemists: a poison gas that would kill thousands in a few seconds is reputed to have been discovered; and the bacteriologist of to-day knows a lot about certain deadly germs that could, if handled for the purpose of warfare, fatally infect an entire nation.

But to revert to Marconi, and the article referred to above. It begins in this fashion:

"Only a few weeks ago Marconi, by turning a switch or pressing a button on board his yacht in an Italian harbour, lit the lights in an Australian exhibition.

"Presumably by turning the switch or button later on he could have extinguished all the lights in the exhibition and made it a failure.

"By wireless rays he can control the course of a ship at sea without any crew on board; he can direct the course of an aeroplane which has no pilot by the same means.

"By switching off his controlling beam he can, at will, leave both ship and aeroplane at the mercy of the elements."

## "Master of the World."

Above we have an excellent example of truth misunderstood. The experiment in relay work, conducted by Marconi a few weeks ago, still seems to be interpreted by some people as an example of direct power control by radio—that is, the actual transmission of substantial power by wireless.

There is no need to explain in detail. Our readers know what that experiment meant—just as they will realise the delicious innocence of the following:

"Has it ever occurred to you that this great Italian, whose wireless inventions have saved many thousands of lives, and are daily and nightly giving pleasure and

entertainment to millions of people, might possibly, if he so desired, make himself master of the world?

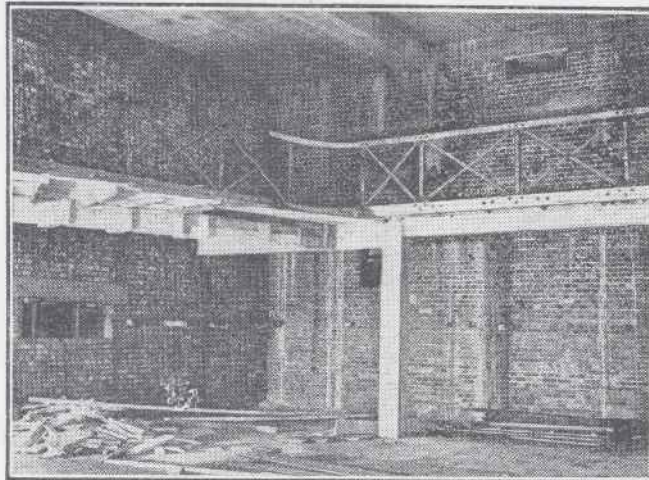
"Yes, master of the world, and supreme Dictator. For, if, by the turn of a switch, he can light or extinguish lights twelve thousand miles away, it is well within the bounds of possibility that he has it in his power to send out a wireless 'ray' or 'beam' which would either fuse or cut off the electrical force of everything afloat or in the air."

The article continues:

"Who knows but what he has it in his power, by the use of a wireless ray, to put every enemy battleship out of action, in the case of another conflict, and bring every enemy aeroplane crashing down to destruction?"

"Master of the world. A solitary individual vested with the powers of life and death, and in a position to dictate to the

## A STUDIO IN THE MAKING



Not a bit like a studio, is it? Yet it is one of the latest at the new B.B.C. headquarters in Portland Place, London, complete with its "Strangers' Gallery," from which the proceedings can be viewed.

Powers. The idea may appear fantastic, but, in view of the demonstrations of his power, his supreme control of the ether, it is not fantastic.

"The very wireless instrument which gives us (more or less) enjoyment might, if Marconi so willed, become an instrument of destruction.

"Think of it, and then thank the Fates that in Britain we have Baird, the inventor of television, who knows probably quite as much about wireless as does Marconi."

## A Good Joke.

There is a good deal more, but we will spare our readers. Despite the fact that we appreciate a joke as much as most people, we can't help feeling a little sad. Poor Marquis Marconi! To be credited with such potential power must prove very disconcerting; but luckily we know, from personal

contact with the great inventor, that he, too, has an excellent sense of humour, and effusions like the above quotation must afford him a considerable amount of amusement.

Still, thank heaven for television! That will prove an effective remedy against any sinister radio "instrument of destruction." Probably the writer of the article has seen the German film "Metropolis," or has been indulging in an orgy of early H. G. Wells and Edgar Wallace. One night he will have another nightmare based on the idea that a mysterious Dr. Fu Manchu-cum-Marconi has pressed a button somewhere and has destroyed the world by radio; and then, when he wakes up, we shall get another inspired article about the radio powers of some "Master of the World." But—sufficient for the day . . . is the humour thereof . . .!

## SELENIUM RECTIFIERS

Continental Stations—Aerial Insulation.

Selenium has been used in the same way as copper oxide or sulphur oxide to form a dry metal rectifier.

Small selenium rectifiers have been developed in Germany for inserting into moving coil measuring instruments.

The constancy and reliability of the new selenium rectifier makes its application to A.C. measurements quite promising.

Unlike Britain's the German wireless licence figures show a decline in the last official figures published.

## A NEW STATION

A new Dutch broadcasting station is working on 299 metres under the call sign P.F.I.—I.D.Z. (The times of transmission are at present Saturday nights between 11.40 p.m. and 1.40 a.m.)

Radio Paris is increasing its power to 60 kw.

Budapest is planning a regional broadcasting two-wave transmitting station on the lines of the British regionals.

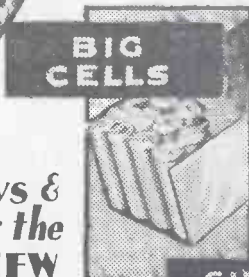
Both the Witzleben, Berlin, and the Konigs-wusterhausen, Berlin, stations have been transmitting a regular series of television tests.

Generally when the primary coil of an aerial tuning unit burns out it will be found that the insulation of the aerial is defective and mains H.T. is shorting to earth.

Aerial insulation should be frequently overhauled at this time of the year, as a leak in this part of the installation may seriously affect reception

# G.P.C.

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Ask always & firmly for the **LISSEN NEW PROCESS H.T. BATTERY**—the battery with the **LONG LIFE**

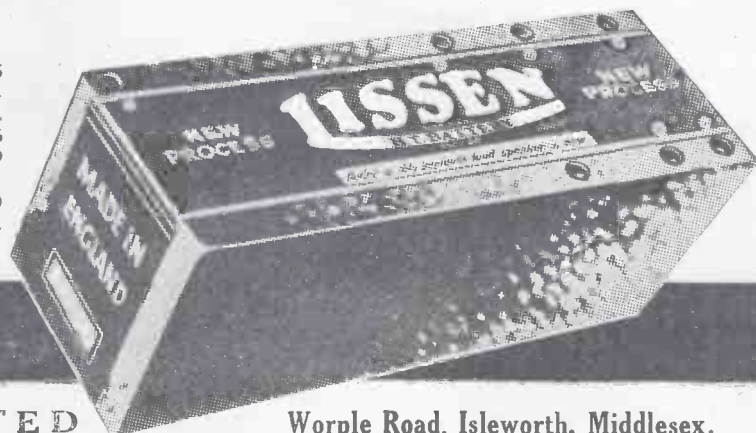
There is dominant energy—unadulterated energy—in the Lissen High Tension Battery, keeping your valves *fully* active all the time, your loud-speaker utterance natural and true, bringing volume and a power smoothness into your reproduction and maintaining this throughout the longest programme.

Only in the Lissen Battery do you get the process which puts such power into your set and explains why the Lissen Battery lasts so long.

Ask firmly "Lissen Battery" by name and show that you mean to take no other.

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60 volt (reads 66)	7/11	60 volt (Super Power)	13/6
100 volt (reads 108)	12/11	100 volt .. ..	22/-
120 volt .. ..	15/10	4½ volt Grid Bias	10d.
36 volt .. ..	4/6	9 volt .. ..	1/6
60 volt (For Portable Receivers)	7/11	16 volt .. ..	2/9
59 volt (For Portable Receivers)	12/6	4½ volt Pocket Battery	5d. each (4/6 doz.)
		Single Cell Torch Battery	4½d.

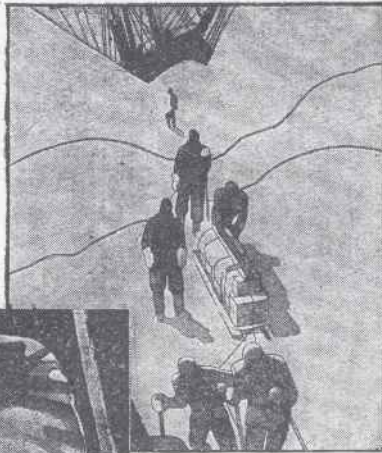


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Wastes—



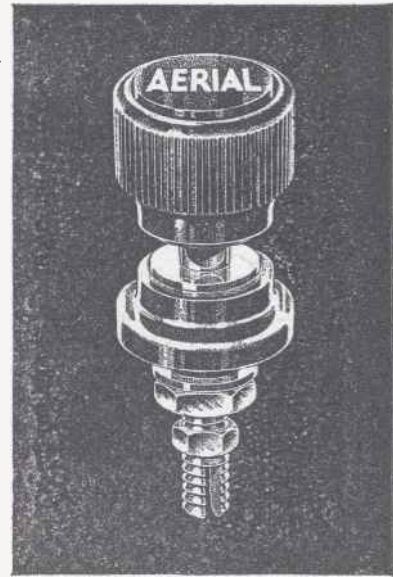
—in  
Tropical  
Forests

Exploration Expeditions rely for succour and safety on radio using Marconi Valves because of their unflinching dependability. B. B. C. Stations—Imperial Airways—Metropolitan Police—Empire Wireless Communications—Trinity House Lightships and Beacon Stations—Croydon Control Tower and large passenger liners all

USE  
**MARCONI  
VALVES**



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Years ago Belling-Lee were already marketing the famous Terminals which manufacturers are standardising to-day.

Belling-Lee products are ahead of their time. Last year's favourites will be this year's favourites, too—Terminals, Plugs and Sockets, Wander Plugs, Spades, Anode Connectors and Battery Cords.

The new "Wanderfuse" takes no more headroom than a Wander Plug—though it's a fuse as well! Price - 1/6.

Spare Fuses (150 m/a) - 9d.

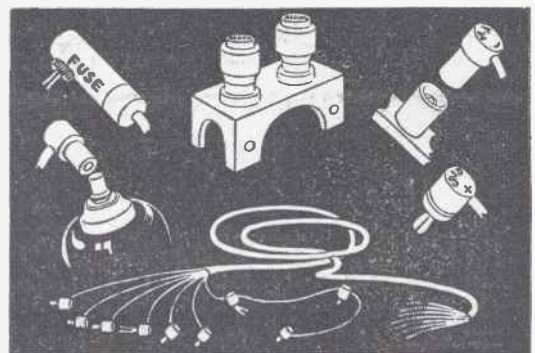
### BELLING-LEE TERMINALS

Type "B" ..	6d.
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Wander Plug ..	3d.
Twin Plug and Socket	1/6
Indicating Spade Terminal ..	4½d.
S.G. Anode Connector ..	6d.
Battery Cords, 9-way	5/9
(also made in 5-, 6-, 7-, 8- and 10-way)	

### TWO NEW COMPONENTS

The Belling-Lee Bakelite Terminal Mount takes any pair of Belling-Lee Terminals or Plugs and Sockets; can be mounted vertically or horizontally on your baseboard, your window-ledge—anywhere.

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HERE IS A FINE  
ARTICLE ABOUT



# TRACKING HOWLERS



By R. W. HALLOWS, M.A.

If there is one thing that makes the mildest of men see red it is the spoiling of programmes by the wails, shrieks, whistles and cat-calls produced by a neighbour who uses reaction not wisely but too well!

Read all about this radio crime, and how it is tackled by the Sherlock Holmes of the ether!

**S**TAND beside a man, normally as gentle as any dove, whilst he is endeavouring to escape the attentions of a howler who pursues him up and down the wave-band, spoiling every transmission just as he has got it tuned in; stand beside such a man, I say, and you may be astonished to hear his lips describing the horrid forms of slow torture that he would apply to that neighbour if only he knew who he was.

### "The 300 Unpleasant Things."

Please do not misunderstand the purpose of this article. If I give hints upon tracking down the oscillator, do not take it that I urge you to hang him, when caught, by the thumbs from his own aerial over a slow fire, or to apply the ingenious Chinese torture of the Three Hundred Unpleasant Things.

Believe me, it is far better to deal with him in a kindly way—especially if he is a size or two larger than you are. Most oscillators are sweet, simple souls who will express the utmost surprise that their own tiny squeaks can be heard even by the man next door.

The Sherlock Holmes business of tracking down the oscillator can be distinctly difficult, especially if you live in a fairly thickly populated district where every other householder has a wireless pole and the remainder have indoor aerials.

Naturally you want to act strictly in accordance with the laws and regulations, but you may set about tracking down the oscillator by methods that will prove distinctly interesting, since everyone nowadays is either a detective or a student of Edgar Wallace, and is therefore attracted by deductions and by the following up of clues.

### On the Trail.

Here is an instance of the way in which an oscillator who was offending through ignorance was run to earth and shown the error of his nasty ways. The sleuth in this case lived in a house which was one of a dozen or so upon a new building estate. Though in his locality both the Brookmans Park transmissions are very strongly received even on a crystal, somebody spoilt all the evening programmes by howling.

Of the twelve houses ten were known to have wireless sets. Three of these belonged to friends of the sleuth's, who were known to be above suspicion. His own made a

fourth and this left only six wireless sets that could be causing the nuisance. Two of these were found by quiet investigation to belong to men who never got home until after eight o'clock in the evenings and whose families did not switch on in their absence.

Since the howling began at a much earlier hour the "possibles" were now narrowed down to four. One of those the sleuth met in the train. He worked the conversation round to wireless and discovered that the set was a crystal plus two note-magnifiers.

what one has to do is to discover the possible villains by eliminating the virtuous.

### The Mystery Solved.

Two questionable sets now remained. One belonged to a young fellow who frequently went out to dances. By ascertaining when dances were in progress and seeing whether howling did or did not coincide with them it was an easy matter to discover that, if he delighted in the cacophony of jazz bands, he was not responsible for that in the ether, since the nasty noises still occurred when

the sleuth's wireless set was used on dance nights.

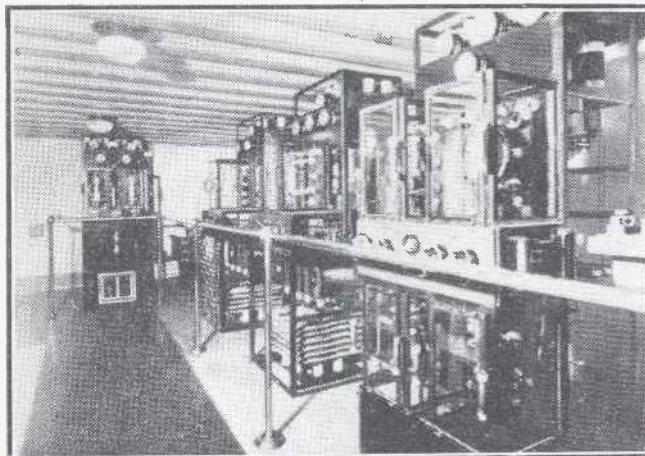
Exit then from the list of suspects our young friend. Sad and ungentle though it may seem to say so, the only person left who could be creating the horrible noises in the ether was a very dear old lady whose son had recently presented her with a wireless set as a birthday present. With the cunning of his kind the sleuth sent his better half round to call, instructing her to admire the appearance of the wireless set and to ask for a demonstration of its undoubtedly wonderful quality.

Yes. I am sorry to have to say it, but the dear old lady did begin by pushing the reaction control over to maximum and then by twiddling other knobs. She said that she couldn't quite understand the queer noises that the set made and that it often took her most of the evening to get 2 L O properly tuned in.

The sleuth's better half, who is a person of tact, said that she was quite sure that her husband would be delighted to give a little help. He was delighted. And so are all the neighbours!

In cases where even the Sherlockiest of Holmes's is beaten the only course open is to send a complaint to the B.B.C.

## WHO IS THAT BEHIND THE HOWL?



You can't pick up foreigners through a lot of oscillation and whistles, though there are some fine stations on the air. This view shows the one at Cracow, Poland, which works on 244 metres.

No chance of howling here. Only three possibilities were left.

Discreet inquiries at the local wireless shop showed that one of these was a real enthusiast who made his own sets and was using at that time a screen-grid H.F. amplifier with reaction between the plate and the grid of his detector valve. Such a circuit is not prone to cause radiation, and the fact that its owner was discovered to pride himself upon the smoothness of his reaction indicated that he was not likely to be the offender.

All this reads rather like the ten little nigger boys, and it is just as well that it should, for in tracking down an oscillator,

## LATEST BROADCASTING NEWS.

**"DIVERSIONS"  
AGAIN.**

**PROGRESS AT SLAITHWAITE  
— THE ULSTER EXHIBITION  
— CARDIFF NEWS — PRO-  
GRAMMES MOVEMENTS.**

**M**ANY listeners who regretted the decision of the officials at Savoy Hill, made some months ago, to suspend that fascinating series of broadcasts known as "Diversions" will be pleased to learn that they are to be revived at the end of October.

There is no doubt that this type of programme is exceedingly popular with a large section of listeners, but unfortunately, the original scheme proved to be rather too ambitious, inasmuch as it became impossible to find suitable material in sufficient quantities, while the compilation of the programmes also became too great a task for the small staff, already overtaxed with work in other directions.

Accordingly, it has been decided to give a regular "Diversions" programme every month, instead of every week as was the case in the first series. This will enable the programmes to be better presented than was done formerly, as well as permit those responsible to explore the potentialities of many ideas which the B.B.C. is hopeful of including in the series.

**Progress at Slaithwaite.**

So well has progress been maintained with the construction of the North Regional transmitter at Slaithwaite, near Huddersfield, that the electrical equipment is now being delivered. Some time, however, must elapse before test transmissions begin, and it is doubtful whether they will start before Christmas.

Already the B.B.C. has decided that only one transmitter shall be put into service for the first month or so, the other being brought into operation, as was the case at Brookmans Park, when listeners have become accustomed to the new conditions.

The first transmitter which will radiate the Regional programme will work on a wave-length of 479 metres and not until a satisfactory service is established will the present comparatively low-power stations throughout Lancashire and Yorkshire be closed down.

**The Ulster Exhibition.**

The Ulster Wireless Traders' Exhibition, which opens at the Ulster Hall, Belfast, on Wednesday afternoon, October 15th, will provide an interesting item for Northern Ireland listeners when the opening speeches are broadcast at 3.30 p.m.

The actual ceremony will be performed by Prof. R. W. Livingstone, of Queen's University, Belfast, other speakers being Mr. Robert Scott, Chairman of the Ulster Association, and Mr. J. W. Barber, Chairman of the Radio Manufacturers' Association. Special trains are being run for the Exhibition and passengers will be given free admission to the Ulster Hall.

**Cardiff News.**

Although a start with the construction of the West Regional transmitter is still a

long way off—its place in the list being after the Northern, Scottish, and possibly, the new Midland transmitters—preparations are going forward at Cardiff for an improvement in broadcasting facilities in readiness for the time when the radius of the Welsh station is extended.

Structural alterations are taking place at Park Place, Cardiff, where the B.B.C. studios and offices are situated, and a new studio is in course of construction. Hitherto Cardiff has had two studios, one on top of the other, which even the most inexperienced layman will appreciate is not an ideal state of affairs.

**"TWO-EARED MIKE"**

This is a double microphone exhibited at the German Radio Exhibition. They claim it gives a true sound-picture because of the "stereoscopic" effect obtained with it.

**FOR THE LISTENER.**

Whilst staying in Italy our contributor listens critically to the Continental stations and decides that they are good—in parts.

By "PHILEMON."

**Tempest.**

**F**OR four nights last week we were cut off from England by a brewing storm. It was a brew of which the witches in Macbeth might well have been proud!

It gathered for four days, silently, with demonstrations of vivid lightning each night. When at last it came down upon us, it divided itself into two parts, one on either side of the Lake.

The two clouds, lurid with inside lightning as Vesuvius in eruption, approached each other over the Lake. Distant thunder rolled continuously. As they drew nearer, they flung bridges of forked lightning across from one to the other. The grass, the trees, the lake water, were as visible as in daylight, but in a vivid hue. Most of the artillery went over our heads; but now and again a shot fell short and a perpendicular flash of lightning struck down unpleasantly near and almost blinding.

When the clouds met, they burst. Rain fell, not in drops, but in spouts and buckets.

Added to this the engineers need more room, while a better waiting-room is also required for the artistes. Several new rooms have been taken in the existing building and here the new studio is nearing completion. The walls will be covered with canvas and the place will be brightened by curtains and chair-covers of yellow and gold.

**Programme Movements.**

Oscar Wilde's play, "The Importance of Being Earnest," which has already been broadcast, is to be revived for London listeners on Friday, October 31st.

St. Hilary, Marazion, the little Cornish village from where listeners have for some years at Christmas time heard a Passion Play, comes into the programmes on Monday, October 27th, when a Cornish Symposium will be relayed. Further details of this broadcast will be given in due course.

What may easily prove to be one of the most important broadcasts of the year will be heard by listeners to the National programme on Thursday, October 30th, when several speeches at the League of Nations dinner will be relayed from the Guildhall, London. The Prince of Wales is among those who will be heard.

A feature programme entitled "Day Dreams of the Darkies," presented by Arthur Blanch, will form part of the programme from Belfast on Tuesday, October 14th. The artistes include Mabel Tait, Frank Cochrane, Daniel Roberts, Tom Jones and W. P. Thomas, Bob Miller's Casual Four and the Mayfair Glee Singers.

Victor Hely-Hutchinson, a member of the Music Staff at Savoy Hill and well-known to listeners both as a pianist and composer, is paying a flying visit to Belfast on Saturday evening, October 18th, to play Mozart's Concerto in A major for Pianoforte and Orchestra. Although, of course, Mr. Hutchinson has been heard on numerous occasions by Ulster listeners, this will be his first visit to the Belfast Station.

It was the sound of steam escaping under pressure from an engine. The dregs of the buckets were hail.

Hailstones, the size of large marbles, rattled on the tiles with such a din that one could not hear oneself speaking. They smashed unshuttered windows; and, in the morning, the ground underneath the vine-pergola in front of the cottage was covered an inch deep with fallen grapes.

It was a great thrill, but I was frightened!

**Boosting One's Country.**

Continental stations, particularly in Germany, boost their own country on the wireless much more than we do. Denmark is very national in this respect also.

The nation is continually advertising itself to its own people, and to the world. They have talks on their own "culture." Hardly a week passes, but what one or other of their poets reads his poems for half an hour.

(Continued on page 192.)



# The P240 will give you increased volume and far better quality

Its huge power handling capacity and extremely low impedance assure this. It is sensitive, too, thus requiring a minimum of early amplification and giving a greater output—sufficient, in fact, to work a moving coil speaker at ample volume for domestic purposes.

Quality, too, is vastly improved and the P.240 will make a world of difference to any set using 2-volt valves—from the modest 2-valver to large sets designed to give an appreciable output.

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Amplification Factor	-	-	-	7
Anode A.C.-Resistance (ohms)	-	-	-	1,900
Mutual A.C. Conductance (MA/V)	-	-	-	3.7

**PRICE 13/6**

**THE AMAZING**

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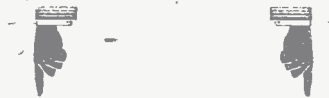
**GET** this wonderful chart. Paste it on a board. Hang it up where you can always see it. Treat your house. For it will make you a master of every—single part of a house is laid bare before your eyes. Inside and outside; upstairs and down—every wall, every part of a wall, every pipe or wire, every board or brick is there uncovered, opened up. So that, with your hand you will walk unhesitatingly to the source of any trouble. "There," you will say, "is the cause of it all." And if you are buying a house there will be not a thing that will escape your eye. You will know from the chart just what you are buying and will make sure of your money's worth. It is astounding that so much information can be amassed in one chart—made one of the most graphic and fascinating pictures in the world. Think of it! The chart is given free with the first part of the **HOME MECHANIC**. Make sure of your copy by asking your newsagent now, to reserve the **HOME MECHANIC** for you each week.

### An Ideal Work for the Practical Man

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.....

# Television at the Berlin Show

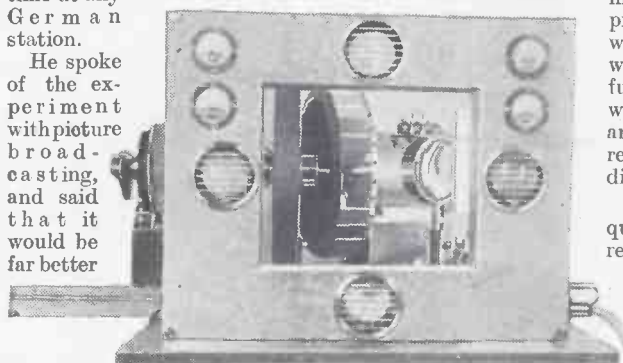


Several television systems were on view, and some were demonstrated at the recent German Exhibition, and in this article our Special Correspondent tells you all about them.

DR. BREDOW, the head of German broadcasting, told the listening public on the eve of the opening of the seventh annual German Radio Exhibition that it was still too soon to give television programme time at any German station.

He spoke of the experiment with picture broadcasting, and said that it would be far better

## SPECIALLY DEMONSTRATED



An experimental Telefunken television receiver that was used in a special press demonstration.

but previously gave the press a demonstration in their own laboratories.

I was not present at this demonstration, but I have heard from reliable sources that the demonstration gave good results.

Telefunken work not with the Nipkow disk, but with the mirror wheel, and with 2,500 picture spots in the second, whereas the others all work with 1,200 or less. Telefunken transmitted on a wave-length of 70 metres, and demonstrated that the reception under these conditions was excellent.

On the other hand, the question of the price of the receiver was raised, but not answered. It is supposed to be in the neighbourhood of the price of a super-five-valve receiver.

The German Reichspost demonstrated television at the exhibition,

and both the Fernsch Co. and the Telehor Co. had a stand. It is very significant of the trend of things to find that the German Reichspost placed the order for their television transmitter with the Fernsch A.-G.

And I must say it looked a remarkably fine instrument, and although operating with only 1,250 picture points per second, it gave a fine picture with no sway and none, or hardly any, of those lines in the pictures we all know so well.

### Methods of Synchronisation.

The synchronisation system of the Fernsch A.-G. and of the Telefunken people is similar. They both employ a special valve generator to produce a local frequency, in the case of the Fernsch A.-G. the picture frequency is coupled to the generated normal frequency, and one thus obtains a perfectly steady picture.

Telehor on the other hand, now use a similar synchronisation system to that used by Baird last year and, curiously enough, the reception shows that same sway up

(Continued on next page.)

for all concerned to develop further the technique of television before making it accessible to the public at large.

Only when it would be possible to guarantee satisfaction artistically and technically would the time have come to introduce a regular television programme service. Till then development should continue experimentally outside broadcasting hours.

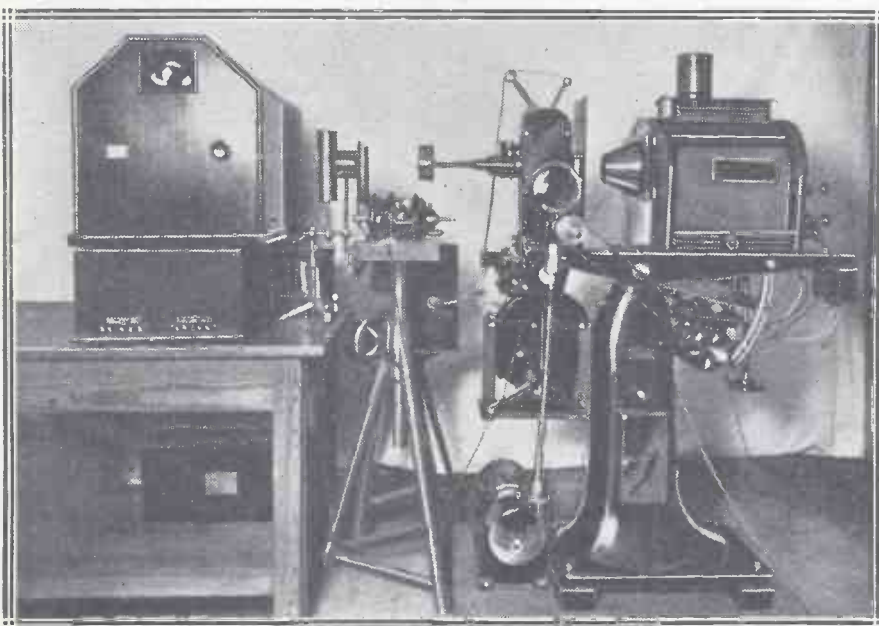
Meanwhile, the two leading German television companies, the Fernsch A.-G., and the Telehor Co., working with Mihaly patents, have decided to manufacture full kits for amateurs to build their own television receivers and have put complete receivers on the market.

### Horizontal Picture as Standard.

These receivers work on both the German and the British television experimental transmissions. Probably my readers will already know that the German Post Office has decided to normalise a horizontal television picture appearing at the top of the Nipkow disk, whereas the Baird Co., in England, transmit the picture so that it can be received on the right-hand side of the Nipkow disk, thus having a vertical picture.

The third German firm interested in television is the large Telefunken concern. Curiously enough, they did not exhibit their television receivers at the Radio show.

## TELEVISION TRANSMITTER FOR TALKIES



This apparatus, exhibited at the Berlin Show by Fernsch A.-G., is designed for the televising of talkie films.

## \*-----\*

# THAT EBONITE FETISH.

By G. S. M.

FOR years I have been watching the constructional articles in the wireless magazines, wondering when someone would have the courage to discard that unnecessary and expensive item, the ebonite panel. What a signal proof it is of the innate conservatism of even the most progressive set-designers!

At last I was delighted to find that POPULAR WIRELESS had broken through the bands of custom and, in the "Economy" Three, had recommended the use of plywood to form the panel. Is it too much to hope that this means the end of the long reign of ebonite as the only material for panels in a wireless set?

### Requirements Have Changed.

What is the origin of this idea that ebonite is the only satisfactory substance for the purpose? To answer this question we must go back to the first days of broadcasting. In the days when we had to make our own valve-holders, by inserting the separate valve-pins in the panel, it was essential to use the best possible insulating material.

But in the modern set conditions are radically different—how different is strikingly illustrated by the fact that some sets even make use of an aluminium panel. This has many advantages in the way of shortening the wiring, and where insulation is necessary it is obtained by the use of ebonite bushes. But from the point of view of economy, which, after all, is very important to many of us, aluminium is quite as bad as ebonite.

By the use of plywood a substantial saving is effected at once. An ebonite panel for an ordinary three-valve set costs about 7s. 6d. The same-sized panel in oak or mahogany-faced three-ply will cost about 1s. or 1s. 6d. Surely such a saving is worth while, if there are no corresponding disadvantages involved?

### The Question of Insulation.

Let us then consider the function performed by the panel in an ordinary set. And first let us correct a possible misapprehension. Anyone hearing a discussion of the respective merits of wood and ebonite might be forgiven for thinking that wood was a very poor insulator, if it possessed any insulating qualities at all. This is, of course, very far from the truth.

Provided that the wood is dry, it forms an excellent insulator, though not, it may be granted, so good as high-class ebonite. Notice that qualification, by the way; for cheap ebonite is often poor stuff, with no advantages over wood. For low-frequency currents there can be no doubt that wood is perfectly efficient.

It is only when we are dealing with high-frequency currents that anyone can reasonably doubt its efficiency. Now what components do we find upon the panel of the ordinary set? The most popular type of set to-day is undoubtedly the three-valver, consisting of a detector followed by two L.F. valves.

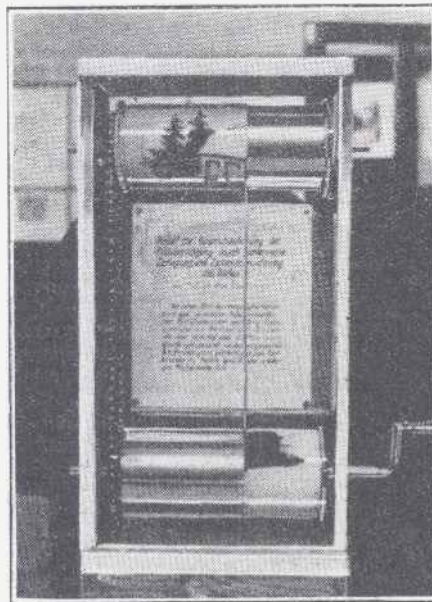
On the panel we shall find a tuning condenser, reaction condenser, on and off switch, and possibly a wave-change switch. If our set has an H.F. valve, we shall probably find a second tuning condenser.

The on-and-off switch may be dismissed from our consideration at once, as it offers no risk of leakage. The first tuning condenser will have its moving plates at earth potential, and should therefore cause no difficulty. Frequently the reaction condenser and second-tuning condenser will be connected in the same way.

### An Easily Worked Material.

Really, then, from the point of view of insulation, the wooden panel is perfectly satisfactory. A further point in its favour,

## MUNCHEN MUSEUM EXHIBIT



This interesting exhibit at the Deutsches Museum in Munchen illustrates the principle of picture telegraphy and television.

## \*-----\*

# TELEVISION AT THE BERLIN SHOW.

(Continued from previous page.)

and down which we were wont to observe at the last year's Baird demonstration.

It is a ticklish matter deciding which was the best demonstration at the exhibition. Personally, I give the laurels to the Fernsch A.-G., with the transmission and reception of their talkie film. A perfectly steady picture, and one that one could look at for some time without getting a headache.

### A Clean Mechanical Job.

I happened to pass behind the scenes and glanced in at the transmitters. Now I am neither biassed, nor, on the other hand, did I give the two transmitters, that used by Telehor and that used by Fernsch, a thorough test, but from the mere impression of a minute's look at each I very strongly felt that the Fernsch's transmitter was a clean and effective mechanical job, whereas the transmitter used by Telehor reminded me more of an experimental transmitter.

for the man who has not had much experience, is the ease with which it can be worked.

What further advantages can be claimed for ebonite? Some, no doubt, will praise the neat appearance of the glossy black panel. This opinion is, however, far from universal, as it is proved by the fact that all manufacturers of ebonite produce not only the ordinary black variety, but also another type finished in imitation of mahogany!

Why, then, not use the real mahogany? I believe that no one who has ever seen a set, well made, with panel of wood to match the cabinet, will wish to go back to ebonite on the score of appearance.

## \*-----\*

# RADIO BREVITIES.

Little constructional and technical tips which will prove useful.

A coating of ordinary household enamel on fairly stiff paper such as the cover of this book makes a good emergency high resistance.

When adjusting the capacity of a compression type condenser in a wave-trap, use a long-handled screw driver or chisel edged skewer so that the hand is well removed from the coil.

When extra smoothing appears to be necessary with a mains unit it is generally the detector H.T. supply that is the cause of trouble.

An old L.F. choke or an L.F. transformer with one good winding, can be placed in series with the H.T. positive lead to the detector in conjunction with a large fixed condenser joined between plate and filament. This will often cure the hum.

Poor contacts in a resistance or an imperfect primary or secondary winding or bad aerial insulation are common causes of "interference."

A 25,000-ohm resistance instead of an H.F. choke will sometimes allow smoother reaction control to be obtained.

Fernsch were giving three demonstrations, one with a transmitter employing over 3,000 picture points and transmitting direct television, one using 1,250 picture points and transmitting a talkie, and by means of a transmitter similar to that built for the Reichspost, a demonstration of direct television by means of a transmitter employing 1,250 picture points.

Telehor were transmitting a film, and I understand that a talkie followed later. Then the Reichspost were demonstrating by means of their own receiver. By the way, Fernsch had a mirror wheel receiver on their stand as well as parts for building a disk receiver and the two standard British Baird televisions.

And now I am sure my readers will ask me what progress there has been since last year. Well, the actual pictures are not very much better, but the work behind the production of the picture has been greatly simplified. The receivers are simpler and more reliable, and the transmitters don't now look like miscellaneous assemblies of scraps.

Even if television is not ripe for the general public as yet, it certainly is, or ought to be, the happy hunting ground for all those who are interested in technical experiments.



# P.M.256A

Price  
13/6

With a still lower impedance than type P.M.256, the Mullard P.M.256A definitely meets the demand for an output valve capable of handling large signal voltages without danger of overloading, and of delivering sufficient power for operating all forms of speaker including the moving coil type.

Its excellent performance is obtained at the very moderate anode voltage of 200, while the filament consumes only 0.25 amp. at 6 volts which may, if desired, be obtained by a step-down transformer from the A.C. electric light mains.

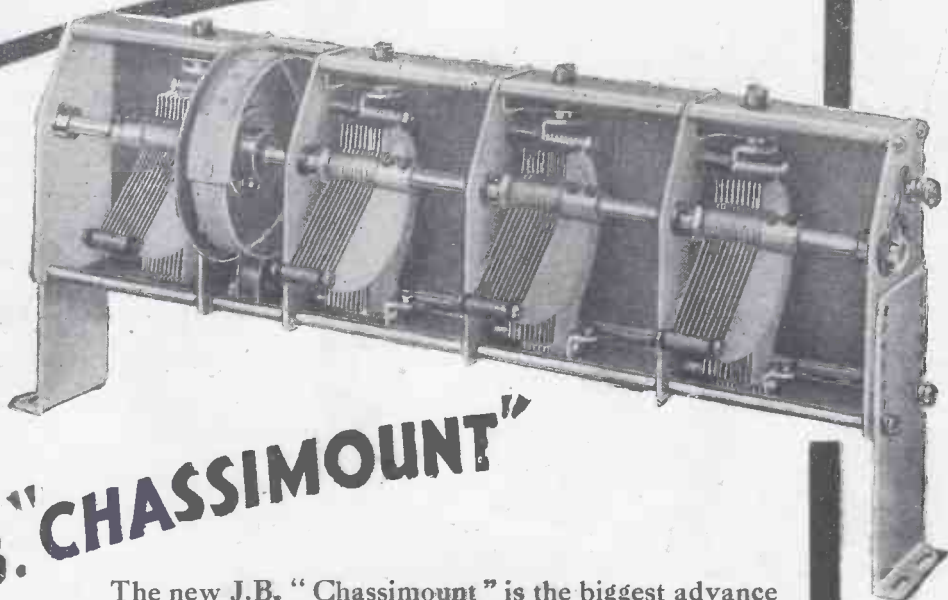
The amplification factor (3.6) indicates that the P.M.256A is particularly suitable for use in sets where large signal voltages are built up by the previous stages of low frequency amplification.

# Mullard

**THE MASTER VALVE**

Advt. : The Mullard Wireless Service Co. Ltd., Mullard House,  
Charing Cross Road, London, W.C.2.

# RADIO'S NEWEST TUNING DEVICE



## The NEW J.B. "CHASSIMOUNT"

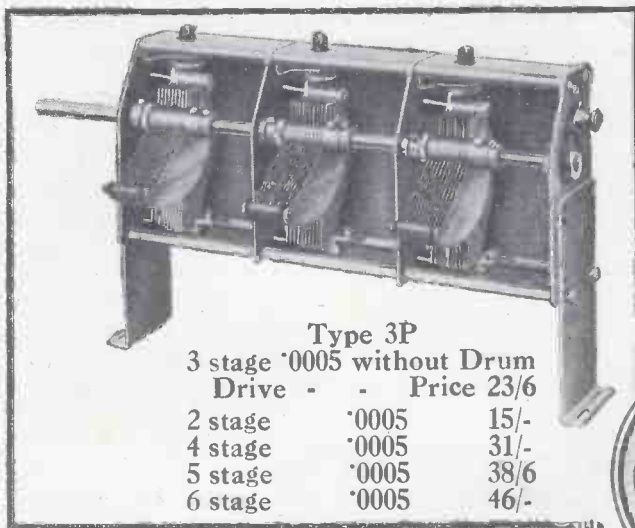
The new J.B. "Chassimount" is the biggest advance yet made in condenser design. It is a complete breakaway, throws open new fields, and will be the basis of this year's popular circuits.

Two, three, even six tuned circuits—one knob controls them all, keeps them perfectly in tune, and brings in station after station.

Once again J.B. lead the way. J.B. precision has made the "Chassimount" possible and ensured the various condenser units matching over the whole range.

The J.B. "Chassimount" is built and designed as a unit. Each stage is adequately screened and has a special device which balances out all stray capacities.

**AND IT COSTS LESS THAN SEPARATE CONDENSERS.**



**Type 3P**  
 3 stage '0005 without Drum Drive - - Price 23/6  
 2 stage '0005 15/-  
 4 stage '0005 31/-  
 5 stage '0005 38/6  
 6 stage '0005 46/-

**Type D4 (Illustrated above)**

4 stage '0005 with Drum Drive  
 Price - 42/6

2 stage	'0005	26/6
3 stage	'0005	35/-
5 stage	'0005	50/-
6 stage	0005	57/6



PRECISION INSTRUMENTS

# CAPT. ECKERSLEY'S QUERY CORNER



THE NEIGHBOUR'S PROGRAMMES—THE POWER OF THE TWINS—WHY IS IT WEAK?—VALVE OR CRYSTAL—THE SPARK AT THE SWITCH.

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

### The Neighbour's Programmes.

J. McG. (Leyton).—"My set is the 'Magic' Three, and, in general, gives every satisfaction. When, however, my next-door neighbour switches on his set, I receive the station to which his receiver is tuned at all positions of my tuning dial. On his ceasing reception, conditions again become normal, and my receiver is adequately selective.

"Both our aerials are of the conventional outdoor type, and are normally separated by a distance of eight yards. The trouble, however, still persists when I use an indoor aerial, even when my receiver, attached to this, is removed to the centre of the room.

"Can you suggest the possible cause of the effect, and a cure?"

Dare I suggest that when your neighbour tunes in a station he tunes in on the silent point of reaction, that is, in fact, oscillating, but at an inaudible heterodyne note?

I cannot for the life of me see any other explanation unless you share a common earth lead to a high-resistance earth. If he doesn't get you, however, the earth suggestion is out of court.

I think you might ask him to slack off his reaction, and show you that he can tune through the station without oscillating audibly, and then try your set.

\* \* \*

### The Power of the Twins.

P. E. R. (Camberwell).—"I have in use a simple three-valver, and find that the 261 transmission is nothing like the 356 transmission in strength. My neighbour also finds the same peculiarity.

"Since the powers of the two transmitters are the same, why should the above be experienced?"

When a wave passes over the land its energy gets absorbed just as when a current passes down a long wire there is an appreciable diminution in its strength. This dying away of the strength more rapidly than the usual inverse distance law is called the attenuation of the waves.

Shorter waves attenuate more rapidly than longer waves when each pass over the same ground. Thus the shorter-wave Brookmans Park field is, at distances beyond

five or six to ten or fifteen miles, depending upon conditions, less than that of the longer wave, due to more rapid attenuation.

As a matter of fact the power in the aerial of the shorter-wave station is greater than that of the longer wave to try and minimise this effect. But no reasonable power is sufficient to get over the difficulty entirely.

### Why Is It Weak?

J. A. A. (Highgate).—"I possess a three-valve set (detector and 2 L.F.) which recently became faulty. Whereas it used to give excellent loud-speaker results, I

unjustifiable symptom you describe that there is too much negative on the grid of  $V_3$ . This could be simply because there is too much negative, or because the secondary of the transformer connected between grid and filament is wholly or partially diss, or because there is only a leaky connection through the choke in the anode of the last valve.

I think a careful test of the transformer and choke should reveal the trouble. But you say you have tested all components! But one of them must be wrong, or you wouldn't be in trouble.

\* \* \*

### Valve or Crystal?

M. B. (Finsbury Park).—"Do you consider a crystal as a detector, and followed by two L.F. stages, will give me a combination capable of distortionless results from Brookmans Park, or would you advise me to employ a valve as detector? I understand that a crystal makes a perfect rectifier."

Some crystals are all right, but to-day they are, except from an economy point of view, obsolete.

Besides, a valve gives you reaction. So use a valve with grid leak detection, plenty of volts, not too high a valve leak, and a modicum of reaction, it will give you far better results all round than the crystal.

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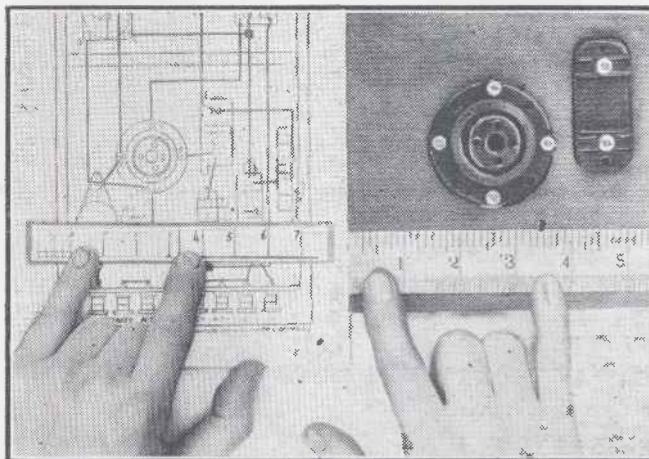
### The Spark at the Switch.

F. D. (Glasgow). "Why is it when switching off my H.T. eliminator, with the cover of the switch removed, a spark is seen at the point where the contacts are broken?"

Because your switch is breaking the current which flows into your eliminator when active. There's a spark at every switch whether it breaks the current to a 50,000-volt, 10,000-K.V.A. transformer or of someone's permanent-wave heater.

Breaking current makes a spark and, as your meter is doubtless telling you, your wireless set takes current.

## FOR THE SET BUILDER



That scale on a "P.W." wiring diagram is the handiest thing in the world for the constructor. All he has to do is to make a little cardboard "ruler" from it, and then measure distances on the diagram with this (left). For instance, on the left-hand side of this picture the diagram shows a fixed condenser which is "four inches" from the edge of the baseboard. Put your real condenser on the real baseboard at a distance of four real inches, and you can be sure your spacing is right. All the distances on the diagram are exactly to scale and you can transfer them all accurately by this method.

can now only obtain a moderate volume before distortion occurs.

"I have tested all components, including batteries, and find everything correct. The emission of the valves also appears to be in order. The valves are transformer coupled, and the output includes an L.F. choke filter.

"When a milliammeter is connected in series with the anode circuit of  $V_3$ , I notice it kicks violently on quite weak signals. Do you consider the trouble is in this last stage."

I suggest from the one curious and quite

Next Week--

FOUR SIXPENNY BLUEPRINTS

FREE

WHAT is the real explanation of the mysterious fascination of the short waves? Practically everyone of us is conscious of that fascination, even though we may have had years of experience of short-wave reception, and have become more or less used to its weird freaks and surprises.

Perhaps in the case of some of the more technically minded of us, some part of it may be due to the never-ending wonder that a set will work at all on such extraordinarily short wave-lengths.

**Amazing Feats.**

We hear such terrible stories of the way losses are enormously increased by the tremendously high frequency of these short-wave signals, that it is a perpetual surprise to find that a set will not merely work and

turns, but what a difference you see in a short-waver!

Here, your aerial coupling coil will quite likely have only two turns and if you are working on the band of wave-lengths from 20 metres to perhaps 30 or 35 metres, then your tuning coil will have only four turns.

If you understand a little about the working of receiving circuits you cannot help feeling surprise that sufficient coupling effects can be obtained with such small coils to transfer the signals from the aerial to the secondary circuit, and to produce reaction.

The explanation, of course, is to be found in those self-same extremely high frequencies which cause all the excitement about losses.

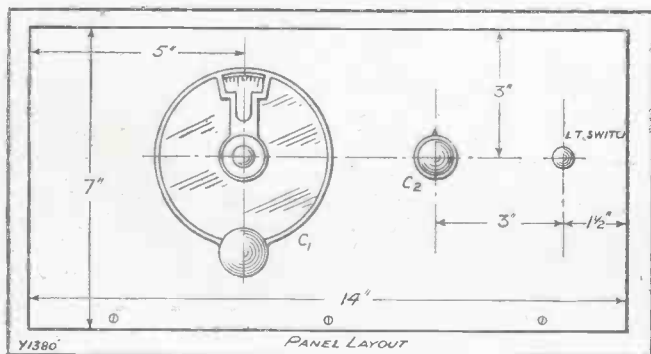
With coils of a given size the coupling effects between them increase in a proportion which depends upon the frequency of the signals traversing the windings, and so for these extremely high frequencies quite small coils can yet give sufficiently tight coupling to make a set work.

Even if one understands this principle, it yet remains rather wonderful to see it actually in operation, as one does in a



Here is a real hot-stuff short-wave set. Everything that you could wish acting controls, never a trace of the ins...

**ONE HUNDRED STATIONS ?**



Not all on the dial at once, of course, but there is no reason why your log should not extend to this imposing number in the course of a few evenings. You will find that it will include amateur transmitting stations in practically every civilised country in the world.

even oscillate easily on these waves, but will perform amazing feats of long-distance reception.

To appreciate the wonder of the effective working of a set on these short wave-lengths one has only to take a glance at the various coils which we use. One is rather accustomed to thinking of the coils in a receiver as containing lots of wire and umpteen

short-wave set.

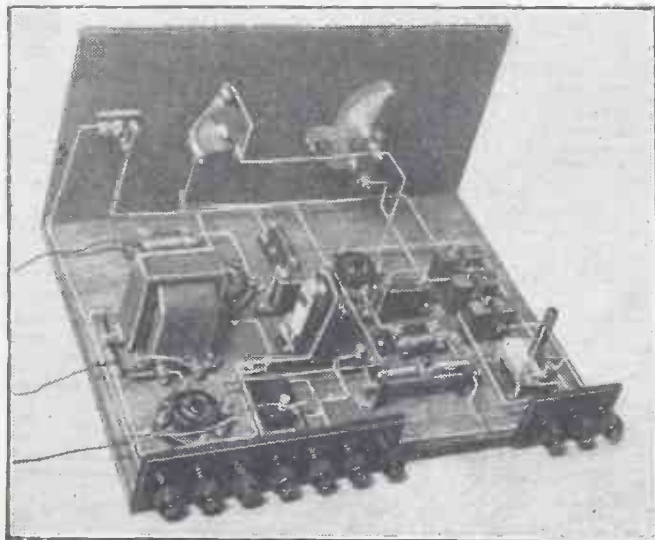
**An Aerial Surprise.**

These things may have something to do with the fascination which the more experienced operator feels in short-wave work, but they cannot explain it all. If one really gets down to bed-rock it is probably more a matter of the extraordinary efficiency of the short waves in covering great distances.

Probably it is just the amazement of receiving very distant stations such as the American short-wave broadcasters on the simplest of sets, and even on the smallest and most inefficient of aerials.

This last point is particularly impressive. An aerial may be so small and inefficient that it would be almost useless for work on the ordinary broadcast bands, unless an exceptionally large, powerful set is used,

**ANYONE CAN BUILD IT**



The "extra special" qualities of the "Night-Flight" have quite obviously not made it difficult to construct, have they? Just observe the open and simple wiring.

**"POPULAR"**

**PRO**



One of the fascinations in programmes is so great that

yet it may serve perfectly for short-wave work and bring in distant stations galore.

Perhaps the whole thing is just one of those mysteries of radio, for we are all agreed that short-wave reception is extraordinarily interesting, but no one seems to be able to say exactly why he finds it so. We have just offered a hint or two as to why we ourselves find it so absorbing, and now we must get down to business and tell you something about the very neat and exceedingly efficient little short-

**YOUR S**

- 1 Panel, 14 in. x 7 in. (Lissen, or Trolite, Paxolin, etc.).
- 1 Cabinet with baseboard 10 in. deep, to fit.
- 1 .00025-mfd. (.0002 and .0003 will serve) variable condenser (Formo, or J.B., Polar, Ormond).
- 1 Slow-motion dial if condenser not of slow-motion type (Igranic, or J.B., Lissen, Ormond, Formo, etc.).
- 1 .0001-, .00012-, .00015-mfd. reaction condenser (Lotus, or Lissen, Ready Radio, Dubilier, Ormond, Wearite, etc.).
- 1 L.T. on-off switch (Bulgin, or Lissen, Benjamin, Igranic, Lotus, Red Diamond, Junit, Wearite, Ormond, Magnum, etc.).

**CROSS THE WORLD**

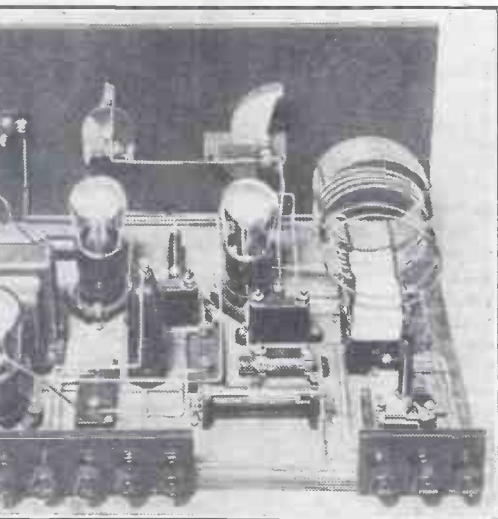


# NIGHT-FLIGHT THREE

...ver with which you can scour the whole world night after night. ...a for in a short-ve receiver is here—super-sensitivity, sweet-threshold howl and ...aps of other good points. A really outstanding instrument of super performance.

Designed and Described by the  
**WIRELESS "RESEARCH DEPARTMENT."**

## GRAMMES AT ALL HOURS



...nating things about a really good short-waver is that it brings at practically any hour of the day or night, because its range you can hear stations in countries where the time is quite different from ours.

...wave design we are presenting to your notice this week.

First of all, let us tell you that it is specially intended for the man who allows himself the luxury of an entirely separate receiver for short-wave work. It will work on broadcast waves, but it is not one of those all-purpose receivers designed to work on the short waves, and to serve for the standard receiving equipment on the ordinary broadcast as well. Excellent as these latter can be, if they are very carefully designed, yet there is much to

be said for the separate short-wave outfit.

In the first place, one can select one's valves very carefully, adjust all the voltages and so forth, and generally keep it tuned up to the best possible pitch for short-wave reception alone. Moreover, one can keep the correct coils always in their sockets, so that the receiver can be brought into use at a moment's notice, and very often without interrupting the use of the ordinary broadcast set if one has a small, separate aerial for short-

...wave work.

This latter may sound rather extravagant, but if you remember that quite a small aerial with only twenty or thirty feet of wire is all you need for short-wave work, you will see that it is by no means out of the question.

With so much made clear, let us go on to take our usual run over the circuit diagram. In the main, you will see that the little receiver is very straightforward, employing that excellent combination, a reacting detector and two low-frequency stages. This is still one of the very best combinations possible for short-wave work, and it is likely to be some considerable time yet before it loses its present well-deserved popularity.

### Some Fine Features.

Straightforward as it is, the "Night-Flight" Three yet contains a number of very interesting features. In the first place, you will note that the set proper has no connection to earth. The lower end of the aerial coil  $L_1$  is earthed, but the filament circuit is left "up in the air" so to speak.

This arrangement is based upon the fact that on the very short waves you will often find that hand-capacity effects are less troublesome if the filament circuit is not earthed. It just depends upon the nature of your earth connection, and so we would suggest that you first wire the set up as you see it, and then try the

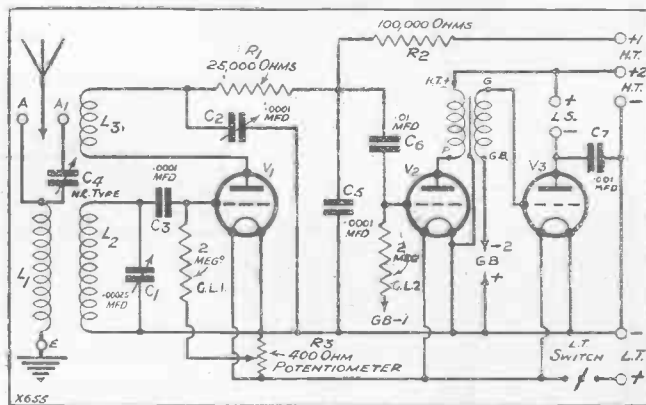
effect of earthing the filament circuit.

You will quite likely find that one way or the other gives you less trouble with hand-capacity effects, and this you can make permanent. For a start, therefore, wire the set up exactly as you see in the diagram, and then try the effect of running a wire from the earth terminal to L.T.—and see what happens. If you get a better performance this way, just make a permanent connection between the appropriate points INSIDE the set.

### Reliable Reaction.

Hand-capacity effects, we should perhaps explain, are always present to some extent or other in a short-wave set, although they should be quite slight in a well-designed instrument. They are worth taking into account, all the same, and so we

## MASTERING THE ETHER



Here you can follow out the special circuit details which make the "Night-Flight" such a truly outstanding receiver. Note particularly the reaction circuit.

suggest you should try this little experiment for yourself.

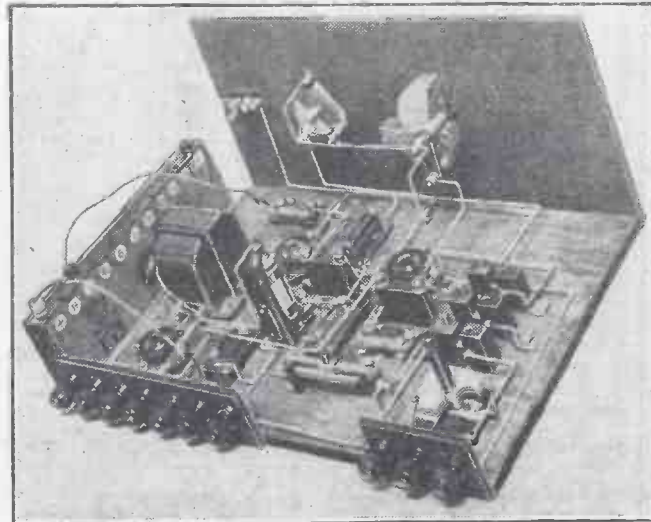
The detector has a potentiometer for the biasing of the grid to the best point for smooth reaction and good volume, and the reaction arrangements you will note are rather interesting. These are specially designed to remove possibilities of threshold howl troubles, and to reduce the effect of

(Continued on next page.)

## SHOPPING GUIDE TO THE COMPONENTS.

- 1 Neutralising condenser, base-board-mounting type (Bulgin, or Magnum, J.B., etc.).
- 3 Coil holders (Wearite, or Lotus, Igranic, Lissen, Bulgin, Magnum, Red Diary, etc.).
- 3 Sprung valve holders (Benjamin, or W.B., Lissen, Igranic, Lotus, Bulgin, Telsen, Wearite, Magnum, Junit, etc.).
- 1 400- or 200-ohm potentiometer (Ready Radio, or Lissen, Igranic, Wearite, etc.).
- 2 .0001-mfd. fixed condensers (Lissen, and T.C.C., or Dubilier, Igranic, Mullard, Ediswan, Ferranti, Goltone, Ormond, etc.).
- 1 .001-mfd. fixed condenser (Lissen, etc.).
- 1 .01-mfd. fixed condenser (T.C.C.).
- 2 2-meg. leaks and holders (Dubilier, or Ediswan, Lissen, Ferranti, Igranic, Mullard, etc.).
- 1 25,000-ohm fixed resistance (Ready Radio, or Ferranti, etc.).
- 1 100,000-ohm anode resistance and holder (Varley, or Lissen, R.I., Igranic, Dubilier, Ediswan, Mullard, etc.).
- 1 L.F. transformer (Telsen, or Igranic, R.I., Lissen, Ferranti, Lotus, Varley, Mullard, Lewcos, etc.).
- 10 Terminals (Belling & Lee, or Igranic, Eelex, etc.).
- 1 Terminal strip, 7 in. x 2 in.
- 1 Terminal strip, 3 in. x 2 in.
- Flex, wire, screws, G.B. plugs, etc.

## ANYONE CAN OPERATE IT



There are only two adjustments to be made inside the set, and of these the potentiometer can be fixed once and for all, while the series aerial condenser need be touched only very occasionally.

## ... WITH THE "NIGHT-FLIGHT" ...

# THE "NIGHT-FLIGHT" THREE.

(Continued from previous page.)

the reaction condenser upon the tuning of the receiver.

You will observe that a differential reaction condenser has not been used, since we have achieved our ends by other means, thinking that since this receiver is to be an additional instrument it will be as well to

use up the older type of reaction condenser which many of us have on hand.

The low-frequency circuits are quite standard, the only points calling for mention being a couple of by-pass condensers. These are marked  $C_5$  and  $C_7$ , and their effect is to prevent H.F. currents from wandering about in the L.F. circuits.

We think we are safe in assuming that everyone who constructs this set will have already had some slight experience of the work, so we are not going to waste time telling you how to assemble it. It is a very easy job, and the wiring diagram and photographs will tell you all you need to know.

## Operating Details.

Now we can get on to the important operating details. First of all, about the choice of valves. The detector is the important one, and here you want a valve which gives you really pleasant and smooth reaction effects. The "Night-Flight" Three is far less critical than older short-wavers in this respect. The H.F. type and some specimens of the R.C. type are usually good here, and so are special "detector" valves.

For the second valve you can use another H.F., although for general purposes one of the L.F. variety is somewhat to be preferred here. The last valve will preferably be a small power or else another of the L.F. type.

The grid bias will usually be  $1\frac{1}{2}$  or 3 volts on G.B.—1 and perhaps  $7\frac{1}{2}$  or 9 volts on G.B.—2. (See valve maker's slip.)

The H.T. voltages will just be the usual ones of about 60 to 80 volts on H.T. +1, with adjustment to produce the best reaction control, and 100 or 120 volts on H.T. +2.

Coil sizes: the aerial coil ( $L_1$ ) will be a No. 2 in most cases, or a No. 4 if your aerial is rather on the small side. Coil  $L_2$  should be a No. 4 for the range of waves from 20 to about 35 metres, and a No. 6 for the next range above, which embraces the remainder of the interesting stations.

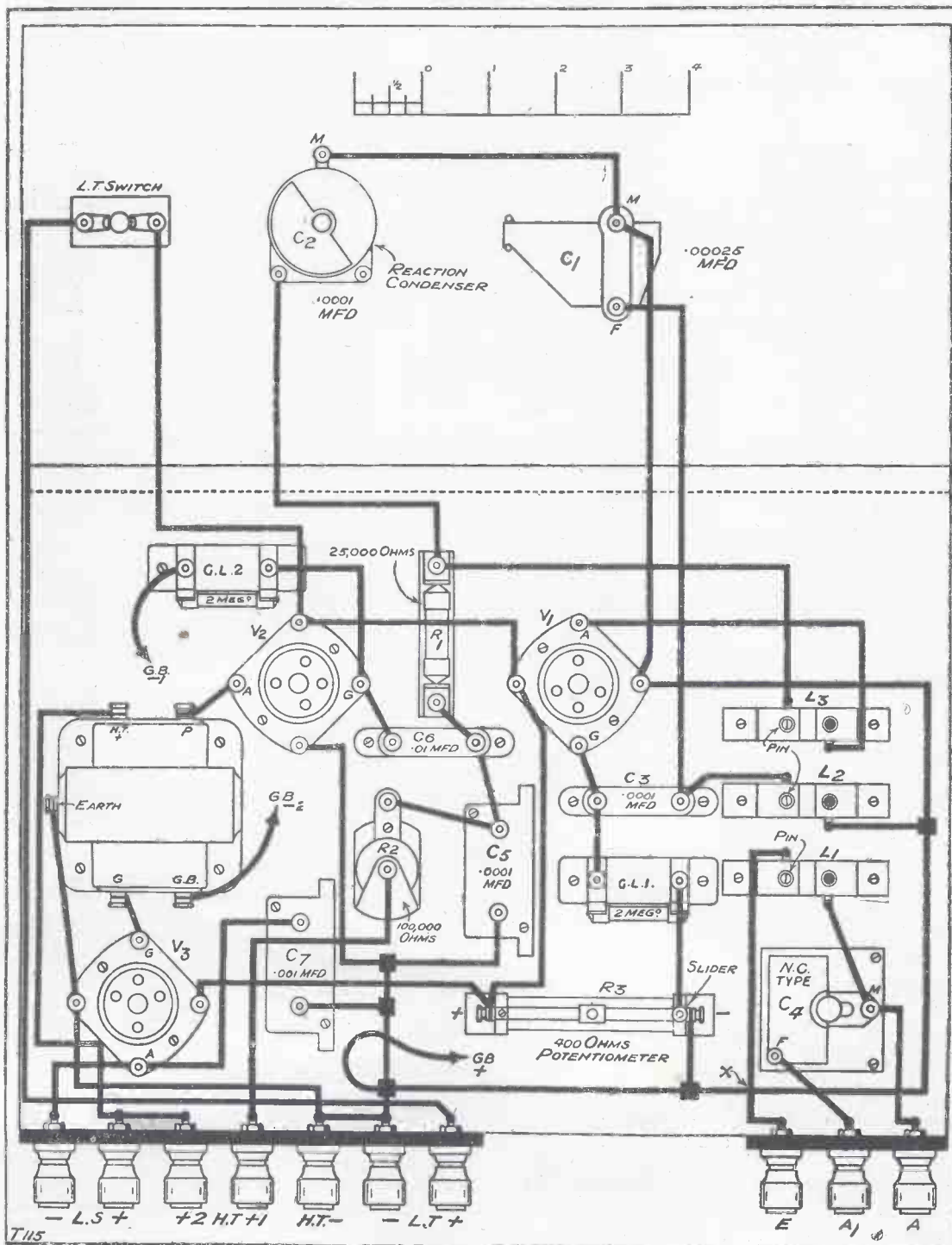
The reaction coil should be the usual No. 6 or No. 9.

### A. and A1.

Keep your aerial lead on terminal "A" if you can, but if you get "flat spots" on the reaction, try the aerial lead on terminal "A1" and adjust the little condenser  $C_4$  so as to remove them.

In general, you will get the best results by keeping the potentiometer slider as near as you can to the positive end, only taking it along towards negative sufficiently far to get smooth reaction. Just where to set it will depend upon your particular valve.

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## FROM THE TECHNICAL EDITOR'S NOTE BOOK.



# Tested and Found-?

## NEW MOVING-COIL LOUD SPEAKER.

**T**HE term *permanent magnet* in connection with moving-coil loud speakers usually conjures up impressions of either ugly and bulky magnets or a thin tone and general insensitivity. Actually there are now instruments in the permanent magnet class that do not merit such criticism, and none less than the Ferranti Magno-Dynamic. It is something quite new.

First of all I will reproduce an extract from a letter the Ferranti people wrote me about this new loud speaker, for it provides an excellent summary of the claims made for it:

"All our speakers have low resistance coils having an average impedance of about 20 ohms, so that with the ordinary type of set an output transformer having a ratio of 15-1 is generally suitable, but in the descriptive list which is at the moment in the hands of the printers a chart is included enabling the ratio of the output transformer necessary in any particular case to be estimated at a glance.

"A comparatively small and light cone is used, and the result is that the whole register is well reproduced and well balanced, the higher frequencies being better reproduced, we believe, than in the case of any other speaker available, whilst the performance when dealing with transients is also good.

"The FERRANTI Magno-Dynamic Speaker represents a very considerable advance in speaker technique, as any speaker employing a permanent magnet has hitherto been of a lower sensitivity and generally poorer performance than all the corresponding mains energised models. This speaker employs a very costly 35 per cent. cobalt steel magnet, and we consider that this percentage of cobalt is essential to ensure absolute permanence of the magnet, which will retain its flux for a lifetime and probably longer.

"In this particular connection we would mention that our experience in connection with the design and production of magnets for electricity meters extending over a period of more than forty years, places us in what is probably a unique position with regard to the production of really first-class magnets, as in an electricity meter any variation of the magnet will cause a loss of accuracy of the meter, which cannot be tolerated under any circumstances.

"No output transformer is included with the speaker, as it is impossible to fit an output transformer that will give the optimum result under all conditions, and further we consider that the best place for an output transformer is in the set, to avoid trailing leads, possibly carrying high-tension current.

"The advantages of the use of a speaker of the Magno-Dynamic type will be very obvious, but we enumerate them as follows:

1. Consumes no current and requires no connection of any kind to the mains.
2. No rectifying valve or metal rectifier to fail or produce mains hum.
3. It may be used readily whether the mains are available or not, as the FERRANTI Magno-Dynamic Speaker will operate quite easily from one good super-power valve such as the P 240 or a P 625.
4. If the speaker is situated some distance from the amplifier, troubles are commonly experienced due to pick-up on the mains leads, and this is avoided with this type of speaker."

The Ferranti Magno-Dynamic is compact and has a "pot" rather smaller than usual, while it is not particularly heavy and is certainly of good appearance. It undoubtedly is most sensitive, and in this respect

can hold its own against the majority of mains driven types.

The cone is moderately free and the lower frequencies come away robustly. There is a high percentage representation at 50 cycles and the upper register is handled equally well.

Altogether it is a completely sound production, and we would not advise those readers who cannot possibly afford £9 10s. 0d. to ask their local dealers to demonstrate it!

## THE PHILIPS PROGRAMME.

If you are at all interested in loud speakers, mains devices, chargers, etc.,

Manufacturers and traders are invited to submit radio apparatus of any kind for review purposes. All examinations and tests are carried out in the "P.W." Technical Department, with the strictest of impartiality, under the personal supervision of the Technical Editor.

We should like to point out that we prefer to receive production samples picked from stock, and that we cannot guarantee their safe return undamaged, as it is our practice thoroughly to dissect much of the gear in the course of our investigations!

And readers should note that the subsequent reports appearing on this page are intended as a guide to buyers, and are therefore framed up in a readily readable manner free from technicalities unnecessary for that immediate purpose.

you should get into touch with Messrs. Philips. I have just received preliminary details of their principle lines for the 1930-31 season, and they make fascinating reading.

## NEW BELLING-LEE LINES.

Among the new Belling-Lee lines are the Wander-fuse, which, as its name suggests, is a combination of a wander plug and fuse, and the multiple purpose terminal block, a bakelite moulding designed to take two terminals of any make, which can be mounted on the baseboard of a receiver either on its back with the terminals vertical, or on its side with the terminals horizontal.

Both items are useful to constructors.

## A PRICE REDUCTION.

The Standard Battery Co. informs me that increased sales have rendered it possible to reduce the Wates Star loud-speaker unit that sold at 36s. to 25s.

## NEW OLDHAM BATTERIES.

As readers will probably by now know, the Oldham horizon has recently very considerably widened. In future Oldhams are to have the benefit of the research resources of a big American battery manufacturing concern, although the Oldham accumulators retailed in this country at least will be 100 per cent British.

In the meantime, I have received samples of the new Oldham "O" type slow-discharge accumulators. These are glass cased, robustly constructed two-volters, specially designed for radio sets of moderate L.T. consumption.

Accumulators used for radio purposes are often subjected to considerable ill-treatment. An ordinary accumulator really wants more frequent charging than once every five or six weeks, although that is the sort of charging period the radio set inflicts on it.

In the case of car accumulators it is an altogether different matter for charging is generally going on all the time the car is in use. But with radio cells the discharge rates are mostly low and charging somewhat irregular, so a special construction is called for to combat the consequent ill effects. This we find in the Oldham "O" type slow-discharge accumulator, which our preliminary tests indicate are quite satisfactory propositions.

## A ROTHERMEL CATALOGUE.

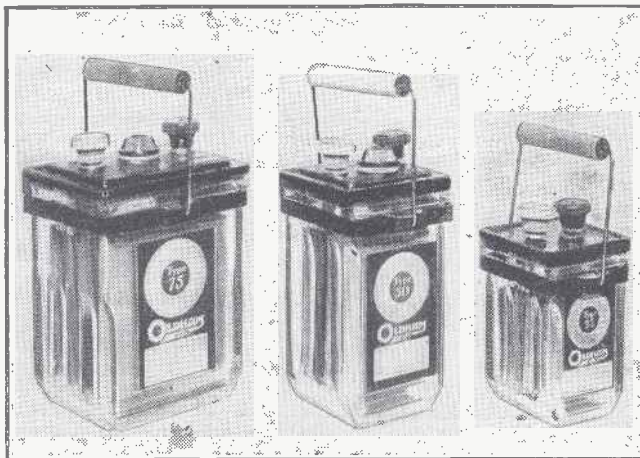
We have received a copy of the new catalogue of Radio, Auditorium, Public Address and Talking Picture Equipment issued by the Rothermel Corporation, Ltd. This catalogue is supplied free to traders, but others have to pay ninepence for it.

## A CAMCO CATALOGUE.

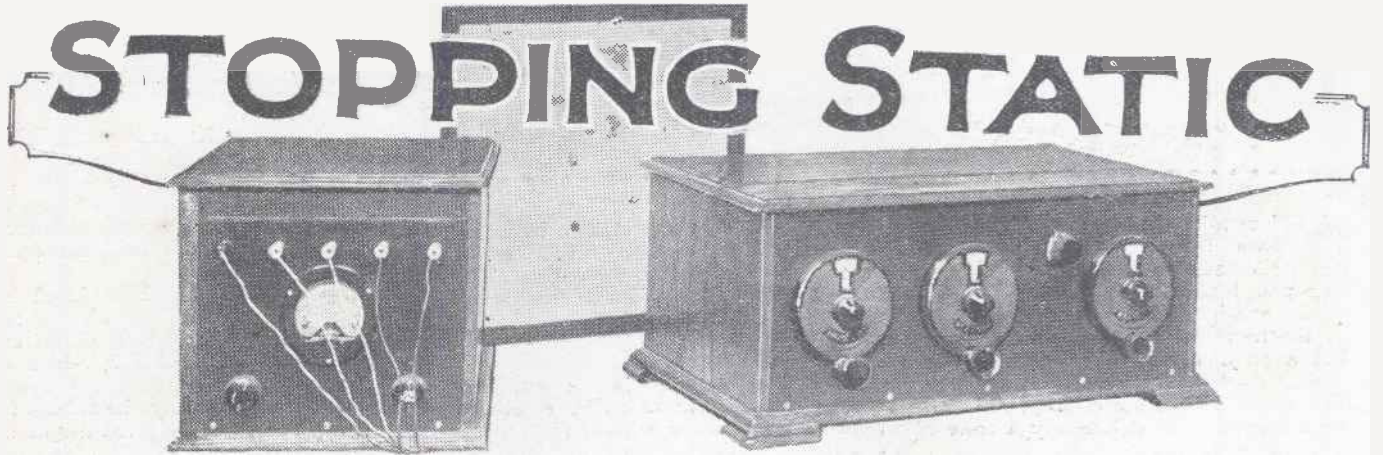
The Carrington Manufacturing Co., Ltd., have issued a 24-page catalogue that is available free on application. It contains details of a really fine selection of cabinets.

## AN INVITATION.

The Dubilier Condenser Co. (1925), Ltd., want all and sundry to write to them for their new catalogue of condensers and radio products. It is list No. 930, and is an excellent production.



The "O" type Oldham accumulator cells.



**I**NTERFERENCE with perfect broadcast reception is enough to spoil the enjoyment of any listener. Especially is this so when headphones are used, as constant clicks or hum become highly irritating. The coastal towns are probably worse sufferers than the cities, since they have also to contend with the problem of Morse interference. But in cities there are more electrical motors and charging plants.

It is not proposed to deal with this subject in the usual way, by explaining how to increase the selectivity of the receiver itself, but by showing how to arrange the aerial-earth system in order to obtain specific results.

**Background Noises.**

Increasing the selectivity, by using aperiodic coupling, tuned aerial coupling, or any of the ordinary methods, does, of course, help to reduce unwanted "signals," but it is presumed that the reader has already experimented with these himself. It might be mentioned, however, that tuned aerial coupling, especially with loose coupling to the secondary circuit, will often reduce appreciably the noises resulting from outside sources other than radio.

Before attempting improvements, it is best to disconnect both aerial and earth from the set terminals, and to connect each in turn, noting the difference in the amount of background noise; for it must not be forgotten that background noises are often due to a faulty grid leak or to bad or dirty connections, nor that earth currents are often the cause of the trouble.

A good size of aerial for loud reception is about 50 ft. long, with a down-lead of 25 ft., the complete aerial from the furthest insulator to the set terminal consisting of one continuous length of wire.

**Shortening the Aerial.**

If a certain falling off in signal strength can be afforded, however, better selectivity will be obtained by shortening this length considerably, while shock excitation from nearby transmitters will be diminished.

Atmospherics cover a wide band of wavelengths, and though there are circuits designed to cut them out, they are by no means perfect, for they complicate the apparatus and greatly reduce the wanted signals as well. A short aerial is advantageous.

As regards "man-made static," which consists of noises from electrical machinery, railways, trams, dynamo charging plants, etc., the best plan is to place the aerial as

**There are many forms of static, both "man-made" and due to natural disturbances, and you will find some useful ideas for cutting down their effects in this article.**  
 By H. RAMFORD.

much as possible at right angles to the power lines. A further remedy is to try a different earth connection, such as water-pipe instead of outside earth, or even to use a counterpoise.

The latter could consist of a single wire stretched at a height of 10 ft. from the ground, and directly beneath the normal aerial. It will have to be efficiently insulated in the same way as the aerial.

**Avoiding the Mains.**

An improvement on this is a number of wires, suspended in the same manner, spread out fan-wise and connected together at the near end. Often a fixed condenser inserted in the earth-lead will improve matters.

room. Where an output transformer is used, the same applies, an additional precaution being the earthing of one side of the secondary. A frame aerial is another solution, but because of its inefficiency it is not generally to be recommended.

When the cause of the trouble is electric apparatus close at hand, the best thing to do is to go and make friends with the owner.

**Causes of Fading.**

Much of the sparking can be eliminated by connecting a couple of condensers close to, and across, the brushes as shown in the illustration. The point between the condensers is taken to earth, while a fuse is inserted in each lead as a safety measure. Be sure, however, to use short connections between brushes and condensers. The value of the latter should be not less than 4 mfd. each.

Improved signal strength can be obtained by "pointing" the aerial towards the desired station. Curiously enough, this means that the free end is furthest from the station, the lead-in end doing the "pointing." If this is not possible, at any rate have the aerial at right angles (broad-side on) to any station that refuses to be tuned out.

Fading is, unfortunately, always with us when receiving distant stations. This is not static, of course, but is nevertheless an acute problem that many learned minds have tried to solve. There are two things that are often taken for fading. One is the results produced by a swinging aerial.

To tighten it excessively means a great strain on the wire and a great strain on the mast. This has been solved by some manufacturers, who have placed insulators incorporating springs on the market. I have never used one myself. The other is the "searching" of the next-door "fan."

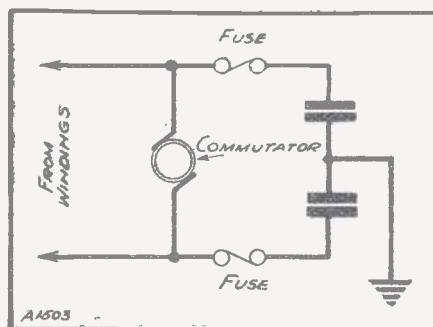
**H.F. is Useful.**

The trouble is most severe when one or both parties use reaction on the aerial.

For best results, efficient high-frequency stages are needed for both parties, but by placing the aerials as far away from each other as possible, and at right angles, and by using different earths, a cure may be effected. The condenser in the earth lead, originally advocated, should result in an improvement.

It is not suggested that any one of these will cure the trouble, or that even all of them together will entirely eliminate unwanted signals, but they should, at little cost, make listening more pleasant.

**MUZZLING THE MOTOR**



By connecting a couple of 4-mfd. condensers across the brushes of an electric motor, as shown here, it is often possible greatly to reduce any interference it may be causing.

It should be noted, by the way, that interference from lighting mains occasionally results from too long a lead from grid condenser to grid of the detector valve, or the core of the intervalve transformer being in the magnetic field of the lighting wires behind the walls.

In the latter case, if it is possible to earth the core or shield the transformer in any way, do so; otherwise it will be necessary to move the set to another part of the

## SHORT-WAVE NOTES.

Below our well-known contributor gives you the latest news of short-wave interest, and answers some questions that have been raised by readers.

By W. L. S.

AS I mentioned a week or two ago, I have been travelling round the Midlands and the North, combining in a way, business with pleasure. Thanks to the weather, the trip consisted mostly of the former! I have, however, found out a great amount about general conditions (particularly for short-wave work) in several parts of the country, and have been interested to visit nearly a score of amateur stations.

I am quite satisfied, now, that the amateur in almost any part of the country (even in the blacker parts of the Midlands) has a very much better time of it than does the Londoner. I listened on several receivers, and not on one was there the amount of continuous hissing background that we all get in London.

### Wonderfully Clear.

Thus signals of the R2 or R3 variety, which are a strain to read in London through the mush, can be comfortably copied sitting back in the chair and reading a book! Needless to say, I am going by the experience of the small percentage of receivers which I was able to handle, but I certainly did not find one locality in which the characteristic "London background" was imitated.

I have to thank P. J. B., of Edinburgh, for a cordial invitation to visit him. Unfortunately, I did not stray as far north as Edinburgh, although I hope to have the opportunity before long.

Curiously enough, among all the places at which I called, the best for reception appear (from results obtained) to be Coventry and Nottingham. Certain parts of Gloucestershire also appear to be excellent.

On my return home I instantly made the amazing discovery that "conditions" have returned again, and that stations from every conceivable country have been pouring in for the last few days. London amateurs have been working New Zealand on 40 metres for several mornings past, and on Sunday evening by 10.30 p.m. there were, as a friend of mine observed, "enough Yanks to fill the bath"!

### Like 1928.

All the more distant parts were there, too, ninth and fifth district Americans in quantities such as have not been heard since 1928. Curiously enough, W2XAD was apparently no stronger than usual, although he certainly was coming over pretty well.

While I have been over this country, a friend of mine has been fortunate enough to have the opportunity of studying conditions in Germany, Esthonia, Latvia, and Finland, and has come back full of interesting tales and descriptions of stations and operators all over these countries. Incidentally, I have to express my gratitude to the Finnish transmitters for sending me back, suitably inscribed, a wonderful Finnish knife.

Presumably, they expect it to be useful in dealing with refractory neighbours or transmitters who use badly-smoothed A.C.! Please accept my thanks in print, O H 2 N M, 2 N X, and 2 O P.

### Excellent Country.

Finland appears to be an excellent country for short-wave radio, especially from the transmitting point of view, as we can often hear the Finns working Australia when there is not a sound of the Australians here. The average Finnish "ham" is apparently far more fortunate as regards length and height of aerial than we are at home, and this in itself may account for a lot.

At all events, the Finns take their radio very seriously, and have a fine reputation for good operating and sound technical knowledge already.

not already made this discovery, I recommend you to approach this society.

There are several firms making components for short-wave work nowadays, and at least one that makes nothing else.

An Indian reader has kindly forwarded particulars of a new broadcast transmission from the Far East, as follows: Saigon, French Indo-China, works on 49 metres and transmits musical programmes (European and Chinese), with announcements in French for the former.

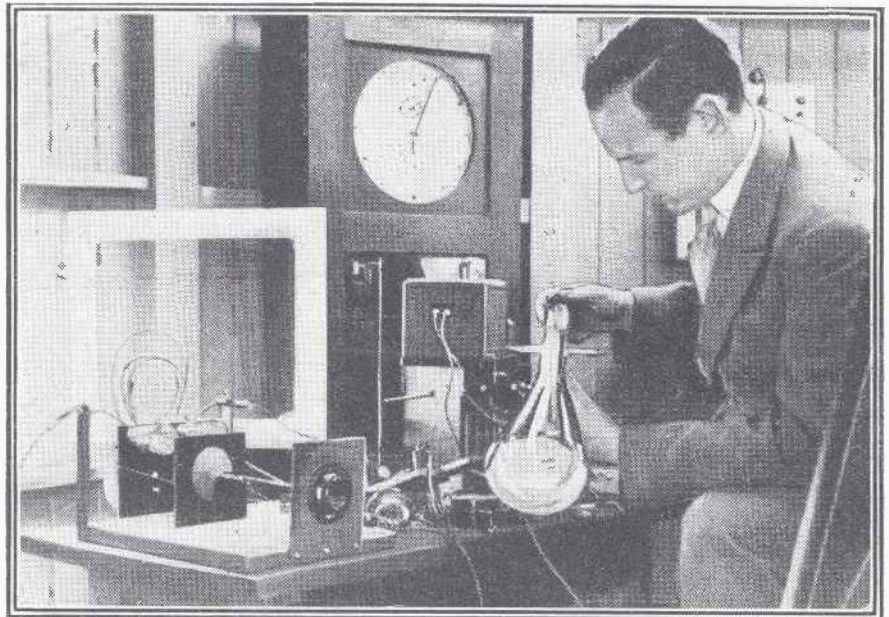
The same station has been heard in India on 15.95 metres, but as yet no musical programmes have been picked up on that wave. K A I X R has such a habit of continually changing his wavelength that this reader says he refuses to chase it any more, and has given it up as a bad job!

### An "Australian Correspondent."

R. H. C., of Victoria, Australia, asks to be adopted as my "Australian correspondent" for all the latest news of short-wave work from the Australian Continent.

Certainly, R. H. C., I should be more than delighted to receive any news in this way, but it does not appear to me that you can claim it as a "privilege" to correspond

## ON THE ULTRA-SHORT WAVELENGTHS



This is Herr Manfred von Arden, a well-known German experimenter, working on ultra-short wavelengths. Note the "coils" on the left, consisting of single or half-turns of wire, tuned by a 1-plate condenser.

Now I have to deal with a letter from H. P. S., of Hounslow, written in article form and headed "The Mystery"! "The Mystery" turns out to be the subject of amateur transmission, about which, says H. P. S., no one in this country appears to know anything.

### The R.S.G.B.

I agree with your remarks, H. P. S., on the subject of dealers, and the way in which they regret that none of their goods are suitable, etc., etc.; but there is plenty of matter available in this country to help on the would-be amateur. The R.S.G.B. has voluntarily turned into a society of and for the transmitter, and if you have

in this way. It is kindness on your part! Many thanks for the interesting letter.

Even during the past eight months, during the bad spell, R. H. C. has logged 56 short-wave broadcast stations, including Europe, Java, Canada, Philippines, U.S.A., etc. From this it does not appear as if the conditions have been quite so bad on the other side as we have been getting them. I hope to publish the first of "R. H. C.'s Bulletins" shortly!

**NEXT WEEK.**

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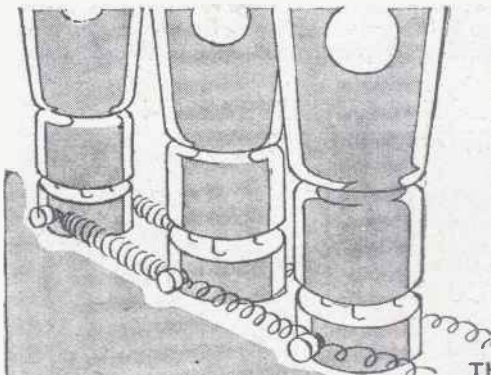
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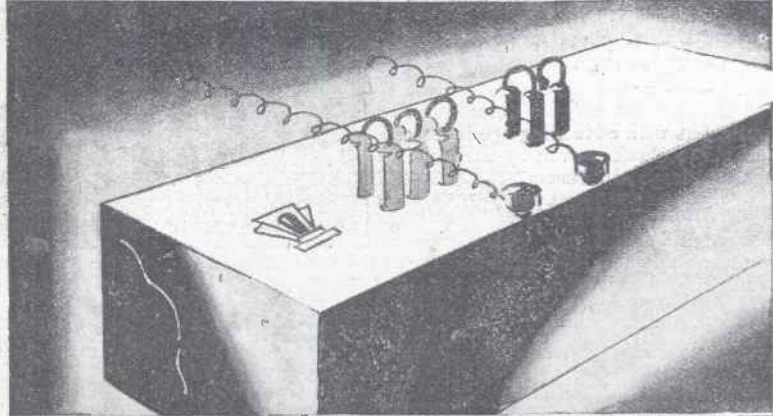
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## MORE ABOUT HOME RECORDING.

Several instruments for home recording were exhibited at Olympia, and in this article are details of how most of them operate. They are simple devices, and can be used in conjunction with ordinary radio-sets to record items or, using a tiny microphone, to record your voice.

By H. G. AYTOUN-KAY.

READERS of the previous article on this subject, which appeared in a recent issue, will have gained a general idea of what can be expected from Home Recording. A description of some of the actual apparatus that can be used is the next step.

I think it is true to say that this is the first published description of Home Recording Gramophones, and to those who want a new interest in radio and feel inclined to take it up, it will be helpful to explain not only how the machine works, but also the underlying reasons for the design of the various parts.

### Quite Easy.

It is as easy to make a record as it is to take a snapshot, but you will, on the whole, get better results if you know how the schemes work. With some of them you can use your ordinary gramophone for driving the disc; in at least one the motor and turntable is supplied.

For recording broadcast programmes, there are advantages in using a machine having a spring motor in preference to one having an electric motor. When a wireless set is used in conjunction with a pick-up for reproducing gramophone records, only the low-frequency amplifier is in use, and the H.F. part is inoperative.

But when a set is used for recording, the H.F. part is working and, as many of us know to our cost, an electrical motor anywhere in the vicinity can provide a most undesirable accompaniment to a radio programme.

The interference is liable to be particularly troublesome with a set working from the mains. This tendency of electric motors to act as transmitters may lie dormant in their youth, but with advancing age it may be impossible to check it even by earthing, screening, and large condensers.

### The Cutting Arrangement.

On the centre spindle above the turntable you want a detachable clip for holding the disc in position while the record is being cut. This is done by a gramophone pick-up working in the reverse direction, i.e. its needle is made to move in accordance with speech and music by being fed from a set or amplifier like a loud speaker.

This cutter head is secured to an arm which, as the disc revolves, is moved at a definite rate across the face of the disc. In some systems this "tracking attachment" is all you need additionally to the actual cutter, needles, blank discs and your ordinary gramophone and radio outfit. In another arrangement the "tracker" is driven through gears by the motor, which moves the cutter at such a speed that there are eighty channels to the inch.

If, as it should, the turntable revolves at

80 revolutions per minute, each inch of recording represents a playing time of one minute. The recorded surface of a 10-in. disc is about  $3\frac{1}{4}$  in. in width, representing 3 minutes 15 seconds.

It is necessary that one should be able to lift the arm clear of the threaded spindle so that it can be moved back at the end of a record. At the same time the amount of permissible play or lost motion in the whole assembly must be very small, and the minimum amount of power must be used to drive it.

The actual cutting is effected either by a small diamond or very hard steel point, and the shape of either is important. If it is inclined to cut too shallow a groove, then when the record is played over the needle may tend to jump from one groove to the next.

On the other hand, if the point is too sharp so that it tears the metal, or if there is too much weight on it, then it may slow down

connected in parallel with the cutter, or a change-over switch can be used. There is no need for critical adjustment of the signal strength, and when making your own record you have one big advantage over the manufacturer of ordinary records.

The latter has to effect a compromise, because he cannot tell whether the record will be used with an electrical pick-up or a soundbox. The home-made disc, on the other hand, is almost certain to be reproduced through a pick-up, and the volume of the reproduction is easily controlled.

A record of exceptional quality can be made by cutting down the input when recording and compensating for the reduced amplitude of the cut by turning up the volume control when playing the record over.

### Record Your Voice.

Records of broadcast programmes are made more interesting if preceded by an announcement, and for this a microphone is necessary. The microphone can also be used for making records of one's own or friends' voices.

For this a wireless set which is intended to be used in conjunction with a pick-up needs no modification. Sometimes, too, one can get quite good results by using a loud speaker as a microphone.

I have found one unexpected use for home recording. We have all suffered the humiliating experience of inviting someone to come round and listen to distant stations, and then had to make excuses. I have now a growing collection of records made on dif-

## A TELEVISION DEMONSTRATION



Demonstrating the principles of a television system at an Exhibition of "Visual and Auditory Aids to Hearing," held recently at the London School of Economics.

the motor and also produce a noisy record with pronounced surface noise or "scratch."

Fortunately, there is no difficulty in procuring diamond points of uniform quality, and the weight on the point can be adjusted by a counter weight on the cutter arm.

It is essential for good quality and freedom from scratch that the discs should be made from the right kind of material.

It is, by the way, convenient to mount an ordinary pick-up and arm on the motor board, because then the same motor and turntable can be used for playing either home recorded discs or the ordinary gramophone records.

While recording, a loud speaker can be

ferent evenings and at times when most people are in bed. These records will convince the most sceptical visitor of the capabilities of my set, even if a thunderstorm rages overhead.

## NEXT WEEK.

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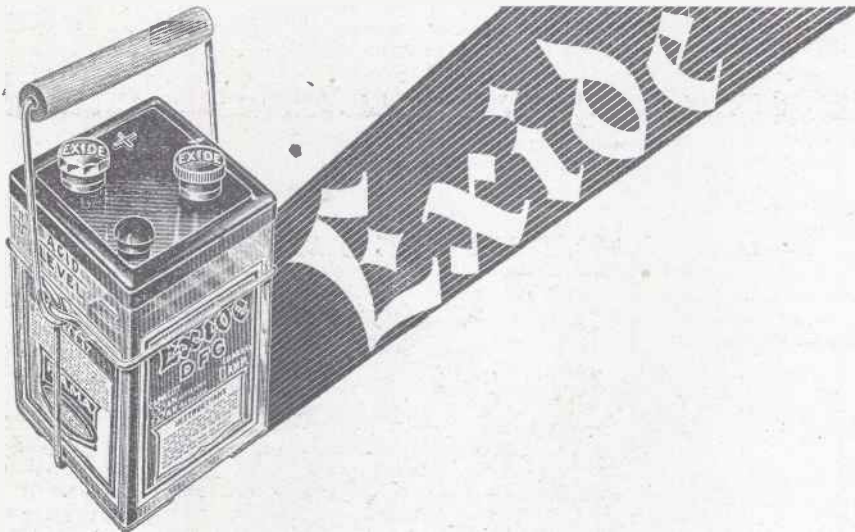


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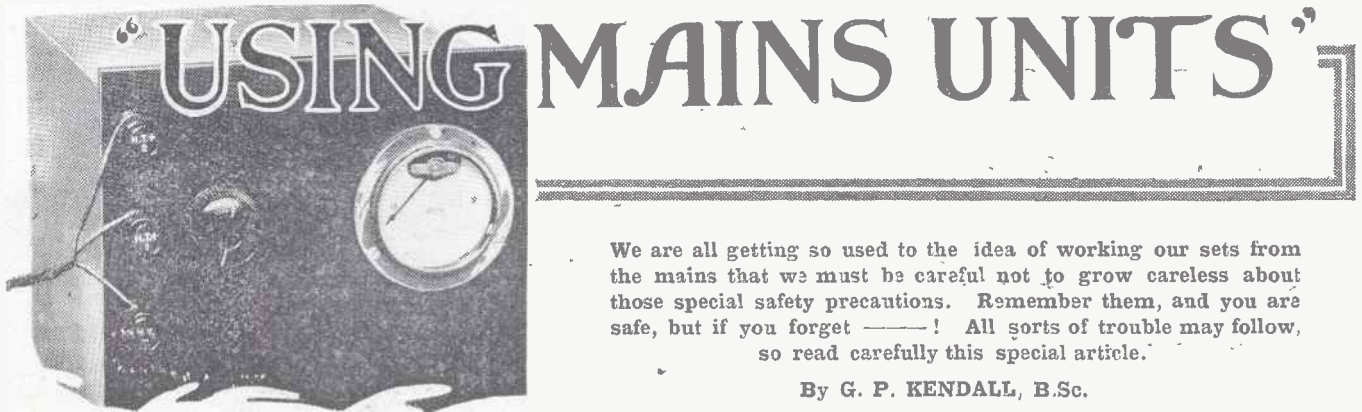


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struction . . . differently coloured and shaped terminals distinguish positive from negative even in the dark . . . completely acid proof . . . strong metal carrier free. Remember, next time, Exide "D" Series for Low Tension.

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We are all getting so used to the idea of working our sets from the mains that we must be careful not to grow careless about those special safety precautions. Remember them, and you are safe, but if you forget ——! All sorts of trouble may follow, so read carefully this special article.

By G. P. KENDALL, B.Sc.

USING the mains to work your set is not really dangerous, you know, but to make it safe you really *must* take proper precautions. If you will only do so it becomes as safe as using any other appliance worked from the mains; but so many people neglect these essential precautions that I feel I must start this article on a rather alarming note.

#### How to be Safe.

If you do not attend to these points there is real danger, at any rate with direct-current mains, of painful shocks, blowing of house fuses, and damage to your gear. With alternating-current mains it is only necessary to use a good and well-designed H.T. unit and a proper output filter to be safe, but matters are far otherwise on D.C. Here you must attend to a number of safety precautions at other points in addition, and it is because I have heard recently of several cases of minor mishaps due to neglect of such matters that I am writing these notes.

I have done what lies in my power to ensure safety for "P.W." mains users by preparing for them the "Safepower" series of H.T. units, which come as near as is possible with simple means to the ideal of absolute safety, not merely as regards actual danger to user and apparatus, but also in eliminating risks of bad behaviour with critical sets, and so on.

Now it is up to the users to see that they carry out faithfully the various safety precautions which apply to the other parts of the outfit when working on D.C. mains, and so ensure a completely safe installation.

#### That Earthing Condenser.

Let me just refresh the reader's memory about the most important of these points. First of all there is the necessity for placing a fixed condenser of large capacity and high "working voltage" rating in series with your earth lead. This is most important, since you must never have a direct earth on your set when working on D.C. mains, for in many cases to do so would produce a short-circuit.

This condenser is automatically provided by the special earthing scheme incorporated in all the D.C. "Safepower" units, and it merely remains to warn you never to forget to use it.

Space will not permit me to go into any detailed explanation as to why it should be so, but please realise that this is a most important point. Always transfer your earth lead to the special earth terminal on your "Safepower" unit and see to it that there is no earth connection on the set itself. With the alternating-current type this point does not arise, since here this condenser is neither necessary nor desirable.

Next the reader must grasp the fact that when working on D.C. mains *every* point in *every* circuit may be dangerous to touch, therefore always switch off from the mains completely when making any kind of adjustment inside your set. By "switch off completely," by the way, I do not mean merely turn off the controlling switch of the mains point from which you are working your H.T. unit. This only breaks one side

should be enclosed in a wooden box with a lid and well insulated leads should run from it to the L.T. terminals of the set, which again should be protected from possible contact with unsuspecting fingers.

Similarly, any projecting grub screws in condenser spindles, control switches, and so on, should be treated with respect. They may be alive, and it is a very good scheme to give every one a little touch of enamel or paint so that no metal remains bare.

#### This is Often Forgotten.

Next I arrive at a point which many readers seem to neglect, namely, the aerial. In those cases where the positive pole of D.C. mains is earthed at the power station, your aerial becomes very much alive, and hence it is laid down in the recommendations of the Institute of Electrical Engineers that precautions must be taken inside the receiver to insulate the aerial from the remainder of the circuit as far as direct current is concerned. You can achieve this end by placing in series with the aerial lead inside the set, where it leaves the aerial terminal, a fair-sized fixed condenser of a high working voltage rating.

This can take the form of a small capacity smoothing condenser with a minimum "working voltage" rating of 250 volts. Any capacity from about .001 mfd. upwards is suitable; if you have a 1-mfd. unit about which has a sufficiently high working voltage rating, this will serve admirably.

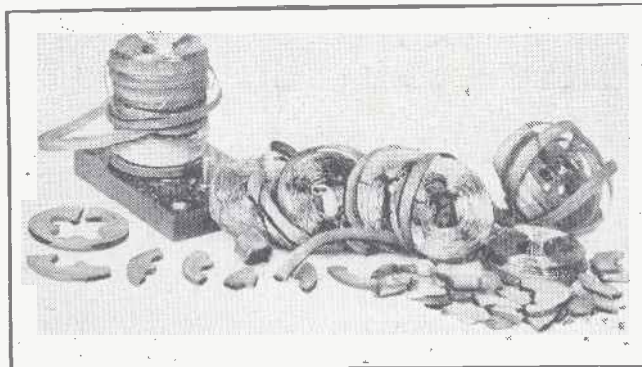
This is really a most important precaution, even more important, in my opinion, than that of the use of the usual series condenser in the earth lead. The latter is a point which more or less attends to itself, since if you do not provide this condenser and it chanced that your mains have the positive side earthed, you produce an immediate short-circuit and the resulting blow-up provides its own warning.

#### Aerial Risks.

The omission of the series aerial condenser, on the other hand, may not produce any immediate effect, but merely makes the aerial a most dangerous object which will one day in all probability do something disastrous.

For example, some day you may decide to fit a lightning arrester, but there is the probability that the thing will eventually break down and short the mains unexpectedly.

### DON'T LET THIS HAPPEN!



A bit of a wreck, isn't it? This was once a heavy-duty H.F. choke in a D.C. "Safepower" unit whose owner forgot to transfer the earth lead from his set to the special terminal on the unit.

of the mains and may not be sufficient, therefore disconnect your mains lead completely by undoing the adaptor at the back of the "Safepower" unit or pulling out the plug from the mains point itself.

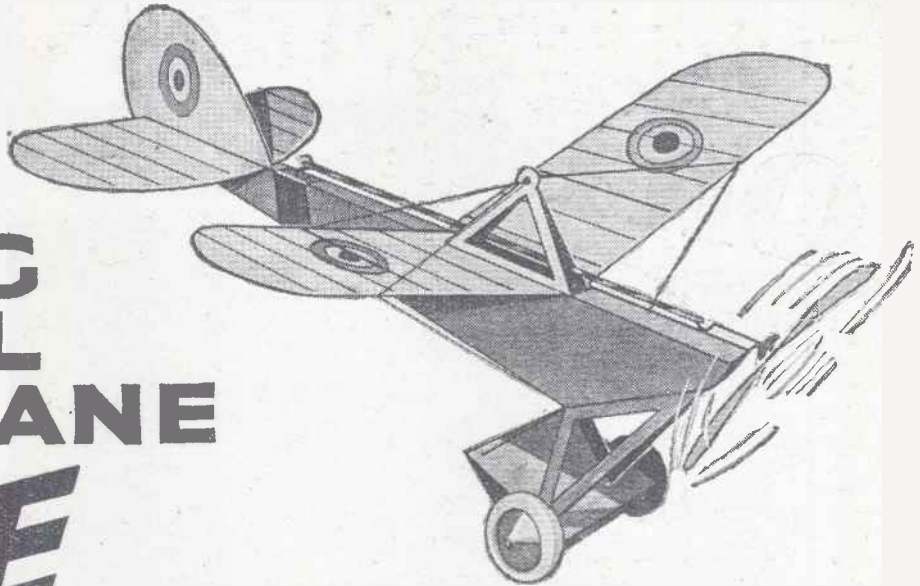
Let me emphasise a little that statement about *every* point in *every* circuit being a potential danger spot when working on D.C. mains. In all those cases where the positive pole of your mains is earthed at the power station, practically every circuit in your set becomes alive and must be treated with due respect.

#### Watch These Points.

Even such apparently safe objects as the low-tension battery will be alive, under these conditions, and due precautions must be taken. The accumulator, for example,

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Figure it out! Take three standard unit batteries costing 7s. 11d. each—total cost 23s. 9d.—and compare the price with the New MAGNET Triple Capacity Battery at 13s. 6d.—equivalent to three units for less than the price of two! On price alone, therefore, choose this new wonder battery which brings to wireless a new sense of H.T. economy. In addition, you get three times greater capacity—sustained power and vigorous life.

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## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

The use of a hydrometer is quite as effective in ascertaining the condition of an L.T. battery as that of a voltmeter, and if the two instruments are used together you get an excellent test of the condition of the L.T. battery. Instructions are given with the instrument and it is very easy to use.

You will find it consists of a kind of large fountain-pen filler which can be dipped into the liquid of each cell in turn, and which will draw up some of the liquid into the glass tube. Arranged in this tube are small beads, generally of different colours, and the positions of these indicate the condition of the battery.

There are generally three beads or indicators in the tube, one heavy, one medium and one light. When the accumulator has been properly charged all three of these will float to the top of the liquid.

About half way through the discharge of the accumulator it will be found that the heavy float sinks to the bottom of the liquid and that the medium float is preparing to do so. And if you try the condition of the cell when it is run right down you will find that even the light float refuses to keep to the top of the liquid, thus showing that the battery needs recharging.

The hydrometer test is not an electrical one but is a test of the specific gravity of the liquid. In other words, the hydrometer tests the chemical changes which are going on inside the acid.

The actual specific gravity of "the acid" or electrolyte of an accumulator will be found to vary a little with different makes, but as a rule a newly charged battery will have a specific gravity of about 1.25.

Such a battery is fully discharged when the gravity is about 1.110. An important point to notice about the Sp. G. is that it is conveniently proportional to the condition of the battery, so that when the battery is half charged the specific gravity is something over halfway between the figures given. Although either the voltmeter or the hydrometer alone can give a reading that is misleading, a double test of this kind is a complete safeguard for the accumulator owner.

### TRANSFORMER RATIOS.

P.B. (Caterham).—"I have taken up POPULAR WIRELESS, but I have not yet seen in it which transformer should follow the

det. valve, a 3-1 or a 5-1. You say low ratio, but do not give their position. I have built the "Magic" Three, and have put the 3-1 after the det., but friends tell me it should be the 5-1 after the det. valve. I have looked over back numbers of POPULAR WIRELESS but cannot see which one it should be. I am using

Osram valves, H.F. as det., L.F., and power. The set is working O.K., but I should like to know if I would get better all-round results by changing vice versa the transformers."

Usually it is better to put the lower ratio—3 to 1 in this instance—in the detector's plate circuit, following this by the higher ratio (5 to 1). But as much depends upon the quality and design of the transformers themselves, and upon the valves used with them, H.T., etc., the best plan is to try changing over to determine which position most nearly suits your requirements.

## WHAT DO YOU THINK ABOUT THIS?

Using an S.G. valve in a rather tricky circuit, a Bristol reader of "P.W." was warned that screen and anode must be adjusted carefully to certain voltages for best results. So variable resistances were fitted in the leads, and good results were obtained experimentally.

Then a voltmeter was borrowed to check the H.T. Tests of the screen and anode showed less than the recommended voltages, so the resistances were varied to make the voltmeter show the recommended readings. But the set worked very badly thus, and eventually the original (low reading) adjustments had to be resorted to again.

Could you have said

### WHAT WAS WRONG?

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

*The cause of the hum described last week was that the extension wires had been run too close to one of the wires of the house lighting system, and was thus picking up the interference from it.*

### THE GRID BIAS NUISANCE.

L.J. (Notts).—"One of the most irritating things to me is the grid bias battery, which always seems to get knocked over or to be dropping one of its plugs out. Is there any way of doing away with it?"

You certainly cannot "do without" grid bias, if only because on the ordinary loud speaker set it effects a very great saving of high-tension current, and exercises a marked improvement on the quality of reproduction. If the following is noted your grid bias troubles will automatically disappear.

Make sure that the plugs fit tightly into the sockets and are quite clean. Cut away the frayed edges of the flexible wires for if whiskers are left here they may give rise to short-circuiting.

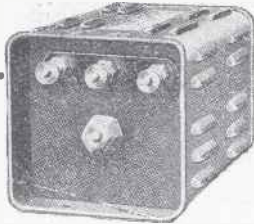
Long flexible leads which are apt to shake and move the plug about can easily be held securely in place if an ordinary elastic band is fitted over the battery, and the plugs are drawn under this before being placed in position in the socket.

In many G.B. batteries the positive plug is placed so close to the 1½-volt negative socket that if the grid bias positive plug is carelessly inserted it may bridge the distance between the two, and short the 1½-volt cell. This, of course, should be guarded against as it may affect reception in the whole set.

Grid bias batteries standing on the baseboard should not be allowed to slide about when the set is moved nor should they be hung in a place only by their flexible connections. (It is very easy to mount a grid bias battery securely and it may save an expensive accident.)

Most grid bias batteries have a cardboard lid which protects them from metallic contact whilst in the dealer's hands. The purchaser very often throws such a lid away, whereas if this is screwed direct to

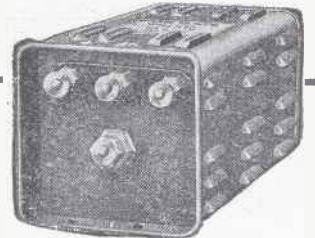
(Continued on page 190.)



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H.T.6. 175 volts, 25 m.a.  
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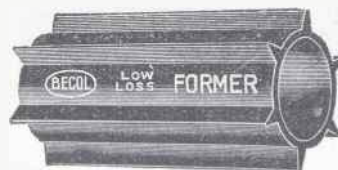
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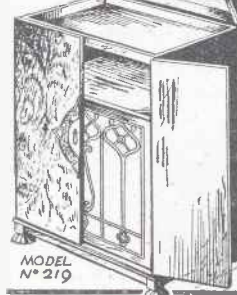
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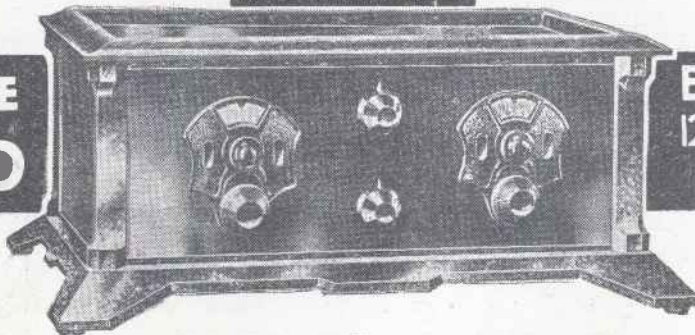
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Please send me full particulars of

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ADDRESS .....

NOTE: Part Exchange does not apply to Hire Purchase System.

Fill in Form 'B' if you require particulars of our easy monthly payments or part exchange system.

Fill in Form 'A' if you wish us to purchase your receiver.

## RADIOTORIAL QUESTIONS AND ANSWERS.

(Continued from page 188.)

the baseboard it will make a stand in which the battery can be held in place. Failing this, a small strip of leather, or strong tape, screwed to the side of the case, or a holder of bent brass strip will make a perfectly satisfactory job. Once the battery is properly fitted with flexible leads of suitable length, and adjusted correctly, it will afford no more trouble than one of the valves.

### H.F. UNIT FOR SHORT OR ORDINARY WAVES.

C.W.T. (Dagenham, Kent).—"My set uses plug-in coils, which I make myself, and covers short as well as ordinary B.B.C. waves. I am going to add an H.F. screened grid stage for which I have several H.F. chokes, the necessary tapped coils, neutralising condensers, fixed condensers of different sizes, a '0005 tuning condenser, valve holder, switch, etc.

"What would be the connections for the kind of H.F. amplifier that has a tuning condenser with clip to tap in either the whole or part of the coil, and using the same batteries?"

You will need to mount the variable condenser on a panel about 7 ins. square and to have a baseboard 7 or 8 in. deep, with an upright screen suitably arranged to divide the grid and anode circuits of the H.F. valve.

The H.F. choke must be one efficient on ordinary as well as short waves, and it would be necessary to fit the unit with two output terminals (one for ordinary and one for short waves) in addition to two L.T. terminals, and aerial, earth and two H.T.-T. terminals. The wiring will be as follows:

Aerial terminal to a flexible lead terminating in a clip that goes on to the aerial coil. One side of the aerial coil holder goes to the grid of the valve holder.

The other end of the aerial coil holder goes to the earth terminal, to the moving vanes of the '0005 variable condenser, to one filament terminal on the valve holder, to the screen, to L.T.- and to one side of a 1-mfd. fixed condenser.

The L.T. + terminal goes to one side of the on-off switch, the other side of which goes to the remaining filament on the valve holder. The fixed vanes of the '0005 variable condenser are connected to a clip which taps in the desired position on the coil, or on to the lead which goes from the end of the coil to grid.

## TECHNICAL TWISTERS

No. 29.

### THE L.T. BATTERY.

#### CAN YOU FILL IN THE MISSING LETTERS?

There are two ways of reckoning the "capacity" of an accumulator. Do not confuse the "....." with the "....." rating.

When an L.T. battery is connected to a wireless set it is discharging continuously, and it will require recharging much . . . . . frequently than if used intermittently, as for ignition purposes.

If two similar L.T. batteries are connected in parallel the . . . . . remains constant, but the capacity is . . . . .

When two similar accumulators are connected in series the . . . . . is . . . . . but the capacity remains unaltered.

Last week's missing words (in order) were: Loud speaker. Five, Six, Power. Milliammeter, Negative. Adding, Plate (or Anode).

The remaining side of the 1-mfd. condenser goes to H.T.+1 terminal, which is joined to the screen terminal on the valve holder; that is to say, the one opposite the grid (which is normally the plate socket of an ordinary valve holder).

The H.T. + 2 terminal is taken to one end of the H.F. choke and the other side of this choke to two condensers (one ordinary '0003 fixed condenser and the other adjustable neutralising condenser). This latter condenser is then joined to one of the output terminals and is used for short-wave work. The other (the '0003-mfd. condenser) is joined to the other output terminal and your set's A terminal is joined to this for ordinary wave-lengths.

The terminal on the top of the valve is then joined by means of a semi-flexible lead to that end of the H.F. choke which goes to the junction of the two condensers and this completes the wiring.

### HOW TO SOLDER.

N.G. (Guildford, Surrey).—"Last year I got into a fearful mess with soldering, but I should like to have a go again this year. What are the main points to watch?"

Soldering is really quite simple, the main idea being to clean and heat the two surfaces sufficiently for solder to adhere to them. When they are thus warmed and if they are perfectly clean, the solder can be run from one surface to another, and on cooling it will set as one mass, thereby joining them together.

The great art is first to clean both the iron and the working surfaces perfectly. The iron must be "tinned," which is done by heating it in a flame (a gas jet is ideal) until it commences to burn with a green flame.

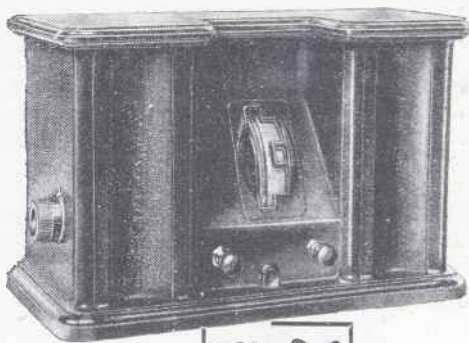
When this occurs it can be removed and filed until it is bright, and whilst very hot it should be dipped into a tin lid containing a little flux and a blob of solder. The solder will then run on to the clean surface of the iron and coat it with a bright covering of solder, and then the iron is warmed up again ready for business.

Whilst it is being reheated the two surfaces can be thoroughly cleaned with a file or emery-cloth until the bright metal shows, and they should then be touched with a little flux. When the heated iron is brought into contact with them the thin coating of solder appears on them also and they too are said to be "tinned."

When both surfaces have been tinned and held together, the iron is heated once more and then it is

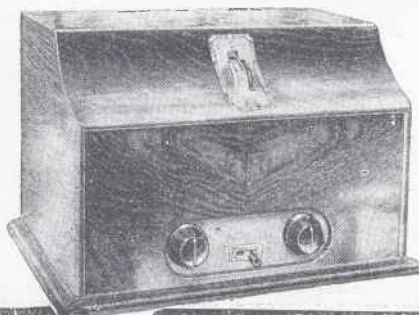
(Continued on page 192.)

## THE BURTON EMPIRE TWO Battery Model



**57'6**  
Without Valves.

A compact little receiver of very attractive appearance, designed to give good reception of local station programmes. Tuning is effected by a drum drive condenser, combined with a volume control. Two push-pull switches provide for changing wave range, and for switching on and off. Finished in moulded bakelite cabinet.



## THE BURTON EMPIRE SCREEN GRID THREE, Battery Model, £8 : 12 : 6. Without Valves.

A highly selective three-valve receiver incorporating a screen grid high frequency stage and a detector, transformer coupled to a power output valve. Adequate volume is obtained without use of a pentode. Tuning is effected by a single drum dial driving a pair of ganged condensers. A small auxiliary condenser gives fine tuning. Single switch wave range adjustment. Reaction is by a differential condenser system, giving very smooth control.

# BURTON GOES ONE BETTER

Wonderful as the success which BurTon receiving sets have been in the past, the new models illustrated below completely eclipse all previous records, both in the results obtainable and the value for money offered.

Built with scientifically designed components of our own manufacture, all BurTon sets can be thoroughly relied upon to give the most satisfactory and no-trouble service under all conditions.

Send for latest lists and ask your dealer to show you the latest BurTon models.

C. F. & H. BURTON, PROGRESS WORKS, WALSALL, ENG.



# THE NEW Varley NICORE L.F. AUTO-TRANSFORMER



VARLEY NICORE L.F. AUTO TRANSFORMER.  
 (List No. D.P.13)  
 D.C. resistance, Grid to G.B. ... 17,000 ohms.  
 D.C. resistance, Tap to G.B. ... 3,000 ohms.  
 Inductance from Tap to G.B. ... 120 Henries.  
 Ratio 7 : 1.

£1



Write for Section D of the Varley Catalogue, which gives particulars of this and other Varley Transformers.

The highest possible amplification from a single stage, without sacrifice of quality, may be achieved with the new Varley Nicore L.F. Auto Transformer. It is ideal for those receivers which employ only one stage of L.F. amplification, because the very high ratio of 7 to 1 has been obtained without appreciable falling off at the extreme ends of the frequency gamut.

It is the famous Varley Bi-duplex method of coil winding and the development of the core so successfully used in the Varley Nicore 1 which have made this new Auto Transformer possible.

The Varley Nickel Iron Alloy Core has a far greater permeability than older types. By its use Varley have been able to cut down the number of turns on the primary and secondary and to reduce their self-capacity, while still keeping the inductance of the primary at a high value. At the same time, this new Varley Nickel Iron Alloy conduces to increased all-round efficiency, because it allows of a smaller core and windings. There is, consequently, a reduction in the losses due to hysteresis and eddy currents.

Only three terminals are on the Varley Nicore L.F. Auto Transformer. Being designed solely for the resistance or choke feed auto-transformer method of coupling, there is a permanent internal connection between the primary and secondary.

Varley's experience in coil winding and transformer design has produced this new addition to the Varley range.

Test its performance for yourself.

## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 193.)

placed over the two surfaces simultaneously, so that it heats them equally. When hot enough the blob of solder on the end of the iron will readily run over the two surfaces and these should be held steady until it solidifies, which it does a moment after the iron has been removed.

At this stage, and before the joint has had time to get quite cool, wipe it over with a clean cloth so as to remove any trace of superfluous flux. The heat will have liquified this and it can be removed easily and quickly.

If it is left for a little while it will get cool and become greasy, and then it will be found exceedingly difficult to remove it. If, however, the above points are borne in mind soldering will become very easy and pleasurable.

### IS IT SAFE?

J.M.B. (Brighton, Sussex).—"I was thinking of buying a charger for the low tension battery, but I know nothing about wireless and do not think it would be safe for me to handle it. Do you consider this kind of apparatus dangerous or would it be quite in order for a novice to use it?"

Such apparatus is perfectly safe and can be used with every confidence. If you buy a charger which is made by a reliable firm you will find that explicit instructions for installation and use are issued with it.

You should read these details carefully and preserve them for reference. Probably you will have absolutely no difficulty whatever in the use of the instrument if you take ordinary care, but should you for some reason not get the perfect satisfaction from the instrument which you expected, a line to the makers will result in expert advice being sent to you.

Providing ordinary care is used there is no danger (all such units being liable to Board of Trade regulations as to safety) but, of course, just as in the case of an electric iron or vacuum cleaner, it is assumed that the owner will take reasonable care not to let the insulation become defective, and to work it as recommended by its makers.

## FOR THE LISTENER

(Continued from page 166.)

They celebrate the birthdays both of the living and the dead whom they wish to honour; particularly of the living. Young poets, young artists and architects, young musicians, in Germany get repeated chances of making their work and their aims known.

I rather like this idea. Germany is evidently proud of its youth. There is nothing quite like it in our programmes. If you have made your name, the B.B.C. may give you a show; but not so readily if you are simply in process of making a name.

Our "Points of View" are usually those of old and tried men. We worship achievement, the Germans worship experiment. The deeds and reflections of the old occupy us rather than the thoughts and aspirations of the young; yet it is these latter which are important.

Mr. Clinton Baddeley reads Dickens charmingly, but I sometimes wish that the B.B.C. would boost our youth more, and let us hear what our young poets are saying, what our young artists are dreaming, what our young scientists and politicians are thinking and aiming at.

### Critics.

But, if I had my way, I would give less time in the programmes to the critics than to those who were doing the things which they criticise. It is interesting to hear what Mr. Desmond McCarthy has to say about a young writer, but, if I could drag the young writer himself to the microphone, I would rather like to hear what he thinks about

himself and the world and life, what he is "out" to do.

Critical work is secondary; critical opinions, however admirable, are secondary; and I would rather hear a creative worker explain himself than a critic criticise him.

### Broadcast Music.

Sir Hamilton Harty is evidently feeling sore about something. He calls the musical policy of the B.B.C. "amateurish and arrogant." He says that wireless music is a "debased substitute" for concert hall music. Sounds rather touchy!

I have never regarded wireless music as in any sense a substitute for music heard in the concert hall. It is no more a substitute for it than is a telephone conversation with a friend a substitute for a tête-à-tête over a cup of tea in an A.B.C. shop.

But unfortunately most of us cannot get anything else. Sir Hamilton's conducting of the Hallé Orchestra would be unknown to me unless it had been for the wireless, and I should have missed much.

I still miss the real thing, for I cannot get to Lancashire on a magic carpet. Wireless has its limitations, but it is as absurd to grumble at them as at a railway train because it runs on lines and not across meadows.

Professional interests may be involved, and Sir Hamilton may be sore on this account; but listeners are not worrying themselves very much about professional interests and are grateful. It is very good to hear, over the telephone, even, the voice of a friend you are not likely to see in the flesh for a long time.

# Metal Rectification

## Important Developments have taken place in IGRANIC-ELKON RECTIFIERS

Since the introduction of IGRANIC-ELKON METAL RECTIFIERS, intensive and systematic research in the Modern Laboratories of the IGRANIC BEDFORD WORKS have resulted in—

### IMPROVED RECTIFIERS

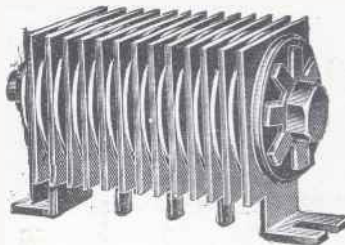
which are

**SMALL** in Bulk.      **HIGH** in Efficiency.      **LOW** in Price.

Suitable for all purposes, including H.T. Supply Units, L.T. Supply Units, H.T. and L.T. Accumulator Chargers, GRID BIAS SUPPLY, Excitation of Moving Coil Speaker Fields, etc., etc.

In addition a range of dependable yet inexpensive components for use in conjunction with IGRANIC-ELKON RECTIFIERS have been developed, including POWER TRANSFORMERS, CHOKES, CONDENSERS, RESISTORS, etc.

May we send you a Catalogue.



Write for a copy of  
"THE LINK BETWEEN"  
a booklet containing valuable  
data for Mains Users. Address  
your enquiry to D:pt. R. 161.



# THE RADIO SENSATION OF THE YEAR



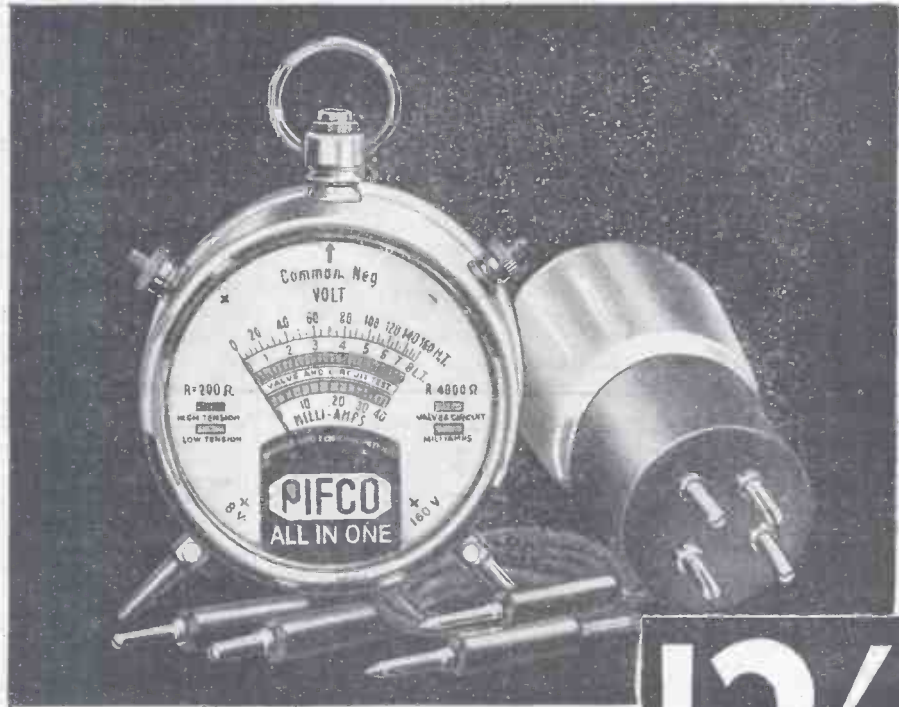
# TESTS EVERYTHING!

• • • **VALVES  
FILAMENT  
ANODE & GRID  
COMPONENTS  
AND CIRCUITS  
AS WELL AS  
L.T., H.T. AND  
MILLIAMPS**

Here is the All-in-One Radiometer at a price that makes it an investment. A fool-proof instrument that tests every single thing on your set, and gives you the solution to the most baffling problems. A real Sherlock Holmes, this wireless aid.

Ask your dealer to show you the All-in-One Radiometer. See him demonstrate how simply you can test your own components. Watch him plug in a valve. See the finger on the dial say "O.K." or "Dud." Notice how the simple attachment of the leads provided will find that weak spot in the circuit. Have him couple up the All-in-One to a battery. The reading is as clear as clock time.

Now is the time to buy the All-in-One Radiometer. An accurately calibrated instrument that will save you pounds in cash and hours in time. Ask for our booklet or write direct to Pifco Ltd., Pifco House, High St., Manchester



# 12/6

# PIFCO ALL IN ONE RADIOMETER

(FOREIGN)

## A VISIT TO "EKCO" WORKS

**T**HE best tonic imaginable in these days of depressing unemployment figures is surely the experience which befell a representative of "P.W." recently.

The occasion was a visit of inspection by the Mayor of Southend to the enormously enlarged and elaborately equipped new works of Messrs. E. K. Cole, and the tonic effect came from the unmistakable air of expanding prosperity and high-speed production evidenced by every department of this excellently organised modern factory.

### Unquestionable Success.

We are so used to having America held up to us as the pattern of highly organised prosperity, mass production by intensive methods, and so on, that it is indeed refreshing to encounter a British concern which so strikingly exemplifies everything which is best in these things.

The unquestionable success which they are bringing to this extremely progressive firm is the best possible answer to those who doubt the essential soundness of British industry.

The "Ekco" concern must be well-known to "P.W." readers as manufacturers of mains units and all-mains receivers of high quality at very reasonable prices, and we can realise the tremendous and well-deserved expansion which has taken place in the firm in the last few years.

It is quite one of the most romantic stories of the radio industry, as a few facts and figures will demonstrate.

### How It Began.

The firm started in 1925 with a staff of three and a floor space of but 50 square ft. By the end of the year they were occupying 150 square ft., and year by year the expansion went on more and more rapidly, until now they have 80,000 square ft. in use, with an additional nine acres of land set by for future building, and a staff of 1,100.

The tour of inspection at which our representative was present proved extremely interesting, and several points impressed him particularly. There was first the fact that extraordinarily searching and exhaustive tests are applied to every part on completion, and before that part passed on to the assembly line where it would be incorporated in a complete instrument.

Impressive, too, was the skilful organisation which must have gone into the laying out of the production lines themselves. Here were seen the chassis of each type of unit or receiver starting at one end of a long, moving table and gradually working along in a series of carefully thought out stages.

### Exhaustive Tests.

At each stage it came into the hands of a worker who carried out certain definite steps upon it, then sent it off on its journey once more. Finally it appeared at the head of the moving table as a finished instrument, and then went straight on test under working conditions.

These tests again were of a most exhaustive nature, and our representative was particularly interested in those applied to the all-electric receivers of various types. These were carried out in well-equipped silence cabinets located near the end of each production line, with the aid of a "standard" receiver on a change-over switch.

Two points were specially noted here. The first was that the "standard" instrument was treated as a *minimum* of performance: each production set had to be as good or better. If it could be discovered to be inferior in any way it was rejected. The second point was that the test for quality was carried out upon a moving-coil loud speaker, which is something which only a really good instrument can pass successfully.

### Tremendous Progress.

Altogether it was a most interesting afternoon, and left a strong impression of tremendous progress and prosperity based upon excellent organisation and a never-ending effort to produce a better and better article.

\* \* \*

If you are using a D.C. battery eliminator, and your positive main is earthed, pay very particular attention to prevent shorting or leakage, and if you use an earthing switch, make sure you have a weatherproof cover on this.

\* \* \*

The Radio Experimental Society of Manchester has been licensed to work on a wavelength of five metres.

# TRELLEBORGS

## GUARANTEED GENUINE EBONITE

Highest dielectric insulation 120,000 v. per m.m.  
Lowest power factor.  
No current absorption.  
Unconditionally guaranteed perfect.

No surface leakage.  
Easy machining.  
Best polished surface.  
Superfine consistent quality.

### PANEL PRICES PER SQUARE INCH, POLISHED

**9/16<sup>D.</sup>**  
BLACK  
1" - 3d.

1/2" THICK

**3/4<sup>D.</sup>**  
MAHOG.  
1" - 1d.



## THE SUPERFINE QUALITY RADIO EBONITE

**TRELLEBORGS EBONITE WORKS, LTD.**  
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## HERE IS THE WIRELESS CABINET YOU ARE LOOKING FOR, INSTALL A

### 'LANGMORE and be Proud of Your Set.

The "LANGMORE" No. 7. Has open Back and Sides to SPEAKER COMPARTMENT as recommended by the B.B.C., and is very strongly constructed of Oak and Plywood.

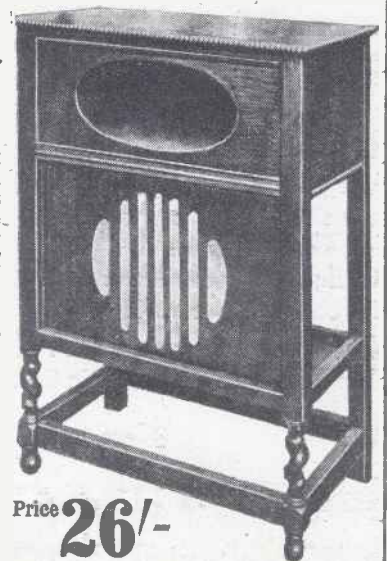
Size overall 30" high x 21" wide x 11 1/2" deep.

The top compartment which measures 8" high x 18" wide x 10 1/2" deep inside, is for the set and takes a Panel 18" x 7".

The Oval Aperture is 12" x 5".

The Bottom Compartment to Accommodate LOUD SPEAKER and BATTERIES, measures 13 1/2" high x 18" wide x 9" deep inside, and has well DESIGNED SILK COVERED BAFFLE.

All are fitted with HINGED TOP, Heavy Base Board, etc. and BEAUTIFULLY FINISHED IN JACOBAN OAK.



Price **26/-**

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WE specialize in the supply of all good quality Radio sets, etc., on easy terms. We will give you efficient and prompt service. A few examples below:

**McMICHAEL MAINS THREE.** The outstanding all-mains set of the season. Remarkable performance both as regards sensitivity and quality of reproduction. A receiver we can thoroughly recommend. Demonstrations daily.

Cash Price . . . . . £21 0 0

Or 22/- with order and 11 monthly payments of 38/-.

**EKCO ALL MAINS 2-V. SET.** A reliable regional receiver for A.C. or D.C. Mains. Cash Price . . . . . £14 10 0

Or 18/6 with order and 11 monthly payments of 26/-.

**LISSEN 2-V. SET,** battery model, including valves. Cash Price . . . . . £3 10 0

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**NEW OSRAM MUSIC MAGNET 4 KIT.** A first-class long-distance receiver incorporating 2 H.F. stages, single dial tuning. Cash Price . . . . . £11 15 0

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**120 VOLT EXIDE H.T.** Accumulator, 5,000 M.A. capacity, including 2 Polished Oak Carriers. Cash Price . . . . . £4 13 0

Or 6/6 with order and 11 monthly payments of 8/6.

**NEW BLUE SPOT 66R UNIT.** The finest balanced armature movement on the market. Complete with large Cone and chassis. Cash Price . . . . . £2 10 0

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**LONDON RADIO SUPPLY CO.,**  
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## "IT FITS YOUR PORTABLE"



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ASK YOUR DEALER OR WRITE FOR FOLDER 55

This wonderful Combined Eliminator and Trickle Charger is the finest All-Mains Unit yet produced, and is as simple to connect and as compact as an H.T. Battery and every bit as safe.

It has no moving parts nor valves, incorporates the Westinghouse Metal Rectifier, and is fully guaranteed for 12 months. Small enough to fit the Battery space in portable and cabinet receivers, it provides smooth and constant High and Low Tension current entirely free from hum.

There are two variable tappings of 0/100 and 0/120 Volts respectively, and one fixed of 150 Volts. Output 25 m/A at 150 Volts—the highest of any unit designed for portables. The Trickle Charger caters for 2-, 4- and 6-Volt L.T. Accumulators.

# "CLARKE'S" ATLAS ALL-MAINS UNIT A.C.188

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"BEST WAY"

### 4 CHEAP to MAKE Sets

(Book No. 367)

Contains complete constructional details for making four inexpensive and easy-to-build receivers. All have passed the most exacting tests before being published.

"BEST WAY"

### 4 SUPER SETS

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These Super sets are for MODERN CONDITIONS, and will enable constructors to take full advantage of the dual programmes under the Regional Scheme.

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from all Newsagents and Booksellers everywhere, or 7d. post free (Home or Abroad), from "Best Way," 291a, Oxford Street, London, W.1.

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**Compare** —and  
no other Speaker  
gives such value  
at the price

We can think of no flowery adjectives to describe our new Speaker—they have all been used up on other Speakers.

We make these two claims—and you are the judge—

1. The new Graham Farish Speaker tells the truth—it never distorts.
2. Compare—and you will agree that no other Speaker offers such value at the price.

*Driven by adjustable 4 pole unit, the Graham Farish Speaker is obtainable in three attractive finishes: Mahogany, Walnut or Oak, price 42/-.*

**GRAHAM FARISH 42/-**  
BROMLEY · KENT

## NEW DANCE BANDS.

Some further Broadcasting News.  
From OUR SPECIAL CORRESPONDENT.

**H**ARRY R. Hall's Gleneagles Hotel Dance Band, which during the summer has been heard every week by listeners throughout the British Isles, is playing at the Midland Hotel, Manchester, during the autumn, and arrangements have been made for its programmes to be broadcast on several occasions to Northern and London Regional listeners, as well as once from the National transmitter.

### "Seaside Snapshots."

Another dance band, a new one to listeners, has a place in the Northern programmes on Friday, October 17th, when it plays at the Ritz Palais de Danse, Manchester, for the Manchester Radio Exhibition Ball. This band is directed by Ivor Kirchin.

Midland Regional listeners can rely on a pleasant entertainment from Birmingham

## A Magnificent Gift!

FOUR SIXPENNY  
BLUE PRINTS

will be

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with

POPULAR WIRELESS

NEXT WEEK

ORDER YOUR COPY NOW

USUAL PRICE

on Monday, October 13th, when a bright little feature entitled "Seaside Snapshots," produced by Howard Moreton, will attempt to recapture the holiday spirit of July and August in music and sketches designed to recall happy reminiscences. Dorothy Summers, Mabel France, Harry Saxton, Mason and Arms and the Midland Wireless Nonet are in the cast, so that the show should be a good one.

### Relays from Manchester.

Canon A. N. Cooper, well-known as "The Walking Parson," and for the last fifty years vicar of Filey, is giving a talk to Northern listeners at 7 p.m. on Saturday, October 18th, in which he will describe "My Walk to Rome." There is no doubt that Canon Cooper's ideas of walking greatly surpass what other people would prefer to call a long trek.

Not only has he walked to Rome, but to Budapest, and has crossed the Carpathians,

the Pyrenees and the Alps. He was seventy years of age when he walked to Madrid, and every European country, except Russia, has heard his footsteps.

As already mentioned in these columns, several relays from the Manchester Radio Exhibition are to be included in the broadcast programmes, and special mention should be made of one which takes place between 7.45 and 9 p.m. on Monday, October 13th, when a star vaudeville entertainment will be radiated from the North Regional and National transmitters. The artists, in addition to the Northern Wireless Orchestra, will include Stainless Stephen; Gillie Potter, Derek Oldham and Winnie Melville, Bransby Williams, and Foden's "Brass" Quartet.

## WHAT I THOUGHT OF THE SHOW.

(Continued from page 153.)

which rule in Germany. I suppose it rightly comes down more and more to 1 high frequency, det., and 1 low frequency as the ubiquitous set.

There was a lot of competition in the all-mains type; the sole disadvantage of which is that only 15 per cent or thereabouts of householders are equipped with the mains. But doubtless a larger proportion of potential wireless users can use the mains to their great benefit. Indeed, the whole solution of the maintenance problem is found in mains working.

### "Side Shows."

As to the Show itself; the impression left every year is the same. It's so much the same. Small blame to anyone. It's a Show of the same thing. But what a pity there cannot be more space!

I went at a comparatively uncrowded hour and was jostled uncomfortably. I understand that it's impossible to obtain better accommodation at present, and probably that alone prevents a show having the breadth, cleanliness and dignity of that held yearly in Berlin.

The "side shows" always interest me and afford a real relief from the monotony of darkish wood. The lovely white and aluminium of the Dubilier high-voltage condenser, for example; the brass, the white metal, the "machinery" of the Garrard motor, the coil-winding machine, and last but not least, the B.B.C. power amplifier. That was a lovely oasis of light and progress, slightly marred by the inclusion of two (filled) kitchen chairs in front of the unit.

### A Disappointing Exhibit.

The other part of the B.B.C. exhibit is disappointing. It showed the oldest transmitter against a bit of the newest. It would surely have been more in keeping to show the new transmitter against a bit of the old? Brookmans Park is the year's achievement, it is represented by a coil of copper pipe!

Well, well! It's a great industry! And many congratulations to those who have built it up. I wonder if the show would have been quite as big if Daventry 5 X X had not, during six or more years, automatically kept out all American competition. I am still waiting for my medal!

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*Best way to all Stations!*

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Specially designed for the new Regional requirements.

**The most efficient and selective DUAL WAVE COIL produced.**

Suitable for Mullard 3<sup>rd</sup>, Furzehill 4, "P.W." Exhibition 4.

PRICE (complete with Base and Terminals) DW/8 8/-

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(Described in this issue.)

- Kit "A," less valves and cabinet. Cash .. £4:13:0  
Or 12 monthly payments of 7/9
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Or 12 monthly payments of 10/4
- Kit "C," complete with valves and cabinet. Cash .. £6:13:4  
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### EXHIBITION FOUR

(Described in September 20th issue)

- Kit "A," less valves and cabinet. Cash .. £7:17:6  
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P.W. 4/10/30

## "MY RADIO LUCK."

(Continued from page 161.)

Mavis Bennett.

The fact that, in private life, I am Mrs. Stanford Robinson will tell you of the luck which wireless has brought me. It was entirely through my broadcasting work that I met my husband, for he played my accompaniments on the first occasion that I sang from a B.B.C. studio.

Shortly afterwards he asked me to marry him. If I were to forget the many other things which I owe to the wireless, I shall be forever thankful for this alone.

Again, broadcasting has helped me considerably in building my reputation, and, what is more important, it is helping me to keep that reputation. It is far easier to make one's name than to keep it, you know.

It has brought me many friends amongst the B.B.C. officials and artists, and countless others amongst listeners in this country and abroad whom I have never met.

And so I could go on. A few lines are not sufficient for me to tell you of the many ways in which the radio has brought me luck. As it is, I must content myself with saying that not one word of thanks for my efforts has passed unappreciated; for if I

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have been the means of providing some small amount of pleasure to my public, then I feel I have fulfilled my main duty as a broadcast artist.

Mabel Constanduros.

I owe much to wireless, for it has brought me a great deal of luck.

Before broadcasting started I had done no professional work at all. A paid "entertainer" (how I loathe that classification) heard me at a concert where we were both performing, and begged me not to waste my "gift," as he called it.

On his advice, I wrote for an audition at 2 L O and, somehow or other, struggled through the test. I was so ill after the ordeal that I went home to bed, convinced that I had been a failure. Imagine my surprise, therefore, when I was told that I was regarded as a "find."

It was through my broadcasting work that I first started writing. I discovered that I could employ my pen to advantage, and, amongst other things, I now write the "Buggins" sketches in collaboration with "Bert," otherwise my friend, Mr. Michael Hogan.

I have received many beautiful presents from listeners, not the least of which is a gold watch. But perhaps the most amusing gift I have received was sent to me after I had broadcast a monologue in which "Grandma" lost her false teeth. Somebody sent me two complete sets to supply the deficiency!

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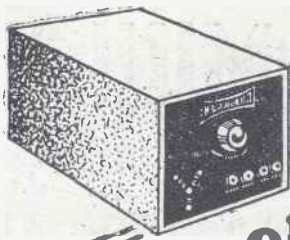
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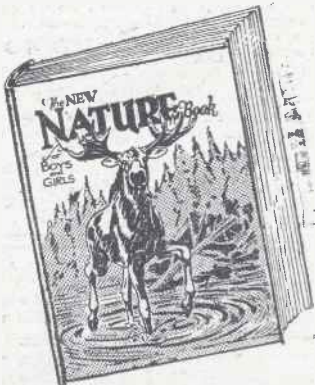
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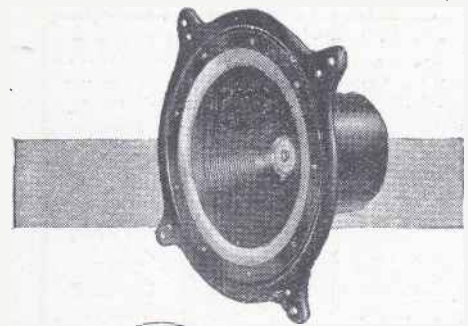
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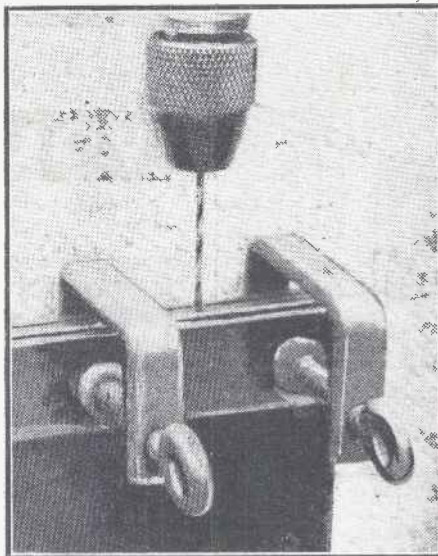
## PREVENTING PANEL-SPLITTING.

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A difficulty of this nature can readily be overcome, however, by clamping two strips of ebonite or wood on each side of the panel, as shown in the illustration. The panel, under these conditions, will not break or chip away under the influence of the drill, and a clean and tidy hole will be the result.

In cases where it is quite impossible to clamp up the panel in the above fashion, a pilot hole should first be drilled with a very

### A SIMPLE SOLUTION.



The ebonite to be drilled is held between two pieces of other material.

fine drill. If this is subsequently enlarged by carefully drilling with a drill of the required size, the edge of the panel will generally be found to stand up to the process without any chipping.

Wherever possible, of course, the panel should be clamped in the manner illustrated in order to make quite sure that its edge will not break away during the operation of drilling.

## NOTEBOOK NOTIONS

When an anode resistance is noisy do not scrap it before you make sure that the spring contact at the end of it has not worked loose enough to cause the trouble.

Where your aerial coil is at present right inside the receiver or placed so that magnetic coupling cannot easily be obtained, an extra coupled circuit can easily be used to improve selectivity by placing this outside the set and linking the two coils through a neutralising condenser.

Twisted flex is not usually a good material for very long loud speaker leads owing to its rather high self capacity.

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## TECHNICAL NOTES.

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

### Low-tension from the Mains.

PROBABLY the most reliable method of using A.C. mains for providing the low-tension current is to employ indirectly-heated valves, and these have become very much more popular during the past year or two. The alternatives are either to use a valve with a very low-resistance filament, this being heated by means of a special heating transformer, or to use a low-tension mains unit.

Owing to the fact that the low-tension mains unit is apt to be bulky and expensive, it does not seem to have achieved anything like the same degree of popularity as the high-tension mains unit. In the case of the low-tension mains unit a current of perhaps  $1\frac{1}{2}$  to 2 amperes (say 1,500 to 2,000 milli-amperes) has to be dealt with, whilst a high-tension mains unit is not, as a rule, called upon to deliver more than 50 to 100 milliamps.

Thus, the load upon the low-tension mains unit may be roughly twenty times as great as that on the high-tension unit, and it is in consequence of this that much heavier smoothing circuits have to be included.

### A.C. Valves.

With the directly-heated A.C. valves, using a low-tension heating transformer, unless you are very careful about the circuit arrangements you are apt to have trouble with A.C. hum.

Undoubtedly, in my opinion, the most satisfactory solution of the A.C. low-tension supply problem is the indirectly-heated valve, and this view would appear to be borne out by the rapidly increasing employment of this type of valve in all-electric receivers.

I suppose it is hardly necessary to mention, unless for the sake of newcomers to radio, that the indirectly-heated type of A.C. valve employs a filament which is heated by A.C. current, but this filament is not the electrode which acts as the cathode of the valve.

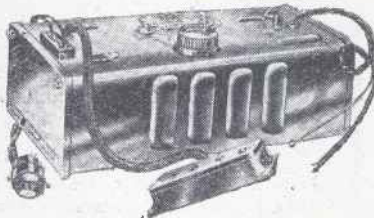
The heater filament is surrounded by a cylindrical cathode which, however, is electrically insulated from it. The cathode derives its heat by radiation from the heater filament, and this cathode, so far as the circuit arrangements are concerned, takes the place of the ordinary filament in a normal battery-operated valve.

### Some Important Points.

There are one or two points to be borne in mind with regard to A.C. indirectly-heated valves, however; one point is that sometimes you may get an electrical leak between the heating filament and the cathode circuiting it. If this occurs you will almost certainly be troubled with a loud A.C. hum in your loud speaker, and I am afraid that there is nothing you can do to cure the trouble except, of course, to change the unsatisfactory valve and to substitute a good one.

You will sometimes find that you get an A.C. hum also owing to the fact that the resistance value of the grid leak is too high.

(Continued on next page.)



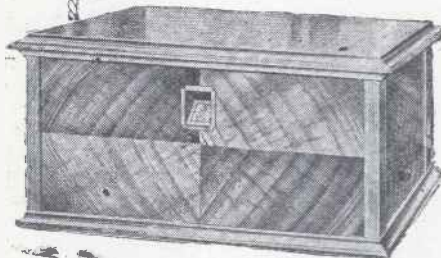
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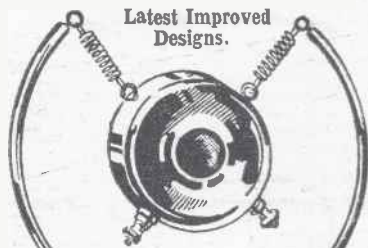
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## TECHNICAL NOTES

(Continued from previous page.)

If you have any idea that this is the cause of trouble in your receiver, it is a very simple matter to try a lower value of grid leak, or even to connect a low value of grid leak across the terminals of the present grid leak as a rough-and-ready test.

### Moving-Coil Points.

Another cause of A.C. hum, especially when the loud speaker and the mains unit are included in the same cabinet as the receiver, is interference between one unit and another.

Then, again, let us suppose the loud speaker is of the moving-coil type (I mean with electro-magnetic field, not with permanent-magnetic field), then if the field is excited from the A.C. mains it may be that the A.C. current is not sufficiently smoothed.

As a matter of fact, this is not very likely to be the case unless you have a defective rectifier, because the rectified current is fed into the field-winding of the moving-coil speaker and this is (or should be) a particularly effective choking-coil, so that, as I say, it is scarcely likely that this will be the main cause of your trouble.

### Choke Output.

It is a good plan when working with an all-electric set to use a choke-output circuit (or a transformer) so as to prevent the high tension of the anode circuit of the output stage from gaining access to the windings of the loud speaker.

My recent remarks in these Notes on the peculiarities of different types of receiver when an electrical pick-up is connected to the circuit have brought me a number of questions from readers. In several cases these are concerned with the question of volume control.

I have been rather surprised to find that quite a number of readers complain that, although their receiver works perfectly well for radio reception, they have not been able to get it to work satisfactorily with a gramophone pick-up.

### Radio and Gramophone.

I think the reason why a set which works well on radio is sometimes not satisfactory with a pick-up is usually because, when the pick-up is being used, the grid voltage applied to the first valve is much greater than when the set is being used for ordinary radio reception.

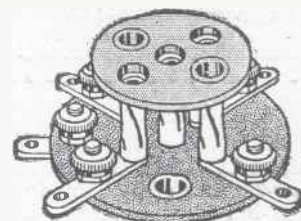
For example, take the case of a three-valve set. When this is working on radio it is probable that the input voltage is not more than a fraction of a volt, whereas when a pick-up is used, especially if it be a sensitive one, the input voltage may be considerably over 1 volt. This obviously means that valves, particularly in the first and second amplifiers, will be overloaded, and the need for a proper volume control becomes obvious.

### Overloading.

A common point is that in some cases a set will be overloaded by a sensitive pick-up, whilst in other cases a set with considerable amplification will not give very loud results, which shows amongst other things the considerable variation in the sensitivity of different types of pick-ups.

(Continued on next page.)

## NEW CLIX LINES

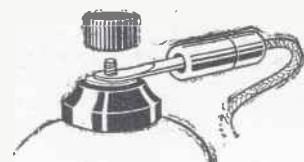


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## TECHNICAL NOTES.

(Continued from previous page.)

When using volume control (and, as I say, a volume control should always be used with an electrical pick-up) it is generally a good plan to connect this across the input. If the pick-up is particularly sensitive you will probably find it advisable to connect the pick-up in the first L.F. stage.

### Is Sensitivity Overdone ?

When electrical pick-ups were first introduced there was rather a scramble for sensitivity, but I think that this sensitivity has been somewhat overdone in certain types of pick-up, and better results are often obtainable by using a pick-up of only medium or moderate sensitivity with a little extra amplification following it.

If the pick-up is too sensitive there is a tendency to what we may call initial distortion which, like change at the railway booking office, "cannot afterwards be rectified." I always have a feeling when using different pick-ups that I get better results with an instrument which is *not* too sensitive, and that this is much more manageable.

As regards the volume control, this should be of the potentiometer type, and may be connected direct across the pick-up terminals.

### R.C. Coupling.

There is some difference of opinion as to whether R.C. coupling gives really good results with a pick-up, the point being that with valves coupled in this way the permissible grid swing is comparatively short, and overloading therefore occurs fairly easily.

Some readers claim to obtain perfectly satisfactory results with R.C. coupling, whilst others state positively that the best results, so far as good volume combined with purity is concerned, cannot be obtained with R.C. coupling, and that it is essential to use some form of transformer coupling.

This question, however, is one which many experimenters cannot afford to consider very seriously, inasmuch as their problem consists in fitting the pick-up to the *existing* receiver !

### Screening.

The advantages of screening between successive stages have been so much emphasised in technical articles that there is, I think, sometimes a danger of screening being adopted when it is not really necessary, and inasmuch as screening brings with it certain *disadvantages*, it may be that if it is used in cases where it is really unnecessary it does more harm than good.

Of course, with screen-grid valve stages screening is often essential, but you should always bear in mind that the proximity of a screen, or indeed any metal object, to a high-frequency stage necessarily results in certain eddy-current losses, which I think I mentioned a few weeks back.

The point is that in H.F. stages it is often possible to gain advantages in the way of additional amplification (or rather in freedom from instability which permits greater amplification to be obtained), which advantages outweigh the disadvantages of screening which I have just mentioned above.

(Continued on next page.)

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**EASY TERMS WITH SERVICE AFTER SALES.**

**NEW OSRAM MUSIC MAGNET FOUR**  
SEND The very latest kit, incorporating 2 S.G. H.F. stages for great range and selectivity. Single control. Balance in 12 monthly payments of **18/6**

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SEND Model W.5 Portable H.T. Eliminator for A.C. Mains. Output 120 volts at 15 m.a. 2 ly variable and power tappings. Balance in 11 monthly payments of **10/9**

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**"VERT" WIRING CLIP.**  
No soldering. No bending wires round terminals. Takes any number of wires to a terminal, any gauge. Tested and approved "Popular Wireless."  
3 gross (sufficient for 3 valve set) 2/-  
Trade enquiries invited.  
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at a quarter shop prices, or buy Cabinets for Wireless. Order Set as shown. British double spring motor, 12 in. velvet turntable, swan arm, metal sound-box amplifier, needle cups, for £1/18/6 p.p., and build your own Cabinet. Portable Gramophones from 15/6, postage 1/6. Motors from 8/6. Lists free. 64 pp. Catalogue No. 218/219. Drawing, and How to Make Gramos., 3d.

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PLEASE MENTION "POPULAR WIRELESS" WHEN REPLYING TO ADVERTISEMENTS

## TECHNICAL NOTES.

(Continued from previous page.)

### Some Screening Precautions.

I have often seen amateur-built receivers in which the screening was carried out in a very sloppy fashion, and was not only probably ineffective for the purpose intended, but actually a positive danger to the whole of the circuit.

When you introduce extensive sheets of metal into the interior of the cabinet you must take very special care that all possibility of short-circuit or accidental contact is avoided. Indiscriminate pasting-in of small sheets of tinfoil is very much to be discouraged, and if you wish to fit a screen, for example, on the baseboard, it is much more satisfactory to remove the components and fit the screen in properly.

It has been more than once suggested that this baseboard screen should then be covered completely over with, say, a very thin sheet of plywood, or with a thin sheet of ebonite, so that accidental contacts with the metal sheet are entirely prevented.

## P.W.'s 2/- Gift PRESENTED FREE

with next week's "P.W." will be

## Four Sixpenny BLUE PRINTS

Containing full constructional details of four especially chosen sets.

Order your copy now and secure this Magnificent Gift.

### Baseboard and Vertical Screens.

Remember that with many components contact between the terminal, or the wire attached to the terminal, and the baseboard is very easily made. For instance, in the case of a valve holder fitted with soldering tags, these are frequently bent downwards and may easily touch the baseboard. If the baseboard is covered with metallic sheet, trouble is almost certain to result.

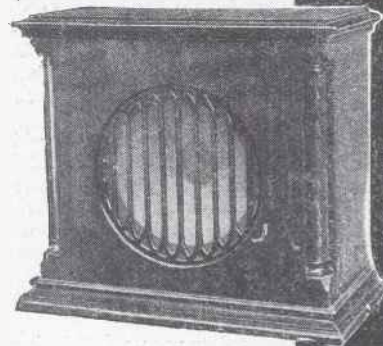
Of course, even though the baseboard shield is sandwiched between two non-conducting sheets it is still very important to remember not to make contact with the shield by screws passing into the baseboard, at any rate, screws to which electrical connection is to be made. Ordinary holding-down screws, of course, do not matter.

If vertical screens are used, obviously the holding-down screws for these should definitely make contact with the baseboard shield.

READ  
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BRITAIN'S  
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ON SALE EVERYWHERE

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Assembled in handsome finished cabinet.

Mahogany - £8:18:6  
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Also available in chassis form with 14 in. baffle £6: 6:0

Made by the makers of the famous W.B. Valve holders

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## BUILD £12 GRAMOPHONE

for £3 Instructions 3d. Latest Horns and Motors. Cash or Terms. Catalogue Free.  
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## Can you beat this?

### "PURATONE" SCREEN GRID VALVES 7/6

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which represents an immense stride in radio engineering and technique. The design of the patented coil assembly ensures results comparable with the highest-class manufactured sets.

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The three-gang condenser is already assembled for you. You have no difficulty in placing the parts in position as the base plate is already holed for each component.


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It is difficult to realize that there are only four valves in this powerful, super-sensitive, super-selective set.

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**PRICE**  
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### SPECIAL FEATURES

- 1 The two Screen Grid stages give extreme selectivity and sensitivity with an unrivalled range.
- 2 Enormous amplification with perfect stability is given by the complete shielding of H.F. Circuits.
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- 4 Change of wave-length is effected by an external switch and the set need not therefore be opened.
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- 6 Assembly is the essence of simplicity.
- 7 Volume control is provided not only to act as such, but to procure extreme selectivity.

**POST COUPON NOW**



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Name \_\_\_\_\_  
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 The "Osram Music Magnet 4"  
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 The General Electric Co. Ltd.  
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Prices apply only in Great Britain and Northern Ireland.

Cut out coupon and paste on postcard or enclose in unsealed envelope. Halfpenny postage in either case.

## THE SET THAT BRINGS THE CONTINENT TO THE BRITISH ISLES

Advt. of The General Electric Co. Ltd., Magnet House, Kingsway, London, W.C.2


# I'm Sorry!

*But Curfew will not toll to-night!*

fact is, my H.T. battery's tired out and I've forgotten to buy another so we'll have to miss that special performance after all.

Yes, I quite understand you're fed up with my H.T. batteries running down always when something worth listening to is on—

Well, I won't buy another battery, I'll get an R.I. H.T. Unit, constant power and absolutely safe, my dear.

The secret of the new  H.T. Unit is the use of Nikalloy the amazing metallurgical discovery, utilised with such amazing success in the popular "Big Three"—The "Hypermu" and "Hypermite" transformers and the "Hypercore" Choke.

Ask your dealer or us for the illustrated leaflet which tells you all about the New H.T. Unit which is absolutely revolutionary in Safety, Efficiency and Economy.

*Encased in Bakelite Case, beautifully coloured to represent Walnut.*

**FOR PORTABLES AND MOST RECEIVERS UP TO 5 VALVES**

*Consumption up to 20 millamps at 140 volts,*

A.C. MODEL £4 - 15 - 0

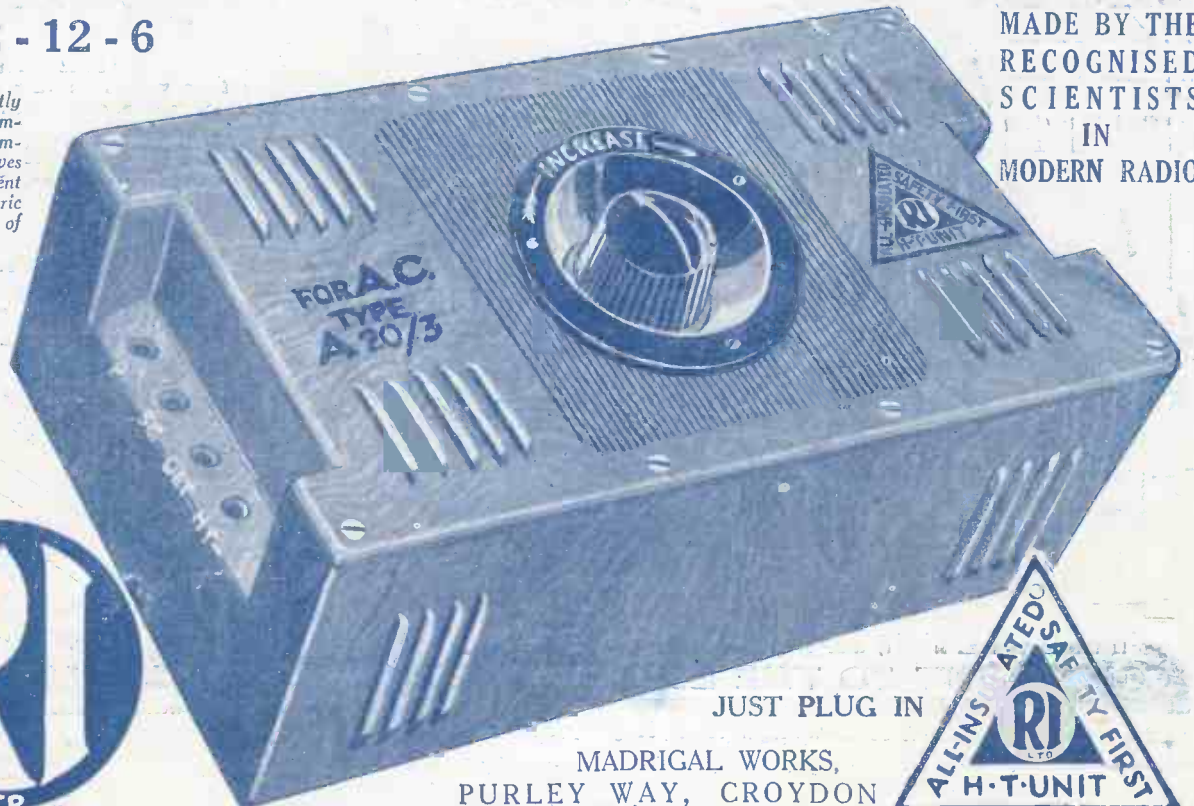
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*Cuts out the costly H.T. Battery, improves reception amazingly and gives safe H.T. Current from any electric supply at a cost of about 3/- a year.*



## ALL-INSULATED H.T. UNIT

MADE BY THE RECOGNISED SCIENTISTS IN MODERN RADIO



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# Popular Wireless

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October 11th, 1930.

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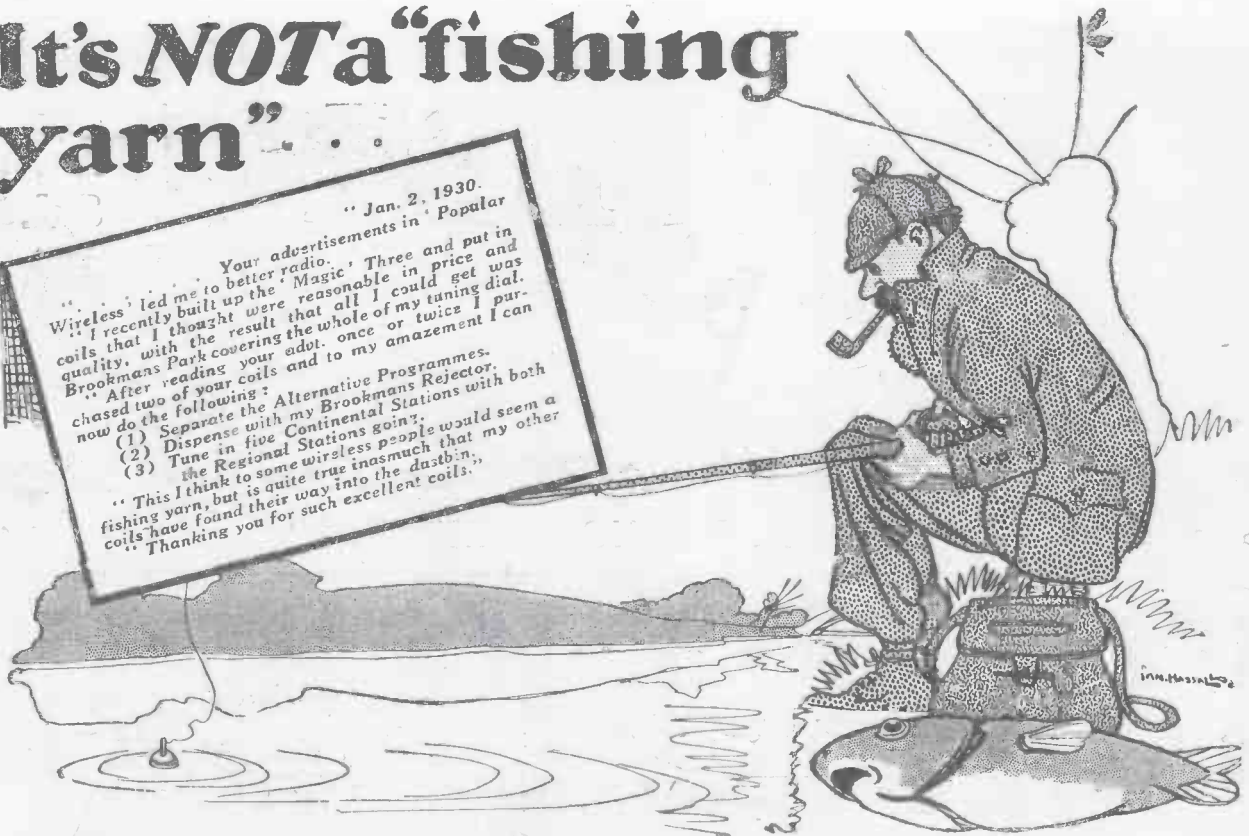


THIS  
MAGNIFICENT  
2/-  
GIFT INSIDE

Take It Home  
With You

# It's *NOT* a "fishing yarn" . . .

Jan. 2, 1930.  
 "Your advertisements in 'Popular Wireless' led me to better radio. I recently built up the 'Magic' Three and put in coils that I thought were reasonable in price and quality, with the result that all I could get was Brookmans Park covering the whole of my tuning dial. After reading your ad, once or twice I purchased two of your coils and to my amazement I can now do the following:  
 (1) Separate the Alternative Programmes.  
 (2) Dispense with my Brookmans Rejector.  
 (3) Tune in five Continental Stations with both the Regional Stations going.  
 This I think is some wireless people would seem a fishing yarn, but is quite true inasmuch that my other coils have found their way into the dustbin. Thanking you for such excellent coils."



## It's a fact that **LEWCOS** Resd. **COILS**



**LEWCOS  
 "X" Coil**

**LEWCOS  
 Centre-Tapped Coil**

THE LEWCOS "X" AND CENTRE TAPPED COILS ILLUSTRATED ABOVE ARE SPECIFIED FOR THE "EASY CHANGE THREE" AND THE "MAXI-POWER FOUR" DESCRIBED IN THIS ISSUE.

WRITE FOR LEWCOS FREE SHEET OF BLUE PRINT OF FOUR SUGGESTED CIRCUITS UTILISING LEWCOS COMPONENTS.  
 Please quote Ref. R70.

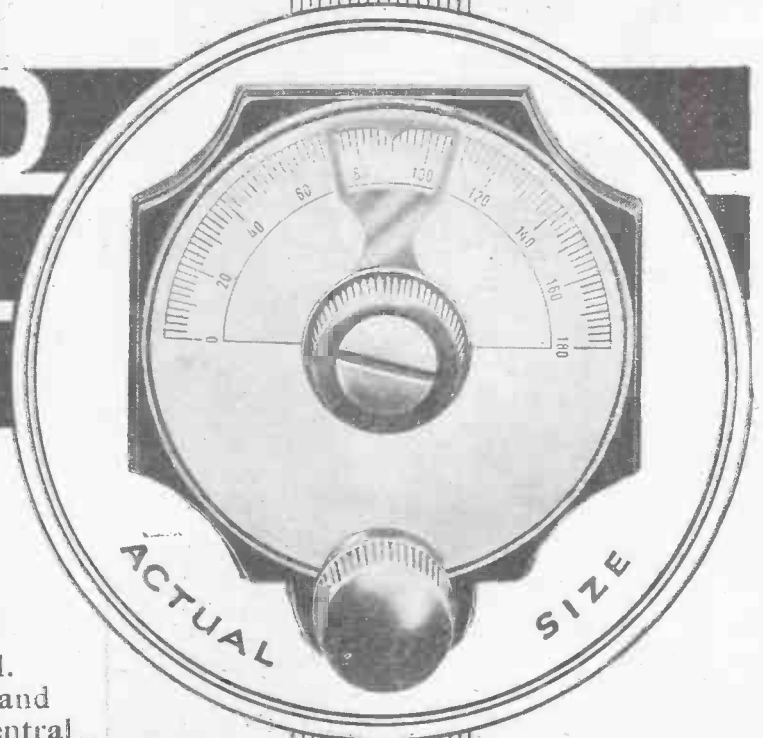
because of their extraordinary powers of selectivity do enable you to cut out local stations and tune in to the most difficult and distant stations across the world.  
 Lewcos Coils have reached this stage of perfection through a backing of continuous scientific research and the superior materials and workmanship used in their manufacture.  
 Descriptive leaflets of the Lewcos Coils which are specified for various receivers, and illustrated above, will be sent on request.

THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED, CHURCH ROAD, LEYTON, LONDON, E.10.



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## The New **ORMOND GEARED DIAL** ♦♦♦



A new geared dial of novel movement and most elegant design.

The frame is constructed of best quality bakelite of great strength, highly polished.

Both fast and slow motion are provided. The former, by lifting the driving knob and throwing drive out of gear, enables central bush knob to manipulate the condenser spindle direct. Slow motion is obtained by giving driving knob slight twist, pressing into gear and operating in the usual manner.

The Aluminium dial is in direct connection with the heel screw, a Terminal is provided for separately earthing the dial; the latter may then be used as an anti-capacity earthing shield. Ratio approximately 10 to 1.

Cat. No. R/360.

Price 2/6.

*The  
Perfect  
Dial —  
with a  
Perfect  
action*



# 2/6

**THE ORMOND ENGINEERING CO., LTD.,**  
Ormond House, Rosebery Avenue, London, E.C.1

Telephone: Clerkenwell 5334/5/6 and 9344/5/6.

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*We are exhibiting  
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Radio Exhibition  
STAND No. 64  
Main Hall*

**YOU'LL GET  
MORE EFFICIENT  
DETECTION WITH A**



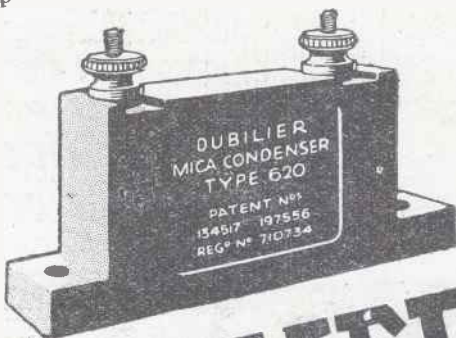
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GRID LEAK & CONDENSER!**



THE extremely low dielectric losses and the high degree of accuracy of Dubilier Mica Condensers are well known.

These qualities make them invaluable in any radio frequency circuit and especially so in the grid circuit of a cumulative grid detector where very minute high frequency currents are dealt with and where even small losses have an appreciable effect.

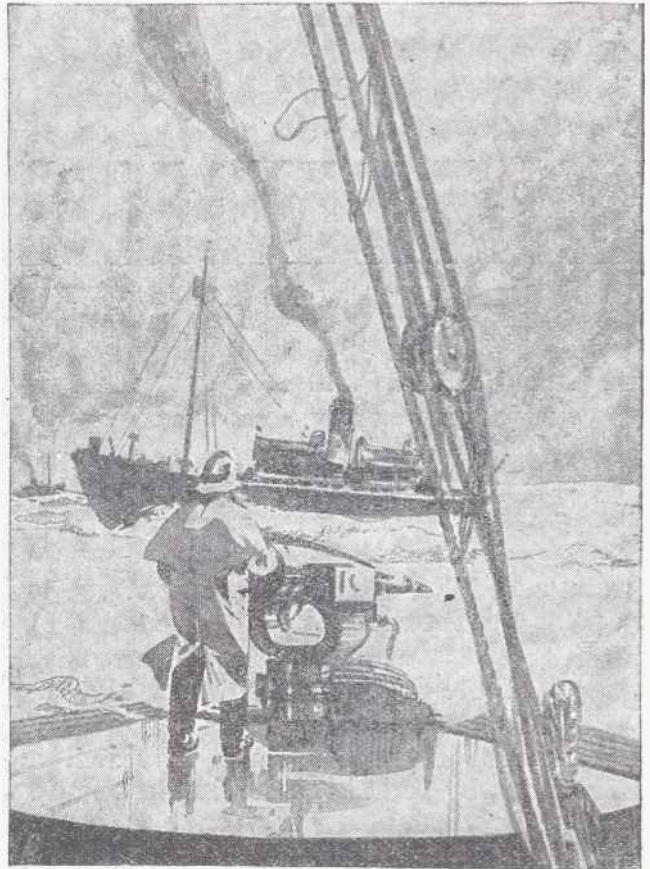
Specify Dubilier for your next set.



**DUBILIER  
CONDENSERS**

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

**When buying Valves  
-Remember!**



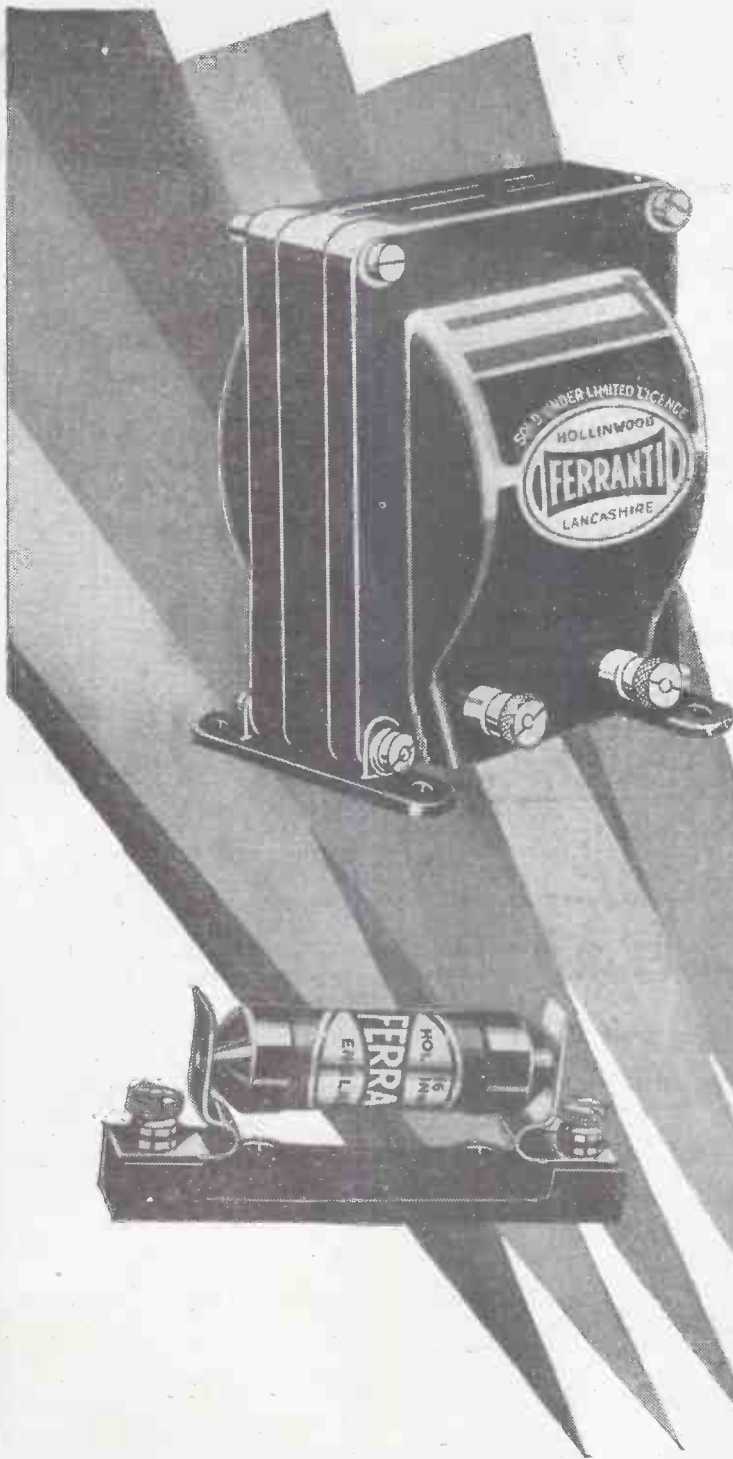
At the Harpoon Gun.

**Whaling Fleets at sea for months on end keep in touch with the world through Radio. They use Marconi Valves because of their unfailing dependability.**

Imperial Airways—The B.B.C.—Metropolitan Police—Empire Wireless Communications—Trinity House Lightship and Beacon Stations—Croydon Control Tower and Large Passenger Liners all

**USE  
MARCONI  
VALVES**





The Standard  
for all good  
Sets.

*Write for Leaflets and particulars,  
also booklet of Ferranti Radio  
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# FERRANTI COMPONENTS

FERRANTI LTD.

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Every Reader of "P.W." will receive  
**ANOTHER GREAT GIFT!**

**FREE  
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In response to innumerable requests we have prepared a  
**COMPLETE GUIDE TO  
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**—FOR  
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**"THE KEY TO THE ETHER"**

Don't miss this! It is absolutely invaluable to the man who wants to get the best from his set.

*Among the special articles, you will find:—*

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And How-to-make Details of Two Fine Sets!

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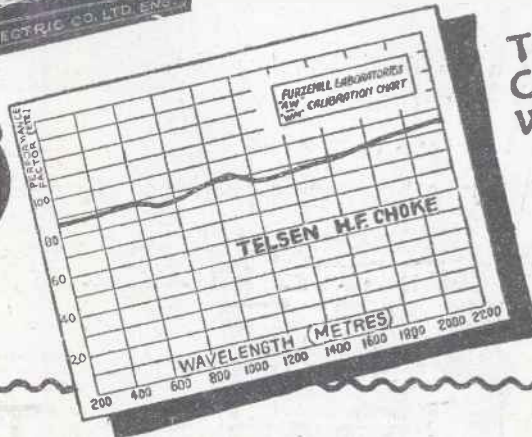
**THREEPENCE**

**ORDER NOW**

# JUST LOOK AT THIS REMARKABLE NEW H.F. CHOKES!



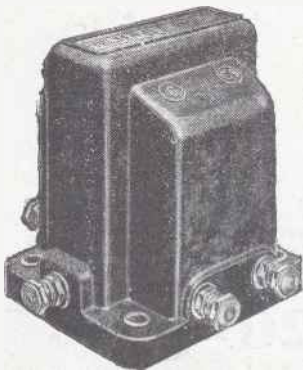
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## THE TELSEN H.F. CHOKES WITH THE WONDERFUL CURVE

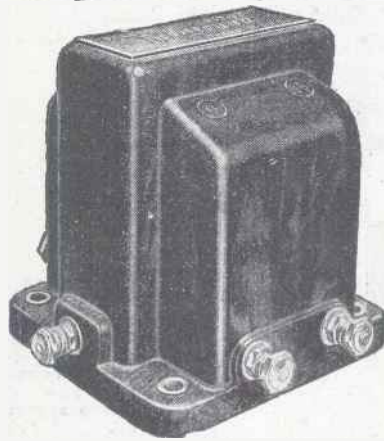
The remarkable performance of this new Telsens H.F. Choke will be appreciated from the accompanying graph, showing the curve of this component, which is the result of a standard choke test carried out by I. W. Reyner, B.Sc., A.M.I.E.E. at the Furzehill Laboratories. It is designed to cover the whole wave-band range from 18 to 4,000 metres, has exceptional low self-capacity and is shrouded in genuine Bakelite. Inductance 150,000 microhenries, resistance 400 ohms.

Price **2/6** each



Telsens "Ace" Transformer, the ideal model for all Portable Sets, and where space is limited, gives perfect reproduction throughout the musical range. Shrouded in genuine Bakelite, with new windings and core, fitted with earth terminal. Made in ratios 3-1 and 5-1.

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Telsens "Radiogrand" Transformer, new model, shrouded in genuine Bakelite, with new windings and core, fitted with earth terminal. Made in ratios 3-1 and 5-1.

Price **12/6** each

Telsens 7-1 Super Ratio "Radiogrand" Transformer, giving enormous amplification with perfect reproduction shrouded in genuine Bakelite with new windings and core, fitted with earth terminal.

Price **17/6** each



Telsens Valve Holders. Prov. Patent No. 20286/30. An entirely new design in Valve Holders, embodying patent metal spring contacts, which are designed to provide the most efficient contact with the valve legs whilst allowing the valve to be inserted or withdrawn with an easy movement, instead of being subjected to undue strain which often causes damage and loss of efficiency to the valves. Low capacity, self-locating, supplied with patent soldering tags and hexagon terminal nuts.

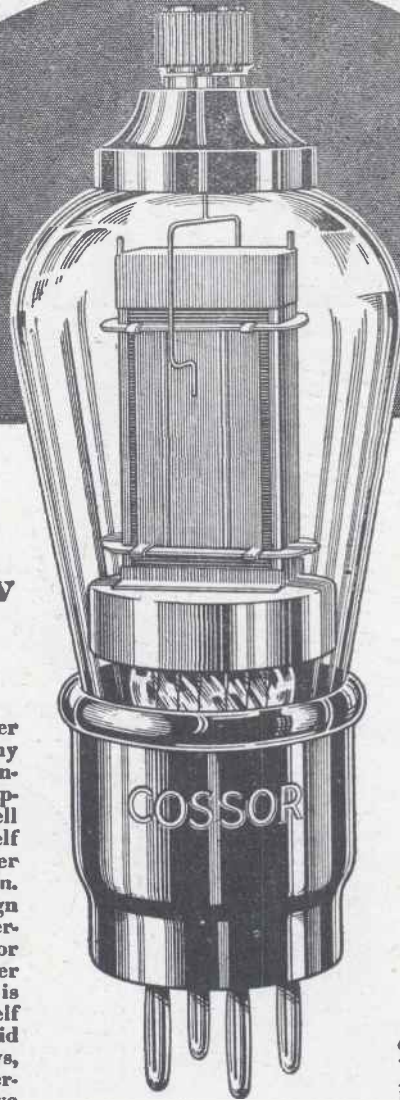
Price **1/-** each

# TELSEN COMPONENTS

**Highest actual amplification!**

**— due to its  
abnormally low  
inter-electrode  
capacity**

The effective H.F. amplification per stage that can be obtained in any Screened Grid Set is largely controlled by the inter-electrode capacity of the S.G. Valve. It is well known that the lower the self capacity of the valve the greater its effective stage amplification. Important features in its design and construction permit the inter-electrode capacity of the new Cossor 215 S.G. to be reduced to the order of .001 micro microfarads. This is substantially lower than the self capacity of any other Screened Grid Valve on the market. It follows, therefore, that this new valve permits a big increase in effective amplification. In fact, results are obtained which, a year ago, would have been considered quite impracticable.



Cossor 215 S.G. 2 volts,  
15 amp. Impedance 300,000.  
Amplification Factor 330.  
Mutual Conductance  
1.1 m.a/v. Normal working  
Anode Volts 120. Positive  
Voltage on Screen approx.)  
60. Price **20/-**

**THE NEW  
COSSOR  
215 S.G.**

**G R E A T E S T    E F F E C T I V E    S T A G E    G A I N**

A. C. Cossor Ltd., Highbury Grove, London, N.5.

♥ 6259

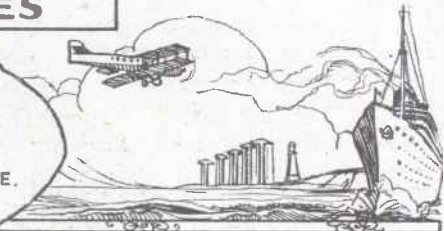


# Popular Wireless

LARGEST NET SALES



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**BLUE PRINTS BUCKSHEE!**  
**A BIG BARGAIN.**  
**SHORT-WAVE RESULTS.**  
**A GOOD TALK.**

## RADIO NOTES & NEWS

**THE COUNTY CHAMPIONSHIP AT THE RADIO SHOW. SOUTH OF THE LINE NEXT WEEK.**

### Blue Prints Buckshee!

WHAT do you think of your two shillings-worth of Blue Prints that are placed inside the pages of "P.W." this week? They are given away absolutely free, gratis and for nothing, to everyone who planks down threepence and picks up the Pride of the Bookstall, viz., namely, i.e., that is to say, "P.W."

They say it is more blessed to give than to receive, and honestly it warms and superheats the cockles of my heart to think of what you lads are getting this week!

### Like Flowers in Spring!

THEY come to you, those blue prints, as bright and as new and as blue as violets in spring. And you might think they just happened—cropped up like weeds do, when nobody was looking! But there you would make a major error, for those blue prints represent knowledge, experience, toil of hand and sweat of brow.

Each one is a worked-out, tried-out, gingered-up and best-yet circuit, guaranteed by "P.W."—Britain's Leading Radio weekly.

### "Ariel"—Auctioneer.

THE more I think of it the more enthusiastic I get! I feel like the auctioneer "who stood in this market place full forty years." You know the kind. "P.W." is no stranger to you. There is nothing here to-day and gone to-morrow about the radio paper that began before broadcasting, and that still has the largest net-sales of any radio weekly in the world!

And when offering you weekly this quintessence of the cream of British radio journalism, we do not ask, for five bob, four-and-six, three bob, half-a-bar, one and a kick, ninepence, or even a tanner, but we publish and provide it, printed on both sides of the paper, full-stops and commas thrown in, profusely illustrated and packed with technical tips, for the sum of threepence only!

### A Big Bargain.

AND just one word before I leave the subject. When you open your free gift and find that it occupies most of the available floor space with perhaps a rod, pole or perch over, do not grumble because we did not make it smaller.

Those blue prints are drawn exactly to scale, each one is the self-contained soul of a go-getter set, and if ever there are any blue prints in this whole wide world, you can bet it will be "P.W." that supplies them. (Probably buckshee at that!)

Yes, sir! Those Blue Prints are certainly IT, for they give you all the information you want—at a glance.

### Heard the Nonet?

MIDLAND wireless listeners who have been mourning the lot of the Midland Wireless Orchestra are greatly comforted by the advent of the Midland Wireless Nonet. A "Nonet" is a combination of nine players, and a merry wag once described it as "one over the eight."

If they keep off chamber music and live up to this happy description they should do well, shouldn't they?

### A Bugle Call Across the Atlantic.

THE other day they had an American Legion ceremony in the Arlington Cemetery, Washington, and in order to get the right touch they had bugles blown by the American Legion in Paris at 4.25 A.M. before the tomb of the Unknown Soldier. The bugle-calls were caught up by wireless and transmitted all over the States as part of the ceremony. Uncle Sam is a sentimental soul, isn't he? But he does believe in going the whole hog!

### Short-Wave Results.

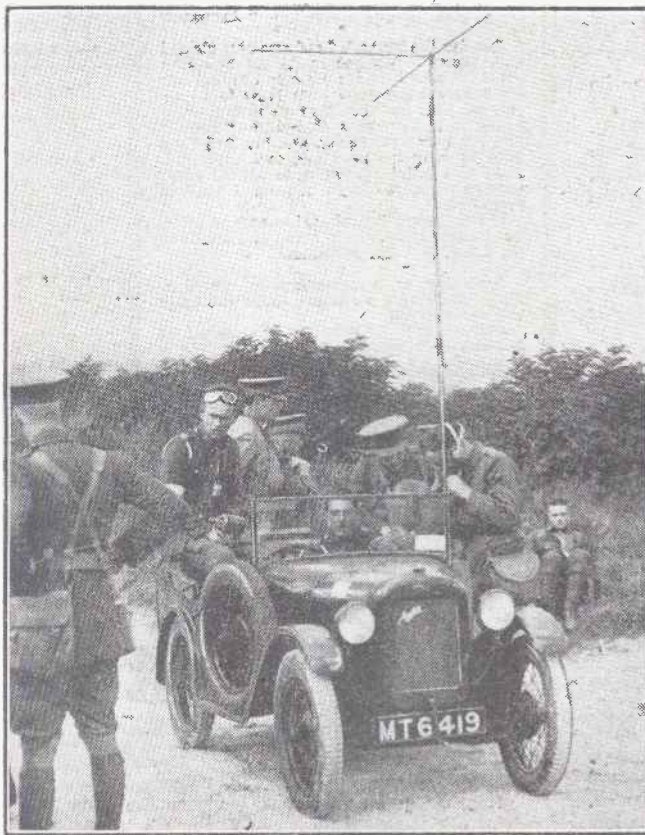
THE short-wave conditions are improving at last, and the ether is now less "puddeny" than at any time since last season. Our short-wave correspondent, "W. L. S.", who has been looking very crestfallen and bedraggled for months, has brightened considerably, and many readers have testified in no uncertain tones their pleasure at the change of affairs.

Listen to this clarion call from Clacton. "Yesterday evening I logged over fifty amateur stations on the "Magic" Three. I heard the following prefixes: GF, OZ, PA, D, UO, TS, SM, HB, EA, FC, ON, DV, and EU. How's that for a few hours' listening?"

### Reading Morse.

IN case I should think he was pulling my leg this reader goes on to explain that the majority of these stations were. (Continued on next page.)

### THE WIRELESS BABY



Even "babies" were pressed into service during the autumn army manoeuvres, and here one is shown carrying a complete wireless installation.

## RADIO NOTES AND NEWS

(Continued from previous page.)

picked up on Morse signals. But he also says: "I don't think anyone can enjoy the short-waves properly unless they can read Morse."

It's certainly very nice to be able to dash and dot your way through all the stations, telephony or otherwise.

## A Good Talk.

I DO not often stray into a complimentary mood about broadcast talks, but I should like to say how much I enjoyed that thrilling talk some weeks ago by Major Yeats Brown on "Escapes from War Prison Camps." And, by the way, I wonder how many of you fellows have read those true stories of the prison escapes of some of our men from Germany, etc.?

For sheer hair-raising excitement and interest they beat any other books about the War I have come across. Get the one called "I Escape" from the library. You will have to sit up late, and prepare for prickles down your spine, but it's what I call a book.

## Manchester's Exhibition.

HERE'S Good Luck to the Manchester Radio Exhibition, which occupies the whole of the ground floor at City Hall, Deansgate, from October 8th to October 18th. I am afraid I shall not be able to get up to Manchester this year, which is a great disappointment when I recall the scenes of my youth and the possibilities of gaiety with which that city is well stocked! But still, duty first, as the policeman said when he stopped all the traffic to let the superintendent's wife cross the road.

## Radio Classes.

LONDONERS with a thirst for radio knowledge will be glad to know that the classes in wireless and high-frequency engineering have re-opened at the Polytechnic, in Regent Street, London, W.1. The facilities include a transmission lab. with a complete commercial installation for telegraphy and telephony (6 R A).

You can learn a lot about radio also at the Northampton Polytechnic, St. John's Street, London, E.C.1.

## The County Championship.

CONGRATULATIONS to Hertfordshire, which has paid Brookmans Park the prettiest tribute it is possible for a county to pay a radio station. For of all the counties of England, according to the latest figures, the percentage of families holding radio licences is higher in Hertfordshire, where Brookmans Park is situated, than in any other county!

Oxford and Surrey are both well placed, but at the time of writing Herts has it!

## Durham's Distinction.

AND who do you think is at the bottom in this race for a Lonsdale Belt for Listeners? Not little old Rutland, though Rutland has an average of 25.7 families against 30.9 which is the average all over the country. Essex, Staffordshire, Derbyshire and several others are below Rutland, and right at the bottom, down among the dead men, is county Durham.

I am sorry to say I do not know much about Durham as a county, except that they turn out a particularly fine brand of Light Infantry, but I have a feeling that Durham can do much better than this.

## At the Radio Show.

BEFORE the Radio show fades into a dim and distant memory I must tell you of my trying experience there with Victor King. I was feeling a bit tired of all the pushing and bustle, when he rushed up from behind me, gripped me by the arm and said, "Come with me. Quick, and I will show you the absolutely cutest little thing in the Exhibition."

I dodged with him right across the floor, up those stairs, across the gallery, into the Empire Hall, following him and expecting to see I-knew-not-what wonder in wireless,

## SHORT WAVES.

## EASY FAME.

One advantage of the wireless is that nobody can stop you singing a duet with a famous artist if you want to.—"Sunday Pictorial."

"Clocks are being married to radio," we read in "Pearson's Weekly."  
We only hope that matrimonial discord won't be set up.

Wireless Announcer (forgetting himself): "And here is another S.O.S. Will David Brown—DAVID BROWN—send back the tenner I lent him at Easter, as it is urgently required?"—"Passing Show."

## VERY TENDER.

"The faculty of listening is a tender thing, and soon becomes weary and satiated," wrote Martin Luther.

But what about our three million odd licence holders?

"When he speaks a whole nation listens."  
"A man of importance, eh?"  
"No; a wireless announcer."

—"Answers."

One day the farmer's hand was very pleased with himself. He had found out how they got the "news" on the wireless. He had seen the accumulators going into town to be re-charged. He had seen through that at once, of course! They sent those little "boxes" in when they were empty, and just had them filled up with the news and sent out again. Then they rolled out the news till the boxes were empty, when they sent them in again to be refilled.

It was bound to leak out sooner or later, but I don't know who is going to break it to the B.B.C.!"—"The Scotsman."

According to a contemporary, Faraday, Hertz, and Preece are among those who made wireless possible.

Perhaps so, but why not let bygones be bygones?"—"Humorist."

and when at last he reached his Journey's End he turned and with almost tears in his eyes, he said, "She's gone!"

What I said won't bear thinking about!

## The Los Angeles Limit.

THEY say that a Los Angeles lady listener is so fond of listening that she has fitted flex on her headphones so that they will reach to any part of the house. I hate to butt in on domestic affairs, but I'll bet that her husband won't care if she hangs herself with 'em!

## South of the Line.

IN a nice pally letter, which was posted at Durban, South Africa, "Sparks" gives me news that will gladden the heart of G 2 R B. This is what "Sparks" says:

"I heard G 2 R B at Q S A 5 working

Popular Wireless, October 11th, 1930.

telephony when we were heeling 25 degrees south of the Equator about the middle of July. He was as strong as 5 S W, who started up later. Wave-length about 20 metres.

I cannot give my name and station since the Marconi Company does not allow us to write to the Press without permission."

Many thanks, all the same, "Sparks," and a good voyage.

## Time to Stop It.

I HEARTILY disagree with, much of this fantastic criticism of the B.B.C. announcers one sees and hears, but I must admit that I am in complete sympathy with the Middlesbrough man who grumbles about the inclusion of the word "time" in a sentence like this: "In two minutes time we are taking you over to Hull to hear Mr. Codfish give his weekly talk on 'Why Midge's Bite at Eventide.'"

This listener avers that "in a few minutes we are taking you over to Hull" would be a much cleaner way of saying it.

## Fine!

THE Yugo Slavian Government has passed a new penal code whereby any person who voluntarily or negligently misappropriates the current necessary to the working of a radio installation is liable to punishment by one year's imprisonment or a fine of 10,000 dinars."

I do not know exactly what a dinar is, but I should hate to shell out 10,000 of them, and as for one year's imprisonment—pew! It looks to me as though some enterprising Yugo Slav has pinched the Prime Minister's L.T. battery and this new law is the official come-back.

## The Radio Association.

IN our issue of August 30th, page 658, I expressed regret that this body had instituted "the degrees of Fellow and Associate," thus apeing certain learned societies of world-wide repute. The Hon. Solicitor of the Association thereupon announced that I am "most singularly ill-informed in making such a statement regarding these examinations—" It will be observed that I did not mention or even refer obliquely to examinations. What I wrote is plain and I think that my readers will agree that as an index of scientific learning there is no comparison between "F.R.A.," and, say, "F.R.S.," or "F. Inst. P." Still, the Association does not sell its degrees, as do some—which is greatly to its credit.

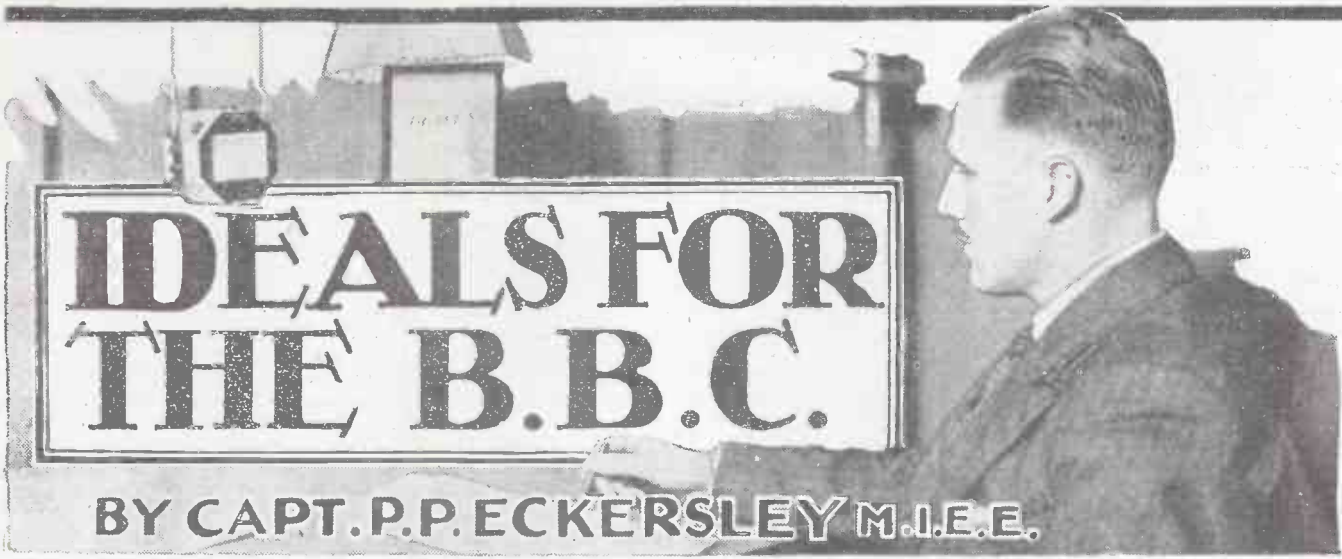
## Next Week.

I KNOW you think those Blue Prints will want a lot of beating, but I must say two words before I close down—"Next Week!" I have just had a peep at the free book to be given away with the next number of "P.W.," and I should be failing in my duty as an old pal of yours if I did not warn you to get your threepence ready. It's a winner!

If you want alternative programmes, if you are out for distance and foreign stations, if you want to turn your set into a pal-staggerer, get that book!

Miss your train, miss your bus, or miss the post to your best girl, but whatever you do don't miss the "Key to the Ether." They are printing them in thousands, but I bet that the demand will beat the printers!

ARIEL.



# IDEALS FOR THE B.B.C.

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

POPULAR WIRELESS continues its fight for the liberties of the listener. Recently I read the Editor's article on mediocrity. He was factual enough to quote my record as an example of achievement along the right sort of lines and he regretted that I no longer influenced the affairs of broadcasting to the same degree as of old.

I, too, regret it, believing that the potentialities of broadcasting have not been realised to the extent they might have been. I may sound conceited; I try to be perfectly frank and to look on everything as impersonally as may be.

I am interested in broadcasting; I am interested in the B.B.C. as an experiment in public service. I believe that broadcasting is the biggest cultural influence in the world to-day, and by that I do not mean anything to do with Education, as the B.B.C. uses the word.

I mean the B.B.C., more than any single existing agency, has the chance to help the great majority of persons to a wider appreciation of the world about them, and hence to a greater individual happiness.

Surely the more things one learns to enjoy the greater the potentialities of happiness? And surely the B.B.C. has the chance to bring into our homes that breadth of mind, hopefulness, optimism, enthusiasm and youthfulness that might lead us out of the present mess.

### Just Criticism

I have nothing against individuals in the B.B.C.; I am not sore that I am no longer "in the saddle." (Obviously not!) But, as a writer in POPULAR WIRELESS pointed out, the B.B.C. should welcome criticisms as such, and most the criticism of the "informed."

Thus, if what I write

A further outspoken article by our Radio Consultant-in-Chief, in which he constructively criticises British Broadcasting, and proffers some valuable advice.

hereunder, and perhaps again from time to time in other articles, seems to be no more than the cheekiness of a "gamin" cocking snooks at those who have banished him from their band, then this will be due to a failure of my powers of expression, not a true reflection of the spirit which inspires what is written.

### Banal Nonsense

It may be nothing to the B.B.C.; they can smile gently and frigidly and say, "Oh, but they don't know our problems," and talk banal nonsense about "it being impossible to please everybody." It isn't that. I was so interested to read the Editor's articles that I felt I might, in parallel, put

my point of view as I have so often put it to them.

My point of view is this: Broadcasting is an invention having this unique privilege: that it can bring the spoken word intimately into people's homes.

The written word wields a vast influence in its own sphere, the appeal of the sincerely spoken word is greater. Once recognised, this point of view should base all constructive policy.

But do the people at Savoy Hill make their chief interest broadcasting, as we understand it by that definition, or do they make it the Broadcasting Corporation, and their position in the Broadcasting Corporation?

Is a unit of the mob cloistered in one of those many offices interested most by the fact that now, at this moment, broadcasting is going on, words are being spoken, music played, plays crystallised into the actualities of the medium, or in the fact that he is allowed to have his secretary in his office instead of calling for a general office girl?

Does he come to the office bursting with a new idea to be "put up," or is he calculating some minute personal advantage over a colleague?

And the upper strata?

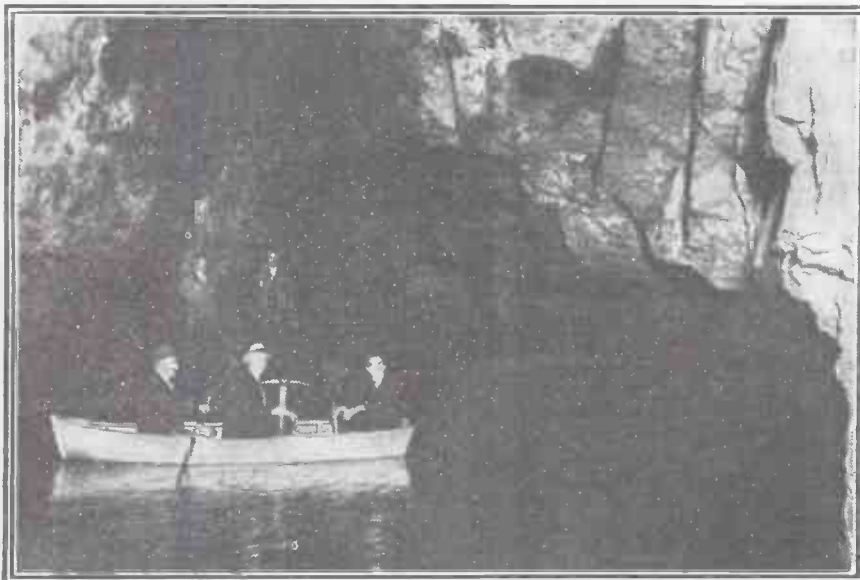
Are they learning to sit back only to dig themselves in on a pension at sixty, or to be famous for force of recognisable leadership? Is it the thing itself or the instrument of the thing?

### "Human Nature"

High-falutin nonsense? Yes, to those who say human nature is human nature and leave it at that. Yes, to the time-servers and mediocrities moving staff about from one provincial station to another. Yes, to those

(Continued on next page.)

## WIRELESS IN THE WOOKEY HOLE CAVES



The huge cavern, 500 ft. below ground, at the Wookey Hole Caves, Somerset, which was the scene of one of the Diversion items that were broadcast recently by Cardiff. We have had much correspondence about Wookey Hole, which seems to have aroused great interest.

## CORRESPONDENCE.

### AN AMATEUR SHORT-WAVER. MAKING YOUR OWN COILS. WATCH YOUR VOLTS.

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

#### AN AMATEUR SHORT-WAVER.

The Editor, POPULAR WIRELESS.

Dear Sir,—It is now seven years since a photograph of my station appeared in your very interesting paper, POPULAR WIRELESS, and from the letters I received at that time and since, from your readers, I think the enclosed photograph will be of interest to your short-wave readers who often hear my station. A great deal of improvement will be noticed since September 15th, 1923. The centre shows transmitter, which is quartz crystal controlled, the frequency is correct to 1 per cent, a high degree of accuracy, the microphone key, speech amplifier and modulator may be seen in front on right. The special screened receiver is on the extreme left with a wavemeter above it which tunes from 10 metres upwards.

Thanking you in anticipation,  
Yours faithfully,

C. HEWINS, G 2 Q H.

Grimsby.

#### "MAGIC" THREE IN TRINCOMALEE.

The Editor, POPULAR WIRELESS.

Dear Sir,—May I add my voice to the chorus of appreciative praise about your "Magic" Three. I have just constructed same, and it is all that you claim for it.

Especially on the short waves it is marvellous. No hand capacity and no threshold howl whatever. I am now listening to P.C.J. which is coming in at full L.S.

5 S W also comes in at fair strength. I have also heard Sydney, Zessen, Nairobi, Java and a few others. On the broadcast band I get Bombay and Calcutta well.

Colombo is a bit weak after they changed over to 423 metres since June 1st, but quite good for a three-valver.

You promised me an article on Electrolytic rectifiers some time ago. Perhaps Dr. Roberts could give me a few hints as regards the best electrodes, solutions, etc.

In my set I use a Lissen output transformer in the last stage. The secondary goes to two terminals and the primary doing duty as a choke goes through a 4-mfd. condenser to two other terminals. I find the choke output gives me volume for short waves and the transformer secondary gives me quality for ordinary work.

I do not know whether this is technically correct but it does my job all right. Another hint as regards stopping L.F. howl I found effective is to place a sheet of aluminium or any non-magnetic metal underneath the baseboard and earth it to E. terminal. This stopped the howl in my case after all the usual remedies failed. Hope this will be useful to readers.

Again many thanks for the "Magic" and also for the many valuable articles in your paper.

Yours faithfully,  
F. V. HERFT.

Fort Frederick, Trincomalee, Ceylon.

#### MAKING YOUR OWN COILS.

The Editor, POPULAR WIRELESS.

Dear Sir,—As an addendum to the article "Making Your Own Coils" ("P.W." of May 17th), here is a variation of those described which might meet with the approval of other readers.

There are good stations just above and just below the range of a No. 35 coil on my set, and I have made a two-in-one coil, approximately a No. 30 and a No. 40, on the lines indicated in the article. I have used, however, a 2-in. former in order to match better the size of most commercial coils and to make the number of turns correspond more closely to the number of the coil.

Winding clockwise, a loop is twisted off at the 10th turn, and in all there are 38 turns on two banks.

The coil is placed on the mount exactly as described in the article, but the end from the last turn only is fastened to the mount pin. The other end and the loops are fastened to two terminals on top of the coil. These terminals are small, and are mounted on a strip of cardboard to which one coat of thin shellac has been given. Three cardboard spacers, one between the terminals and one at either end of the terminal "strip," keep the metal underparts of the terminals well away from the windings of the coil. The strip is fastened to the top of the coil by means of thread, and the whole coil, including the strip, is covered with Empire tape. To the socket of the coil mount goes a few inches of flex, with a small spade end, which is screwed under one or the other of the two terminals, giving a No. 30 or a No. 40 coil at will. Tested against a separate No. 30 and a separate No. 40 coil, no difference in volume or quality could be detected on either terminal; any losses, therefore, must be very slight; and I have one coil doing the work of two.

No. 100 and 150 coils (approximate) made as described in the article, but with No. 28 S.W.G. enamelled wire, necessitating two and three banks respectively on a 2 1/2 in. former, give me very good results, and I intend applying the two-in-one scheme to the No. 150 later on.

Yours faithfully,  
J. P. NAPPER.

Cardiff.

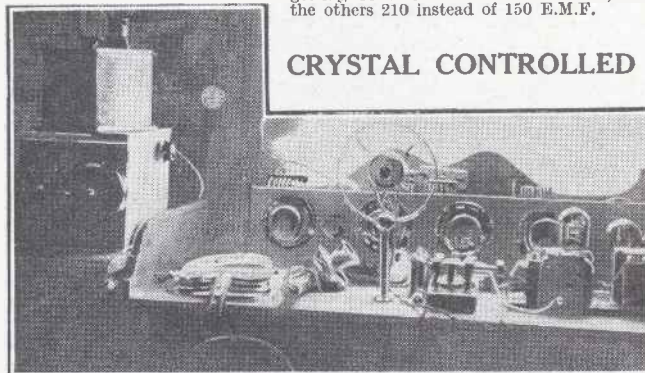
#### WATCH YOUR VOLTS.

To the Editor, POPULAR WIRELESS.

Dear Sir,—I imagine that this incident about mains units or H.T. supply in any form might interest you and the readers of "P.W."

The other day I met a friend who had just installed a mains unit to supply H.T. to his three-valve set. And he was complaining bitterly how much reaction he was getting, and how tuning became impossible.

So I volunteered to go round to his residence and see the apparatus. The moment the current was turned on the set flew into most violent reaction, and no matter what direction the reaction condenser was rotated, the effect was the same. I asked him what voltage his valves took. The reply was, "I don't know." Having procured a catalogue, we looked them up and found that the screen-grid valve was getting 96 volts instead of 60 volts, and the others 210 instead of 150 E.M.F.



Mr. Hewins' fine amateur transmitting outfit (call-sign G 2 Q H) is crystal-controlled. Note the microphone.

Always notice what voltage your valves are meant to take, and see that you are giving that amount, as it may save no end of trouble and lead to better reception. Most valves never require their maximum voltage.

Wishing POPULAR WIRELESS every success and good luck.

Yours faithfully,  
J. G. MATHIESON.

Ireland.

#### IDEALS FOR THE B.B.C.

(Continued from previous page.)

who say that after all it isn't so bad! But it's not like that to me; I love broadcasting.

It isn't so bad, they say. No, it's very good. I am the first to say it. Itemised, the programmes are good. I should say none better in the world.

The B.B.C. is efficient to a degree, so efficient that some of our big businesses would pay bigger dividends if they got Sir John Reith to set about their incompetent slacknesses.

But that is not the point. The result of good material and superlative organisation is that the B.B.C. dishes out flat slabs of programme in a highly methodical way, and the composition and ingredients are guaranteed pure, healthy and nourishing.

But what's the fun in that? and how does it help true appreciation of food? Mental food, if you will have it, out of its analogy.

I want to see the broadcasting service brought to that pitch that when a burning question is tossed this way and that among the newspapers (who must think first of their circulation) people say, "What does the B.B.C. say about it?"

#### Why Not Be Topical?

And I want people to be able to trust the B.B.C. to get someone to say the right thing—spiritually the right thing, culturally the right thing, factually the right thing. *Unemployment*—why not say outright that a new spirit is wanted about the whole thing, and that all this bolstering of inefficiencies will never work?

*The Disfigurement of London* by these new buildings—why not an outspoken call to our better feelings as regards to-day's greedy vandalism? Such things would bring far more respect for the moral qualities of those who direct our broadcasting than any amount of denial of rational entertainment in favour of a surfeit of formal religion.

I must disclaim any desire to do away with religious broadcasts; I believe they have considerable value, but as that is so obvious, why need they fear an alternative?

It's the spirit of the thing that must change. Younger-minded people not ashamed to speak the truth from the heart, devoted to the service, anxious to amuse, to laugh, to cultivate optimism—and not dreary jesters, and call it Vaudeville.

There is a chance still. Try new things. Get rid of false culture, of the highbrow intellectual speaking his dreadful dialect out of the depth of his conformist soul, and let real people with real things to say go ahead.

#### Younger Talent Required.

Let some of the younger talent have more say, let some of the younger enthusiasms have play; don't let the old men and the set minds find a reason for turning everything down!

It's so easy to turn things down and wait for others to turn up. Specially when you have a charter giving ten years. Ten years—Epilogue: A few more years shall roll—but I am conscious of a failure to express that spiritual revolution that should come and make broadcasting young again.

It's sad just to have to talk about it rather than the chance to do it. I wonder how many will write me letters beginning, "You may be a good technician, but I advise you to stick to your own job. Of all—"

I hope a lot, because that is much better than indifference. I made all my old B.B.C. listener friends of the writers of just such letters, in the days when we were young.

DON'T MISS THE  
FREE GIFT  
With "P.W."  
NEXT WEEK



**A**FTER Olympia, the second great radio event of the year is the Manchester radio exhibition. This year, it runs from Wednesday, October 8th, till Saturday, October 18th, and it will be opened on the first day by Sir John Reith.

It is the seventh of a very successful series of wireless exhibitions promoted jointly by the Manchester "Evening Chronicle," the Radio Manufacturers' Association, and Provincial Exhibitions, Ltd.

**Larger than Last Year.**

Olympia was larger than ever this year and it is certain that the Manchester Show, too, will be much increased in size. It will occupy the whole of the ground floor at City Hall, together with the recent extensions, and it will afford northern enthusiasts an opportunity of seeing exactly what radio has to offer this year.

There were many unable to get down to London to visit the Olympia exhibition, but Manchester will offer them an excellent alternative. Every leading firm in Great Britain will be represented by receivers, speakers and components, while there will be firms showing that were not present at the London Exhibition.

The B.B.C. always takes a keen interest in the Manchester Show and provides it with admirable backing. As before, they will be broadcasting the opening speeches and much of the special entertainment material that is being provided.

The Manchester exhibition will not be as large as the Olympia show, that is fairly certain, but it will lose little or nothing in that. The exhibits will be very representative and visitors will see everything worth while that Londoners were able to view.

**A Friendly Show.**

One of the criticisms raised against Olympia was that, if anything, it was too large. Undoubtedly, there is a limit above which little is gained by increasing the mere size. Visitors get weary of an apparent repetition of similar exhibits.

Manchester gains, too, in the fact that firms are able to show new season's products they were unable to complete for the London exhibition. This was very noticeable last year, and some dozens of interesting new products made their first appearance at the City Hall, Deansgate.

Also, inasmuch as most of the Stands are somewhat smaller, there is a tendency to limit the exhibits only to important and outstanding lines.

The City Hall display always seems to be a rather more friendly or homely assembly than the general run of exhibitions. In a metaphorical sense, there seems to be a cheery smile over the whole of the building. Perhaps it is characteristic of the North, but the visitors talk among themselves as well as with the various stand attendants without the reserve that is common between strangers in the South.

Somewhat, also, the presentation at Manchester seems to be unusually enthusiastic, but then the Manchester "Evening Chronicle" is a source of inspiration that would make anything go, and Provincial Exhibitions, Ltd., certainly know how to put a show over.

Undoubtedly, even those who "did" Olympia should make an effort to go

will be, the attendance will break all records.

There was a time when the Manchester Show was considered by a good many to be an unnecessary duplication of Olympia, but no one suggests such a thing these days. That is proved by the very wide support it receives.

Manchester itself is a great city, and within a few miles it has Liverpool, with an even larger population, and all around are dotted great towns of vital industrial importance.

**A Special Article.**

Then again, it must not be forgotten that Manchester is within comparatively easy reach of Ireland and Scotland. It is very many miles nearer these parts than is London. Further, there are always hundreds, if not thousands, of American traders in Liverpool and Manchester. In view of all this it is obvious that the Manchester Show is necessary to the welfare of radio.

Next week, I am going up there to report on the exhibition for the benefit of "P.W." readers. Special arrangements have been made to run my article through so that it can appear while the exhibition is still in progress.

I must say that I am looking forward to this journey with very great interest indeed. I do not feel that I saw everything that the industry has to show at Olympia. But even if every exhibit were identical with those on view at the London exhibition, I should still consider the journey very well worth while.

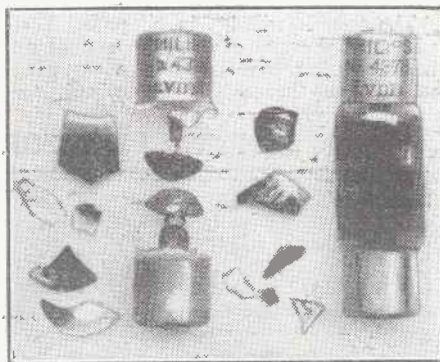
**The Common Link.**

It does you good to mingle with the crowds conjured up by another city. It widens your horizon and you learn that your own "home town" is far from being the centre of the universe.

Moreover, past experience has proved to me the strength of the common link that radio can form between people living hundreds of miles apart. For instance, at Manchester you hear radio matters in Yorkshire and Lancashire dialects, but they are radio matters that would strike a note of sympathy in any southerner enthusiast.

And there will be plenty of Scotsmen and plenty of foreigners at the Manchester Radio Exhibition, too. Indeed, the radio element of the whole country will be focused on the City Hall, Deansgate, between 3 o'clock on Wednesday, October 8th and Saturday, October 18th.

**THE FUSE BLEW!**



The fuse on the left was blown to bits when lightning struck an aerial equipped with a Philips Aerial Discharger. This device was quite able to deal with further such "demonstrations" when a new fuse was fitted.

North next week. The City Hall itself is, in my opinion, an ugly affair, a sombre, depressing building, at least in its external appearance, and even Mancunians will agree, I am sure, that the setting is most uninspiring. That part of Deansgate is one of the very dullest parts of Manchester, and when it is raining—!

But once you have passed through the doors of the City Hall it is like walking into a new world.

There is every indication that the seventh of the series will indeed be a lucky seventh, and if the interest in radio displayed in London is duplicated in Manchester, and there is little doubt that it

# THE B.B.C.'s NEW PRAYER BOOK.

By THE EDITOR.

"... a new cult has started—the cult of non-sectarian radio worship... a new type of religion is being hatched out at Savoy Hill."

**W**ILL the B.B.C. start a new religion? It looks like it; and whether the Mahomet of a new radio cult will come to the listener, or the listener to the Mahomet, is obviously no difficult problem to solve: the Prophet will come to the listener, via the microphone, whether the listener likes it or not.

If some people consider the idea suggested above absurd, we would answer that the conclusion we draw is not without a solid foundation.

A few days ago we learnt that the B.B.C. had compiled its own prayer book for the broadcasting of prayers and services. In short, a new cult *has* started—the cult of non-sectarian radio worship, with official B.B.C. sanction.

## No Fear of "Revivalism."

The "Evening Standard" bluntly says we do not want revivalism by microphone. There is no fear of that; the B.B.C.'s prayer book is very non-sectarian. It is, in fact, something *almost* original, and for that reason suggests that a new type of religion is being hatched out at Savoy Hill.

Nevertheless, the new prayer book is interesting. Included in it are suggested forms of service, meditations for the close of Sunday programmes, collects from the Book of Common Prayer, prayers translated from the Roman Catholic missal, and prayers for feasts, celebrations, and other such special occasions.

Although we understand that the book was submitted to several prominent Churchmen, it does not contain any evidence of having received their approval, let alone their blessing—possibly because of the very clever way the non-sectarian style of the book is observed throughout.

Some have suggested that the B.B.C. have overdone the religious side of broadcasting, and that the B.B.C. should be the servant of every denomination.

## A Clever Compromise.

The last suggestion is obviously absurd. If the B.B.C. were to observe the logical consequences of such a policy, it would take years to deal with every sect, denomination, etc., known to the worshippers in this world. For obviously being the *British* Broadcasting Corporation, with a wide audience of overseas listeners—which will be tremendously larger when the new Empire station is ready—the B.B.C. could not, in common fairness, confine its religious broadcasts to the Christian denominations only! (Of course, it would; and that's where the fallacy lies; and hence the new prayer book.)

B.B.C. prayers, therefore, effect a novel and rather clever compromise, and if the new idea is not overdone the B.B.C. will be able to congratulate themselves on having solved a tricky problem in a way which, although it may not please those who dis-

approve of such strictly non-sectarian worship, cannot but fail to demonstrate the spirit of impartiality which animated Sir John Reith in preparing the book.

## A BRAILLE DIAL



This is a crystal set designed especially for the blind. The dials are calibrated, in wave-lengths, with Braille markings.

The trouble will be, in all probability, when, in the course of time, the new prayer book acquires the status of a sectarian publication—the sect of Savoy Hill (or

perhaps Portland Place), and we may yet see, as a direct consequence, the foundation of a sect of B.B.C. converts.

If so, another religious controversy and a Dis-establishment Bill for Savoy Hill are certainly indicated.

A long-wave wireless station which is to be erected at Rasin, near Warsaw, for the Polish Broadcasting Company, will be the most powerful broadcaster in Europe. The station, which is now being finally tested by the Marconi Company, will operate on a wave-length of 1,411 metres on 158 kw. in the aerial, almost the maximum power allowable under The Hague Convention to any European station.

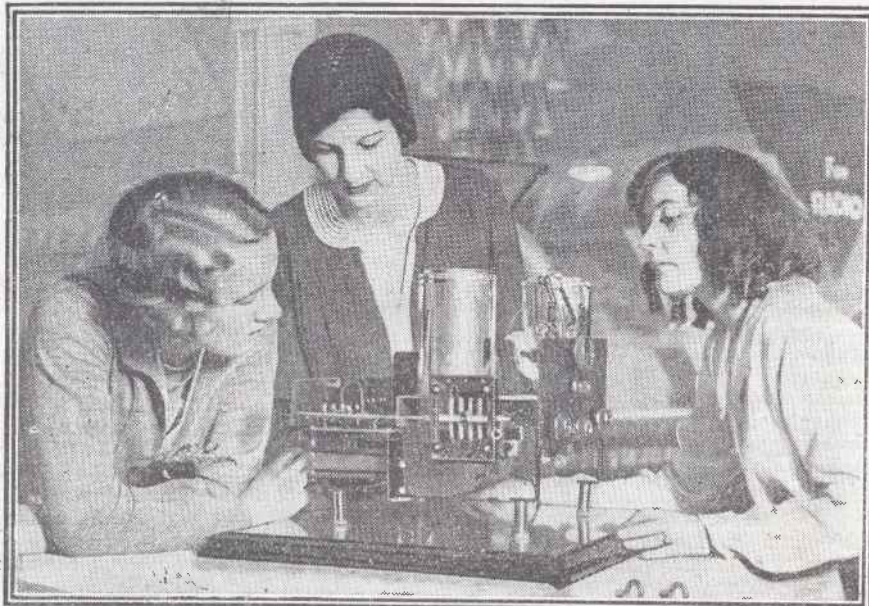
## Colossal Power.

The power of the new Warsaw station can be understood from a comparison with 5 X X at Daventry, which has a power of 25 kw. in the aerial, and by the realisation that it will be more than 150 times as powerful as the first London 2 L O broadcasting transmitter, which was shown at the Wireless Exhibition at Olympia.

The various parts of the transmitter are contained in aluminium and glass panels completely screened from one another to avoid interaction, and the last amplifier stage contains eight of the largest valves ever manufactured commercially by the Marconi Company. These huge valves are each of 100 kw. A valve drive of absolute precision has also been provided in order to ensure that the station will remain accurately on its allotted wave-length and to prevent it from interfering with other transmissions on neighbouring wave-lengths.

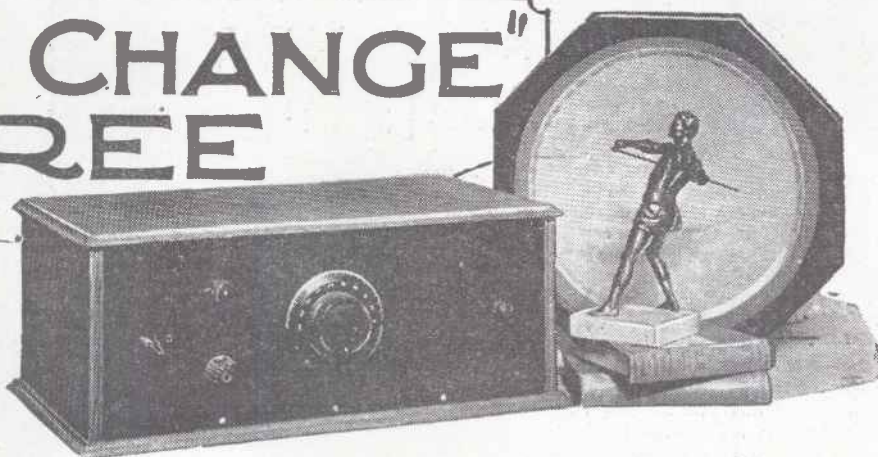
The aerial at Rasin will be of the half-wave type, terminating in a feeder house underneath the aerial. Feeder lines from the transmitting hall to the feeder house will convey the energy to the aerial, which will be carried on two masts 600 ft. high and 750 ft. apart. These will be the highest masts in use at any of the European broadcasting stations. A complete broadcasting system, including several relay stations, will also be sent out to Poland.

## MAINS SETS FOR MODERN MISSES



The recent exhibition at Olympia was remarkable for the keen interest displayed in the radio gear by ladies. Here you see some of them examining a three-valve all-mains set.

# The "EASY CHANGE" THREE



Here are some interesting supplementary details about this attractive and highly efficient wave-change three-valver. You will find complete constructional details on the sheet of free blue prints given away with every copy of this week's issue.

By the "P.W." RESEARCH DEPT.

THE preparation of a batch of set designs for one of our free gift blue-print sheets is an event which is always looked forward to with pleasure in the "P.W." Research Department.

## WHAT YOU WILL NEED.

- 1 Panel, 18 in. x 7 in. (Trolite or Lissen, Paxolin, etc.).
- 1 Cabinet, with baseboard 10 in. deep to fit (Pickett or Cameo, etc.).
- 1 .0005-mfd. variable condenser (J.B. or Lissen, Lotus, Dubilier, Ormond, Polar, Formo, Ready Radlo, etc.).
- 1 .0001, .00013 or .00015-mfd. differential reaction condenser (Lotus or Lissen, Polar, Igranic, Dubilier, J. B., Magnum, Parex, Wearite, etc.).
- 2 On-off switches (Lotus and Benjamin, or Lissen, Igranic, Bulgin, Junit, Ormond, Red Diamond, Wearite, Pioneer etc.).
- 3 Single coil holders (Red Diamond or Lissen, Lotus, Igranic, Wearite, Bulgin, Magnum, etc.).
- 3 Sprung type valve holders (Benjamin or W.B., Igranic, Lotus, Lissen, Wearite, Telsen, Dario, Bulgin, Junit, etc.).
- 1 .0003-mfd. fixed condenser (Lissen or T.C.C., Ediswan, Ferranti, Dubilier, Mullard, Goltone, etc.).
- 1 .0002-mfd. fixed condenser (Dubilier, etc.).
- 1 2-meg. grid leak (Dubilier or Lissen, Igranic, Ediswan, Mullard, Ferranti, etc.).
- 1 R.C.C. unit with  $\frac{1}{2}$  meg. anode resistance and 1 or 2 meg. leak (Lissen or Dubilier, etc.).
- 1 H.F. choke. (Ready Radio or R.I., Lissen, Lewcos, Varley, Telsen, Lotus, Dubilier, Watmel, Wearite, Magnum, Parex, etc.).
- 1 Fuse and holder (Bulgin or Magnum, etc.).
- 1 L.F. transformer (Igranic type J, or Varley, Lissen, Telsen, R.I., Ferranti, Mullard, Lewcos, Lotus, etc.).
- 1 Terminal strip, 18 in. x 2 in.
- 10 Terminals (Ealex or Belling & Lee, Igranic, etc.).
- Sockets, plugs, flex, screws, G.B. battery clip, etc.

For example, there is the fact that once these blue prints are published they become part of the "P.W." series, and we know that they will be drawn upon by intending constructors for quite a long time to come.

Consequently, we have to take the greatest care to ensure that they are not merely up to date, but will stay so for as long as possible.

## Only the Best.

This means that one must review all the recent developments, and decide which of them are real and permanent improvements on previous methods, and which are merely novelties likely to be replaced by something better quite soon. Thus, there is no doubt about the continuance of differential reaction, but there are plenty of other things which are by no means so assured in their position, and a careful decision is called for in their case.

All this means that a "P.W." blue-print set is particularly attractive from the intending constructor's point of view. He knows that if he decides upon one of these he can be reasonably certain that it will be a set sure to remain up to date for at least as long as he is likely to keep it in use. (If we know our constructor, he will be sighing for something bigger and still more powerful before it has become obsolete!)

It means, too, that every detail has been carefully chosen as being truly representative of the best in modern radio, and as being, moreover, in the opinion of an expert, likely to remain the best way of doing that particular thing for a long time to come.

Then, again, another difficulty of the stimulating kind for the designer confronts him in the choice of component types he may use in a blue-print set. We have a very definite rule about this, to the effect that only parts of absolutely standard types, and of which there are lots of alternative makes available, may be employed in these receivers.

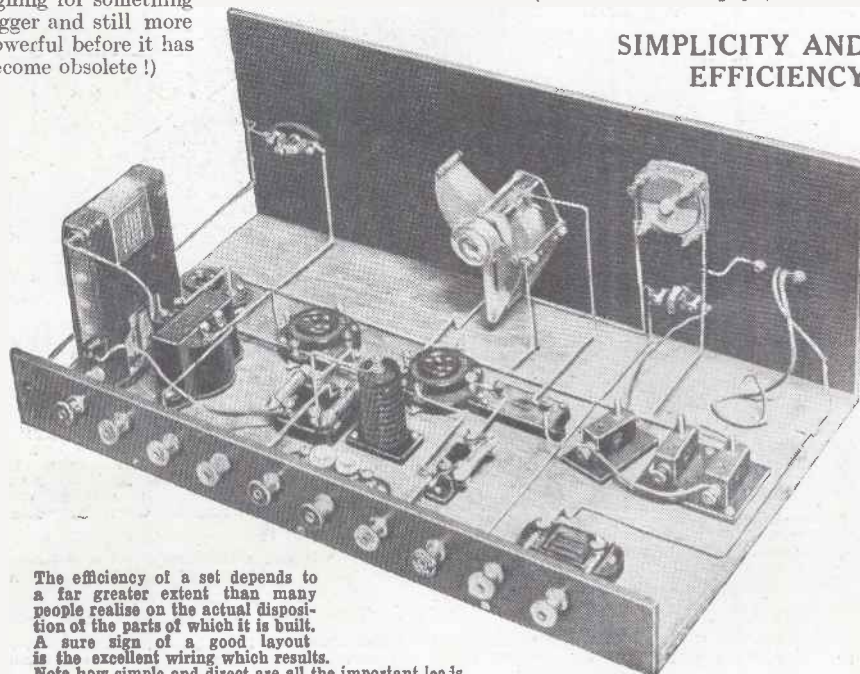
The reason for this rule will be pretty obvious when you remember how long our readers in different parts of the world continue to regard each blue-print design as more or less of a standard for that particular type of receiver.

## What It Means.

The effect of the rule is to compel the designer to work within very definite limits. He must get the outstanding performance and up-to-date qualities he wants by dint of ingenuity and hard work, and not by the easy method of using special coils and other parts to suit some particular scheme.

(Continued on next page.)

## SIMPLICITY AND EFFICIENCY



The efficiency of a set depends to a far greater extent than many people realise on the actual disposition of the parts of which it is built. A sure sign of a good layout is the excellent wiring which results. Note how simple and direct are all the important leads.

For one thing, the production of these designs is accompanied by certain special difficulties which are not met with to the same extent in our usual run of sets, and they are just the sort of difficulties which stimulate the keen designer.

## THE "EASY CHANGE" THREE.

(Continued from previous page.)

An incidental advantage of the rule from the intending constructor's viewpoint is this: since every part required is of a fully standardised nature he can be pretty sure of being able to assemble any given "P.W." blue-print receiver very largely from the stock of components he will have on hand.

### An Ever-Popular Combination.

The three-valve you see illustrated on these pages forms an excellent illustration of the points we have just outlined. Blue Print No. 58, given away with every copy of this week's issue, provides you with complete practical details of this extremely attractive instrument, but there are still quite a number of interesting things we should like to tell you about.

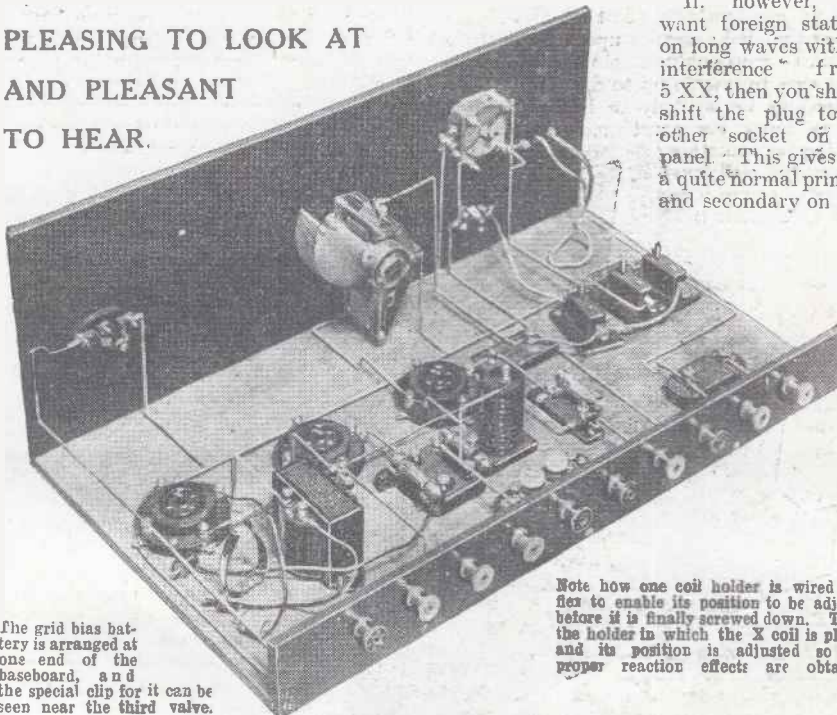
What we set out to produce was a version of that ever-popular combination, the "detector and two L.F." set, with a really outstanding performance and extreme simplicity of construction and operation.

That we have succeeded you may well believe when we tell you that we began the preliminary work on this and the other sets in the group as long ago as last May, and that we were extremely satisfied with it when it went through its final tests.

### An Extremely Attractive Set.

As you now see it the receiver is an extremely attractive example of its type. It has sensitivity and selectivity well above the normal level of its type, it has a delightfully simple and efficient wave-change arrangement calling for very few coils (only three), and it is easy to operate.

## PLEASING TO LOOK AT AND PLEASANT TO HEAR.



The grid bias battery is arranged at one end of the baseboard, and the special clip for it can be seen near the third valve.

True, it has only one tuned circuit, and so you must not expect it to deal with the more arduous regional conditions close up to the station without a rejector, but for all other purposes its selectivity is ample,

Its sensitivity, too, is likely to provide a pleasant surprise for those who believe that at least one H.F. stage is needed to get foreign stations on the loud speaker. Given anything like a decent aerial the "Easy Change" will do it, and with ease.

The wave-change scheme is rather interesting, for it is so simple that one might excusably suspect it of inefficiency until you look into the details.

First of all, note that on the medium waves the "X" coil,  $L_2$ , is used for tuning and aerial coupling, by closing  $S_2$  and putting the panel plug in the appropriate socket. Coil  $L_1$  is the reaction winding, and this serves on long waves also by virtue of the special positioning of the coils (see note on blue print).

### Switching Scheme.

The long-wave secondary coil,  $L_2$ , is also in circuit on medium waves in parallel with the "X" coil, but since it is very large in comparison it has a negligible effect on the tuning range of the circuit, and of course, losses are kept well down in this way. (It is one of the best of wave-change methods.)

To go over the long waves you open  $S_2$  (put it to "off"), and the low-wave coil,  $L_3$ , thereupon goes out of circuit to all intents and purposes. If all you want is 5 X X you will in most cases find you can then get it at particularly good strength, by re-tuning to some point near the bottom of the dial.

If, however, you want foreign stations on long waves without interference from 5 XX, then you should shift the plug to the other socket of the panel. This gives you a quite normal primary and secondary on long

Note how one coil holder is wired with flex to enable its position to be adjusted before it is finally screwed down. This is the holder in which the X coil is placed, and its position is adjusted so that proper reaction effects are obtained.

waves, the reaction coil serving also as a primary or aerial-coupling coil.

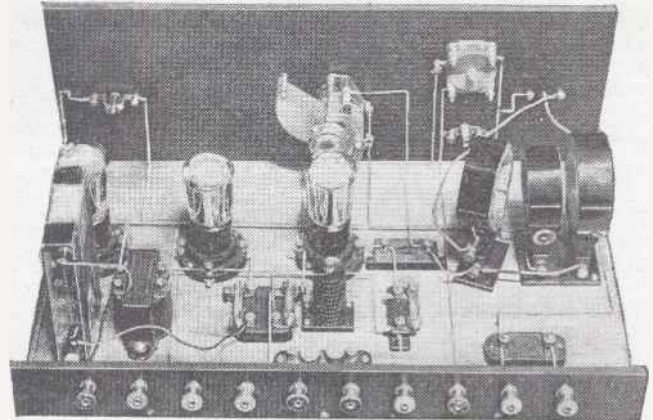
With this we can leave the general details of the circuit, for the other features you will be able to make out quite easily for yourself on the blue print.

Now there is a little point about grid bias we should mention. If you look at the photo on this page you will see that the original set was fitted with a single clip for a grid bias battery, placed near one corner of the baseboard.

### Position of G.B. Battery.

This clip will hold a single 9-volt G.B. unit in an upright position, as you will see

## READY FOR WORK



All finished and ready to try out. One coil is set out at a slight angle to the others for reasons stated in the text.

in the photos on the previous page, which shows a Lissen unit actually in place. Now this amount of bias voltage is not enough for the super-power type of valve, and if you use one of these you must provide rather more.

To enable this to be done we have left an open space on the baseboard between the middle valve socket and the panel. There is ample room here to stand a couple of 9-volt units side by side, and if you join them up in series you will have 18 volts available for biasing purposes.

### A Point to Remember.

This should be enough for even the largest of the super-power valves which are at all likely to be used in a set of this type.

Mention of grid bias voltages reminds us of a little matter concerned with the life of G.B. batteries which applies to all sets. We raise it here because it seems to be not too well understood by many, and it is rather important if you are to get the best possible service and life from your valves.

It is this: People are often lulled into a false sense of security about the state of health of their grid bias battery by the perfectly correct reflection that it is delivering no current. It does not follow, however, that it will therefore inevitably have an indefinitely long life.

That is by no means the case. Small dry cells have a limited life whether giving current or not, and it pays to keep an eye on the condition of your G.B. After all, it is cheaper to buy a new bias battery than to replace a power valve whose emission has vanished!

**NEXT WEEK**  
**THE KEY**  
**TO THE ETHER**  
**A MAGNIFICENT FREE GIFT**



# NEXT YEAR'S SETS

By Victor King



SOME philosopher or other has said that it is "idle to speculate as to the future." It certainly is. In my opinion, it is "idle" to speculate in anything—especially stocks and shares. But that is by the way, and don't forget that judicious investment is a very different thing!

However, I am neither going to speculate nor prophesy in this article; I am going to try to give you my ideas as to the trend of radio development, and tell you what I think is the common goal of we set designers.

### Wild Prophecies.

Nothing makes me get more hot under the collar than the wild optimism of our self-constituted scientific prophets. I mean those people who will tell you what the future of a thing is going to be almost before that thing has been discovered or invented.

We got it in "extenso" when the dull-emitter valve first made its public appearance. "The day of the 'cold valve' is now very near at hand," was the sort of thing that was bleated by our pseudo-scientific soothsayers.

Television sent them into ecstasies of prediction. "You'll see the boat race on your parlour screen before another year is through," they blathered.

That sort of thing does a grave disservice to the true scientist in that it tends to rob him of the dues justly earned by his concrete achievements.

And the real fallacy that lies at the root of all wild speculation of the kind to which I have referred, is that everything must progress for ever and ever. A science, such as radio, may progress as a whole, but in its march it may leave many outworn units behind.

### What About the Crystal?

What about the crystal detector? Will that progress until it enables you to work a loud speaker on very distant stations? Personally, I don't think it will, but if some regard that as a faint possibility, I'll remind them that a wonderful invention of Marconi's, known as the Mag-

A famous set designer looks a little way ahead, but does NOT indulge in speculation. He is so au fait with current radio conditions that he does not need to draw on his imagination, although, as those who know his work will agree, he is very well endowed in that respect, too!

netic Detector, was at one time an almost revolutionary invention. But after serving the radio world very faithfully for many years it was superseded and is now absolutely obsolete.

And so with the Electrolytic detector, the crossbow which revolutionised medieval

wars, the flint and steel for lighting fires, the candle-snuffer, the fish-tale gas light, wooden warships with sails, etc., etc. They all served their various purposes well, and reached their individual zeniths, and then faded out as they were displaced by things that could do the same sort of jobs better, or were found unnecessary owing to changing conditions.

### We Never Know.

Therefore, to return to radio, why should it be regarded as certain that articles now in daily use, or just in the process of being brought into use, should be with us for ever, improving and improving and keeping on improving?

The valve, for instance, is now quite ubiquitous. And it is continually being improved. The new valves have wonderful characteristics, but for all we know there may be a little boy at school in Poland or Putney, or, for that matter, a little girl nestling in a cradle in Carolina who is destined to cause the banishment of the valve by inventing some quite new method of detecting and amplifying radio signals.

The present methods in anything, radio, television, lighting, heating, may, in the distant future, be regarded as quaint dead-ends. But I must not lay myself open to the criticism of speculation!

However, you see how easy it is to beat these prophet chaps at their own game.

### On Surer Ground.

If we discuss next year's sets, we are on saner and surer ground. Barring revolutionary discoveries or inventions (which are very few and far between, whatever the daily papers say) the progress of radio set design seems to be on fairly orderly lines.

It seems evident that the all-mains type of set is due to become more and more popular, for power supplies are being rationalised and are being more widely used. Further, it is apparent that people are getting less suspicious and less timid of the mains.

With increasing popularity, mains  
(Continued on next page.)

## "VARIETY" AT HOME



Miss Gracie Fields, and Mr. Pitt, her husband, listening-in at home with a new Mullard Orgola set. Miss Fields has, of course, frequently broadcast.

## REMARKABLE NEW VALVES

Authentic details of new valves that operate without any filament heating, and of others that have external control electrodes.

By OUR OWN CORRESPONDENT.

NOT just new types of old valves, but completely new valves, built up on different principles; principles which have been tried innumerable times in many laboratories but have reached the practical stage only now.

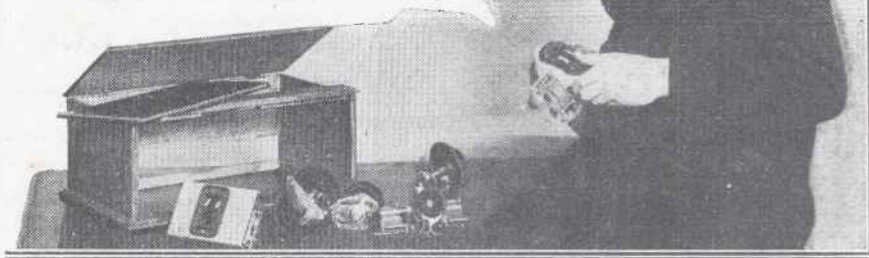
In the one case there are the new Arcotron valves developed by the German Telefunken people, and in another case there are the new Photovalves working without the usual low-tension current, which, however, are not quite "ripe" for the market as yet, although one firm already makes them.

### External "Grid."

In the case of the Arcotron, the firm wished to develop a cheaper valve for the cheap kind of all-mains local station loud-speaker receiver working with two or three valves. The Arcotrons are on the market in two types; one as rectifier, that is as detector valve, and one as L.F. amplifier valve. The difference between the two lies in the amount and kind of gas contained in the valve.

The "grid" is in the form of an outer metal coating on the glass bulb, the anode and the

### "CAN I USE THIS?"



Mr. Victor King, one of the world's foremost radio set designers, and the most outspoken wireless critic of the day, examines some components preparatory to evolving a new receiver design. Victor King writes articles only for "Popular Wireless" and its associated journals—yet another compliment to the unrivalled position held by "P.W."

directly-heated cathode are within. Owing to the "grid" being away from the cathode there is a comparative freedom from mains hum and general insensibility of the valve to smaller variations of the cathode temperature.

### How It Works.

The action is quite simple to explain. The variations of potential applied to the outer coating of the valve influence, by way of the glass, the stream of electrons flowing to the anode. The only difficulty in older types of this valve which had no practical use was the necessity of making the form of the valve so that the outer coating on the glass would have a sufficient influence on the interior happenings, and this has been obtained by the very thin and flat form of the whole.

The new Photovalves rely on the same principle as the photo-electric cells, i.e. the

sensitivity of certain chemicals to light. The cathodes of the Photovalves are made of light sensitive materials so that the moment light strikes them, they begin to emit electrons, and naturally they vary the intensity of the electron emission according to the intensity of the light striking the valve.

Now there are several methods of having a permanent and unvarying source of light. One can have an electric lamp on D.C. mains burning near the valves, but in the case of A.C. of even as high as 50 cycles per second one gets hum owing to the slight variation in the intensity due to the A.C. "hills and dales."

### Another Method.

Then there is a much better method of having a source of light. Have a small neon tube or ray close to the cathode and have it fed from the anode source of current. This type of valve reminds one of a second kind of light-sensitive valve recently described by Seibt.

This works on a similar principle. A neon ray is made to pass between two electrodes and electrons are drawn off from this ray by means of the usual anode. In the case of this valve, which really is not light sensitive but uses a ray of ignited gas as a cathode, the voltages have to be very high, especially for the neon ray.

In the case of Ardenne's Photovalves more or less normal voltages can be used, only one drawback being experienced. The emission of the cathodes he has used up to now is not very great, even when exposed to brilliant sunlight. For that reason the Photovalves as yet would seem to be best for resistance capacity amplification.

It will be interesting to watch for the first really commercial use of the Photovalves, though we already have the first sets working with the Arcotrons. But the Photovalve incorporates quite new principles, and they do seem to provide one way of getting away from L.T. batteries and current supplies.

Read MODERN WIRELESS  
Britain's Best Radio Magazine  
Every Month  Price 1/-

## NEXT YEAR'S SETS.

(Continued from previous page.)

sets, and components for mains sets, will, of course, get much cheaper. But even taking all this into account, I do not think that battery sets are going to be ousted for a long while yet in this country.

No doubt the day will come when the idea of having to have your own little power supplies will be regarded as incongruous. But before that day arrives the mains will have to be connected to every house just as is water at the present time. And then people would no more think of having a battery set than they would now dig wells in their gardens to get water for the radiators of their motor-cars.

If you disregard the power side of the set you still have many things to think about. What of wave-change switching? Nearly every set these days gives you a choice of at least two wave-bands, and you generally go from one to the other merely by operating a small panel switch.

### Three-wave Switching.

There is still room for improvement here, and I think you will see it take the lines of bringing in a third wave-band, this being rendered available by the same one or two panel switches. And this third one will, of course, be the short wave-band.

Already at least one commercial set has wave-change switches between the short and medium waves. This is the first time that that has been done, I fancy. Anyway, there doesn't seem to be a very big step between that and having all three bands "on the panel" and without changing coils.

But does the ordinary "household" set want the short waves? I can hear some of you asking. Well, that is just a wee bit debatable, but then the short waves may hold some surprises in store for us in the quite near future. Even now one does not have to have much in the way of a set improvement that will make the short waves just as easily "tunable" as the long waves. The "Magic" series of sets shows that. And, say what you will, short waves are fascinating and the only things that will "spike their guns" from the ordinary listener's point of view are the international programme relays the B.B.C. may undertake on a world-wide basis.

### In Your Hands.

Selectivity, sensitivity, simplicity, plus inexpensiveness, are what we designers are aiming at all the time. You can be sure that we won't tack short-wave switching on to those of our sets that are intended as "household" outfits (as opposed to special experimenter affairs), or, indeed, anything else, unless it can be done without sacrificing any of the above qualities or unless there is a real public demand for them. After all, it is the amateur enthusiast who sets the pace in receiver design, and "P.W." readers have much more to do with the progress of radio than they probably realise.

So it really amounts to this: you and your fellow listeners and amateurs know, or should know, the way radio is going, because it is going in the direction you want it to go—or as closely in that direction as it can be made to go.

# G.P.C.

## LISSEN

scores with it!

Choose your battery on the basis of "Current per Cell" content, and you will choose a Lissen Battery. Because the cells of the Lissen Battery are big and supercharged with High Tension current, put there by the Lissen Secret Process.



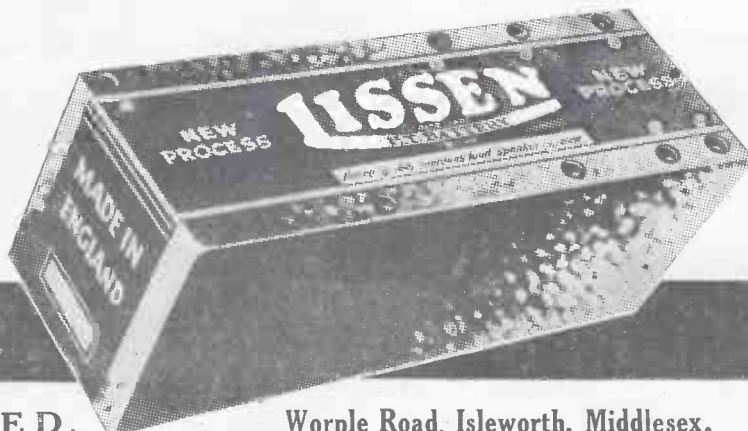
*Ask always & firmly for the LISSEN NEW PROCESS H.T. BATTERY—the battery with the LONG LIFE*

The energy flowing from each cell is smooth and without the slightest sign of ripple or hum. Choose a Lissen Battery and your loudspeaker will find the battery eager to show the power it contains and for how long that power will last.

*Ask for a Lissen Battery by name at any one of 10,000 Radio Dealers, but insist upon it firmly.*

**PRICES**

60 volt (reads 66)	7/11	60 volt (Super Power)	13/6
100 volt (reads 108)	12/11	100 volt .. ..	22/-
120 volt .. ..	15/10	4½ volt Grid Bias	10d.
36 volt .. ..	4/6	9 volt .. ..	1/6
60 volt (For Portable Receivers)	7/11	16 volt .. ..	2/9
59 volt (For Portable Receivers)	12/6	4½ volt Pocket Battery	5d. each (4/6 doz.)
		Single Cell Torch Battery	4½d



LISSEN LIMITED,

Worple Road, Isleworth, Middlesex.

## NOTES FROM THE NORTH.

All the latest news about the North Regional and Scottish Regional High-power stations, and other matters of interest in the North.

From OUR NORTHERN CORRESPONDENT.

THE three lattice steel masts which are to hold the North Regional aerial 500 ft. above the ground at Moorside Edge have sprung up like mushrooms. They are now very nearly finished, and the work has reached the stage when it looks decidedly exciting to the layman.

The erectors seem to enjoy going to work some 400 ft. up, however, and as the masts sway gently in the breeze they calmly go on with their job of bolting together the 18-ft.-long sections which are hoisted up to them by cranes. They warn any landlubber who approaches below to keep clear of the mast because if a workman were to drop a nut from that height it would hit the man on the ground so hard that there would be a job for the Slaithwaite undertaker!

### The Moorside Aerials.

The masts are already a conspicuous landmark for many miles around, and on clear days the workmen have wonderful views across the Yorkshire moors and beyond the town of Huddersfield, which is five miles away.

Moorside Edge is the name of the heather-covered plateau selected by the B.B.C. as the site for the North Regional station, and as it is 1,000 ft. above sea level the tops of the masts will be 1,500 ft. above the sea, which is higher than the tops of any other wireless station masts in this country.

The masts are similar to the 5 X X masts at Daventry. They stand on spherical bases which allow them a certain amount of sway in a gale.

The aerial which will radiate the National programme on 301.5 metres will be suspended between two of the masts, and the aerial for the North Regional programme on 479.2 metres will hang between one of the masts and the third mast. Thus, one of the masts will support an end of each aerial.

### Testing Before Xmas.

The station building is now completed, and the heavy machinery is being installed. This is a big job. The heavy parts have to be transported up steep hills to reach the site—I say “parts” because machinery like the three 300-h.p. Diesel engines has to be assembled at Moorside Edge, the complete engines being too big and heavy to be conveyed there complete. These engines will drive the dynamos which will supply the power for the transmitters.

A B.B.C. official tells me that it is not possible to say anything definite about when the transmitters will start to transmit, but he adds that “public tests on one transmitter should be heard before Christmas.”

I asked this official whether he thought the opening of this station would give a fillip to public interest in broadcasting in the North of England. He replied by pointing out how the licence figures have steadily increased during 1930, and by saying that he thought that one of the

reasons—though not the only one—was the opening of the London Regional station.

“Not only has there been an increase in the number of licences this year,” he said, “but there has been an increase in the rate of increase, compared with previous years.” He gave me these figures, which show the margins by which, in each year, the total number of licences exceeded the total for the previous year:

1927	.. .. .	121,563
1928	.. .. .	128,010
1929	.. .. .	162,432
1930	.. .. .	201,854

It is impossible to tell how many of the 201,854 extra licences taken out in 1930 (the years are counted up to the end of July) were due to the opening of the new London station, but if Brookmans Park has helped to boost the figures it seems certain that Moorside Edge will do so next

are assured that modern sets will cope with the changed conditions.”

By no means all listeners will have modern sets to receive Moorside Edge, however, and the B.B.C. is preparing to help listeners to overcome troubles similar to those which occurred when Brookmans Park opened.

A protest has been made at Liverpool against the selection of 479.2 metres as one of the Moorside Edge wave-lengths. It is feared that shipping radio will interfere with this transmission, and it is stated that reception in Liverpool of the Midland Regional transmission on this wave-length is mutilated by ship Morse.

### Western and Scottish Stations.

The B.B.C. has announced that when the North Regional transmitter takes this wave-length the Midland Regional station will take Glasgow's wave-length (399 metres) and Glasgow will take Manchester's (376). The Manchester station will, of course, be dismantled.

Now that the B.B.C.'s mobile transmitter has arrived on the Quantock Hills, in Somersetshire, and is testing for the West Regional station site, many listeners are wondering what has happened to the proposal to build a Scottish Regional station near Falkirk. There have been no

## THE QUESTION—TO DRESS OR NOT TO DRESS?



Getting the right atmosphere in the broadcast studio is a matter which is always receiving attention. Some producers believe that the only way is for the artistes to don the usual stage costumes, a practice in which Mr. Ridgeway believes, for here are the performers rehearsing for one of his recent productions.

year—and even more so, for the North of England as a whole is less well served to-day than the South was before Brookmans Park opened.

### Liverpool's Grumble.

There is one advantage in the North of England obtaining its Regional station a year later than London. The manufacturers have had a year's experience with the problems of dual programme reception, they have mastered the boggy of interference, and, in the words of the chairman of the Radio Manufacturers' Association, Captain J. W. Barber. “Northern listeners

apparent developments in this connection recently.

There have been “goings-on” behind the scenes, however. I am able to state that the mobile transmitter tested three sites, all near Falkirk. They are all considered technically suitable for the Scottish station.

The delay is due to negotiations for the purchase of one of the sites, which is near the road to Slamannan. It is believed that these negotiations will be successfully concluded very soon, but in the event of their breaking down, the B.B.C. has the other two alternative sites to fall back on.

**BETTER RESULTS THAN EVER BEFORE**

Range, quality, volume—all are improved if you use the Mazda AC/SG in the H.F. stages of your all-mains set. It is a remarkable valve with a colossal amplification that will enable you to bring in the most distant stations with a clarity and volume which you have never before experienced.

Selectivity also is assisted because the large magnification allows you to use a degree which will ensure maximum selectivity and amplification.

WITH  
THE  
**MAZDA  
AC/SG**

The  
Amazing  
**MAZDA**  
RADIO  
VALVES

**MAZDA AC/SG  
CHARACTERISTICS**

Fil. Volts	- - - -	4.0
Fil. Amps	- - - -	1.0
H.T. Volts	- - - -	200
Amplification Factor	- - - -	1200
Mutual Conductance (MA/V)	- - - -	3.0

**PRICE  
25/-**

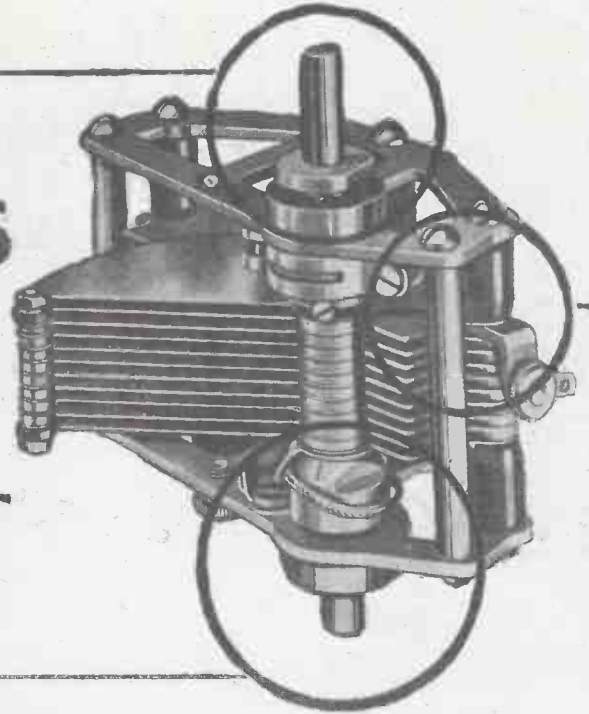


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Incorporating the Wiring Supplies, Lighting, Engineering, Refrigeration and Radio Business of The British Thomson-Houston Co., Ltd.  
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1a, Newman Street, Oxford Street, W.1  
Showrooms in all the Principal Towns.

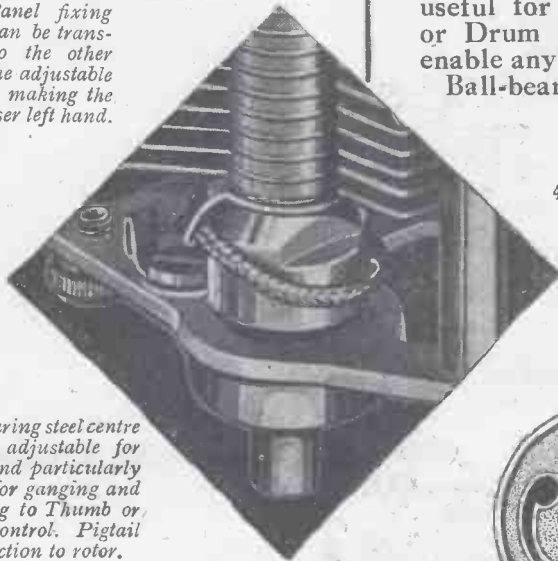
**EDISWAN**

V.82

# Features that matter



*This Panel fixing Bush can be transferred to the other end of the adjustable spindle, making the Condenser left hand.*



*Ball-bearing steel centre spindle adjustable for length and particularly useful for ganging and attaching to Thumb or Drum control. Pigtail connection to rotor.*

Here are some features of last year's outstanding success—The J.B. Universal Log Condenser.

It is exceptionally rigid, with frame and vanes of extra hard brass. Its insulation is highly efficient, and stray capacities and eddy-current losses are minimised by cutting away all surplus material.

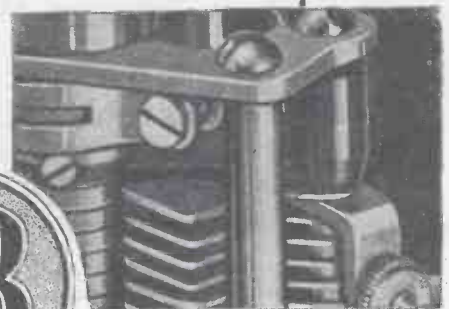
A special feature lies in the steel Centre Spindle, which is adjustable for length. This is particularly useful for ganging and for attaching to J.B. Thumb or Drum Dials. The bush is specially designed to enable any panel from  $\frac{1}{16}$ " to  $\frac{1}{4}$ " to be used.

Ball-bearing centre spindle. Pigtail connection to rotor

**PRICES :**

·0005	9/6	·00025	8/9
·0003	9/-	·00015	8/9

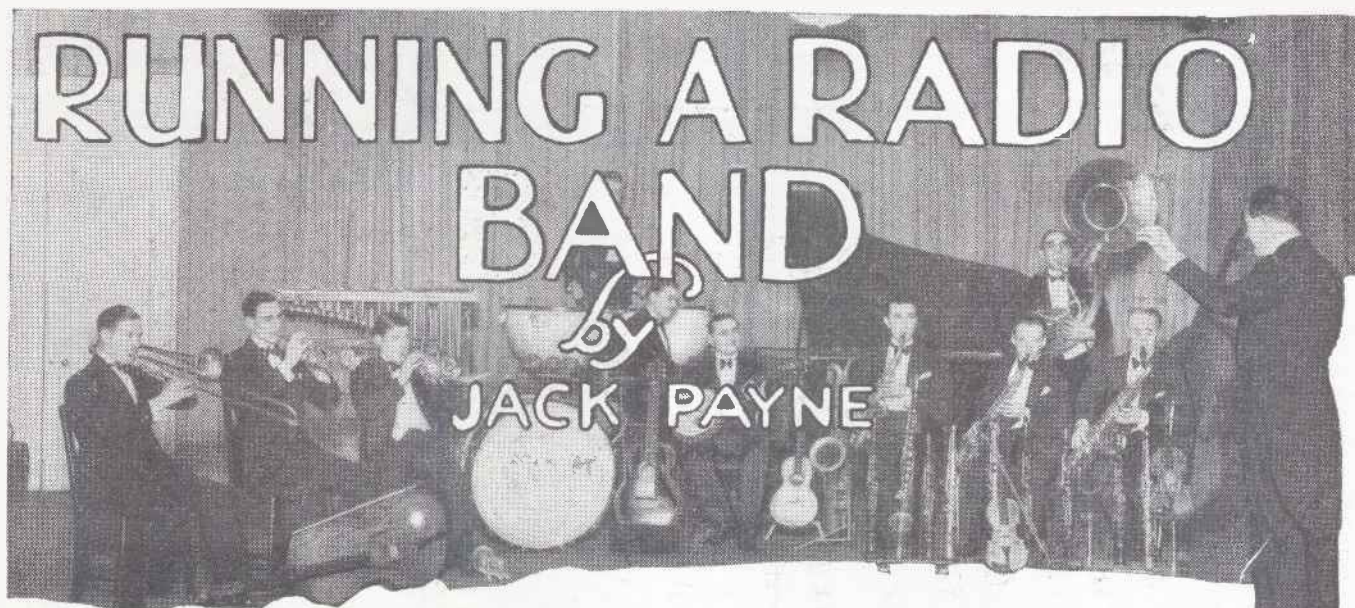
4" J.B. Bakelite Dials. Black 1/6 extra.  
Mahogany 2/- extra.



*Showing the well-known J.B. adjustable tension to centre spindle.*



**PRECISION INSTRUMENTS**



**R**UNNING a radio band is a far more complicated business than most listeners suppose. Quite apart from the actual broadcasting, there is a vast amount of office work, organisation, programme arranging, and rehearsing to be got through. There are letters from listeners to be dealt with, suggestions to be considered; and new dance numbers are brought to my notice every day with a view to including them in my programmes.

It is extraordinary how very few people appreciate the extent of such work "behind the scenes." Some time ago, I received a letter from a well-intentioned but sadly misguided lady which brought home the truth of this rather forcibly. She said:

**Some Extra Work!**

"Dear Mr. Payne,—As you broadcast only for an hour or two each day, you will doubtless be anxious to take on some extra work. If your manner and appearance is suitable, I can engage you two hours daily to give piano lessons to my little girl of eight.

"For this I could pay you 10s. a week, and also provide you with your tea. Also, if you are serious-minded—and my nephew speaks highly of you in this respect—I am willing to pay you an extra half-crown a week to take my child into the park, and explain to her the beauties of Nature.

"I might add that this is an excellent opportunity to improve your position as I have several influential friends to whom I can introduce you."

**Making Up a Programme.**

I do not say, mind you, that every listener thinks I have as much spare time on my hands as this particular correspondent, but many people assume that my work starts and finishes with my actual broadcasting. Why, rehearsals alone occupy far more of my time than my microphone appearances! It is safe to say that for every hour I spend with my band before the microphone, I give at least three hours to rehearsals.

I have other points to consider which do not confront the leader of an ordinary dance band. Numbered amongst our listeners are thousands of people who do not dance. They deserve to be considered just as much

\*-----\*

**The organisation behind a radio dance-band is very much larger than most of us might imagine. In this breezy article Jack Payne gives us a glimpse behind the scenes.**

\*-----\*

as the dancing fraternity. I will go further—they have just the same right to be considered.

Consequently, in making up a programme, I have to bear in mind the two entirely different groups of listeners—the non-dancers who must be *entertained*, and the dancers who, above all other considerations,

**GIVE YOURSELF  
A PAT ON THE BACK**



One of Britain's most popular broadcasters—Jack Payne.

demand time and rhythm. To the latter class, dance music is merely a means to an end. To the former it must be an entertainment in itself.

That is why you will find a comparatively large percentage of my programmes consists of novelty numbers. By this I mean we are

continually introducing songs with comic patter and cross-talk, and tunes which enable us to bring in a good number of unusual effects. In doing this, we introduce an element of entertainment which is lacking in the programme of a band which caters entirely for dancers.

**Letters from Listeners.**

The letters I receive from listeners have long since passed the three hundred a week mark. Some are genuinely helpful—these, I need hardly say, are the most welcome, many are diverting, and a few are—well!

The attention I give to my various correspondents occupies a considerable portion of my time, as you may guess. But I am always anxious to learn what listeners think of our performances.

I think the most astonishing letter I ever had was from a young man who, it seemed, was annoyed with me. "I am in a serious difficulty about you," he wrote. "I don't know what to do about it. I have a fiancée—there's nothing unusual in that, I know—but a little while ago I rigged up a wireless set for her.

"Every time I call on her now, she asks: 'Why don't you sing like Jack Payne?'"

**The Tunes of Today.**

I hesitate to write on the "sympathy" which every wireless performer hopes exists between himself and his unseen audience, for so much has already been said and written on the subject. But it is, nevertheless, an actual fact that a microphone performer, whether he be a soloist or one of a large band, rarely gives of his best unless he feels his audience is with him. Therefore, the knowledge that we are giving satisfaction to our listeners always "keeps us up to the mark," as the saying is.

Through the medium of wireless I have endeavoured to prove there is no connection between the tunes we know to-day and the "jazz" of the war years. There cannot be the slightest comparison between those two vastly different types of compositions, for they are the products of two entirely different eras. Jazz, as we once knew it, has gone for ever.

You may still prefer the symphony orchestra to the saxophone. It is purely a matter of personal taste. So why worry?

LATEST BROADCASTING NEWS.

GROUP LISTENING.

INTEREST OF LOCAL AUTHORITIES—CANADA'S PRIMA DONNA—SIR JAMES BARRIE—LORD BEAVERBROOK—PROGRAMME ITEMS

GROUP listening has secured a big hold in the North despite the fact that its inauguration was delayed until some considerable time after other parts of the country were well away with schemes to foster organised plans for getting the greatest benefit from broadcast adult education talks.

Two Area Councils are working; one whose activities cover the counties of Cheshire, Lancashire and Westmorland, the other looking after Yorkshire. Preliminary experiments, from the first year's operations, have brought encouraging results, and it is anticipated that there will soon be no fewer than 150 listening groups in the Northern Region.

The Carnegie Trustees are taking an active interest in the scheme in Yorkshire and at Burnley, where the new Central Library was recently opened, a special listening room is being provided where an up-to-date receiving set will be installed for a group which is to start early in October.

Interest of Local Authorities.

At Leeds the local education authority is supervising group listening in connection with Women's Institutes, the members of which meet in schools, and the Trade Union Council is also exploring the potentialities of broadcasting in their educational work. This is being done particularly through Trade Councils at Bolton and Brighouse.

An essential part of successful group listening is the appointment of competent leaders for the discussions which follow the broadcast talks, and with a view to coping with this side of the work special courses of instruction for likely students have been organised. The Yorkshire Summer School at Saltburn, working in conjunction with the Yorkshire Area Council, have just completed two successful courses in which more than thirty students participated. Most of the students already possessed experience of leadership and their intention is to conduct groups in their own localities this autumn.

Canada's Prima Donna.

Sarah Fischer, often described as Canada's most distinguished prima donna, will be the solo artiste in a programme devoted to French and Spanish music which the National Orchestra of Wales is giving for West Regional listeners on Saturday evening, October 25th.

Miss Fischer, who is well known to London audiences for her work at Covent Garden during the 1924-25 season, broadcast from Cardiff about two years ago when she took part in a Canadian programme arranged in connection with a special Empire Week. She has also appeared at the Opera Comique and took part in the Mozart Cycle at the Paris Festival in 1928.

Sir James Barrie.

Sir James Barrie is to broadcast again. This will be good news to Scottish listeners, and possibly to many others, for it is decided to include his speech in the National and London Regional programmes when he is installed as Chancellor of the University of Edinburgh at noon on Saturday, October 25th. Sir James is equally as good a broadcaster as he is a writer, and while his previous broadcasts have been rather of the light-hearted kind, it is possible that listeners will hear him adopt a more academic style of oratory on October 25th.

Lord Beaverbrook.

Lord Beaverbrook was to open a series of broadcasts on Empire Trade on October 16th. This has now been postponed to a date towards the end of November not yet determined. It is probable that Conservatives, Labour and Liberal representatives will reply to the "Chief Crusader."

Programme Items.

Speeches by Mr. Lloyd George, the Lord Chancellor, Lord Sankey and Sir Henry

Lytton will be relayed from the Savoy Hotel to National listeners on Tuesday, October 21st, the occasion being a luncheon in honour of Sir Henry Lytton of the D'Oyley Carte Opera Company. Listeners may also hear a song by Sir Henry, who is, of course, a famous old Savoyard.

In connection with the League of Nations Banquet on Thursday, October 30th, from the Guildhall, London, which, as stated in our last issue, will provide listeners with another opportunity of hearing the Prince of Wales, there will be also a speech by Lord Grey of Falloden, who will preside at the Banquet which is in honour of the delegates to the eleventh Assembly of the League of Nations.

Lord Knutsford Again.

Lord Knutsford, Chairman of the London Hospital, who has not appeared before the microphone since he made his historical appeal which resulted in the greatest response ever made by listeners, is to give a talk for National listeners on Tuesday, November 4th, in which he will speak on "Nursing as a Career."

Dame Ethel Smyth is visiting Northern Ireland on Friday, October 24th, to conduct some of her own compositions during the opening concert of the Belfast Philharmonic Society, which is to be relayed from the Ulster Hall at 8 p.m. The programme will also include "The Master Mariners," by Dr. Thomas Wood, a work for chorus and orchestra, and which, it will be remembered, was broadcast from the Belfast studio nearly two years ago.

Saturday, October 18th, brings Mr. Bransby Williams to the microphone in a new rôle when "The Incredible Adventures of Roland Hern" will be broadcast.

PRUNING AND TUNING



Alderman Thompson of Brighton—who has gained a great local reputation for pruning unnecessary expenditure from the town's Budget—spends his spare time in tuning-in.

FOR THE LISTENER.

By "PHILEMON."

Whilst staying in Italy our contributor listens critically to the Continental stations and decides that they are good—in parts.

Leo Fall.

THE English programmes did not take any notice, but continental stations, with their passion for anniversaries, have celebrated Leo Fall, with performances of his works everywhere. He died five years ago.

I always connected him with "The Dollar Princess," a gay and tuneful and amusing thing; but last Sunday night I heard "The Rose of Stamboul" from Milan, and I ranked him still higher in the world of Comic Opera. Milan let itself go in "The Rose of Stamboul," and no mistake.

I have rarely heard a performance so full of joyous abandon, and of so contagious a gaiety. I do not know who the vocalists were, but they were mighty good; and the whole affair had any amount of dash and brio and élan, and any other word you can think of to suggest high spirits.

Happy the man who can be remembered with such exhilarating cheer! Sunday night, too!

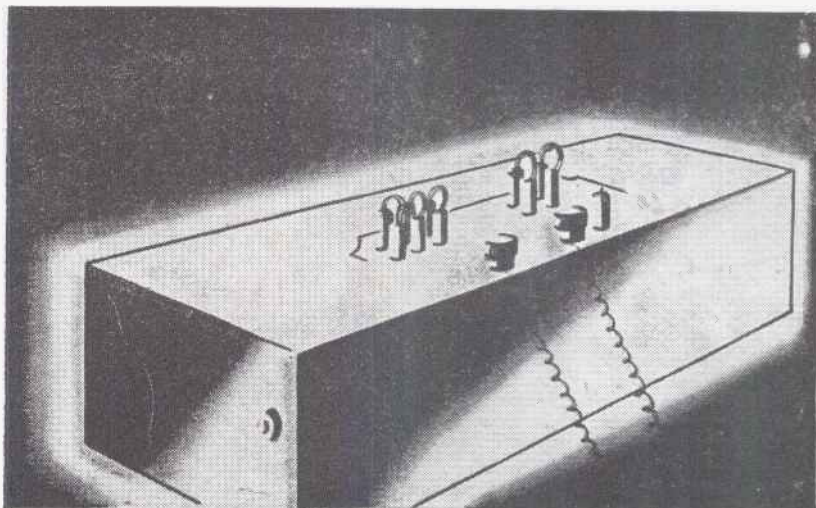
Across the Channel.

If you have a set which will put you in touch with continental stations, I advise you to try them occasionally, for, though I am patriotic to the marrow, there are some things you get better here than at home. I assume that you will try chiefly for music.

For opera, get Rome or Milan. For orchestral music, and part-singing, get one or other of the German stations. Many English listeners, if they attempt continental listening at all, rarely get farther than Radio Paris; but, in my opinion, the programmes from this station are not a patch on the German ones, either for general interest or efficiency.

(Continued on page 256.)



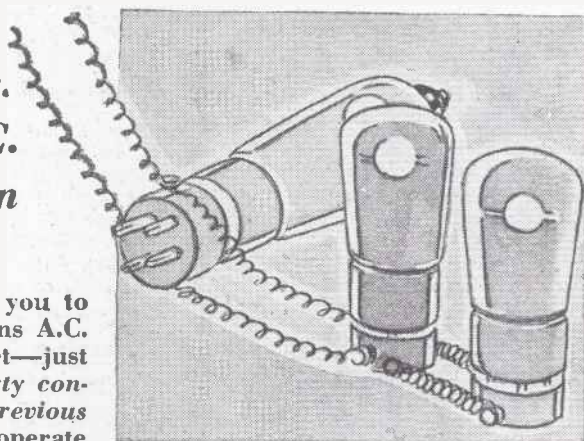


## Make your Battery Set All-Electric

### The Six-Sixty A.C. Mains Conversion Equipment is suitable for practically any Battery Receiver

*No internal wiring alterations.  
Specially selected Six-Sixty A.C.  
Valves and Six-Sixty 4/5 pin  
valve holder adaptors.*

The new Six-Sixty A.C. mains equipment enables you to turn your present battery receiver into an all-mains A.C. operated set. No need to scrap a satisfactory set—just adapt it. *The dimensions of the complete Six-Sixty conversion equipment do not exceed those of the previous batteries, while the unit is specially designed to co-operate with specially selected Six-Sixty A.C. valves.* Nowhere else can you obtain this advantage—valves and mains-conversion unit built by the same manufacturer to suit each other and work together.



The Unit can be obtained correctly built for any A.C. house supply. It is fitted with L.T. terminals giving 4 volts and up to 5 amps. H.T. tappings of 60, 75, 100, 120, 150 and 200 volts and Grid Bias tapping of —1.5 to —20 volts are provided—any three H.T. or two G.B. values being available for use simultaneously. Automatic Grid Bias is provided—the most modern and expensive arrangement. A further advantage is that the H.T. leads from the set are not removed when once inserted.

Dimensions, 13" x 5½" x 4".

Power Unit alone (H.T., L.T. and G.B.) - - £6 6 0

Complete Conversion Equipment from - - £8 5 0

Made by the makers of the famous Six-Sixty Valves.

Write for leaflet giving particulars of complete range, including new Six-Sixty Valves, Six-Sixty Cone Speaker Assembly and Cone-Speaker Wiper, Six-Sixty Turntable, Six-Sixty Valve and Set Tester, Six-Sixty Valve Adaptors, Six-Sixty Gramophone Pick-up Attachments, Six-Sixty Grid Leaks and Holders.



# SAY SIX-SIXTY

(B.V.A. RADIO VALVES AND EQUIPMENT)

Six-Sixty Radio Co., Ltd., Six-Sixty House, 17/18, Rathbone Place, Oxford Street, W.1. Telephone; Museum 6116/7.



**KL1 1926**



**1930  
MH4**

# Osram Valves for A.C. Mains Sets

"The General Electric Company can fairly be called pioneers of the indirectly heated valve."

*Wireless World, Sept. 17th, 1930*

**The FIRST**  
*indirectly heated valve -*  
**was an OSRAM**

The **LATEST OSRAM** Indirectly Heated Valves still lead because they combine all the essential points of an A.C. valve -

**The NEW OSRAM M.4. Series**

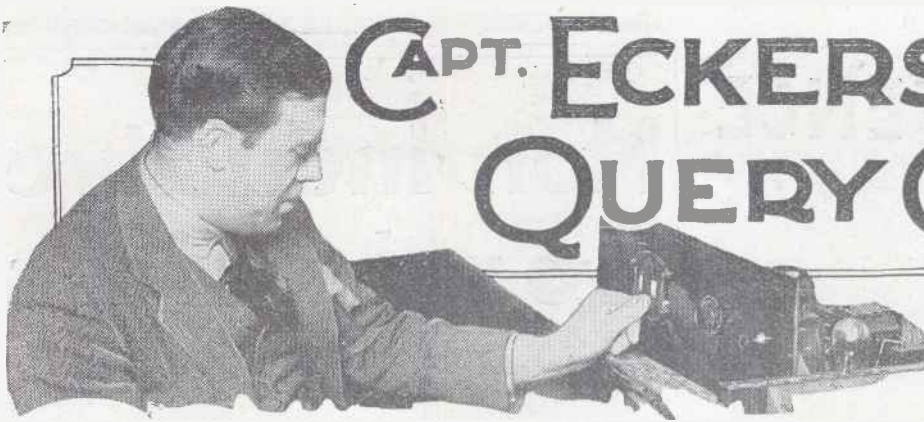
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OSRAM MH4	35	16,000	15/-
OSRAM MHL4	20	8,000	15/-
OSRAM ML4	9	3,000	17/6

and the wonderful OSRAM MS4 screen grid valve preferred by the leading manufacturers of A.C. Sets for Stability, Efficiency and Absolute Reliability - Price **25/-**

**MADE IN ENGLAND**  
Sold by all Wireless Dealers

- Absolute Reliability.**
- Ample and LASTING Electron Emission.**
- Stability in use.**
- High Electrical Efficiency.**
- No hum.**
- Absence of parasitic noises.**

Write for Booklet "OSRAM VALVES for A.C. Mains & Rectifying Valves" OV 5568.



# CAPT. ECKERSLEY'S QUERY CORNER

**SHOCK FROM THE L.S. CHOKE—WHEN THE VALVE GETS HOT—IS IT THE ACCUMULATOR?—“UP TO SCRATCH.”**

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

### Shock from the L.S. Choke.

J. R. N. (Chislehurst).—“I have added an output filter to my set in order to prevent the H.T. from flowing through the loud-speaker windings. To my surprise I find that if I touch the speaker terminals I get a shock. Does this mean that the output filter is not working properly?”

It might do, of course, but you must do this test.

Stop any signals coming into the loud speaker at all, disconnect aerial switch, and try when the B.B.C. is off (any time Sunday practically) and then touch the loud-speaker terminals.

If you do *not* then get a shock your output filter is blocking off your H.T. D.C. volts. But when you restore conditions of working there are volts of alternating-current modulation, are there not? I mean if there were no volts across your loud-speaker terminals, how is the thing going to make a noise?

It's possible to get quite unpleasant shocks due to pure H.T. volts of modulation even though all D.C. is blocked off. The cure is not to touch when working.

### When the Valve Gets Hot.

“PERPLEXED” (Strood).—“How hot should the bulb of a super-power valve get?”

“I am using one of the 2-volt type with 150 volts H.T. and the recommended grid bias. Yet after half an hour or so the glass becomes almost too hot for me to bear my hand on. Is this in order?”

Oh, yes. That's all right. Never be afraid of a little heat.

Catch hold of the bulb of your electric light (one that's doing its duty in a central position, not that one economising for you in the hall), and you'll realise, as the professor said after a discussion on a vexed subject, “it's difficult to get light without heat.”

It's difficult to get power without the appearance of heat, vide a lorry of 1912 make carrying a ten-ton load up Kirkstone Pass. Go down to Brookmans Park and see a cascade of water pouring over a grid of pipes and steaming because that water's cooling valves in the station.

A super-power valve has to get rid of a lot of waste heat, because to get some reasonable power into useful form in a loud speaker a lot of power must be expended in the valve. The heat is due to electrons bombarding the anode of the valve.

### Is it the Accumulator?

H. McG. (Glasgow).—“Although the makers of the L.T. accumulator in my portable receiver state that it is impossible to spill any of the acid under any circumstances, I find that there has been some leakage of acid and the ‘floor’ of the receiver is quite damp.”

“The performance of the receiver has also been falling off lately, and recently the reaction control ceased to function entirely

back from charging is clean. The deterioration of the set could come about by acid getting on to components or by the level of the acid in the accumulator being too low (due to leak).

Try the voltage of the accumulator while it is working. And finally if these hints do not help you write to the makers.

### “Up to Scratch.”

A. G. (Cheltenham).—“Do you consider pick-up reproduction is possible, say up to 5,000 cycles, without the attendant needle scratch? If so, can you kindly offer suggestions for overcoming the noise?”

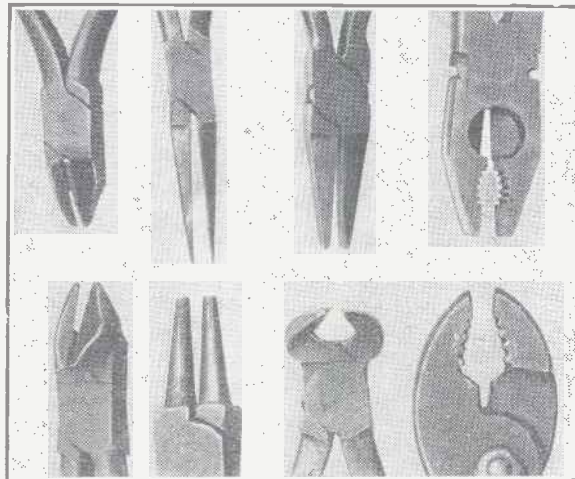
This is a difficult question. It involves the variables of (1) What amount of scratch will you stand for? (2) What do you mean by reproduction “up to” 5,000 cycles? (3) What is the usual ratio of wanted sound and unwanted on the records you play?

I mean by (1), if you are amplifying very much indeed scratch is inclined to be more noticeable than if reproduction is weaker. (2) Do you mean you want to hear something of 5,000 cycles or full amplitude at 5,000 cycles? If you want to hear something but do not want full reproduction scratch can be eliminated to a greater extent than if your conditions are full reproduction at 5,000 cycles.

(3) If you play jazz records there is such a continuous noise that scratch is not noticeable. But if there is constant variation between *ff* and *pp* scratch comes in. Then there's the balance of “needles” against “results”!

It's all very difficult.\* But you can overcome the noise the more as you cut off high frequencies. A lot of my friends just shunt the pick-up with a spot of capacity. It seems to help!

### “PLIERS, PLEASE !”



Don't forget that when buying pliers and similar tools you can get different sorts for different operations, and that a wise choice in the first instance will simplify all your constructional work this winter.

although I am unable to discover any obvious cause for this, such, for instance, as a run-down H.T. battery.

“Do you think that the spilt acid can in any way be responsible for the present poor performance of the receiver?”

Makers are nearly always right, but they cannot get over occasional faulty workmanship

It may be your accumulator is faulty and leaking. It may be it does spill, of course, but in view of what the makers say this is unlikely.

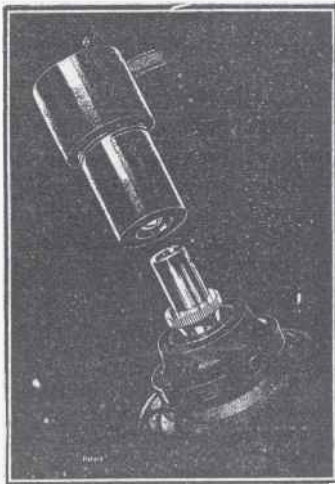
It may be that you charge your accumulator in situ and that acid spray makes it look as though the acid were leaking. It may be that those who charge your accumulator for you stand it in acid and let the spray damp it and everything else.

See if the accumulator when it comes

## ANOTHER FREE GIFT

with next week's  
**POPULAR WIRELESS**

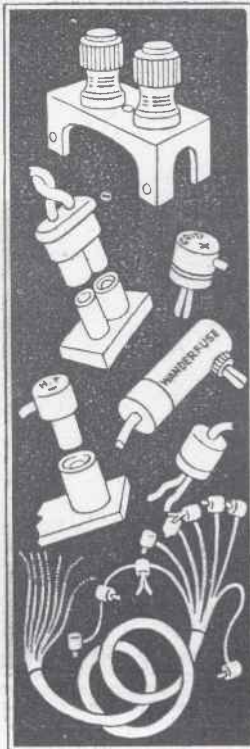
# SAFETY FOR SIXPENCE



SUPPOSE you "blew" your Screen-grid Valve to-night . . . Sixpence would have saved it. The Belling-Lee S.G. Anode Connector is entirely insulated. Even if it touches exposed metal parts at earth potential your valves are safe and your H.T. supply too.

Just push it over the Screen-grid Anode Terminal in place of the usual nut. Then forget it. Strong spring grip—compact—side entry for flex—a special loading device grips the braid as well as the wire. S.G. Anode Connector 6d. each.

For Screen Grid or Pentode.



Patent

## TWO NEW COMPONENTS

The new Terminal Mount, Price 8d. The new "Wander-fuse," Price 1/6. Spare fuses (150 m/a), 9d. each.

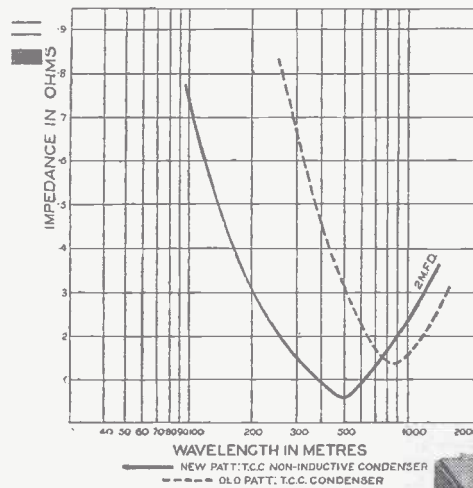
Belling-Lee Terminals: Type "B," 6d. Type "M," 4½d. Type "R," 3d. Wander Plug, 3d. Safety Plug and Socket, 9d. Twin Plug and Socket, 1/6. Indicating Spade Terminal, 4½d. Battery Cords, 9 way, 5/9. (Also made in 5, 6, 7, 8 and 10 way.)



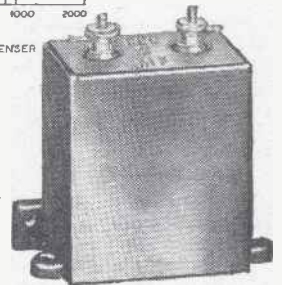
Advt. of Belling & Lee, Ltd., Queensway Wks., Ponders End, Mdx.

# Non-inductive Condensers

## the Latest T.C.C. Development



Here's the latest T.C.C. development—a Non-Inductive Condenser at no extra cost. The advent of the Screened Grid Valve has emphasized the need for a condenser having the minimum of impedance in order that small high frequency currents may be readily passed. How the new T.C.C. Non-Inductive Condenser achieves this result is shown on the curve above. The ordinary 1 mfd. condenser has a resonant point at about 900 metres whereas in the new T.C.C. Non-Inductive Condenser this has been reduced to nearly 500 metres. Be wise: always use



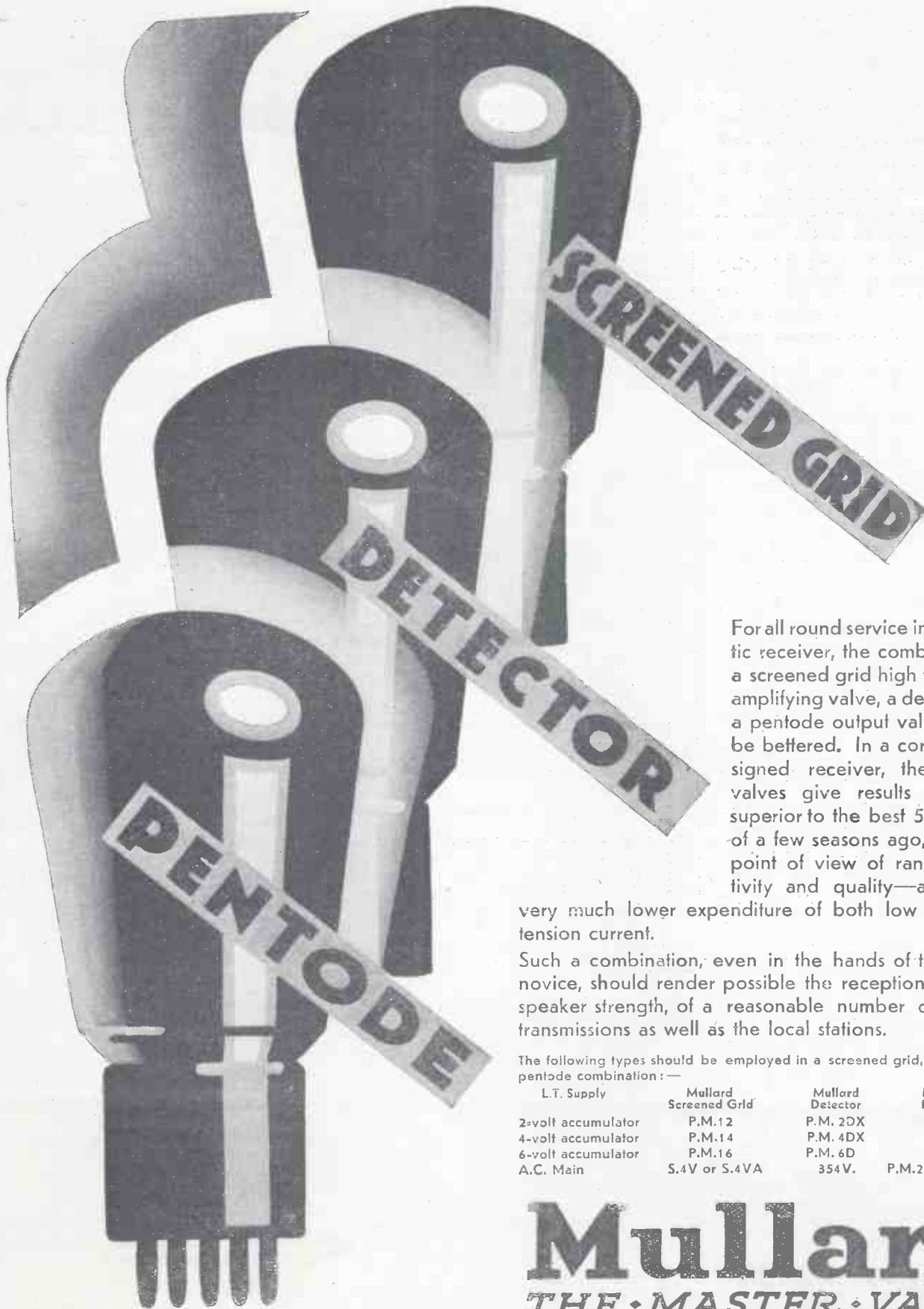
Available in all capacities from .005 mfd. to 2 mfd. from all wireless shops.

The above illustration shows the T.C.C. 2 mfd. Non-Inductive Condenser in moulded case 3/10.

Telgraph Condenser Co., Ltd., N. Acton, W.3



Always ahead in Condenser Design



For all round service in a domestic receiver, the combination of a screened grid high frequency amplifying valve, a detector and a pentode output valve cannot be bettered. In a correctly designed receiver, these three valves give results definitely superior to the best 5-valve set of a few seasons ago, from the point of view of range, sensitivity and quality—and for a

very much lower expenditure of both low and high tension current.

Such a combination, even in the hands of the merest novice, should render possible the reception, at good speaker strength, of a reasonable number of foreign transmissions as well as the local stations.

The following types should be employed in a screened grid, detector and pentode combination:—

L.T. Supply	Mullard Screened Grd	Mullard Detector	Mullard Pentode
2-volt accumulator	P.M.12	P.M. 2DX	P.M.22
4-volt accumulator	P.M.14	P.M. 4DX	P.M.24
6-volt accumulator	P.M.16	P.M. 6D	P.M.26
A.C. Main	5.4V or S.4VA	354V.	P.M.24 or P.M.24A

# Mullard

## THE MASTER VALVE

THE name of this fine set gives you the key to the whole idea underlying its design. "Maximum power" was what we set out to give, and maximum power for its size is just what it has got.

Taking it all round, it is the most sensitive and selective receiver, with the greatest amount of real hefty punch, that we have

#### SOME COMPONENTS —

- 1 Panel, 21 ins. × 7 ins. (Lissen or Trollite, Paxolin, Becol, Resiston, etc.)
- 1 Cabinet, with baseboard 10 ins. deep to fit (Cameo or Pickett, etc.)
- 2 3-point on-off switches (Red Diamond or Bulgin, Ormond, Wearite, Ready Radio, etc.)
- 2 .0005-mfd. variable condensers (Lissen or Lotus, J.B., Formo, Dubilier, Ready Radio, Ormond, Polar, etc.)
- 2 Slow-motion dials if condensers not slow-motion type (Igranic or Lissen, Ormond, J.B., Lotus, Ready Radio, Formo, etc.)
- 1 .0001, .00013, .00015-mfd. differential reaction condenser (Dubilier or Lotus, Lissen, Ready Radio, Wearite, Ormond, J.B., Magnum, Paroussi, etc.)
- 1 Filament Rheostat (Wearite or Gecophone, Lissen, Igranic, etc.)
- 1 L.T. switch (Bulgin or Igranic, Lissen, Lotus, Benjamin, Red Diamond, Junit, Wearite, etc.)
- 6 Single coil holders (Lissen and Lotus, or Igranic, Bulgin, Wearite, Magnum, Red Diamond, etc.)
- 4 Sprung valve holders (Formo or Igranic, W.B., Benjamin, Lotus, Lissen, Bulgin, Wearite, Junit, Magnum, etc.)
- 1 .0002-mfd. fixed condenser (Dubilier or Lissen, T.C.C., Ediswan, Ferranti, Igranic, Mullard, Goltone, etc.)

yet managed to produce with the aid of entirely standard parts. (Note that it uses plug-in coils.)

#### A Surprising Circuit.

It put up a really wonderful show on test, cutting out the Brookmans Park transmission with remarkable ease, and then bringing in an amazing string of foreigners

at genuine loud-speaker strength with very little reaction in use.

Altogether it delighted us, for we had set out to produce something really outstanding with the aid of a carefully thought-out selection of just such parts [as we thought most of our readers would be likely to have on hand as a result of previous ventures in set building. Our tests showed that we had succeeded in even fuller measure than we had hoped for, hence the satisfaction.

That brings us to the second great feature of the "Maxi-Power": although it is a big set, and quite ambitious in the number of its special schemes and refinements, it can be built quite economically. There is nothing critical or special about its parts, and if you run over the list you are likely to be pleasantly surprised at the number of them you already possess.

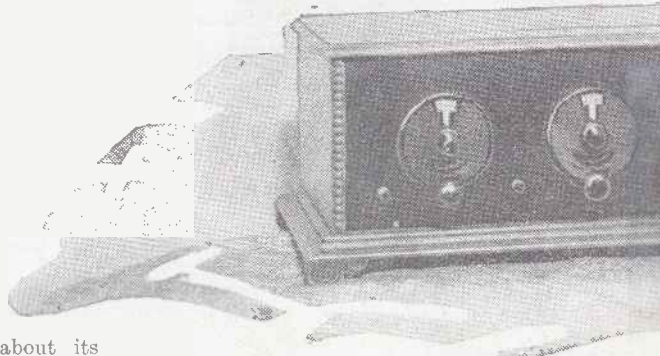
#### Easy Wave-changing.

It is, of course, a wave-change set, and much time and thought was expended in perfecting the plug-in coil arrangement finally adopted. It is a method possessing many outstanding advantages in the way of freedom from the losses so often present in wave-change switching circuits, reasonable number of coils required, and so on, but best of all is the extremely high efficiency it has enabled us to get from the screened-grid valve.

It gives you a real hard-working H.F. stage, with lots of "mag." and selectivity well up to the exacting requirements imposed upon by the Regional conditions. That gives the set a good start, and then following after it there is a modern high-efficiency detector circuit with differential reaction to give the signals another boost up.

Next comes a carefully designed low-frequency amplifying side which takes the clean, strong output from the detector and builds it up to really satisfying loud-speaker volume. The L.F. side was given

# The Maxi



One of this week's free gift blue prints gives complete details of the long-range receiver. Below you will find a list of the parts you will need to use and

a good deal of thought, both as to circuit values and practical lay-out, and the result is an excellent combination of high magnification and superb quality of reproduction.

The blue print gives you the full practical information about the set, and you could build and work it successfully without reading a word of this article. However, there are quite a number of interesting things we can tell you about it.

For example, we can tell you something of the working of the circuit, which will no doubt interest those who like to know what goes on inside their sets.

#### Few Coils.

The first thing you will notice is that the wave-change switching is of the type which keeps all coils in circuit on long waves. Although efficient, this method is apt to result in a rather large number of coils unless care is taken.

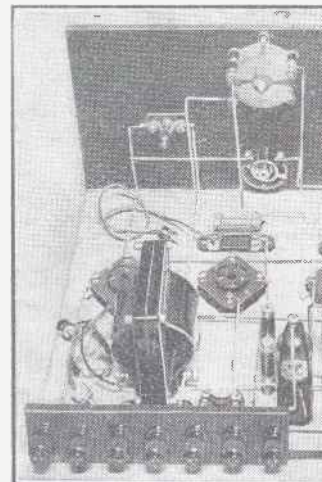
By making judicious arrangement of the circuit we have reduced the number to only three for the H.F. grid circuit and three for the intervalle coupling and reaction arrangements. In consequence the set is by no means complicated to wire up and is not nearly so bulky as this type is apt to be.

In the H.F. grid circuit you will see two plain low-wave coils and another for long-waves with a very simple kind of switch which gives an extremely effective throw-over from one wave-band to the other.

#### Simplified Switching.

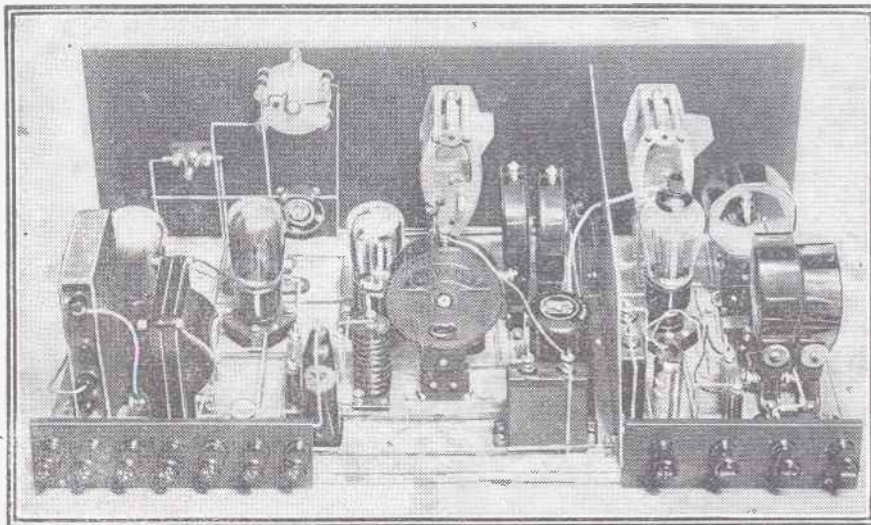
In the intervalle coupling circuit there is a very similar scheme. The only difference is that we are now dealing with the grid circuit of the detector valve, and so the "primary" portion of the circuit is used for inter-valve instead of aerial coupling.

## THE POWER



Here is the L.F. end of this fine set, showing the intervalle coupling circuit. The circuit is continued until finally a tremendous volume of output is obtained.

## ULTRA-EFFICIENCY WITH STANDARD COMPONENTS



A general view, which shows the impressive layout of this fine up-to-date receiver. Note how its special features have been achieved with the aid of entirely standard parts.



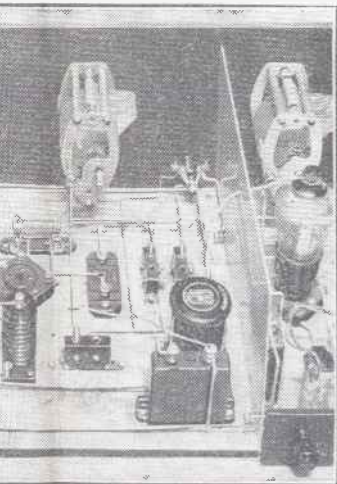
By The  
"P.W." RESEARCH DEPT.

Complete constructional details of this powerful and up-to-date will find some interesting general notes about its working.

Note that the "parallel feed" lead from the anode circuit of the S.G. valve goes to the point equivalent to the aerial lead in the previous circuits, and that the long-wave coil  $L_6$  is of the "X" type.

The reaction circuit is of the differential variety, as we have already remarked, and here again we have saved a separate coil, with a consequent economy of space and simplification of wiring and switching.

DEPARTMENT



...t, where the building-up process is con- volume of real power emerges from the ut terminals.

...ther a little below it, but many people like to have a definite control for volume. This we have accordingly provided in the form of a filament rheostat for the S.G. valve.

Controlling Volume.

This type of control is particularly efficient in operation, for it can be made to give a very wide control and does not upset the quality if used with just a little discretion (don't use it to cut down the volume to a mere whisper: that sometimes introduces a little distortion).

One practical hint should perhaps be given in connection with the use of this volume control. The point is that some screened-grid valves have filaments with a considerable "time-lag," in other

words they heat and cool comparatively slowly.

In practice this just means that you should turn the volume control knob rather slowly, to give the valve filament time to respond. Otherwise one is apt to over-shoot the mark.

With that hint we can leave this part of the subject. For the blue print itself really gives all the constructional information and practical data.

The Alternatives.

We still have a little more space left, so we shall be able to clear up a few more points that may interest you.

First, there is the question of the alternative sizes for the long wave "X" coil, which is marked  $L_6$  on the blue print. You will observe that the specification for this is 200 or 250, and you may wonder why the alternative should be given when the coil is in a closed circuit where its size can be predicted accurately.

Well, the point here is that either size will serve, but the 200 is somewhat the more convenient of the two. However, many people will already have a No. 250, and No. 200 is a rather unusual size, so we gave the choice.

Size No. 200 is to be preferred because it gives a somewhat better tuning range (on long waves) and makes the second dial read more like the first one. The 250, on the other hand, will usually only just tune down to Hilversum, because also in circuit on the long waves is the coil  $L_5$ .

What it amounts to is this: If you have to buy the coil, make it a No. 200 X. If you already have a No. 250 X you can quite well use it, so long as you just understand the point about tuning range.

On Long Waves.

Another point where there is a choice of coil sizes is in the primary of each lower wave coupling circuit. These primaries are marked  $L_1$  and  $L_4$ , and the effect of changes of size here is to govern selectivity. The smaller sizes quoted give the higher selectivity, but the larger ones generally mean better volume, particularly on distant stations.

Then there is a point about the working of the aerial circuit on long waves. You may wonder why there appears to be no provision for getting one of the usual coupling effects here, with a separate primary or an "X" coil.

The explanation is simple: We have got the right effect by

taking the aerial lead on long waves through the small fixed condenser  $C_9$  to the "upper" end of the long-wave coil  $L_3$ .

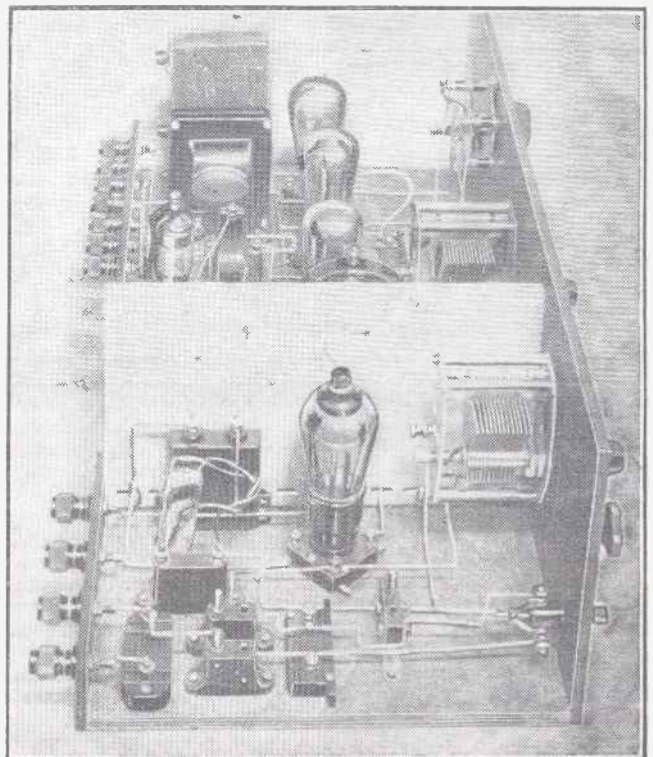
In this way we have got a coupling effect

—YOU WILL NEED.

- 1 0001-mfd. fixed condenser (Lissen, etc.)
  - 2 01-mfd. fixed condensers (T.C.C., etc.).
  - 1 001-mfd. fixed condenser (Ormond, etc.).
  - 1 0003-mfd. fixed condenser (Dubilier, etc.).
  - 2 1-mfd. fixed condensers (T.C.C. or Lissen, Dubilier, Mullard, Hydra, etc.).
  - 2 2-meg. leaks and holders (Lissen or Ediswan, Ferranti, Dubilier, Igranic, etc.).
  - 2 H.F. chokes (R.I. and Ready Radio, or Lissen, Varley, Telsen, Lewcos, Wamtel, Wearite, Dubilier, Magnum, Junit, Lotus, etc.).
  - 1 100,000-ohms anode resistance and holder (Varley or Igranic, R.I., Lissen, Mullard, Dubilier, etc.).
  - 1 Low ratio L.F. transformer (Ferranti or R.I., Lissen, Telsen, Varley, Igranic, Mullard, Lotus, Lewcos, etc.).
  - 1 Fuse and holder (Magnum or Bulgin, etc.).
  - 11 Terminals (Belling & Lee or Igranic, Eelex, etc.).
  - 1 Standard "P.W." screen, 10 ins. x 6 ins. (Parex or Wearite, Ready Radio, Magnum, etc.).
  - 1 G.B. battery clip (Bulgin, etc.).
  - 2 Terminal strips, 6 ins. x 2 ins. and 7 ins. x 2 ins.
- Flex, wire, screws, plugs, etc.

which turned out to be quite suitable for this particular receiver. It naturally produces a valuable simplification.

STRENGTH, SELECTIVITY AND PURITY



Note how simply the wave-change switching is worked out in the H.F. stage.

## FROM THE TECHNICAL EDITOR'S NOTE BOOK.

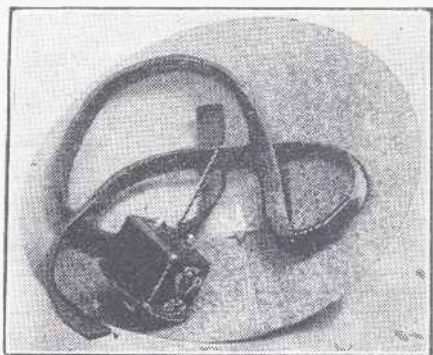


# Tested and Found—?

## MAKING YOUR OWN SPEAKER.

THE Six-Sixty people manufacture valves, and very good valves, too, but they also make a loud-speaker assembly. This consists of a unit, cone and cone-surround material. The price, all in, is 15s. A cabinet or baffle-board finishes the instrument.

The Six-Sixty cone paper is excellent stuff, and when used in conjunction with a Six-Sixty unit the results stand far



The Six-Sixty Cone Loud-speaker Kit.

above the 15s cost as judged by present-day radio price values. You get excellent sensitivity and a most commendable evenness of response.

## G.E.C. PUBLICATIONS.

Three new G.E.C. publications it would well repay you for the trifling trouble of securing are:

- (1) "Wireless Guide."
- (2) Osram A.C. Mains and Rectifying Valves.
- (3) Osram Valves for power amplification; Osram photo-cells and Osram lamps for talking-picture apparatus.

Copies of these are available free on postal application.

## NEW PIONEER SWITCHES.

The new Pioneer switches have rounded contact springs, so that their active surfaces are considerably increased. As I have said on previous occasions, switches, though small, are important items, and if faulty can give rise to annoying troubles.

But I cannot see these new Pioneers developing faults. They are robustly constructed, and their designs are distinctly workmanlike.

The ordinary on-off type for filament

switching, etc., retails at 1s. 3d., while there is a triple contact variety at 1s. 6d.

These Pioneers are made, of course, by the Pioneer Mfg. Co., Ltd., and in that they are sound constructionally and have good panel appearance, I have no hesitation whatever in recommending them to "P.W." constructors.

## MORE IGRANIC LEAFLETS.

Two more Igranic publications have been issued, the one dealing with the Igranic Midget Radio Switch and the other with the Igranic 5-Watt Extra-Stage Amplifier.

## EELIX RADIO BULLETIN.

The recent number of the Eelix Radio Bulletin, which is issued by J. J. Eastick & Sons, is a particularly bright number, and in it is included a helpful article on volume control.

## C.A.V. CATALOGUE.

C. A. Vandervell & Co., Ltd., have now issued their new radio accumulator catalogue, a folder dealing with an entirely new range of H.T. accumulators, and literature describing their jelly acid, non-spillable accumulators for portable receivers. These publications are now ready for distribution to interested readers.

## OBETA BATTERIES.

These have recently been reduced in price, in cases by more than one shilling. Obeta batteries are handled by F. L. Lesingham of Victoria Street, London, S.W.1.

## A MARCONI VALVE.

One of the latest Marconi valves is the PX4, and it has these fine characteristics. Impedance, 1,050 ohms; amplification factor 3.5, and mutual conductance 3.3. It is a four-volter, taking a filament current of .6 amp. and a maximum H.T. of 200 volts.

Its 4-volt filament rating brings it in line with the 4-volt mains valves and it can, in fact, be used in conjunction with these. It is, of course, a super-power valve suitable for the final stage of a pretty big set. The maximum anode current is 50 milliamps at 200 volts, so that you can see it is a "ten-watter."

It gives fine results, and is just the sort of valve you want to operate a moving-coil loud speaker. A particularly interesting feature lies in the fact that it has the heftiness hitherto associated only with super-power valves needing 300 or 400 volts H.T. Those radio enthusiasts who have D.C. mains should be particularly interested, for D.C. imposes an awkward voltage limitation that, hitherto, has debarred its owners from enjoying the use of the really "big" valves.

## BRITISH BLUE SPOT PRODUCTIONS.

The British Blue Spot Co., Ltd., has been formed for the distribution of the famous Blue Spot products, and also to provide for their manufacture in Great Britain. This company has taken over the staff and records of the Blue Spot department of F. A. Hughes & Co., Ltd., and have acquired substantial premises.

## NEW BLUE SPOT SPEAKER.

The Blue Spot people seem to "keep the ball rolling" to good effect. It is not so long ago that I chronicled the arrival of a new Blue Spot Unit. I have now the pleasure of saying a few words about the model 41K Blue Spot complete loud speaker.

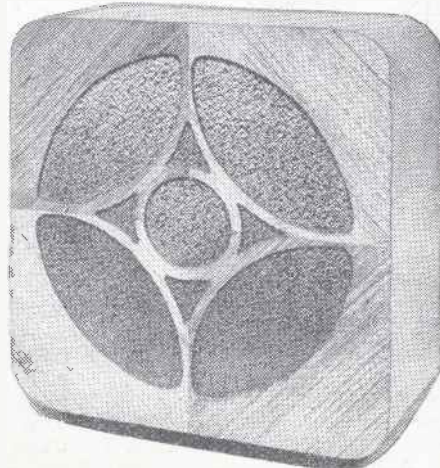
This speaker incorporates the Blue Spot 66K Unit, and it is built into a fine little

Manufacturers and traders are invited to submit radio apparatus of any kind for review purposes. All examinations and tests are carried out in the "P.W." Technical Department, with the strictest of impartiality, under the personal supervision of the Technical Editor.

We should like to point out that we prefer to receive production samples picked from stock, and that we cannot guarantee their safe return undamaged, as it is our practice thoroughly to dissect much of the gear in the course of our investigations!

And readers should note that the subsequent reports appearing on this page are intended as guides to buyers, and are therefore framed up in a readily readable manner free from technicalities unnecessary for that immediate purpose.

cabinet having an attractive walnut finish. It retails at 50s. Its reproduction is bright and clear-cut, and its response is much wider—speaking in terms of frequency range—than many instruments costing two or



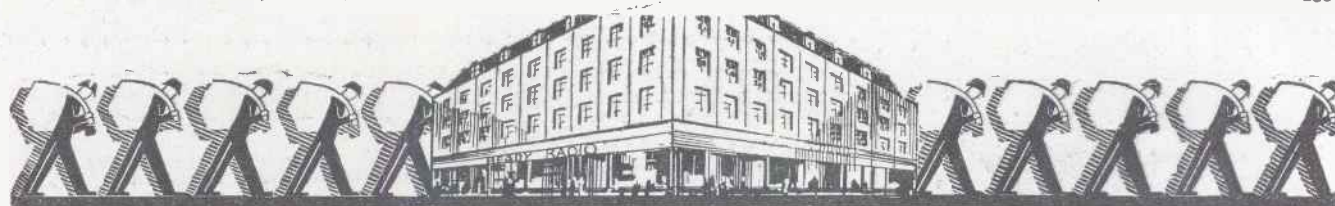
This is the 41K Blue Spot.

three times as much. "P.W." readers should make a point of hearing one of these Blue Spots at their local retailers.

## TWO-VALVE MAINS SET.

I have been reading some literature dealing with the two-valve all-electric set made by Gambrell Radio, Ltd. It employs a pentode and incorporates wave-changing, and seems to be a particularly attractive outfit.





# THE "EASY-CHANGE" THREE—"MAXI-POWER" FOUR

## PRICE LISTS OF APPROVED PARTS

### THE "EASY-CHANGE" THREE

	£	s.	d.
1 Ebonite panel, 18 × 7 ins. . . . .		6	0
1 Hand-polished oak cabinet with 10 in. baseboard . . . . .	1	10	0
1 ReadiRad .0005 variable condenser . . . . .		4	6
1 ReadiRad .00015 differential condenser . . . . .		5	0
2 ReadiRad on-off switches . . . . .		1	8
3 ReadiRad single coil holders . . . . .		2	6
3 Benjamin vibrolders . . . . .		4	6
1 ReadiRad .0003 fixed condenser . . . . .		10	
1 ReadiRad .0002 fixed condenser . . . . .		10	
1 ReadiRad 2-meg. grid leak . . . . .		10	
1 Lissen R.C.C. unit with 1- and 1- or 2-meg. leak . . . . .	4	0	
1 ReadiRad "Hilo" H.F. choke . . . . .	4	6	
1 ReadiRad fuse and holder . . . . .		1	3
1 Igranite type J L.F. transformer . . . . .	17	6	
1 Terminal strip, 18 × 2 in. . . . .		1	8
10 Belling Lee terminals . . . . .		2	6
1 Lewcos coil, No. 60X . . . . .		4	9
1 Lewcos coil, No. 250X . . . . .		6	6
1 Lewcos coil 100 . . . . .		4	6
3 Valves as specified . . . . .	1	7	6
1 Set ReadiRad Jifilinx . . . . .		2	6
1 ReadiRad duograph dial . . . . .		6	6
Screws, plugs, etc. . . . .		1	8

TOTAL (including valves and cabinet.) **£7 2 0**

### THE "MAXI-POWER" FOUR

	£	s.	d.
1 Ebonite panel, 21 × 7 in. . . . .		8	0
1 Hand-polished oak cabinet with 10-in. baseboard . . . . .	1	10	0
2 ReadiRad 3-point on-off switches . . . . .		3	0
2 ReadiRad variable condensers, .0005 . . . . .		9	0
2 ReadiRad duograph slow-motion dials . . . . .		13	0
1 ReadiRad differential reaction condenser, .00015 . . . . .		5	0
1 Wearite filament rheostat, 15 ohms . . . . .		1	6
1 ReadiRad on-off switch . . . . .		10	
6 ReadiRad single coil holders . . . . .		5	0
4 Benjamin vibrolders . . . . .		6	0
1 ReadiRad .0002 fixed condenser . . . . .		10	
1 ReadiRad .0001 fixed condenser . . . . .		10	
2 T.C.C. .01 fixed condensers . . . . .		6	0
1 ReadiRad .001 fixed condenser . . . . .		10	
1 ReadiRad .0003 fixed condenser . . . . .		10	
2 T.C.C. 1 mfd. . . . .		5	8
2 ReadiRad 2-meg. grid leaks and holders . . . . .		2	8
1 R.I. H.F. choke . . . . .		7	6
1 ReadiRad "Hilo" H.F. choke . . . . .		4	6
1 Varley 100,000 ohms resistance and holder . . . . .		7	0
1 Ferranti A.F.3 L.F. transformer . . . . .	1	5	0
1 ReadiRad H.T. fuse and holder . . . . .		1	3
11 Belling-Lee terminals . . . . .		2	9
1 ReadiRad Standard screen, 10 × 6 in. . . . .		2	0
1 ReadiRad G.B. clip . . . . .		6	
1 Terminal strip, 21 × 2 in. . . . .		2	6
2 Lewcos coils, No. 35 . . . . .		7	0
2 Lewcos coils, No. 60 . . . . .		7	10
1 Lewcos coil, No. 250X . . . . .		6	6
4 Valves, as specified . . . . .	2	7	6
1 Set ReadiRad Jifilinx . . . . .		4	0
Screws, flex, plugs, etc. . . . .		1	6

TOTAL (including valves and cabinet.) **£11 5 6**

ANY OF THE ABOVE COMPONENTS CAN BE SUPPLIED SEPARATELY, IF DESIRED.

**KIT A** less valves and cabinet . . . . . **£4: 4:6**

or 12 equal monthly payments of 7/9

**KIT B** with valves less cabinet . . . . . **£5:12:0**

or 12 equal monthly payments of 10/3

**KIT C** with valves and cabinet . . . . . **£7: 2:0**

or 12 equal monthly payments of 13/-

**KIT A** less valves and cabinet . . . . . **£7: 8:0**

or 12 equal monthly payments of 13/6.

**KIT B** with valves less cabinet . . . . . **£9:15:6**

or 12 equal monthly payments of 18/-

**KIT C** with valves and cabinet . . . . . **£11: 5:6**

or 12 equal monthly payments of 20/9

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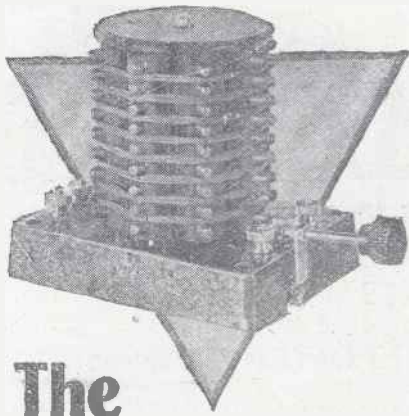
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**Cash or Easy Payments**





# The Tuner that Selects! **17/6**

**THIS** is the Watmel Dual Range Tuner. More than that, it is also a wave-trap. It transforms a "woolly" circuit into a selective one—gives snap and tuning clarity quite exceptional.

You can incorporate it easily in any existing circuit employing reaction—and you should build it into any new circuit. Loose aperiodic coupling and efficient winding are the secrets. And the Watmel Tuner is a beautifully finished job.

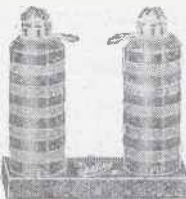
All moulded parts of attractive Walnut-mottled Bakelite. Robust positive "push-pull" switch concealed in base.

Price complete **17/6**

## THE WATMEL BINOCULAR H.F. CHOKE

gives maximum efficiency, very low self-capacity and an extremely restricted field.

Type DX3  
Inductance - 200,000 m.h.  
Self Capacity - 1.6 m.mtd.  
D.C. Resistance, 1,400 ohms.  
Price **6 -**



Type DX2  
Inductance - 40,000 m.h.  
Self Capacity - 1.2 m.mtd.  
D.C. resistance, 450 ohms.  
Price **4/-**

If you cannot get these Watmel products at your dealers, send remittance and order direct to us, and the article will be despatched by return.



**WATMEL WIRELESS CO., LTD.,**  
Imperial Works, High St., Edgware.

Telephone: EDGWARE 0323.

M.C.13.

# SHORT-WAVE NOTES.

By W. L. S.

Our expert gives you all the latest news about short-wave conditions and circuits.

**A**NYONE who spent an evening at the Show and is also a reader of these notes cannot fail to have been impressed by the *absence* of anything of great interest to the short-wave man. The number of new ideas brought into the short-wave field can certainly be counted on the fingers of one hand, and the number of commercial firms making and bringing before the public a short-wave receiver upon the other.

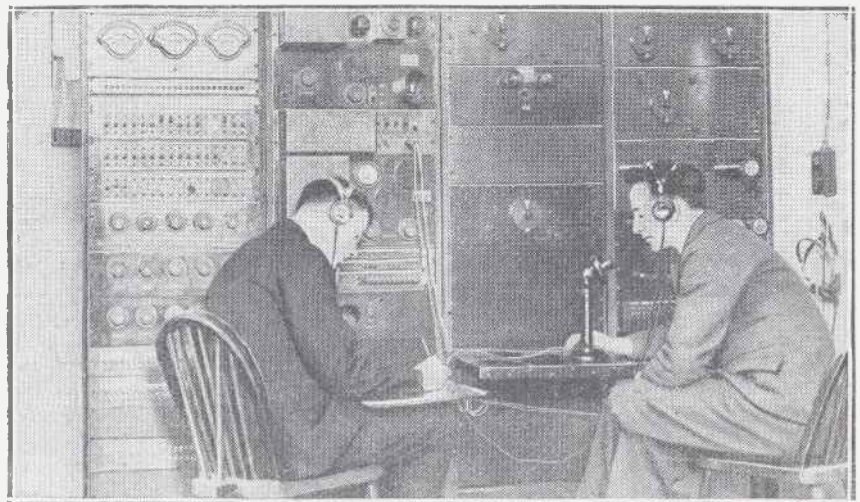
It is indeed strange that in this country the short-wave man is left so much to fend for himself. At the same time, I think this same fact has a lot to do with the undeniable success which several amateurs have met in this direction. After all, whether one receives or transmits, nothing is quite such good training as having to make one's own gear before one can get results worthy of the name!

small tuning condenser for tuning on the amateur bands (very small meaning of the order of '00002 or even '00001). To tune to the short-wave broadcast bands I have used in parallel with this something like a '0001 reaction condenser, which has been "pre-set" for whatever band I have wished to explore, all the tuning being carried out on the other.

### The Best Tuning Capacity.

I deliberately dropped this idea a few days ago and installed, in place of the two condensers, a single '00005. The immediate result was that the 20-metre amateur band occupied the 10 degrees between 8° and 18°. The strange thing was that I found I liked it! Tuning is naturally far more critical, but, given a good slow-motion dial—which I fortunately *do* possess—not really difficult, and I found that the benefit of being able to swing right round the band

## WORLD-WIDE RANGE OF RECEPTION



This is a view in the recently erected Post Office receiving station, situated near Baldock, Hert's. It is in touch with Australia and other distant parts by means of short waves.

### Why is Britain Behind?

In the States there is a huge amount of standardised short-wave apparatus on the market: much of it can be obtained over here, but the price is, as a rule, rather higher than we have as yet been "educated up to." In America the public can see the value of paying a little more for a really "super-quality" article, whereas in England it is too often the cheap and shoddy article that sells best.

Speaking in terms of sets per member of the population, I should say that even some of the remote parts of the British Empire display a greater interest in short waves than we do ourselves. Lamentable, but true!

Although I have already been accused by well-meaning readers of changing my mind on the second and fourth Sunday of the month, I hasten to admit another change that has been brought on by experience. I have always advocated the use of a very

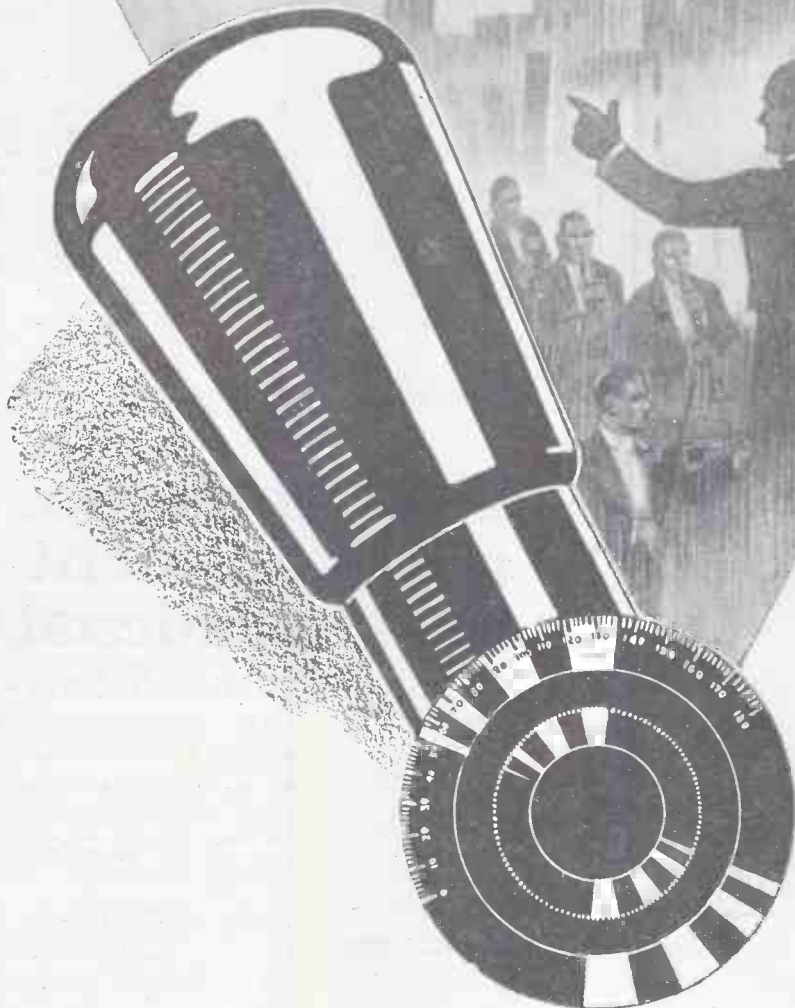
rapidly instead of having it spread over the full 100 degrees more than compensated for the extra difficulty in finding a station.

Then I tried a '0001 but did not like it at all. It would doubtless be in order for short-wave broadcast, but one simply cannot tune in weak amateur signals when the whole band, 280 kc. broad, occupies but 5 divisions.

The value for good tuning combined with a reasonably small number of interchangeable coils certainly appears to be about '00005.

Two readers, curiously enough, write to tell me of their success with indirectly-heated screened-grid valves for S.W. work, with D.C. on the filament. Not only is the well-known "buffer" effect obtained, but quite a large amount of amplification is also possible. It is well-known, of course, that the characteristics of these valves are far better than those of the directly-heated variety.

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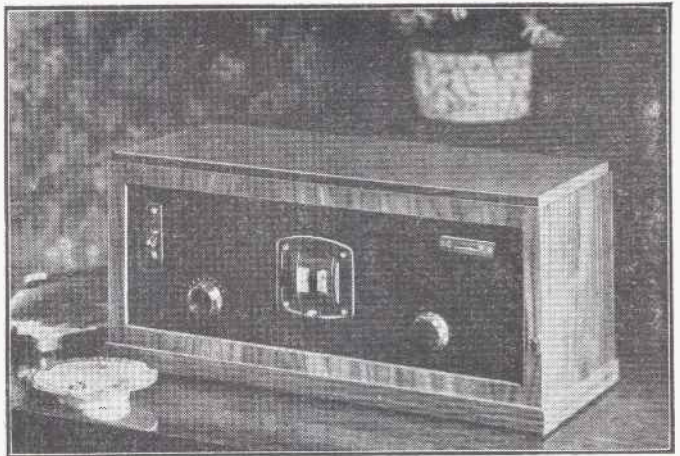
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### SUCH SIMPLICITY—

You just plug in and listen to the clear, perfectly reproduced voice or sound of any of the best programmes at home or abroad.

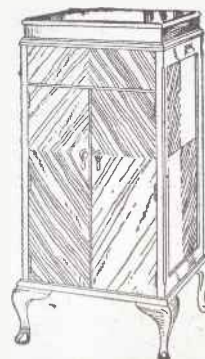
The four valves give power that thrills to handle. First the Screened Grid Valve. Then the detector followed by the first: low frequency valve. And, finally, a super power valve, ensuring a surge of pure volume that is amazing in its vivid, exact realism.

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# MAKING MULTIPLE METERS

The full constructional details of an inexpensive, easy-to-make, triple-range A.C. voltmeter.

By C. P. ALLINSON, A.M.I.E.E., F. Inst. P. Inc.

WHEN I remember my early impecunious days at wireless—long before the war—when I used to see beautifully finished variable condensers, oscillation transformers (as we called them in those days), crystal detectors, and so on, all gleaming resplendently in gold lacquer and mahogany woodwork, I can sympathise with the plaints of the equally impecunious beginner at wireless of to-day.

Since most wireless components are comparatively cheap nowadays, his chief complaint to-day very often is that he cannot afford to buy the various meters that he covets, or, if he can manage to scrape up enough for a couple, there are at least four more that he needs.

Many experimenters have a couple of D.C. meters, but when they start doing some work on all-mains A.C. stuff they find they are stuck, for their meters are useless for testing the A.C. side of a circuit.

I thought, therefore, that a method of making up a cheap A.C. meter would be rather popular, and I had a look round to see what could be done.

### A Compact Meter.

The outcome of this "think" is the compact little three-range A.C. voltmeter you will see illustrated in the photographs.

This meter has a total range of 1 to 1,000 volts. It consists of a 0-10 voltmeter with a switch which multiplies the range by 10 (thus giving 0-100 volts), and next by 100, giving 0-1,000 volts.

It consists of a cheap moving-iron voltmeter, which registers equally on A.C. and D.C., with a couple of series resistances to give the desired higher ranges.

First of all, when purchasing the voltmeter, you want the flush fitting type, and if you ask for the cheapest meter they have

in the shop you will probably get the moving-iron sort.

The great thing to notice is that for D.C. testing the voltmeter has no polarity—i.e. the terminals are not marked + and —, and it does not matter which way round you put it on to the battery you are testing

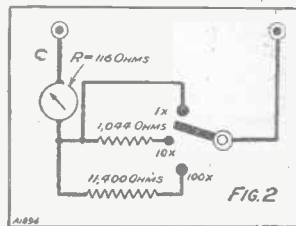
### The First Step.

Provided this condition is observed, the meter will also read on A.C. The range of the meter should be 0-10 volts.

The next thing to do is to find out what the resistance of the meter is. It is doubtful whether, with a cheap meter, the resistance value will be marked on the instrument.

If you have a friend with a resistance

### SIMPLE CIRCUIT



You should be able to make the connection easily with the help of this simple circuit diagram.

bridge he will check it up for you, otherwise you can do it yourself provided you have, or can borrow, a reasonably accurate milliammeter.

Simply put the milliammeter in series with the voltmeter across a battery of, say, 6 volts, and note the milliammeter reading. Fig. 1 shows how to do this.

Then, if the meter reads 60 milliamps, for the sake of argument, and the battery voltage is exactly 6 volts, then the resistance of the meter is 100 ohms. Ohm's

Law,  $C = \frac{E}{R}$ , is the formula you need to work the answer out. C is in amperes, E in volts, and R in ohms. Multiply C by 1,000 to give the answer in milliamps.

### The Two Resistances.

I expect that with a cheap meter you will probably find that the resistance will lie between this value and 200 ohms; I doubt if it will be higher. The one I bought actually had a resistance of 116 ohms.

Now, in order to get the higher ranges you will have to connect resistances in series with the meter. For a 10 X range a resistance nine times as great as that of the meter itself must be used. In the case of my meter, which had a resistance of 116 ohms, a resistance of 1,044 ohms was wanted. For the 100 X range you will need a resistance 99 times as great; in this case it would be 11,400 ohms approximately.

Now, for all practical purposes a resistance of 1,000 ohms would be quite



The completed instrument has a particularly neat appearance, as you can see.

satisfactory in this case, and I proceeded to wind one up.

If you buy one, be sure to get a really good, heavy wire-wound resistance, for on the full scale deflection a low resistance meter takes a fairly heavy current—in this case nearly 100 milliamps—and a cheap resistance will burn out the first time you use the meter on the full scale.

The one I made I checked up on a Wheatstone bridge, and got it exactly the right value.

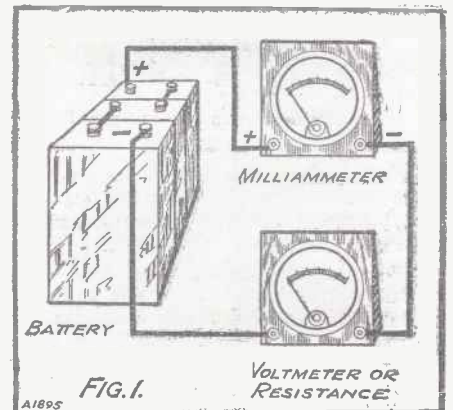
### Necessary Wire.

For those who have no bridge the milliammeter may again be called into action. The resistance being connected in place of the voltmeter in Fig. 1. A resistance of 1,000 ohms will pass 1 milliamp for every volt applied to it. So if you have a 6-volt battery you adjust the resistance till it passes 6 milliamps. If the battery shows a little over 6 volts, it may just have come off charge, get the current to read just over 6 milliamps.

The wire to use for this resistance will be not smaller than 38 gauge D.S.C. resistance wire, which has a resistance of about 8 ohms per foot. You will therefore need about 125 feet, which is about ½ oz., or perhaps a little more, depending on the insulation covering.

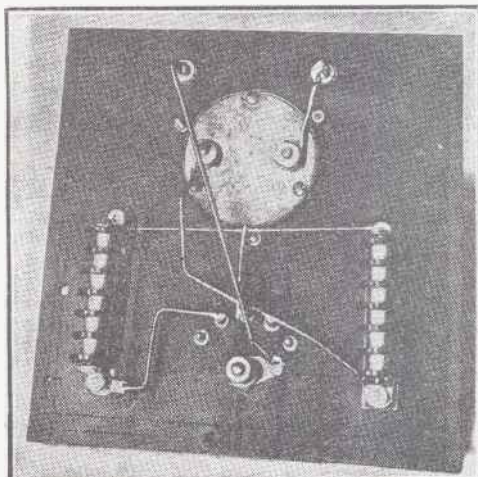
This wire will carry in the neighbourhood of 200 milliamps at a rise of 100 deg. C., (Continued on next page.)

### A VITAL VALUE



Finding the resistance of the milliammeter.

### THREE RANGES



Although you can measure three ranges of A.C. voltages, the device is far from being complicated or costly.

## PROTECTING THE PANEL.

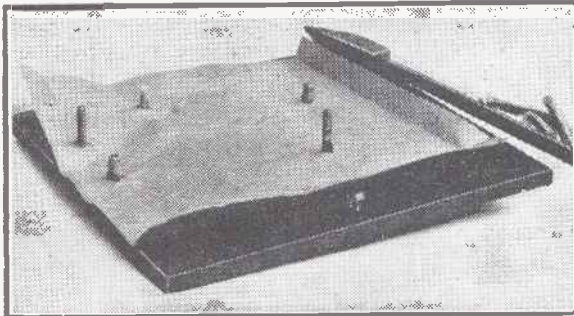
One of those little "brain-waves" that save such a lot of time, and make for tidiness and efficiency.

ONLY the tidiest worker manages to keep traces of solder and flux off the underside of his panel when soldering up the necessary connections, and, alas, we are not all tidy workers!

It is, however, a very simple matter to protect the panel from sundry traces of flux and solder when carrying out soldering operations by the straightforward procedure of placing a sheet of rather thick brown paper over the panel surface in the manner shown in the illustration.

The paper should be pressed down over the terminals, etc., and it should be turned up, more or less, at its edges in order to

### SO EASY TO DO!



A few seconds in putting the paper on, and a further few seconds in pulling it off, and all that dust and flux is kept from the panel.

prevent the escape of solder and flux at the edges of the panel.

On the completion of the soldering operations the paper is merely torn away, revealing a perfectly clean under-panel surface.

#### Simple Precaution.

This is a simple precaution which all constructors should take, for not only do flux and solder set up small leakages when their traces are left adhering to the panel, but the flux, owing to its sticky nature, tends in time to collect dust and grit, thereby increasing still further the possibility of surface leakages.

## MAKING MULTIPLE METERS.

(Continued from previous page.)

and this is its continuous rating. You will therefore see that it will safely carry the 100 milliamps that may be required without the slightest risk of burning out.

For the 11,400-ohm resistance, 11,000 ohms will do in practice. You will either need 11 times as much of the same wire, or, since this will be a little bulky, a finer gauge might be used, unless it is at all likely that it is going to be used a lot at full scale deflection on this range for long periods at a time.

For short tests—and I don't suppose you will want to test on 1,000 volts A.C. very often—a finer gauge can be used, since it will not be carrying the current long enough to heat up. A suitable gauge would be No. 42, with an approximate resistance per foot of 18 ohms. You will therefore need about 600 feet, weighing about 1 oz.

In any case, remember that the above figures are only approximate, as much depends on the actual wire used—whether it is Constantin, Manganin, Ferry, Eureka, etc.—and the weight of the covering. If you are in doubt, check up on the makers' actual figures for the wire they sell.

#### Sectional Bobbins.

The formers to use are purely a matter of convenience. I had some little sectional bobbins that did the job nicely, and I certainly advise the use of a longish bobbin so as to give ample heat radiating surface in case the meter is used constantly for long periods.

The bobbins used, and the method of mounting them between clips will clearly be seen from the photograph taken from the back of the panel. This view also shows the connections quite plainly, and used in conjunction with the circuit diagram in Fig. 2 will enable you to make the connections without the slightest difficulty.

The size of the panel is immaterial. Make it whatever is most convenient. Do put the instrument in a small box, however, since this will protect it; while the lid will be a convenient carrier for test leads. The box I have used was one I had knocking about, and I have no doubt you will be able to buy a suitable little case without difficulty for a small sum, if you haven't got one handy.

When using this meter to test a circuit of whose voltage you are doubtful, start with the switch on the 100 X position—i.e. to the right—so that if it should happen to be a high voltage the meter will be protected. If you get no reading, or a reading that is less than one unit of the scale, turn the switch to the 10 X position and proceed again according to the deflection that you get.

#### Very Useful.

You will find this meter extremely useful.

If you are doubtful whether the mains transformer is giving the heaters the correct voltage on load, use the meter and make sure. If you want to see what the regulation is like you can do so by taking all the valves out and noting the voltage on "no load." Then put them in one at a time, and note the voltage drop on each occasion.

You can also test the output voltage of the secondary winding, and provided that it is not greater than 500-0-500 you can measure across the outers. If it is higher, however, you must test between the centre-

tap, which goes to H.T. — and each outer in turn.

This will also show whether the two halves are identical. Since the meter also reads on D.C. you can then check up the voltage on the other side of the rectifier and carry out many other interesting experiments.

## A WEATHER-PROOF LEAD-IN.

The rain—and not the radio energy—runs away.

IT is of the greatest importance that the lead-in portion of the aerial circuit of a receiver should be maintained continually in as dry a condition as possible.

The photograph below depicts a very simple method of ensuring this condition.

All you require is a glass funnel having a rim-diameter of three or four inches. These articles are procurable at most chemist's shops, and they cost about ninepence each.

Place the funnel over the end of the lead-in tube, threading the lead-in wire through the stem of the funnel, as shown in the illustration. Then seal up the end of the funnel's stem with a blob of Chatterton's compound or sealing wax. The weather-proof lead-in will now be complete.

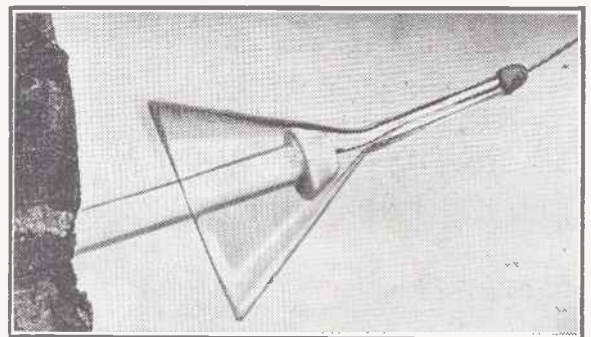
## NOISY RESISTANCES.

Building a set—Increasing selectivity—A soldering hint.

When an anode resistance is noisy do not scrap it before you make sure that the spring contact at the end of it has not worked loose.

When copying a set design take notice of such points as the relative positions of the valve holders and which way the grid and plate sockets face, as these make a great difference to the efficiency of the wiring.

## ALSO KEEPS OFF DUST



Besides protecting the lead-in against rain, you will find that this idea keeps the lead-in partly free from dust (See above).

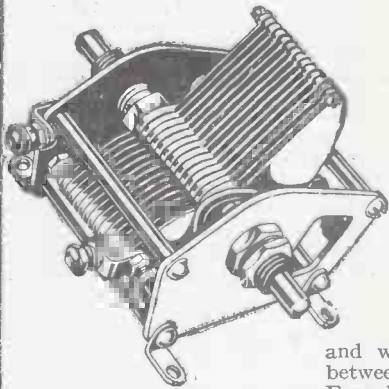
On simple sets troubled with interference a hank of wire of fifteen turns or so tied to the grid coil with cotton, joined to earth at one end and to the aerial lead at the other, often gives sufficient selectivity.

When soldering remember that as little fluxite as possible consistent with a good joint should be used, and as soon as this joint has been made, and while the metal is still hot, the superfluous fluxite should be wiped away.

# REJUVENATE YOUR SET!

The most efficient and economical way of renewing and improving the vitality of your receiver is to fit new modern-type condensers—making sure they are Polar.

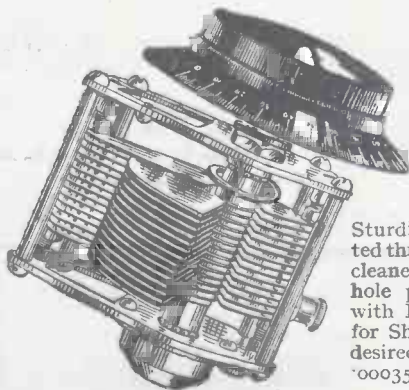
Polar Condensers and Controls by their advanced design and wonderfully precise construction put new life into your set.



### POLAR "UNIVERSAL"

In addition to being perfectly fitted for normal use, this new condenser is specially adapted for ganging. The condenser is unaffected by the withdrawal of the spindle, and when ganged the space between each unit can be varied. Four lugs ensure rigid fixing.

Locked rotor vanes. Suitable for right- or left-hand drum control or one-hole panel fixing. '0003, - 7s. '0005, - 7s. 6d. Phosphor-bronze balls 3d. extra.



### POLAR "IDEAL"

Has both Fast and Slow Motion control. Accurate tuning is easily obtained with the smooth yet firm action.

Sturdily built and constructed throughout of chemically cleaned hard brass. One-hole panel fixing. Fitted with Phosphor-Bronze balls for Short Wave working if desired. '0005 - 12s. 6d. '00035 - 12s. 3d. '0003 - 12s.

THE POLAR No. 3 possesses all the excellent qualities of the "Ideal" but is of the direct drive type only. A Slow Motion dial can be fitted if desired, but without this the condenser has a smooth yet precise action. '0003 - 5s. 6d. '00035 - 5s. 7d. '0005 - 5s. 9d. (Dial 1s. extra.)

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COMPONENTS  
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## HAVE YOUR SET 100% EFFICIENT

Have you ever built a set that wouldn't work? Has a mysterious fault in wiring or component eluded your most thorough search? How many hours have you wasted and how many valves have you burnt out when you have had trouble—how many times have you given up in disgust?

Well, from now on you can say goodbye to all that! The All-in-One Radiometer will test valves components, circuits, batteries, everything—quickly, safely and with absolute certainty.

For 12/6 you can have a wireless expert at your beck and call. You may be a radio fan or the veriest amateur, it matters not a scrap—the All-in-One will help you out. You can be sure of everything before you turn on the juice! The steady readings given on the dial are as easy to follow as the hands on your watch, and the instrument gives perfect accuracy—it has a beautifully finished calibrated mechanism that cannot let you down.

Ask your dealer for our Booklet or write direct to Pifco Ltd., Pifco House, High St., Manchester.

# 12/6

# PIFCO ALL IN ONE RADIOMETER

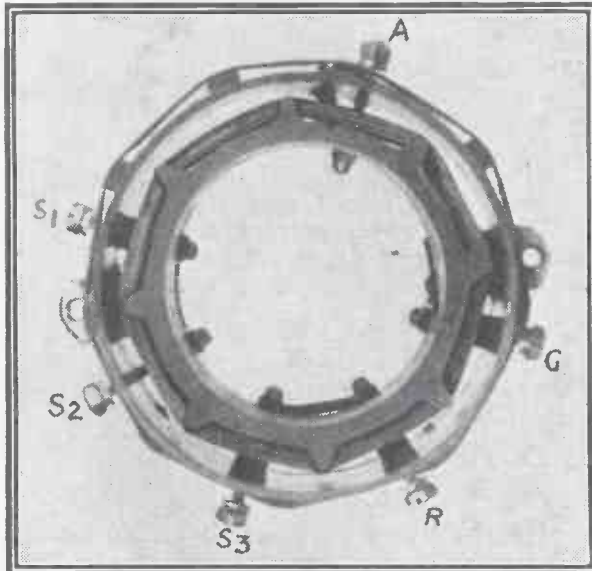


OUR new dual-range coil is going, we believe, to be one of the strongest features of our programme this season. It opens up a prospect of quite a new era of higher efficiency in wave-change

have noticed that certain wiseacres on seeing the unit have observed that since the long-wave winding is fitted quite closely inside the medium-wave one there must surely be heavy losses!

On this page you will find the promised specification and constructional details of the new "P.W." high-efficiency wave-change coil. Designed by the "P.W." RESEARCH DEPARTMENT.

SEEN FROM ABOVE



This plan view of a finished unit gives many important details. First, note the method of assembly: long brass screws pass right through formers and on being fitted with suitable nuts act as terminals. Secondly, observe carefully the markings of the terminals.

That would be true if we used one of the older schemes in which the long-wave coil is short-circuited or left to cause "dead-end" losses on medium waves, but we don't. We connect it in parallel with the other winding for medium waves, and thereby wash out the usual losses.

Very Adaptable.

So much for the efficiency question. The remarkable flexibility and adaptability of the new unit to all sorts of circuits you will see for yourself as the season progresses.

Now for the specification of the unit, so that you may make it up for yourself if you are so inclined. It is not really a difficult job, but, naturally, it is preferable that you should have had a little previous experience of coil construction.

First you want a piece of ribbed former (eight or nine ribs will serve), 2½ in. long and 2½ in. in diameter over the ribs. In the ribs you must file a series of eleven slots with the edge of a narrow file, just as was done for the "Contradyne" coil. Slots to be about ⅜- in. wide, the full depth of the rib, with a space of about ⅜- in. between them (not critical).

This former is thus equipped to carry a slot winding in eleven sections. See lower photo on this page. Ten slots are for the long-wave secondary, and one is for the reaction winding, which serves for both wave-bands.

Winding the Coil.

Now the windings. The reaction one goes in the second slot up from the bottom. Thirty turns of a fairly fine gauge, such as No. 30 D.S.C. wire.

The long-wave secondary consists of 25 turns in each of the ten slots, making 250 in all, of No. 26 D.S.C. Start at the bottom,

(Continued on page 250.)

switching circuits than has been attained before, and with much greater simplicity in set construction and wiring.

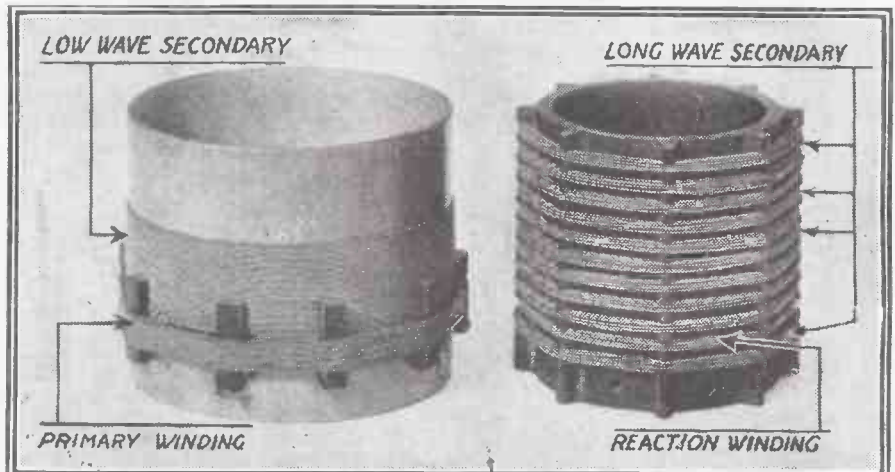
The latter points are obvious ones, but we should like to stress the question of efficiency considerably. There seems to be something of an idea abroad that dual-range coils are necessarily full of losses, and this we want to dispel.

No "Dead-End" Losses.

It may be true enough concerning many of the earlier types, but later research has shown how those losses can be cut down well-nigh to vanishing-point. It is now possible to design a dual-range unit which is well up to the standard of the best practical single-range types.

That is a strong statement, but we make it advisedly, for that is exactly what we have done in our new unit. We particularly want to emphasise this point, because we

READY FOR ASSEMBLY

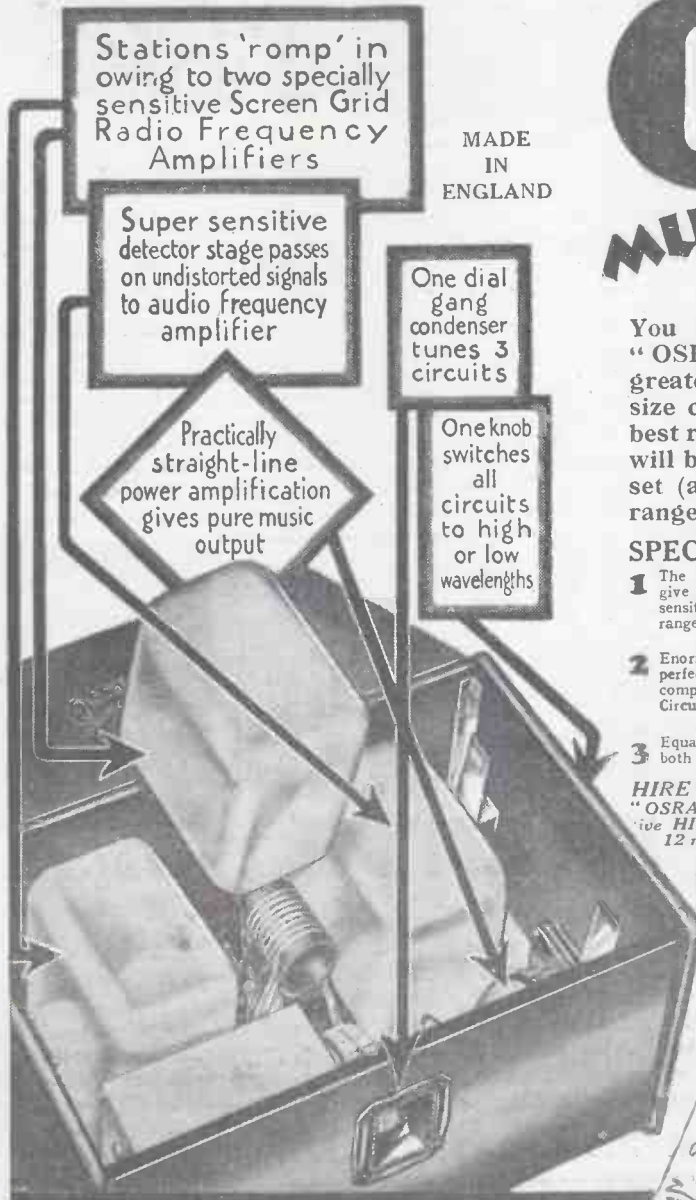


Here you see the outer and inner formers wound and ready for fitting together. Note particularly the position of the windings on the inner former in relation to those on the outer tube.



EVERYTHING **The G.E.C.** ELECTRICAL  
your guarantee

# Make the set that has made a nation wonder!



Stations 'romp' in owing to two specially sensitive Screen Grid Radio Frequency Amplifiers

MADE IN ENGLAND

Super sensitive detector stage passes on undistorted signals to audio frequency amplifier

One dial gang condenser tunes 3 circuits

Practically straight-line power amplification gives pure music output

One knob switches all circuits to high or low wavelengths

# Osram

## MUSIC 4 MAGNET

You assemble the various parts of the "OSRAM MUSIC MAGNET 4" with the greatest ease directed step-by-step by a full size constructor's Instruction Chart. The best results are certain of attainment. You will be thrilled at the mighty power of this set (and yet it can whisper), its immense range and perfect purity and fidelity.

### SPECIAL FEATURES

- 1 The two Screen Grid Stages give extreme selectivity and sensitivity with an unrivalled range.
- 2 Enormous amplification with perfect stability is given by the complete shielding of H.F. Circuits.
- 3 Equal efficiency guaranteed on both wave length bands.
- 4 Change of wave length is effected by an external switch and the set need not therefore be opened.
- 5 Maximum ease in tuning with a single knob controlling triple gang condenser.
- 6 Assembly is the essence of simplicity.
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# MY IDEAL CHILDREN'S HOUR



**COLUMBUS,** the Director of the Children's Hour, says "It would be as dangerous to generalise on the subject of children's tastes as it would be to generalise on the tastes of their elders." Maybe; well, here are the opinions of some well-known radio folk on this important hour in the day's programme.

By Clapham & Dwyer, Vivian Foster, Rev. B. G. Bouchier, M.A., Leonard Henry, De Groot, Maurice Cole and Gracie Fields.

**CLAPHAM AND DWYER:** "Columbus," the Aunts and all the other personalities of the Children's Hour deserve all the laurels they can get (provided that the prickly bits of the laurels don't stick in them!) for it's not honey or easy money trying to be funny to the kiddies.

Bless their little hearts, they need wireless just as much as the grown-ups, and they get it—what with broadcast school lessons and a whole hour devoted to them. And what hard work it is compiling that hour!

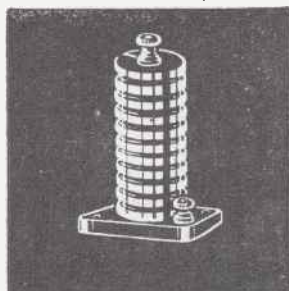
Nobody seems to know just what children want; that's the trouble. Critics write to Savoy Hill and say: "Your Children's Hour

is highly dangerous! I listened to it last night with my twins, and tried to think, myself, as a child would think. The result is that I am thoroughly shocked at the sophisticated stuff you put out."

But how can a mummy or a daddy think as a child thinks? One who tries to think as a child usually ends up by just thinking simple. That gets us nowhere. Children don't think simple!

Other fond parents write in this style: "How SWEET of you to broadcast for the DEAR little kiddies. But why don't you tell more FAIRY stories? I'm SURE every teeny-weeny little one wants to hear tales like THAT."

(Continued on page 246.)



**4/6 READI-RAD HILO "HILO" H.F. CHOKE**

A real "de-luxe" H.F. Choke specified time after time by the most famous designers of the British Technical Press. Used by all discriminating constructors. High inductance; extremely low self-capacity. Efficient over tuning range of 10 to 2,000 metres. Solid ebonite hand-turned former, on bakelite base, designed to take up minimum baseboard space.

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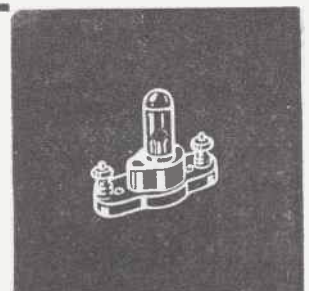
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**READI-RAD 1/3 FUSE**

An essential component in every receiver. Protects your valves from damage due to accidental wrong connections of battery leads. Rated to blow at 100 m/a. Bakelite moulded base of particularly small dimensions and neat design. Easily fitted on baseboard with accessible terminals.

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Bulb 6d.

Spare Bulbs, 6d. each.

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HERE is a magazine of the highest quality at a price within the reach of every purse—a magazine that everybody has been waiting for! The LONDON at 6d. is big; it is bright; it is full of attractive stories, articles and illustrations, all by authors and artists of world-wide reputation. If you want to make certain of the NEW LONDON you should order your copy at once. Here are some of the good things you will find in this issue:

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Exactly like a real oil painting.

Splendid features from such well-known contributors as:

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GILBERT FRANKAU  
SELWYN JEPSON, E. BARRINGTON

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- How I Decorated My House for £25
- The Rise of Maurice Chevalier
- The Care of Clothes
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On Sale  
Friday,  
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New  
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# Varley

## — THE TALK OF OLYMPIA!



The sensation of the Radio Exhibition. Everywhere the Varley All-Electric Radio-Gramophone is being discussed. Never before has such perfection been attained. Clear treble and powerful bass, each note vibrant with life. Low organ notes that you *feel* rather than hear. Music with the freshness, the crispness, the vitality of the real thing. Varley All-Electric Radio-Gramophone (A.C. or D.C.).

Price 85 guineas.

Available on hire purchase terms.  
Arrange for a demonstration.

Write for Section A of Varley Catalogue for full particulars of Varley All-Electric Radio-Gramophones and Receivers.



Advertisement of Oliver Pell Control Ltd., Kingsway House, 103, Kingsway, London, W.C.2. Telephone: Holborn 5303.

**MY IDEAL CHILDREN'S HOUR.**  
(Continued from page 244.)

But do they? Nowadays children seem to prefer Jules Verne to Hans Andersen. And—so we fervently hope and trust—they prefer funny things like Cissie the Cow to tales of Cissie the Silver Fairy.

**The "VICAR OF MIRTH."**



Vivian Foster, the famous "Vicar of Mirth."

The kiddies, we say in unison, don't like to be talked-down-to. They like the loud speaker to make them hold their little sides with mirth, or they like music such as friend Jack Payne gives them, or they like bogy stories with plenty of oooooo-ooohhh eerrrr

about them! Sort of "A. J. Alan-for-the-young" stuff!

**VIVIAN FOSTER** ("The Vicar of Mirth"): I would include an entire novelty—that of the broadcaster asking questions

in a humorous manner, and the listening kiddies answering as though he were actually in the room. It would be "playing at school."

It would lead to much fun, for anyone could reply, seriously or jokingly, raising a merry atmosphere around the loud speaker.

I think that the title ought to be "Mirth Minutes."

Each day a motto would reign, but in a funny way. "Make Hay while the sun shines" would be "Grasp opportunity—never fix the "opportunity." And so on.

Every afternoon there would be a fight, with some mock subject chosen to get a knock-out—a bit of bad grammar, for example, or the mis-spelling of a word. Great fun!

**All Very Jolly!**

Then would follow amusing questions on almost any subject under the sun. The children could write their answers on slips of paper, and in the following day's "Mirth Minutes" the correct answers would be given, and could be checked.

At home any kind-hearted uncle could be induced to offer a prize for the best results of so many "Mirth Minutes."

It would be all very jolly. *Yes, I think so!*

**LEONARD HENRY:** You know, I've never actually broadcast in a Children's Hour (for which I'm truly thankful), so you can take what I say with a grain of salt!

I guess the personality required of a radio "Uncle" must be really great. During my first week of radio I was asked to introduce newcomers to the microphone, and make them feel at home.

I have, therefore, a horrid fear that the B.B.C. Staff are not so simple as they look!

Besides, I'm not so sure that I get on well with the children. Only the other day I met a friend in the street with a chirpy youngster running round her.

"Well, Mrs. X," I said. "And I suppose (this is your little boy?)"

"Who the blazes did you think I was—her husband?" asked the very modern youngster.

And then, again, some of the Children's Hours do not introduce a feeling of Peace. One of the broadcasters, who has a little boy of his own, had to punish him one day.

"My boy," he said, "I understand that for no apparent reason you threw a stone at little Jimmy next door. Why did you do this?"

"Well," replied the boy logically, "afterwards—he hit me!"

**"UNCLE LEONARD"**



One of our most popular broadcast comedians—Leonard Henry.

(Continued on page 248.)

# FOR ALL CIRCUITS

IN

## "POPULAR WIRELESS"

**DUAL RANGE TUNER (W.G.2)**  
Single-Hole fitting Inductance covering Broadcast and Daventry Bands. The short-wave section is single-layer wound and the long-wave portion section wound to avoid losses due to self-capacity in winding. Changing from long to short band is operated by a small knob on top of dial. Dimensions 3 1/2" deep x 3 1/2" x 3".

Price **15/-**

An entirely new **L.F. COUPLING UNIT**  
Something really new for your set—an addition which will make a remarkable difference to your reproduction.

Complete with **Switch for Tone Control**

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**QUICK MAKE-&-BREAK SWITCHES**  
Supplied in Single and Double Pole Make-&-Break Change-over—with delayed action for indirectly heated valves.

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An extensive range designed for use on H.T. Supply Units

Prices from **25/-**

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# WEARITE COMPONENTS

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# The SQUIRE SYLPHONE

Manchester Radio Exhibition.  
Stand No. 15, Gallery.



## THE SQUIRE SYLPHONE.

Model 21, for D.C. mains (high or low resistance) . . . £8 15 0  
Model 21 A.M., for 6 volt accumulator . . . £8 15 0  
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*THE new Squire Moving Coil Speaker*; it incorporates laterally supported diaphragm with free edge—increased concentrated field—no field leakage—no air-damping of moving coil—vibrationless moving coil—full efficiency over complete audio-frequency range and many other new scientific features.

The maximum advance in quality of reproduction has been made in this speaker.

Ask your dealer to let you hear one.

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LESWIN PLACE, STOKE NEWINGTON N.16

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## You can BUILD THIS H.T. ELIMINATOR in less than 2 HOURS

WITH a screwdriver and a pair of pliers this efficient Stal H.T. Eliminator can be built in less than two hours and at a saving of over 40%. There is no soldering, no dirt, no mess—you can build it in the drawing room. The Stal kit of parts comes to you complete (except for the rectifying valve) with full and explicit instructions and illustrations which make the building so easy you can't go wrong.

Why then bother about all-electric sets, few of which are yet fully efficient, when you can make your present tried and trusted set into an all-electric by using this economical Eliminator for your H.T. and by fixing a Stal Charger (costing only 17/6) to your accumulator for a constant L.T. supply:

Write for full particulars

**NOTE:** If you do not wish to build up the Stal Eliminator yourself, your dealer will be glad to do it for a small charge and you will still make a very substantial saving.

### A.C. H.T. JUNIOR KIT.

Output, 140 volts 20 m/a 1 variable tapping.

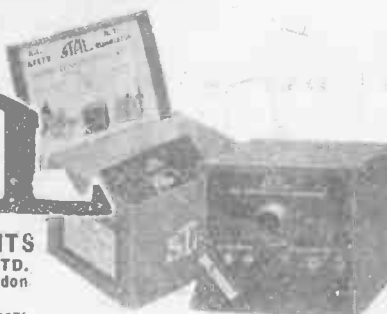
Plus 9/6 for Triotron. G.N.14 rectifying valve. **42/-**

Senior Kit, output 175 volts 40/50 m/a, 3 variable tappings. 60/- plus 12/- for Triotron G.A.24 rectifying valve

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Easy reading  
Smooth action  
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No crackle

**MID LOW LINE CONDENSER**  
9/6  
The lightest lowest loss & most efficient Condenser extant  
Capacities  
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Caps mfd. 2, 1, .5, .25, .1

**Bakelite cased 600 volt test mains Condenser.**  
Prices 3/-, 2/2, 2/-, 1/8, 1/6

**FORMO-DENSOR**  
3/6  
A great little variable compressor type condenser

**MIKA DENSOR**  
400 v. test  
Bakelite and Mica  
Caps. Prices  
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**Drum dial trimmer control.**  
8/6 with one Condenser, 13/- with two. 17/6

**A truly phenomenal illuminated drum dial with trimmer control.**

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7 of out 25 Lines

C.H.S.

## MY IDEAL CHILDREN'S HOUR

(Continued from page 246)

**REV. B. G. BOURCHIER, M.A.:** The Children's Hour does not always last an hour. It has nothing like the great listening audience possessed by the normal evening programmes. Yet it is one of the most important B.B.C. features.

"It brings new life into the limited life of a child, and it teaches the coming generation to appreciate the marvel of radio, and the power of the microphone.

### "MOST IMPORTANT"



The Rev. B. G. Bourchier, M.A., considers the Children's Hour a most important feature of the programmes.

My candid opinion is that the Hour should not be given over entirely to merriment. Educational items should be subtly introduced. Opportunities should be seized during the Hour to educate even when not appearing to do so.

There is a feeling that if kiddies are not treated in the "old-fashioned" way—that is, with plenty of Grimm, Lewis Carroll and

so on, they will become sophisticated. Some parent listeners to the Hour deplore

the frequent broadcasting of mystery yarns with fairly technical details, high-class orchestral selections, and modern poetry. They say that such things are above the heads of children, and if they aren't, then they ought to be!

Do they forget that the world is growing older? *What suited us as children won't suit our children, either in school or on the wireless.* A modern child who talks about television is no more sophisticated than was a child of our day who talked about the telephone.

**DE GROOT:** Music should be the keynote of the Children's Hour. The ages of the children who listen-in during this feature range, I should think, from four or five to fourteen or fifteen.

There is only one short period each day available; it must be after school and before going to bed.

So, you see, it is almost impossible to find items which will appeal at the same time to children of all ages.

Stories and fairy tales won't do. They are puzzling to the toddlers, and are scoffed at by the elder children.

The *only thing* which has a universal appeal is music.

### MUST HAVE MUSIC



"Music is the only thing with a universal appeal to all ages," says De Groot, the famous violinist.

**MAURICE COLE:** Really I have no suggestions as to how the Children's Hour should be run. I have merely gone to the studio and listened (or otherwise!) to the rest of the programme, and played my items!

In the early days I was called "Uncle Maurice," and I announced the titles of my pieces. But since the B.B.C. became a Corporation this has not been allowed!

**MISS GRACIE FIELDS:** As a kiddie I used to hate doubtless well-meaning folk who spoke of "girly" instead of girl, and "housie" instead of house.

Therefore my Hour wouldn't have in it any of that bosh which brings down the level of intellect.

Children do like listening to other children and envying their position at the microphone.

Therefore the idea of having simple competitions and allowing the successful kiddies to broadcast is an excellent one, though I don't believe it has been done for a long time.

*Verb sap!*

### "UNCLE" MAURICE



Maurice Cole, the celebrated pianist, has no suggestions to improve the B.B.C. Children's Hour.

### GUARANTEE.

All valves despatched under guarantee of Money Back in Full if not satisfied and returned within 7 days. All valves are carefully packed & breakages replaced.

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4/6	Type	Fil. volts.	Amp.	Imp. ohms.	Amp. Inc.	
ZAINI	GPR 4/6	2.5	0.05	50,000	12.5	H.F. Det.
	GPR 4/6	2.5	0.05	12,000	5	L.F.
	GPR 4/6	2.5	0.05	40,000	25	H.C.
POWER	GPR 5/6	2.5	0.05	15,000	10.0	H.F. Det.
	GPR 5/6	2.5	0.05	40,000	41	H.C.
	GPR 5/6	2.5	0.05	20,000	15	H.F. Det.
EACH	GPR 11	5-6	0.1	11,000	5.5	H.C.
	GPR 11	5-6	0.1	31,000	9.5	H.C.
	GPR 11	5-6	0.1	75,000	61	H.C.
SUPER POWER	GPR 20/5	2.5	0.05	8,000	7	Power
	GPR 20/5	2.5	0.05	8,000	7	Power
	GPR 20/5	2.5	0.05	8,000	7	Power
EACH	GPR 120/3	3	2,000	45	Super Power	
	GPR 140/4	4	3,500	45	Super Power	
	GPR 120/3	3	220,000	160	H.C.	

2 valves or more sent POST FREE.

# THE GOLDEN P.R. VALVE

## SUPREME IN TONE, SELECTIVITY AND MIGHTY VOLUME

Don't run away with the idea that because a valve is expensive it must be good. There is just as much scientific thought—just as much careful workmanship in the Golden P.R. Valve as there is in the highest-priced valve of any make, and it is covered with a written guarantee of life and efficiency. Until you have tried a Golden P.R. you do not know what you have missed in tone, selectivity and mighty volume; and you save a fine sum, too.

## THE LOWEST PRICED RELIABLE BRITISH VALVE ON THE MARKET

Send for one to-day or ask your dealer—you will be astonished at the excellent results. That is because we keep up-to-date, constantly improving the emission and strengthening the filament. Remember, that you can get 2 Golden P.R. Valves for the price of one standard British valve. Why waste money?

## The Best, Most Economical and the CHEAPEST.

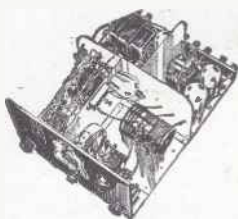
Matched Valves 1/- extra per set. Sent C.O.D. if desired. All P.R. Goods sent C.O.D. if preferred. Ask your dealer for them. Accept no other. 'Phone: City 3788.

**P.R. Products** (Dept. P.) P.R. HOUSE, 14, NEWGATE STREET, LONDON, E.C.4 (Opposite G.P.O. Tube Station.)

### MAKE UP THIS FINE ALL-ELECTRIC RECEIVER

## "SENSITITE"

A.C. SCREENED GRID. DETECTOR. PENTODE  
Everything Supplied. Nothing Else to Buy.  
All the latest Refinements.



One-knob control—Illuminated dial—Gramophone pick-up—Automatic grid bias—Simple selectivity adjustment. No soldering—A screw-driver and pliers is all you require—Panels and screens drilled. Full size blue print ... .. **£9-10-0**

This highly efficient all-mains Receiver is unique in many respects. Simple to build—simple to operate—it has truly remarkable selectivity, sensitivity and purity of reproduction. It is not only selective enough to entirely separate the twin stations when these are but 5 miles away, but will bring in at moving coil strength all the principle European stations.

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**THE WHOLESALE WIRELESS CO.,**  
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## 12 Guinea WIRELESS CABINET for £3

JUST ASSEMBLE IT YOURSELF  
THE "OSBORN"-WAY THAT'S ALL

No. 219. A Radio or Radio Gramophone Cabinet. 3' 9" high, 2' 2" wide, and 1' 6" deep. The battery and loud speaker compartments are at the bottom and are partitioned off. Size of the base behind the fret is 24" x 24". Metal fabric for the fret front is included. Opening at the top and back. This cabinet will take a panel 2 ft. x 9 ins. or smaller.

Ready to Assemble:  
Oak 65/- Mahogany 70/- Walnut 80/-  
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THE REGENT WORKS, ARLINGTON ST., LONDON, N.1.  
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## THE SET DEPENDS UPON THE TRANSFORMER



A marvel of production in L.F. Transformer design. The quality of material and workmanship guarantees results which might be envied by transformers costing three times as much.

Ratio  $3\frac{1}{2}$  to 1, Price **£/6**. 7-1 Ratio model, **12/6**.  
From all dealers of repute or direct from the manufacturers.

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# THIS AMAZING ALL-MAINS UNIT ECLIPSES EVERY OTHER . . . .



## MAKE ANY SET ALL-MAINS —PORTABLE OR STANDARD

**PRICE**  
**£6-0-0**  
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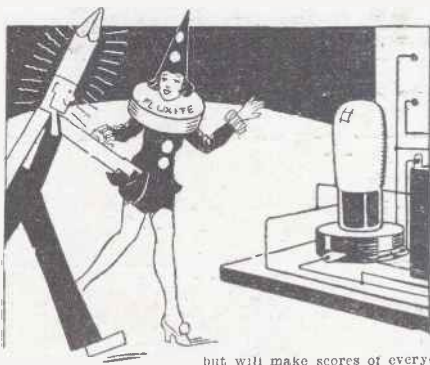
or 10/- down and the balance in 7 monthly instalments of 15/6 each and one of 14/6.

Experts agree that this combined Eliminator and Trickle Charger is the most outstanding Mains Unit of all time. It is as simple to use and as compact as an H.T. Battery and every bit as safe.

It is especially suitable for providing the conveniences and economy of All-Mains Radio with such sets as the Mullard "Orgola" the Osram "Music Magnet" and the Cossor "Melody Maker."

**ASK YOUR DEALER OR WRITE TO MAKERS FOR FOLDER No. 55.**

There are two variable tapings of 0/100 and 0/120 volts respectively, and one fixed of 150 volts. Output 25 mA at 150 volts—the highest of any unit designed for portables. The Trickle Charger caters for 2-, 4- and 6-volt L.T. Accumulators, incorporates the Westinghouse Metal Rectifier and is guaranteed for 12 months.



"We're Fluxite and Solder—The reliable pair, Famous for Soldering, Known everywhere! If you're fixing up Wireless There's no need to fret, Let US join the connections—Then Perfection you'll get!"

See that Fluxite and Solder are always by you—in the house, workshop, garage—anywhere where simple, speedy soldering is needed. They cost so little For Pots, Pans, Silver and Brassware; RADIO; odd jobs in the garage—there's always something useful for Fluxite and Solder to do.

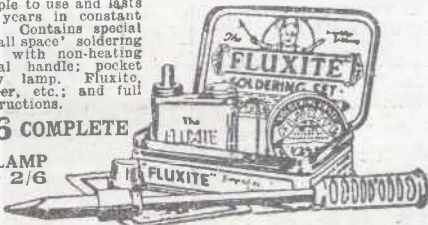
**ANOTHER USE FOR FLUXITE:** Hardening Tools and Case Hardening. Ask for caft on improved method

### FLUXITE SOLDERING SET

Simple to use and lasts for years in constant use. Contains special 'small space' soldering iron with non-heating metal handle; pocket blow lamp. Fluxite, Solder, etc.; and full instructions.

**7/6 COMPLETE**

or LAMP only 2/6



FLUXITE LTD. (Dept. 324), Rotherhithe, S.E.16

All Hardware and Ironmongery Store. Sell Fluxite in tins, 8d. 1/4 and 2/8

ALL MECHANICS WILL HAVE  
**FLUXITE**  
—IT SIMPLIFIES ALL SOLDERING

# "CLARKE'S" "ATLAS" MAINS UNITS

H. CLARKE & CO. (M/CR), LTD., OLD TRAFFORD, MANCHESTER

## THE NEW "P.W." COIL.

(Continued from page 242.)

put 25 turns in first slot, miss over the second slot, leaving it empty for the reaction winding, and continue in third slot, and so on up to the top.

Now the reaction coil: The direction of this is vital. The starting end is to be joined to the lower end of the large winding, and it is then to carry on as though it were a continuation of the latter. Imagine that

**NEXT WEEK.**

## Another GREAT GIFT Number

ORDER YOUR COPY NOW

Price 3d. as usual.

the large coil had finished at the bottom, then carry on the reaction winding as though it were the same winding having another section added in a continuing direction.

The outer former is 2½ in. long and 3 in. in diameter, and is of Pirtoird or other good material. Low-wave secondary has 48 turns of No. 24 D.S.C., in the same direction as the long-wave secondary. Supported above the lower end of this on eight or nine ebonite spacers (about ⅜ in. × ¼ in. × ⅜ in.) is the primary, containing 12 turns of the same wire in the same direction.

Important: Lower edge of primary to come over lower edge of low-wave secondary, which in turn is to come over lowest slot in long-wave former.

### Connecting Up the Windings.

Next, the connections: Top ends of both secondaries go together to "G." Top end of primary to "A," lower end to "S<sub>1</sub>." Lower end of low-wave secondary to "S<sub>2</sub>." Lower end of long-wave secondary and start of reaction to "S<sub>3</sub>." Finish of reaction to "R."

Method of Assembly: Six lin. brass screws passed outwards through both formers. Positioning can be done with nuts or ebonite washers (cut from small tubing) between formers. Double nuts on outer ends to serve as terminals, preferably with soldering tags. All to be placed round lower edge of formers, in positions shown.

Mounting in sets: Small brass brackets attached at the bottom, or a wooden cross-piece fitted inside ribbed former. Screws downwards through cross-piece into base-board of set.

## RADIOTORIAL.

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

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

The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless reception. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialities described may be the subject of Letters Patent, and the amateur and the trader would be well advised to obtain permission of the patentees to use the patents before doing so.

## QUESTIONS AND ANSWERS.

### SWITCHING OFF H.T.

Arising out of a query from a Devonshire correspondent, which was answered in "P.W." No. 432, September 13th issue, a number of letters have been received dealing with the switching off of H.T. with an ordinary make-and-break switch, in such a way that the possibility of danger from an H.T. short across the filament is prevented.

The reply in "P.W." named above stated: "With the ordinary on-off switch no matter how you connect the L.T. leads it is impossible definitely to break both circuits. (Apart from the fact that when the L.T. circuit is broken

(Continued on page 252.)

# NEW IGRANIC Components

## IGRANIC CHOKES



IGRANIC CHOKE

The new range of Chokes includes the following sizes:—

**TYPE C. 15.** Has a constant inductance of 20 henries with polarising currents up to 15 milliamps. D.C. Resistance 1,000 ohms.

**TYPE C. 30.** Has a constant inductance of 20 henries with polarising currents up to 30 milliamps. D.C. Resistance 500 ohms. Specially suitable for use as a Smoothing Choke in H.T. Supply Units.

**TYPE C. 60.** Has a constant inductance of 20 henries with polarising currents up to 60 milliamps. D.C. Resistance 340 ohms.

**TYPE C. 150.** Has a constant inductance of 20 henries with polarising currents up to 150 milliamps. Resistance 20 ohms.

Write for a copy of our new Catalogue to Dept. R. 162.



IGRANIC DIFFERENTIAL CONDENSER

IGRANIC DIFFERENTIAL  
CONDENSER.

CAPACITY 00115 mfd. ON EACH SIDE

PRICE . . . 3/9

IGRANIC CHOKE	PRICE
TYPE C. 15.	10/6
" C. 30.	15/6
" C. 60.	21/-
" C. 150.	45/-







A  
good item  
on any  
programme

*Player's  
please*

*It's the  
Tobacco that Counts*

N.C.C.899

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To get the best out of that "P.W." set of yours you should make a special point of reading MODERN WIRELESS every month. Among its exclusive features is:—

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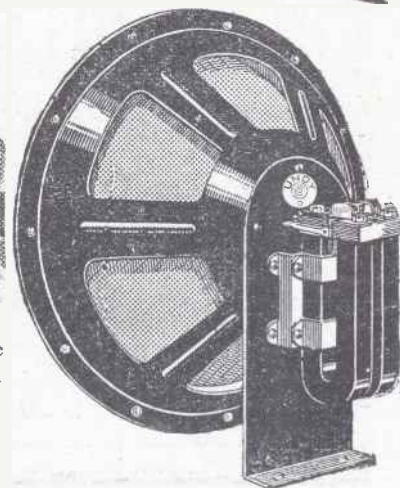
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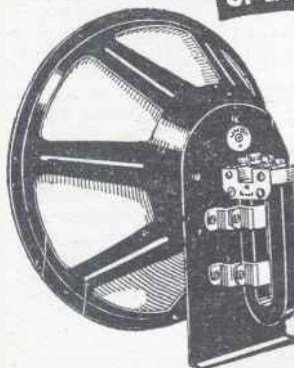
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<b>COSSOR EMPIRE MELODY MAKER KIT.</b>	1931 Model, S.G., Detector and Power.	Balance in 11 monthly payments of	<b>12/6</b>
<b>ONLY</b>	Cash £6:17:6		
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Important Note: All above Kit prices include valves and cabinet.

## THIS WEEK'S SPECIAL! THE ADAPTGRAM.

<b>SEND</b>	The instrument which converts your existing radio receiver into a modern radio gramophone. 9" x 7" x 4" gramophone motor, B.T.H. Pick-up and tone arm, and Frost Volume Control included. Takes any set up to a panel size 21" x 8", or baseboard depth 16". Cash price £11:19:6	Balance in 11 monthly payments of	<b>20/-</b>
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<b>ONLY</b>			
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<b>SEND</b>	<b>CELESTION D.12 LOUD SPEAKER.</b> An entirely new model in oak. Cash price £5:0:0	Balance in 11 monthly payments of	<b>9/2</b>
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## RADIOTORIAL QUESTIONS AND ANSWERS.

(Continued from page 250.)

the cessation of the filament current automatically cuts off the high tension.) If you require to break the actual lead from the high-tension battery, as well as that from the low-tension battery, you require THREE contacts. . . . etc."

This statement has been widely doubted and several readers have sent in diagrams showing exactly how ordinary on-off switches have been arranged in their own sets.

In all the diagrams submitted the same effect occurs. The H.T.+ of the battery is left connected to the H.T.+ on the set and to the plate wiring, etc., H.T.- is left connected to the H.T.- terminal and to the L.T.-, and the switch is so placed that it breaks the contact between these two points and the earth, filaments, etc.

It is then supposed that the filaments are in this way protected when the switch is "off," but a little consideration will show that this is not the case.

Why not? Because an L.T. battery of very low resistance remains connected to the L.T. terminals in practically all cases, the other side of this battery being connected to the L.T.+ terminal and to the filaments. The

## HOW IS THE SET GOING NOW?

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

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

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

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

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

switch in fact is bridged or "paralleled" by this battery in series with the filaments, and consequently it offers not the slightest protection against an H.T. short, unless the L.T. battery is disconnected from the set, which in the ordinary way is never done!

To break the actual lead from the high-tension battery negative, as well as that from the low-tension battery, requires a three-contact switch of the type to which three wires may be joined, all of which are disconnected from each other when switched off, and all joined together when the switch is on.

With this kind of switch the H.T.— wire is taken to one terminal and the remaining two terminals are joined to the two sides of the filament circuit in the ordinary way. When the switch is "open" L.T. is really disconnected from both sides of the filament, and these are disconnected from each other. When closed both the circuits are completed ready for reception.

### THE "STAR-TURN SELECTOR" FOUR.

F. L. (Birchington-on-Sea), "OLYMPIA," and OTHERS.—"What are the windings, etc., for the Selector coil in the 'Star-Turn' Four? (Described in 'M.W.' last July.)"

(Continued on next page.)



## GREATEST AMPLIFICATION LESS RECORD WEAR

The reason why the Wates Pick Up reproduces all those subtle gradations of sound with perfect balance and uniformity of tone at any volume strength, is found in the scientifically correct combination of weight, balance and needle tracking.

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GLASGOW.



## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

Full details for the "Star Turn" coils were given in the May issue of "Modern Wireless" for those who prefer to make their own coils. The "Selector" coil for the aerial circuit is very easy to wind, especially for the man who has had previous experience in this class of work.

The former is a piece of insulated tubing 3 in. in diameter and 3½ in. long, and into each end of this you should fit a wooden cross-piece with a hole in the centre through which you can pass the long spindle of the stud switch to be mounted later, upon one end of the tube. One of these end cross-pieces will provide a means of mounting to the panel.

Two wood screws pass through holes in the panel into it, and hold the unit firmly in place. The other cross-piece is to provide a means of attaching the stud switch to the end of the tube.

This switch has eighteen studs and can be made up of odd parts on a piece of ebonite about 3½ in. to 4 in. diameter. The contact arm is operated by a spindle which passes through the centre of the coil and goes through the panel, and has a knob on the end and preferably a pointer to indicate the position of the arm.

The tube carries three terminals, A, B and C, in the positions shown on the wiring diagram. The winding consists of a single layer of 84 turns of No. 24 D.C.C. wire, which is started by connection to terminal C.

Start at the end nearest the panel, put on 20 turns and take out a tapping to No. 1 switch stud, put on

## TECHNICAL TWISTERS

### No. 30.—THE L.T. SUPPLY.

#### CAN YOU FILL IN THE MISSING LETTERS?

As your L.T. battery will need frequent . . . . . it is advisable to duplicate it, if possible. In other words, have . . . batteries, one in . . . and one on . . . . .

Apart from the voltage, you must consider the amount of . . . . . it can supply, which is popularly called its . . . . .

An L.T. B.'s capacity is reckoned in . . . . .-hours, and if you know how much . . . . . current your set takes, you can easily calculate how often you must re-charge.

Dividing the battery's actual ampere-hour capacity by . . . gives the maximum current in amps. that it can safely supply.

Last week's missing words (in order) were :

Ignition ; Actual. More. Voltage, Doubled. Voltage, Doubled.

four more, tap out to No. 2 switch stud, four more turns and tap to No. 3 stud, and so on till you come to No. 17 stud, at which the winding ends.

Stud No. 18 is blank except that it is wired to terminal B. Make one other connection, i.e. a wire from terminal A to the arm of the switch, and the coil is complete.

#### CUTTING OUT FIRST VALVE OF "MAGIC" FOUR.

R. H. H. (Liverpool).—"I have built your 1930 'Magic' Four and I wish to thank you for this wonderful set. It is most selective and the volume is good.

"One might term it a 'man's set.' The only snag (I beg your pardon!) is the big consumption of H.T. to the small-pocket-money-holder like myself. I wonder if you, in the near future, will be giving the builders of this set a tip how to fix a switch to cut out the

(Continued on next page.)



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ANYBODY CAN DO IT! It has probably never crossed your mind before. You have thought of batteries as "Technical" things—always regarded them as something "mysterious."

The exact opposite is the case. Study the pictures on the left and you will see how really simple it is. You will need no expensive "plant" or machinery—only a few simple tools and hand presses. You need have no special accommodation—a start can be made upon your present kitchen table. The children can help you.

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average worker can complete a 60-volt H.T. Battery in 2 hours at a cost of 2/3 approximately! Compare this with Shop Prices!

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Consider what this means to you. Not only can you SAVE money on your own batteries, and get BETTER results, but directly your friends know of them they will want some, too! Thus, you can begin to build up a Profitable Spare-Time Business and reap a Golden Harvest from the Wireless and Electrical Market. Many men are already making comfortable EXTRA incomes in this Pleasant, Easy Way.

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Your market is unrestricted—it can never become overcrowded—you sell where you like and when you like. If necessary we will purchase sufficient of your output to guarantee you a Weekly Profit providing it reaches the required standard of efficiency which is easily attainable. We will continue your training FREE until you reach that standard—that's fair, isn't it? Don't hesitate—if you have never seen a battery before you can MAKE Money this way. Let us explain this GILT-EDGED HONEST PROPOSITION fully. Write AT ONCE! Make Your SPARE Hours GOLDEN Hours!

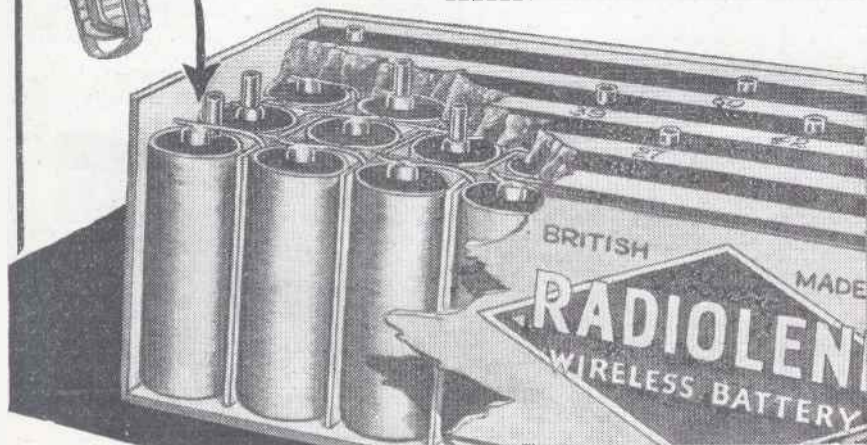
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To Mr. V. ENGLAND-RICHARDS,  
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Sir,—Please send me at once, and FREE, full details as to how I can Make Money at home in my spare time I enclose 2d. stamp for postage.

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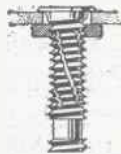
No. 25. Pat.

### SOLID PLUG.

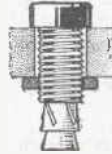
Maximum tensile strength. For use with Resilient Sockets. Engraved or Plain, Red or Black... 2d.



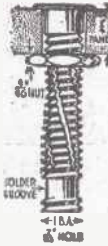
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Short, uninsulated, for thin panels. Flush mounting... 1d.



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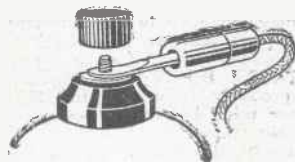


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## RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from previous page.)

first valve. I am sure it would be a boon to many readers besides myself."

To cut out the first valve in this way, when the set is used for local station work, it will be necessary to cut off its filament supply and to transfer the aerial from its normal position to the point where it will be feeding the detector valve grid circuit.

An easy way to break its filament circuit would be to put an on-off switch low down on the panel underneath the first condenser, and then break the positive filament wire that comes through a hole in the screen, taking the two sides to the two terminals on this switch. This will put the H.F. filament on or off as required and its H.T. supply lead (H.T. + 2) need not be removed from the battery.

An easy way to transfer the aerial would be to fit a new terminal on the panel at the other side of the screen near the L.T. switch S<sub>2</sub>. At present you have one of the taps on the Coil L<sub>2</sub> fitted with a flexible lead which goes to the top of the screened-grid valve. This flexible lead can be left, but coming from this point or from one of the other taps on L<sub>2</sub> you need a wire going to your new aerial terminal.

When the H.F. valve is in action the new lead and terminal are not active, and the circuit is exactly as before. But when you switch off the H.F. valve you will be able to bring the aerial to the new terminal, which is connected to L<sub>2</sub> and which will then act as a new aerial terminal with the H.F. valve cut out of circuit.

### Threshold Howl.

G. N.W. (Newcastle).—"Back in the summer I saw in the Short-Wave Notes by W. L. S. a means of curing threshold howl on short-wave sets. Intending to build a short-waver, I kept it by me for some time, but now I cannot find it, and a friend of mine has got a set which is perfect in every way, but he cannot stop it howling on the verge of oscillation!"

"What are the usual things to do in such a case?"

The following are the "cures" recommended. It should be remembered that although only one of them may be sufficient, it is advisable to try them in conjunction with one another where possible, one peculiarity of threshold howl being that it occurs in different sets due to different causes.

- (a) Adjust the filament voltage of the detector valve, by means of a rheostat.
- (b) Change value of detector grid leak.
- (c) Connect a grid leak of 1 or 2 megohms across L.F. transformer secondary.
- (d) Change L.F. transformer, remembering that a cheap make will often be quite satisfactory in such a circuit.
- (e) Use filter output circuit for 'phones.
- (f) Connect condenser of '0005 mfd. across 'phones.
- (g) Connect H.F. choke in 'phone leads.
- (h) Use capacity control for aerial circuit instead of loose inductive coupling. (When using throttling control for reaction you must be careful to see that the capacity of the transformer primary is not so high that it passes H.F. and keeps the set in an oscillating condition when the reaction condenser is at zero. If the transformer has a condenser across it it will, of course, cause howling, and in such a case an H.F. choke is necessary between the plate side of the transformer and reaction coil.)

### BACK NUMBERS OF "P.W."

F. F. (Petersfield).—"Where can I get back numbers of 'P.W.'?"

Back numbers of POPULAR WIRELESS which are still in print can be obtained from the Amalgamated Press, Ltd., Back Number Department, Bear Alley, Farringdon Street, London, E.C.4, price 4d. per copy, post free.

### TESTING FOR DISTORTION.

"BIMBO" (Wolverhampton).—"My brother's firm has recently gone west. I tell him it was all right till he joined it, and the consequence is that quite a lot of good electrical gear went cheap. Among the disposals were some milliammeters, and we got a good one measuring up to 30 milliamps.

"How should it be connected to check and prevent distortion?"

With a millimeter of this kind you can keep a watch on quality by joining it in the lead from H.T. + to the plate of the last valve. It will be marked + and -, so be sure to join it with its + terminal towards H.T. +, and its - terminal towards plate.

For permanent use as a checking instrument it is a good plan to join an on-off switch across it, or else

(Continued on next page.)

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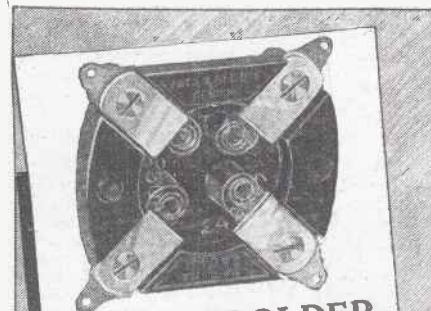
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## RADIOTORIAL QUESTIONS AND ANSWERS.

(Continued from previous page.)

arrange for a plug and socket connection if it does not incorporate a switch of its own.

When the set is on, but no programme is coming through, if you switch the milliammeter in you will, of course, get a reading on the scale showing how many milliamps. are passing to the plate of the power valve. Moreover, the needle should remain steady, even when you are receiving a programme.

If it flickers or kicks when the loud musical passages come along, your set is distorting. Usually, if the needle kicks up—to a higher reading—your negative grid bias to the power valve is too high. If the needle kicks down—to a lower reading—the bias is too low.

If the needle cannot be steadied by adjustment of the grid bias to the power, and any preceding L.F. valves, you are probably "overloading," and trying to make your set hand out greater power than it is capable of giving.

A reduction of strength (by detuning, if you like) will clear up this trouble, but if greater power is required you must either increase your power-valve's ability to handle strong signals by increasing its

### WHAT DO YOU THINK ABOUT THIS?

A Purley reader of "P.W." decided that his "Magic" Three deserved a mains unit, and the dealer recommended a certain type because his own "Magic" Three worked perfectly with this.

On connecting this up there was a loud hum, "which must come from the unit, because the set never hums without it," argued the puzzled owner. So the dealer—a friendly chap—lent him his own mains unit, a tried and trusted one, but the result was the same.

The sets themselves were almost exactly alike, valves of same types, and both used balanced-armature cone speakers. Could you have said

### WHAT WAS WRONG?

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

The trouble with the S.G. valve voltage referred to last week was that the voltmeter was taking too much current, and thus giving misleading readings. The experimental settings of H.T. were right, but connection of the voltmeter made them appear lower.

H.T. + and grid bias (if the maker's recommendations permit) or else get a valve capable of handling that power without distortion.

### RATTLING RESULTS.

D. M. J. (Glasgow).—"What is the cause of rattling in a loud speaker?"

It just depends on what you mean by "rattling." In the sense commonly given to this word, "rattling" means the disturbing and irritating vibrations due to a mechanical defect or a defect in adjustment, such as a screw which has worked loose, a diaphragm which is touching the magnets, or any other part of the mechanism which has become a little loose and which consequently responds to the variations of the loud speaker in a way in which it is not intended to do.

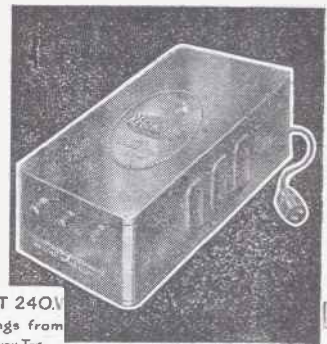
Such rattles are usually noticeable chiefly upon loud passages, and can usually be located if the instrument is carefully examined when working. Although it sometimes happens that such a rattle is not easy to trace, it is usually spotted at once by anyone with several years' experience of wireless, and usually it can be put right in a few moments.

Quite a different meaning is sometimes given to the word rattling, as some people use this to designate resonance on certain notes. True rattling is due to a mechanical defect, as explained above.

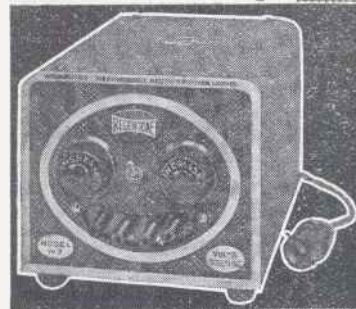
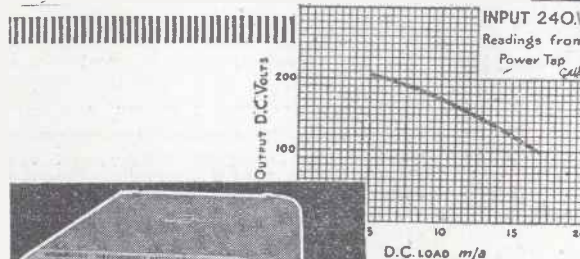
Resonance occurs not when something is loose but when one note, or one particular set of notes, gets amplified by the loud speaker to an extent altogether greater and out of proportion to the impulses which cause them. The natural acoustic

(Continued on next page.)

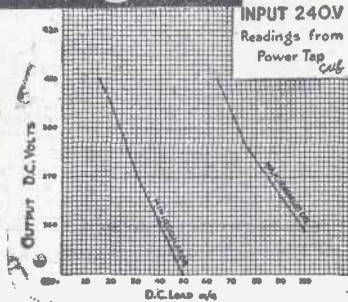
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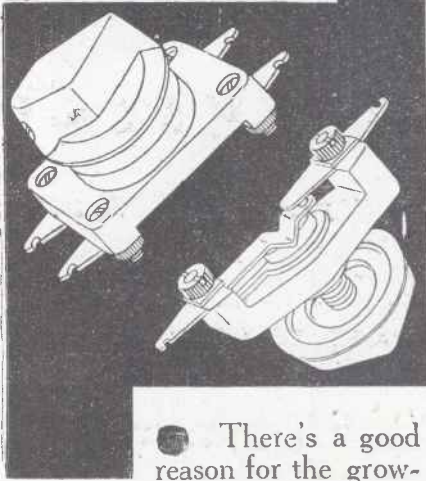


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## RADIOTORIAL QUESTIONS-AND ANSWERS.

(Continued from previous page.)

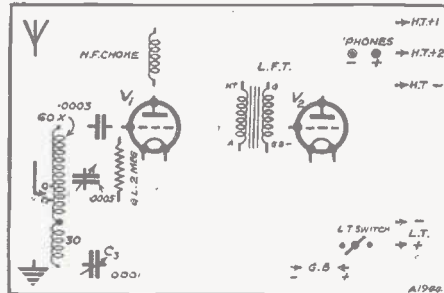
properties of some types of horn loud speakers did not permit proportional reproduction of the various frequencies in music, but accentuated and greatly over-produced those frequencies which corresponded with the natural frequency of vibration of the air column within the horn, or some other inherent frequency that came within the range of audibility.

The extra amplification was due to the fact that the note being reproduced and the reproducer itself were in resonance, i.e.—vibrating at exactly the same frequency, and thus it is that this class of loud speaker defect is more properly described as resonance than as rattling.

### GRID CONDENSER VALUE.

W. P. (Johannesburg, S. Africa).—"The instructions give the value of the grid condenser as '0003 mfd., but I have a '0002 in

## POPULAR "WIRELETS" No. 21



Here are the "components" for a simple 2-valve (detector and L.F. amplifier). Reaction is of the "Reinartz" type, controlled by the '0001 condenser C<sub>2</sub>, and although 'phones are marked this type of set often works a small loudspeaker quite satisfactorily.

Can you "wire-up" this circuit? Look out next week for the answering diagram.

(It is regretted that the solution to Popular "Wirelet" No. 20 is held over till next week, owing to lack of space.)

use, and the set seems perfect. Is it worth while getting the '0003 from the point of view of improved reception?"

You probably would not hear the slightest difference in results however carefully you tried, so we do not think it worth while.

## FOR THE LISTENER.

(Continued from page 226.)

Berlin often has a wonderful Sunday night programme, if you can tear yourself away from Albert Sandler!

### German Talks.

But not, I think, Germany for talks; not even if you are learning German through the wireless lessons at home, and are seeking for bones to whet your milk teeth on! German talks are solid stuff than I can stomach.

I switch in, and out, when I am feeling very determined to be good; or as voluntary penance for my sins. For instance, "The Way to Musical Genius—the Discovery of the Musical Ego"; or "Literature, and the Spirit of Work"; or "The Bureau-cratisation of Modern Industry."

How thoroughly German these sound! That horrible word in the last title, beginning with a "B," which I defy anyone to pronounce after a single glass of the wine of the country! It is all frightfully thorough and deep and long-winded.

No, not Germany, I think, for talks!

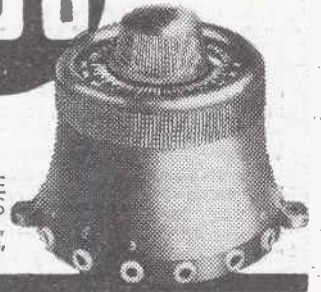
(Continued on next page.)

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**FOR THE LISTENER.**

(Continued from previous page.)

Alice.

Many listeners must have renewed an old pleasure, a fragrant memory like lavender hidden in a drawer, in the revival of "Through the Looking-Glass." It is a perennial flower. A work of unconscious genius.

It is odd how many good things have come into the world by men who had no idea of how good they were! I wouldn't mind laying long odds that Lewis Carroll had no inkling of the fact that "Alice" would live for ever.

It was a good idea to put the second performance earlier in the programme, so that the youngsters could enjoy it before they were sent to bed. The production was excellent, as Cecil Lewis's usually are; as if he loved it himself very much. He has a bright and ingenious mind.

I forget who took the part of Alice in the original production. Was it Athene Seyler? But it fitted Jessie Tandy like a glove.

Congratulations all round, and—encore!

**Edges of the World.**

Geographically, this place, which I am now on the point of leaving, is not one of the edges of the world by any means; but the sight of a caveman or of a dinosaur could not have surprised me more than the sight, yesterday, of my neighbours catching a snake—to cook it and eat it!

There was a hullabaloo outside, and I went to see. It was a lovely beast, about four feet long and dapple-grey.

"Cattivo!" they shouted, and "vel- enoso!" as if to excuse before me the savagery with which they hacked off its head. I do not think that it was either "wicked" or "poisonous."

I think it was a serviceable beast, and a farmer's friend against the field mice. But however wicked and poisonous they thought it to be when alive, it was evidently of quite another nature when dead; for, with their mouths watering, they carried it off in triumph to the pot, and the family dined that night off its white flesh! I have heard of pickled eels, but—snakes!

**TECHNICAL NOTES.**

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

**False "Fading."**

A READER described to me in a letter recently a curious effect which he had obtained with his receiver and which at first looked suspiciously like "fading," the only point being that the station which was being received at the time was only about 50 miles away, and a fairly powerful one at that.

According to all the laws and theory of fading, it appeared to be impossible that this could be the real cause of the trouble in this particular case, although apparently the effect which he noticed had almost the exact characteristics of fading. It turned out eventually, after an examination of the receiver, that the effect was due to a defective contact in the grid-leak holder and when this was put right the trouble disappeared.

(Continued on next page.)



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Kit "A" Cash ... £3:18:3

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### TECHNICAL NOTES

(Continued from previous page.)

#### A Curious Receiver Effect.

I may say that I have heard of this kind of trouble several times before, particularly due to bad contact in a switch, such as the change-over switch from high to low wave-lengths.

Of course, fading will almost invariably be experienced when receiving from the distant stations, and is at certain times of the year prevalent also even on medium distances; but if you get what appear to be fading effects on nearby or powerful stations, you may be fairly certain that the effect is spurious and is due to something in your receiver, probably something of the kind indicated above.

#### Life of Power Valves.

I have, on more than one occasion, mentioned the importance of using correct grid-bias, particularly with a power or super-power valve. I suppose most experimenters know perfectly well that the higher the value of the grid bias (within the proper limits, of course) the smaller the high-tension current which passes in the anode circuit.

This not only results in an important saving in H.T. current, perhaps not very important when an H.T. mains unit is used, but certainly very important if a dry battery is employed, but also actually improves the quality of the reproduction, so that you are not saving H.T. current at the expense of reproduction, but are actually getting an advantage both ways.

#### Grid-Battery Hint.

Quite apart from this, the use of the correct grid-bias also helps very materially in preserving the valve and lengthening its useful life. A high value of H.T. current means a correspondingly higher emission from the filament of the valve (since the H.T. current is, in fact, carried by the emission) and, as you know, if the emission is pushed beyond a certain point the emissivity of the filament may be seriously reduced, or the filament may actually be burned out.

#### What Happens to the Grid!

A point which is not so often borne in mind, however, but which is extremely important, is this: Often when you wish to adjust the value of the grid bias, you may forgetfully leave the H.T. voltage on and simply pull out the plugs of the grid-bias battery and shift them to other positions.

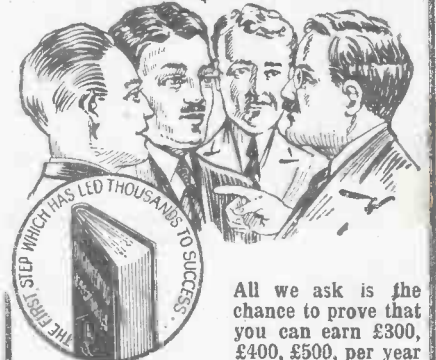
Every time you disconnect the grid-bias lead from the grid-bias battery, clearly the potential of the grid is left "up in the air," and although it is difficult to say off-hand what voltage the grid will assume, it is obvious that it will almost certainly assume a different voltage to that which was intended (otherwise there would be no purpose in having a grid-bias battery at all).

#### Safety for Super-Power Valves.

Now with a power or super-power valve there is great danger, when the grid is disconnected from the grid-bias battery, of the H.T. current rapidly going up to a very high value, and this may have disastrous effects upon the valve. It is a good plan, therefore, when making adjustments, to be careful always to disconnect the H.T. voltage

(Continued on next page.)

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## TECHNICAL NOTES

(Continued from previous page.)

before making the adjustment, and only to have the valve actually working when the grid is connected to some point of the grid-bias battery.

I have known of cases where perfectly good and quite expensive power valves have been completely ruined by this bad practice of juggling about with the grid-bias connections whilst a high value of H.T. voltage is applied to the anodes.

This is one of those little points which may be very easily overlooked even by a careful experimenter, but as soon as you think for a moment of the conditions obtaining when the grid is disconnected you will realise the importance of the precautions which I have just indicated.

### Accumulator Life.

With most types of low-tension accumulator you will find that the screwed terminal pin which projects through the upper part of the celluloid container is locked in position by means of a flat locking nut; this is quite apart from the terminal knob by which the connecting wire is secured to the terminal. After the accumulator has been in use for some months you may sometimes find that a certain amount of corrosion has set in owing to the acid creeping up and attacking this locking nut, as well as the threaded pin.

If the locking nut has come loose (due to the operation of the terminal knob), you should take care to fix it back securely in position. If it is loose, not only is the tendency to creeping of the acid much increased, but also there is a danger, when the control knob is screwed hard down, of the lead plate beneath becoming wrenched.

Incidentally, it is a good plan, before screwing the locking nut home, to cover it with vaseline, as well as all the surrounding parts. Sometimes beginners in radio are averse to coating the terminals of the accumulator with vaseline, as they imagine that this, being an insulator, will prevent good contact from being obtained.

As a matter of fact, and curiously enough, the reverse is the case: the vaseline does not in any way prevent good contact, but, by its preserving action, keeps the terminals clean and free from corrosion, and thereby enables better contact to be obtained.

### Saving Money on L.T.

A very useful hint in connection with the prevention of corrosion in accumulators is to attach a flexible lead strip—say, three or four inches in length, slotted or drilled—in each of the terminals, and then to make connection to the remote or free end of the strip. Before fixing the lead strip under the terminal both the end of the strip and all adjacent parts of the terminal should be freely covered with vaseline.

When the terminal is then screwed up tight it does not need to be interfered with again, and all connections and disconnections are made at the opposite end of the strip. The strip itself, being of lead, will not be attacked by the acid, and the terminal, being well covered with vaseline and not being subsequently liable to disturbance, will also remain well protected. This very simple dodge may be

(Continued on next page.)

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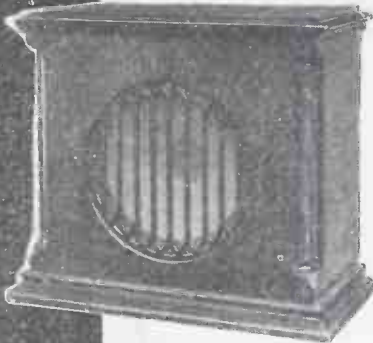
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## TECHNICAL NOTES.

(Continued from previous page.)

the means of adding at least another year of useful life to your accumulator, and is very well worth adopting.

### A.C. Valves.

I am often asked whether indirectly heated A.C. valves will act efficiently as detectors, and also whether, using an indirectly heated A.C. valve as a detector, a set will have as good a sensitivity range as with an ordinary type of valve.

As regards its sensitivity, it is simply a question of using the valve under proper conditions as to anode voltage and grid resistance, so that the characteristic curve is reasonably "straight-line" over the desired range. This is a matter which depends largely upon using a fairly high value of H.T. voltage, but not too high a value of grid leak.

### Pick-up Weights.

A question which confronts the listener who contemplates changing over from ordinary acoustic gramophone reproduction to electrical reproduction is whether the latter will have any bad effect upon the life of his records. In the early days of electrical gramophone pick-ups some of

## DON'T MISS YOUR GIFT BOOK NEXT WEEK

these were, unfortunately, made very heavy, and the armature very stiff, with the result that the reaction between the needle and the record was greater than with an ordinary soundbox.

### Does the Record Suffer?

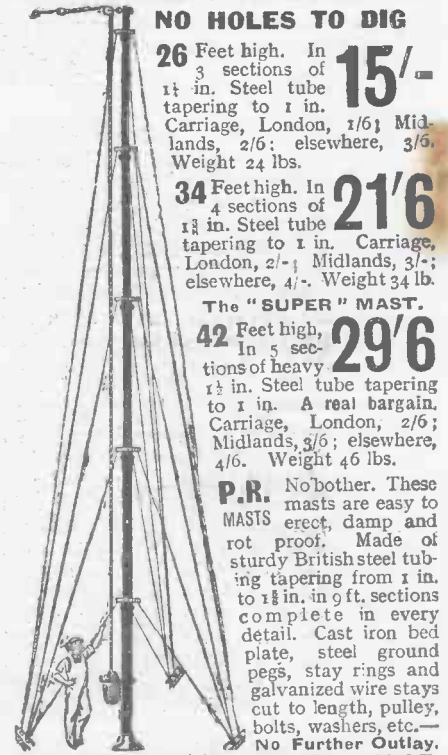
As a matter of fact, there is really no reason why the reaction between the needle and the record should be so severe when using an electrical pick-up as when using an ordinary soundbox, because in the latter case, as you know, the whole of the sound is *directly* produced by the movement of the needle and associated stylus bar and diaphragm, whilst in the case of the electrical pick-up the actual reaction may be very small, and the effect may then be multiplied up to any desired extent by an appropriate amount of amplification.

The fact that we have such a very convenient control of the loudness eventually produced means that we can, within reasonable limits, *reduce* the reaction between the needle and the record in the case of an electrical pick-up to very small dimensions.

### Reducing Scratch.

It is for reasons of this kind that most of the modern types of pick-up are made comparatively light. In the so-called needle-armature types the mass of the vibrating part is extremely small.

## SERVICE MODEL STEEL MASTS



NO HOLES TO DIG

26 Feet high. In 3 sections of 1½ in. Steel tube tapering to 1 in. Carriage, London, 1/6; Midlands, 2/6; elsewhere, 3/6. Weight 24 lbs. **15/-**

34 Feet high. In 4 sections of 1½ in. Steel tube tapering to 1 in. Carriage, London, 2/-; Midlands, 3/-; elsewhere, 4/-. Weight 34 lb. **21'6**

The "SUPER" MAST.

42 Feet high, In 5 sections of heavy 1½ in. Steel tube tapering to 1 in. A real bargain. Carriage, London, 2/6; Midlands, 3/6; elsewhere, 4/6. Weight 46 lbs. **29'6**

**P.R.** No bother. These masts are easy to erect, damp and rot proof. Made of sturdy British steel tubing tapering from 1 in. to 1½ in. in 9 ft. sections complete in every detail. Cast iron bed plate, steel ground pegs, stay rings and galvanized wire stays cut to length, pulleys, bolts, washers, etc.—No Further Outlay.

P.R. PRODUCTS (Dept. P), P.R. HOUSE, 14, NEWGATE STREET, LONDON, E.C.4 (Opposite G.P.O. Tube Station.) Telephone: CITY 3788

**PATENTS, TRADE MARKS.** Inventions Advice Handbook and Consultations FREE.—E. T. KING, G.I.M.E. Regd. Patent Office (G.B., U.S. and Canada), 146a, Queen Victoria Street, London, E.C.4. 43 years' experience. Phone: Cent. 0682.

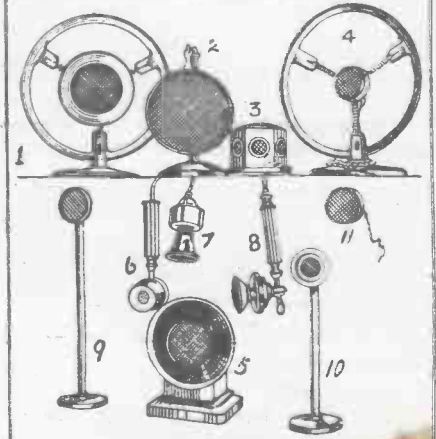
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Any make of L.F. Transformer, Loudspeaker or Headphones repaired and despatched within 48 HOURS—TWELVE MONTHS' GUARANTEE with each pair. 4/- post free.  
Terms to Trade.  
**TRANSFORMER REPAIR CO.,**  
"Repairs" Dept.,  
953, GARRATT LANE, TOOTING, S.W.17.

**EXACT TUNERS**  
250 to 2,000 metres.  
Thousands of these tuners are in use, and we can strongly recommend them. No further coils are required. Send P.O. for particulars and circuits—FREE.  
**THE EXACT MANUFACTURING CO.,**  
Croft Works, Priory Street, Coventry.

**MARVELLOUS—Plays 10 Records**  
**CHROMOGRAM PICK-UP NEEDLE**  
used and recommended by best known Experts and Cinema Operators. Perfect Tone, free from Scratchy Vibration. Fits needle groove without wear.  
Once tried you will use no other  
Sample box 100 needles 9d. post free.  
**CHROMOGRAM**  
The Stradivarius of Gramophones.  
76-78, CITY ROAD, LONDON, E.C.1.

**DX** THE **STANDARD** **PLUG-IN COIL**  
Sold everywhere from 1/-  
DX COILS LTD., LONDON, E.8

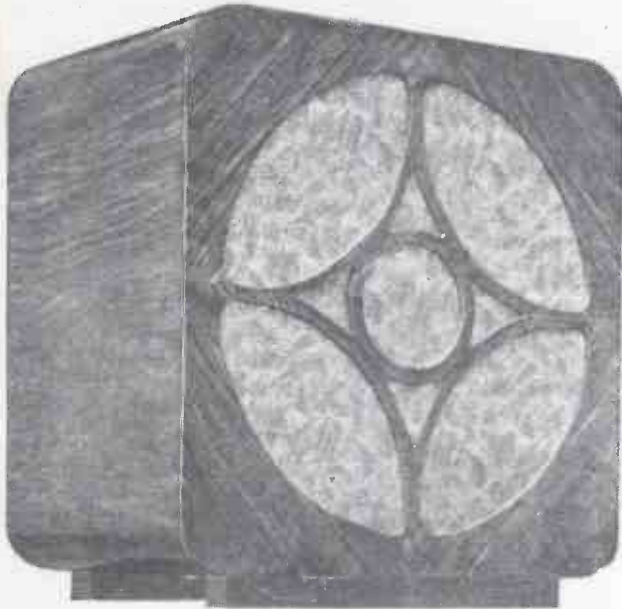
## MICROPHONES



You will find our Microphones remarkably cheap and efficient for all purposes. Detectaphone, Gramo., Announcing or Public Address. We have all types from 1/- to £20, and illustrate a few. Prices: No. 11 Single 4/6; No. 7 (Special Panel) 12/6; No. 10 (Pulpit) 12/6; No. 8 (Hand) 15/-; No. 4 (Pestal) 17/-; No. 3 (Table Multi.) 50/-; Nos. 1, 2 or 5 (Announcers' P.A.) 65/-.  
Micro Transformers: 3/6, 5/-, 7/6 and 10/-.  
3 Valve Amplifiers for P.A. off D.C. mains (Panatrop) £3:10:0. 3 Valve Portable Type. £2:15:0, fitted Mike Transformer.  
Send addressed envelope for our new Sale Bargain List of everything radio and electrical.  
**ELECTRADIX RADIOS, 218, Upper Thames Street, London, E.C.4. City 0191.**

THE PICTURE PAPER WITH THE MOST NEWS  
**-SUNDAY GRAPHIC-**

# TWO OF THE BLUE SPOT RANGE



**29R** —the best Blue Spot speaker that has yet appeared. There is no higher praise. Whatever type of programme you enjoy, you will enjoy it better with this magnificent speaker. If your taste is for chamber music you can now hear it as hitherto you could only hear it in the concert room; if you prefer jazz you can listen to it with all its pep and snappiness. And the cabinet is a splendid piece of furniture in keeping with its wonderful output. Price **£6-6-0**

**51R** This new speaker is driven by the world's wonder unit, 66R. That fact alone stamps 51R as supreme in its class. And the beautiful walnut cabinet—unconventional without being bizarre—will add to the appearance of any room. Price **84/-**



Meet us at

MANCHESTER RADIO SHOW, OCT. 8-18—STAND No. 26. MAIN HALL.

**• THE BRITISH BLUE SPOT COMPANY LTD. •**

BLUE SPOT HOUSE, 94/96, ROSOMAN STREET, ROSEBERY AVENUE, LONDON, E.C.1

Phone: CLERKENWELL 3570.

GRAMS: "BLUOSPOT SMITH, LONDON."

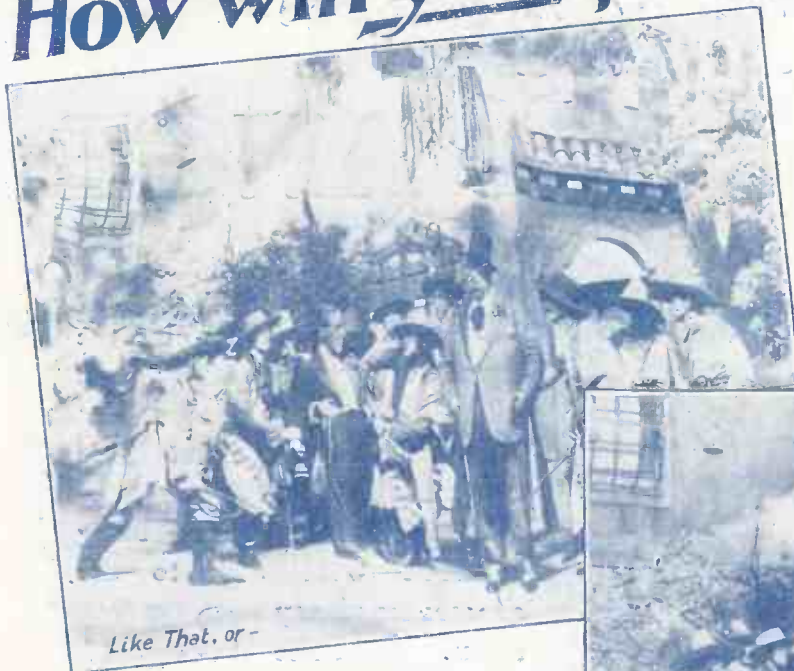
Distributors for Northern England, Scotland and North Wales, H. C. RAWSON (Sheffield and London) LTD., 100, London Road, Sheffield, 22, St. Mary's Parsonage, Manchester; 183, George Street, Glasgow.

# How will you get Eldorado?

LONDON'S LATEST MUSICAL PLAY

To be broadcast from  
Daly's Theatre at 9.45 p.m.,  
Saturday, October 18th.

If you wore spectacles that distorted your vision you naturally would want to change them before you went to Daly's Theatre to see London's latest musical play "Eldorado"—it is too good to be missed or marred.



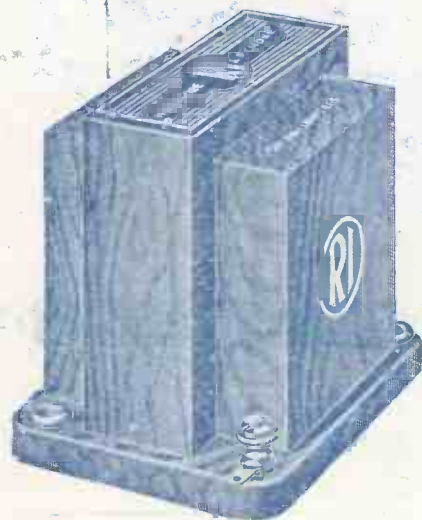
Like That, or -



Perfectly—like this

Likewise, before "Eldorado" is broadcast from "Daly's" on Saturday, October 18th, you should fit a "Hypermu" Transformer in your set between the Detector and Power Valves, and a "Hypercore" Smoothing Choke after your Output valve. That is a precaution that will make your speaker deliver "Eldorado" louder, clearer and better than it has ever reproduced music, voices and sound before and without distortion.

Ask your Radio dealer, or us, for illustrated leaflets of the Big Nikalloy 3, the "Hypermu," "Hypermite" and "Hypercore."



Hypercore Smoothing and Output Choke 17/6  
Inductance 30 henries. 50 milliamps.



Hypermu L.F. Transformer 21/-  
Ratio 4:1

## NIKALLOY

The marvellous metallurgical discovery is the secret of efficiency of the

## "HYPERMU"

L.F. TRANSFORMER and the

## "HYPERCORE"

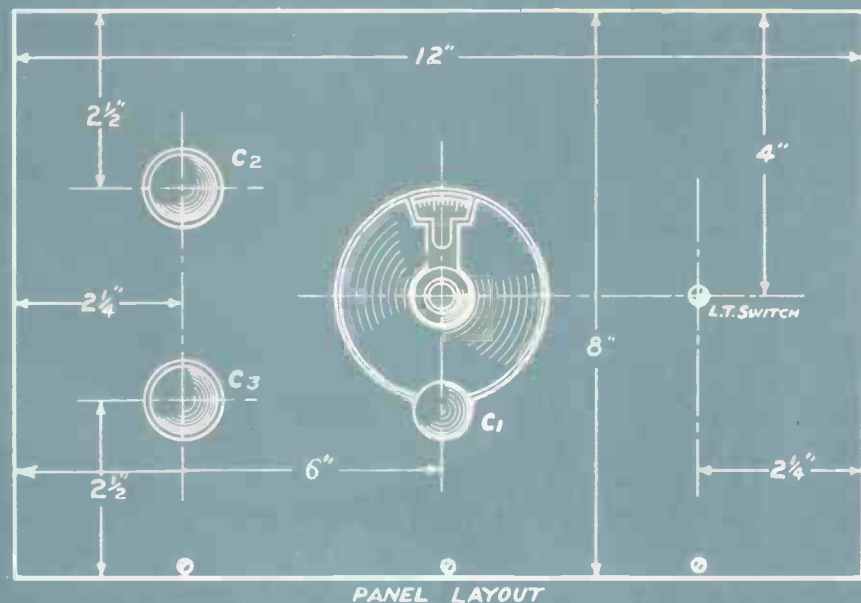
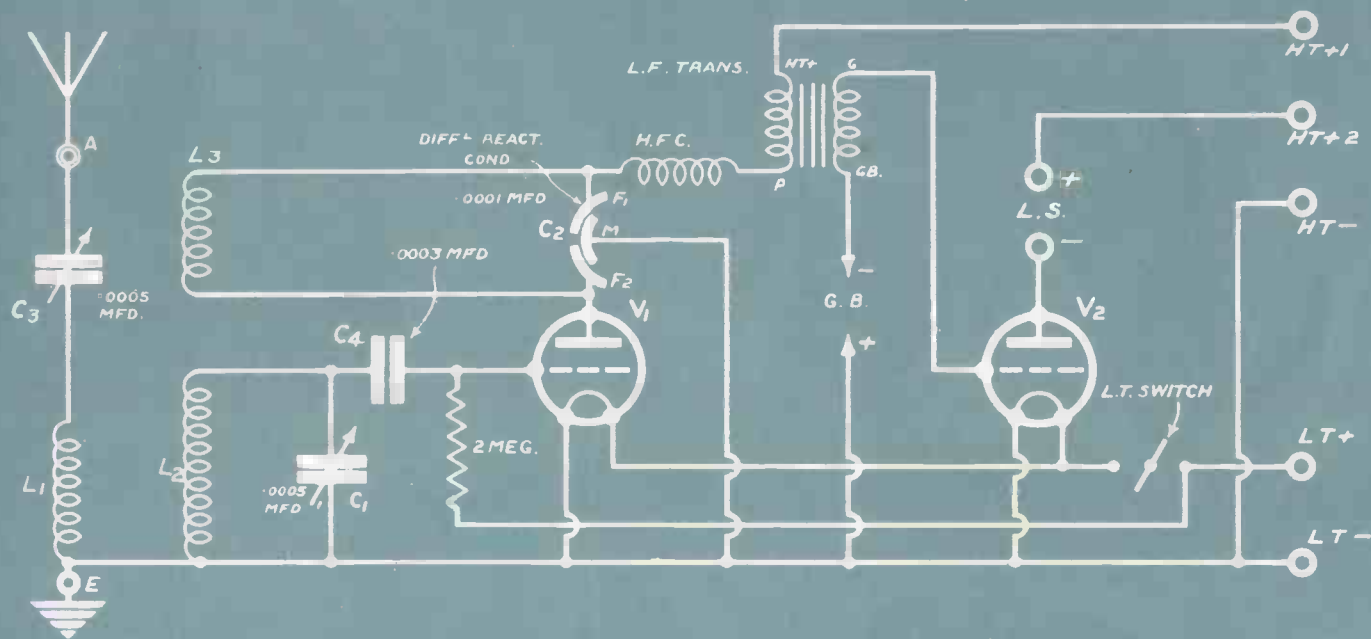
SMOOTHING AND OUTPUT FILTER CHOKE



MADE ONLY BY THE RECOGNISED SCIENTISTS OF RADIO

MADRIGAL WORKS, PURLEY WAY, CROYDON.

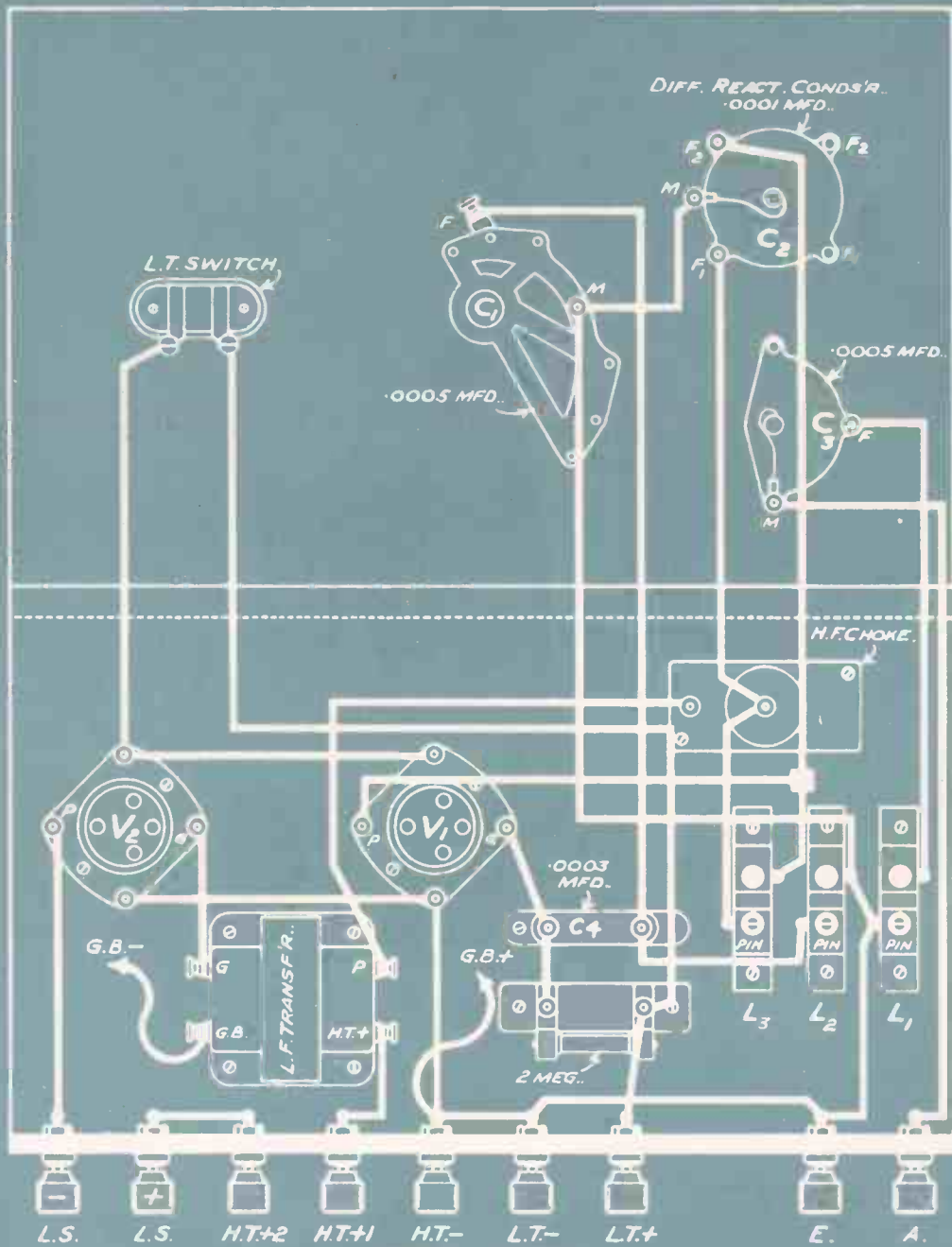
**BLUEPRINTS**



"P.W." Blue Print No. 57. The "Sharp Tune" Two. Price 6d.

#### COMPONENTS AND MATERIALS.

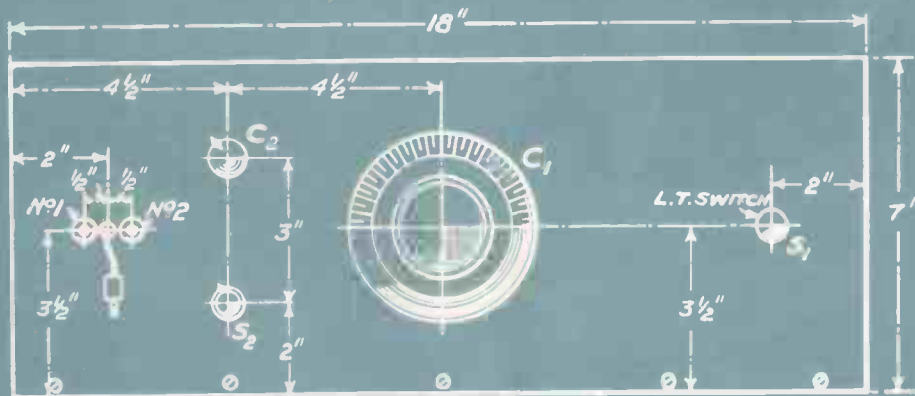
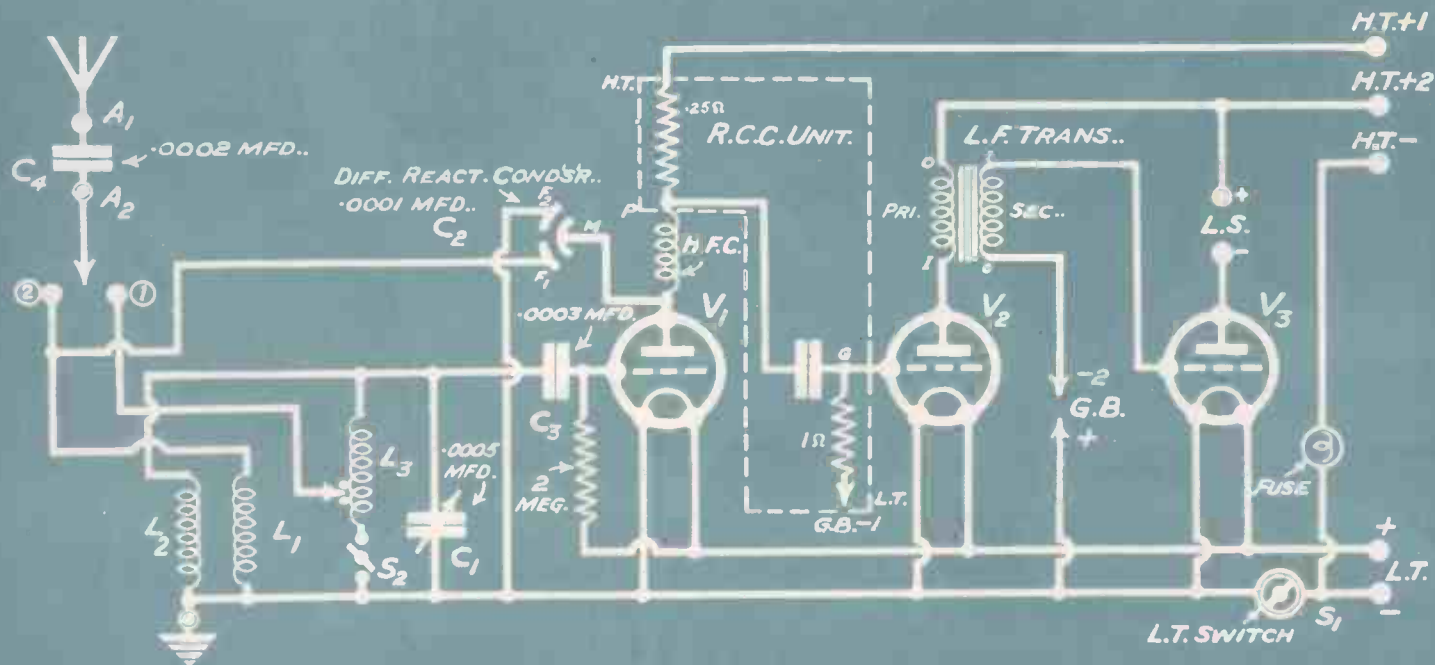
- 1 Panel, 12 x 8 or 12 x 7 in.
  - 1 Cabinet to fit, and baseboard 7 or 8 in. deep.
  - 1 .0005 mfd. variable condenser, slow motion or with vernier dial.
  - 1 L.T. switch.
  - 1 .0001, .00013, or .00015 mfd. differential reaction condenser.
  - 1 .0005 mfd. solid dielectric type variable condenser.
  - 2 Sprung valve holders,
  - 3 single coil holders.
  - 1 H.F. choke.
  - 1 Low ratio L.F. transformer.
  - 1 .0003 mfd. fixed condenser.
  - 1 2 meg. grid leak and holder.
  - 1 Terminal strip, 12 x 2 in.
  - 9 Terminals.
- Wire, screws, flex, G.B. plugs, etc.



WIRING DIAGRAM.

DRAWN BY.	LT
CHK'D BY.	agw
SERIAL NO..	57

"P.W." Blue Print No. 57. Tho "Sharp-Tune" Two. A really simple all-wave set with a special selectivity control. Ordinary plug-in coils, wave-range 20-2,000 metres. Condenser  $C_3$  adjusts selectivity: keep as near maximum as conditions permit. Coil sizes for broadcast:  $L_1$ , No. 35 or 40 (100 on long waves).  $L_2$  No. 60 (250).  $L_3$ , 50 (150). Valves: One H.F. type, one L.F. or small power. About 60 volts on H.T. + 1, 100 or 120 on H.T. + 2.



PANEL LAYOUT.

"P.W." Blue Print No. 58. The "Easy-Change" Three. Price 6d.

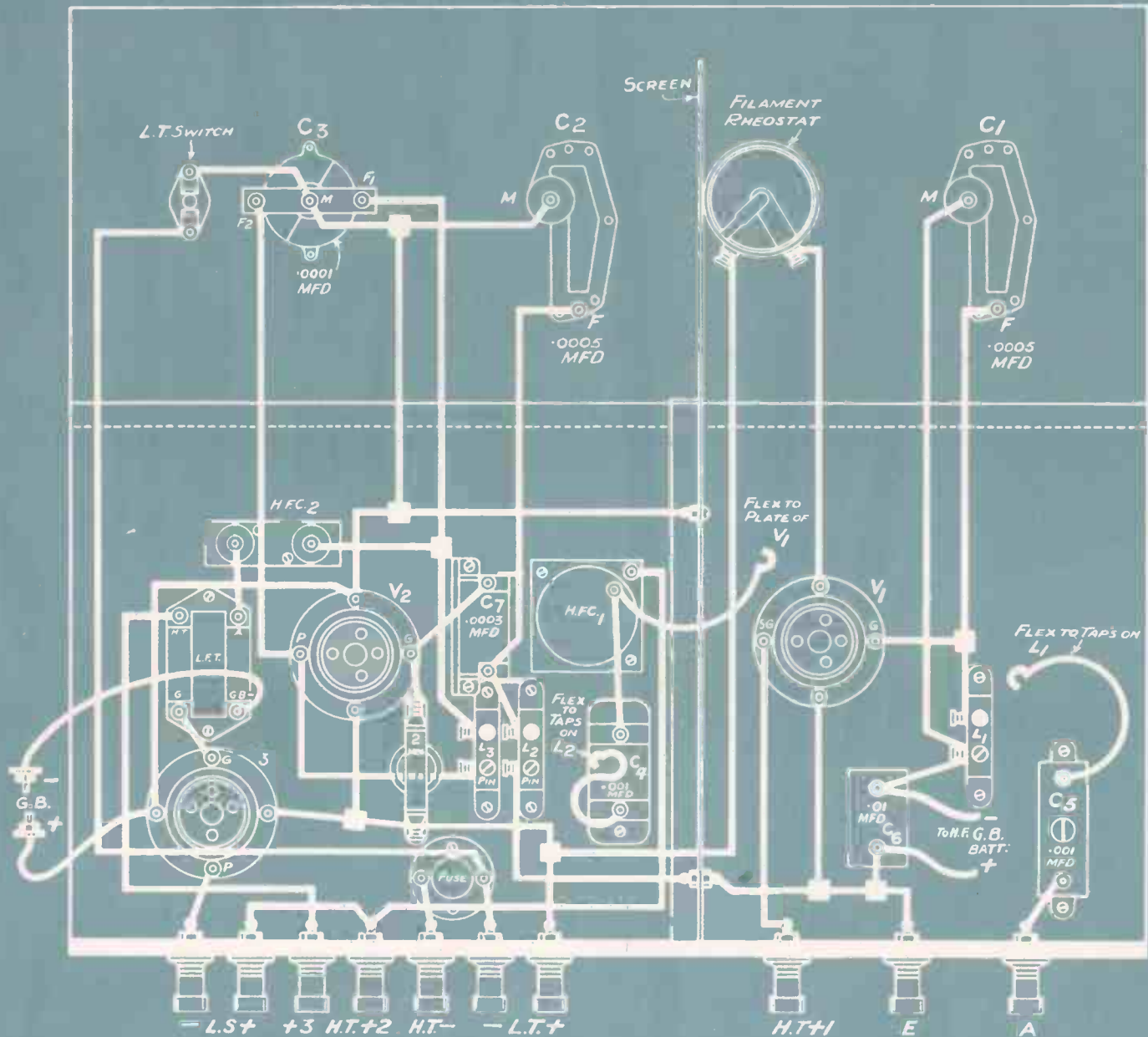
COMPONENTS AND MATERIALS.

- 1 Panel, 18 x 7 in.
- 1 Cabinet to fit, and baseboard 10 in. deep.
- 1 .0005 mfd. variable condenser, slow-motion or with vernier dial.
- 1 .0001, .00013, or .00015 mfd. differential reaction condenser.
- 2 On-off switches.
- 2 Small sockets and plug to fit.
- 3 Sprung valve holders.
- 3 Single coil holders.
- 1 H.F. choke.
- 1 R.C. coupling unit, with  $\frac{1}{2}$  meg. anode resistance and 1 or 2 meg. leak.
- 1 Low ratio L.F. transformer.
- 1 .0003 mfd. fixed condenser.
- 1 .0002 mfd. ditto.
- 1 2-meg. grid leak and holder.
- 1 H.T. fuse and holder.
- 1 Terminal strip, 18 x 2 in.
- 10 Terminals.
- Wire, screws, flex, G.B. battery clip and plugs, etc.







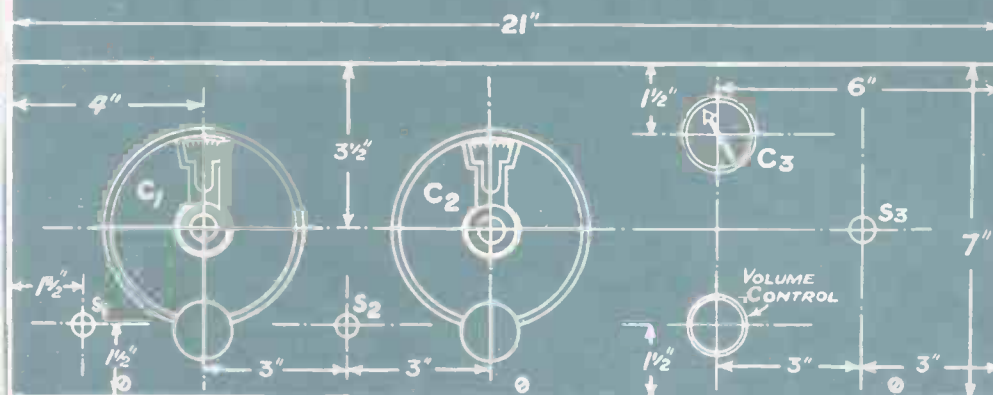
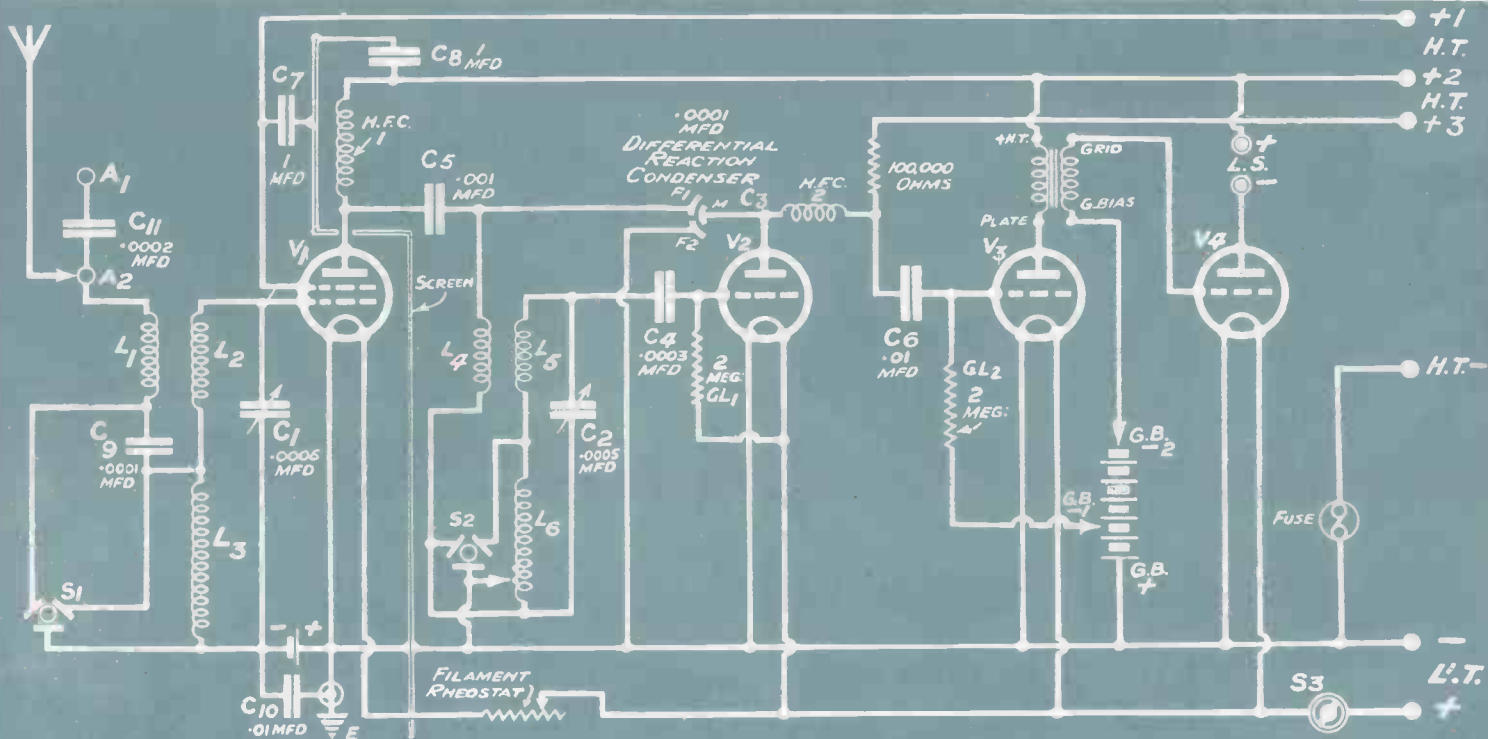


DRAWN BY **LT**

CHKD. BY **096**

SERIAL NO **59**

"P.W." Blue Print No. 59. The "Three-Coil" Three. A high-efficiency selective receiver, with a screened-grid H.F. stage which requires only three ordinary plug-in coils. Selectivity is adjustable by means of the taps on the X-coils and C<sub>5</sub>. Keep the latter set to as large a value as you can. Only reduce to obtain specially high selectivity. Coil sizes: L<sub>1</sub> and L<sub>2</sub>, No. 60X (250X for long waves). L<sub>3</sub>, No. 50 (100). Voltages: H.T. +1, 60-80. H.T. +2, 120. H.T. +3, 60. Valves: S.G. for V<sub>1</sub>, H.F. for V<sub>2</sub>, power or super-power for V<sub>3</sub>.

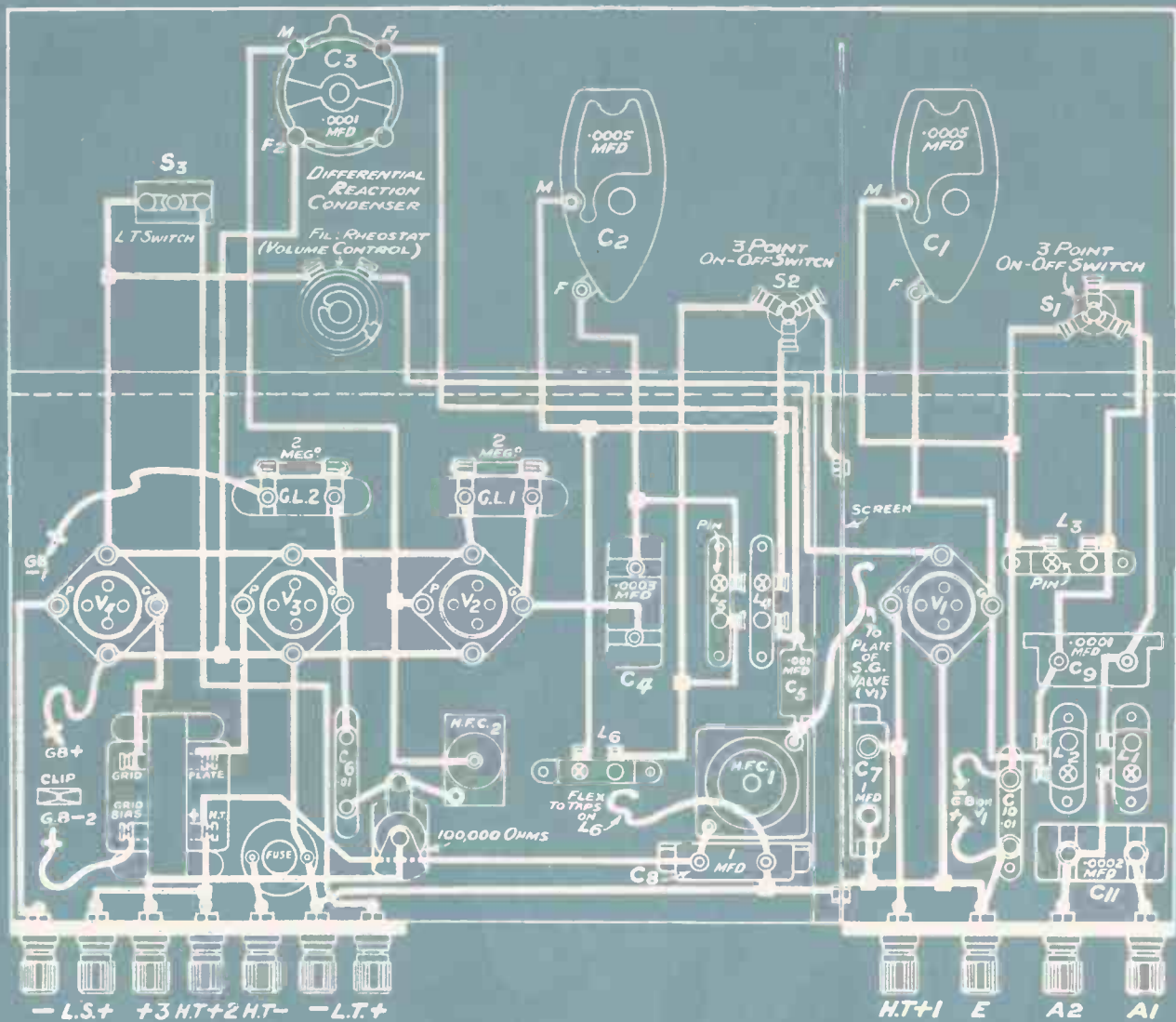


PANEL LAYOUT

"P.W." Blue Print No. 60. The "Maxi-power" Four. Price 6d.

COMPONENTS AND MATERIALS.

- 1 Panel, 21 x 7 in.
- 1 Cabinet to fit, with baseboard 10 in. deep.
- 2 .0005 mfd. variable condensers.
- 2 Vernier dials if condensers not of slow-motion type.
- 1 .0001, .00013, or .00015 mfd. differential reaction condenser.
- 1 L.T. switch.
- 2 3-point on-off wave-change switches
- 1 Filament rheostat, 10 ohms for 2-volt valves, 30 to 50 ohms for 6-volters.
- 6 Coil sockets.
- 4 Valve holders.
- 2 .01 mfd. fixed condensers.
- 1 .001 mfd. ditto. | 1 .0003 mfd. ditto.
- 1 .0002 mfd. ditto. | 1 .0001 mfd. ditto.
- 2 1 mfd. condensers.
- 2 H.F. chokes.
- 2 2-meg. grid leaks and holders.
- 1 100,000 ohm anode resistance and holder.
- 1 Low-ratio L.F. transformer.
- 1 H.T. fuse.
- 11 Terminals and two strips, one 6 x 2 in. and one 7 x 2 in.
- 1 "P.W." screen, 10 x 6 in.
- Wire, screws, flex, G.B. plugs, G.B. clip, etc.



DRAWN BY	AD.
CHKD. BY	ASR.
SERIAL NO.	60

"P.W." Blue Print No. 60. The "Maxipower" Four. A powerful and selective long-range receiver with wave-change switching and plug-in coils. For higher selectivity put aerial lead on terminal A<sub>1</sub>. Coil sizes: L<sub>1</sub> and L<sub>4</sub>, 25 or 35. L<sub>2</sub> and L<sub>5</sub>, 60. L<sub>3</sub>, 150 or 200. L<sub>6</sub>, 200X or 250X. Voltages: 60-80 on H.T. + 1, 120 on H.T. + 2, about 70 on H.T. + 3. Valves: S.G. for V<sub>1</sub>, H.F. for V<sub>2</sub>, L.F. for V<sub>3</sub>, power or super-power for V<sub>4</sub>. Put S<sub>1</sub> and S<sub>2</sub> to "off" for long waves.



HERE'S ANOTHER GREAT "P.W." GIFT!

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**THE KEY TO THE ETHER**

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EVERY SET-OWNER NEEDS THIS INVALUABLE RADIO GUIDE

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- FINDING FOREIGNERS YOUR AERIAL AND EARTH TIPS FOR TUNING
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- TWO-HAND TUNING
- "PLACING" THE STATIONS
- SELECTING YOUR SET
- IMPROVING YOUR SET
- DIVING DOWN TO SHORT WAVES
- LONG WAVE FAVOURITES
- WHAT WAVELENGTH WAS THAT?
- AND HOW TO MAKE DETAILS OF TWO FINE SETS.

**DON'T MISS IT!**

# ON THE PEAK OF

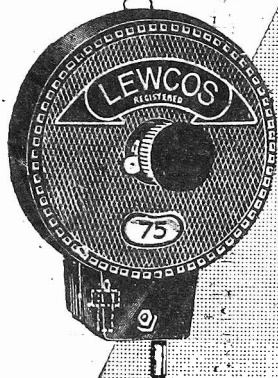
## Efficiency Quality Power & Value

# LEWCOS PRODUCTS

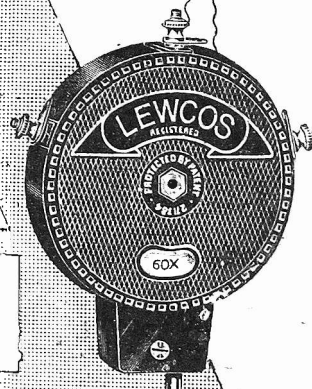
The Lewcos "X" and Centre Tapped Coils are specified for the "Three-Coil Three" and the Lewcos H.F. Choke and Centre Tapped Coils for "Sharp-Tune Two" Receivers described in this issue

The difference you notice with Lewcos Coils in your Set is an increased and greater purity of volume. Lewcos Coils are Super Selective, and by reason of the superb materials and workmanship used in their manufacture they are indisputably superior in quality and performance.

Write for Lewcos Free Sheet of Blueprints of Four suggested circuits utilising Lewcos components Ref. R.70.



THE LEWCOS CENTRE TAPPED COIL Price: CT 25-75 ... 3/8 CT 100-300 ... 4/6



THE LEWCOS "X" COIL Price: X 50-75 ... 4/8 X 200-300 ... 6/6

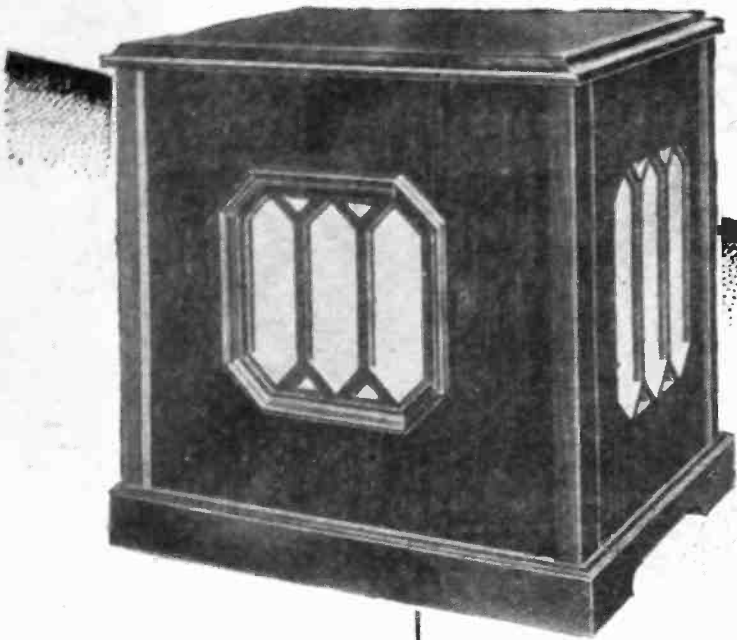
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# CLAIMS proved by PERFORMANCE

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Lyth Hill,  
SHREWSBURY.

August 28th, 1930.

Messrs. Ferranti Ltd.

Gentlemen,

I have had an opportunity of giving your Magno-Dynamic Speaker a very good trial lasting over 12 days.

I have compared it with another make of the permanent magnet type of moving coil Speaker and find that it is vastly superior. Your Speaker is much more sensitive; in fact, no more power is required from the set than was necessary to work my —.

The great point, in my opinion, in which your Speaker excels, is the excellent balance over a wide range of musical frequencies. The bass notes, however low, are present in their proper proportion—neither being over-emphasised nor of hollow distorted tone.

The high notes are clear and of excellent quality—while speech is reproduced with a naturalness and distinctness that I have never heard before from any Speaker.

You certainly have produced a first-class job which must be a blessing to people not on electric light mains.

Yours faithfully,

(Signed) John D. Davies, A.C.G.I.  
Capt.

\* This letter which has been received from a purchaser of a Ferranti Electro-Dynamic Speaker is reproduced for comparison with our own claims made in advertisements for this product:

"Gives reproduction which is very nearly true to life."

"It is a definite step nearer to perfection."

Etc., etc.

PRICES:

Table Model	
Oak ..	£15 5 0
Walnut or Mahogany	£16 14 0
Metalcovered Rexine	£12 10 0
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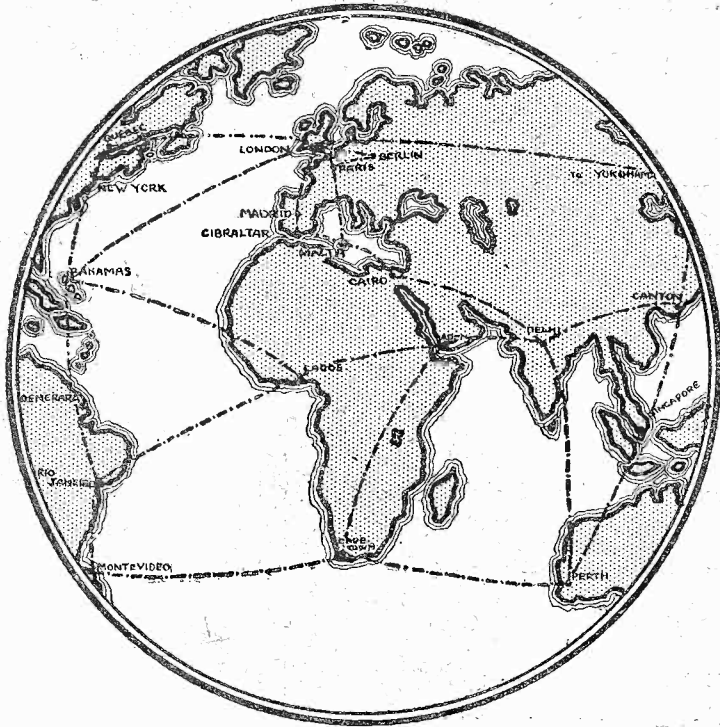
FERRANTI Ltd.  
HOLLINWOOD  
LANCASHIRE

# FERRANTI

MOVING COIL

## MAGNO-DYNAMIC SPEAKERS

# When buying Valves -Remember!

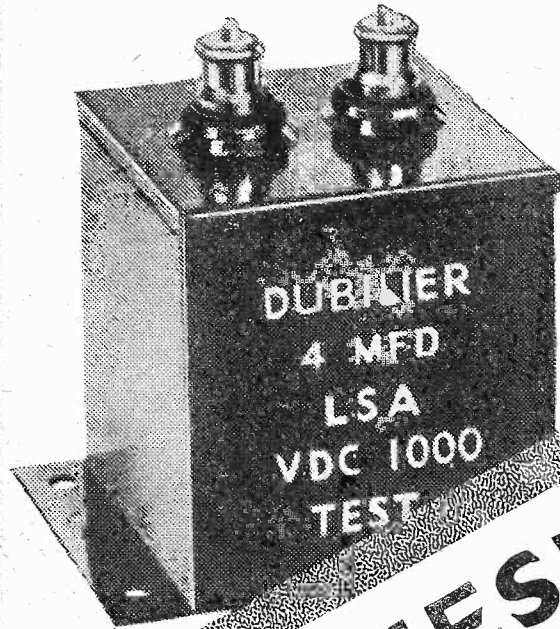


**Empire Wireless Communications**  
**The B.B.C., Metropolitan Police,**  
**Trinity House Lightships**  
**and Beacon Stations,**  
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**Tower and all**  
**large Pas-**  
**senger**  
**Liners**

USE

# MARCONI VALVES

Buy the Valves the Experts use!



## USE THESE HIGH VOLTAGE CONDENSERS-

### -THEY NEVER LET YOU DOWN

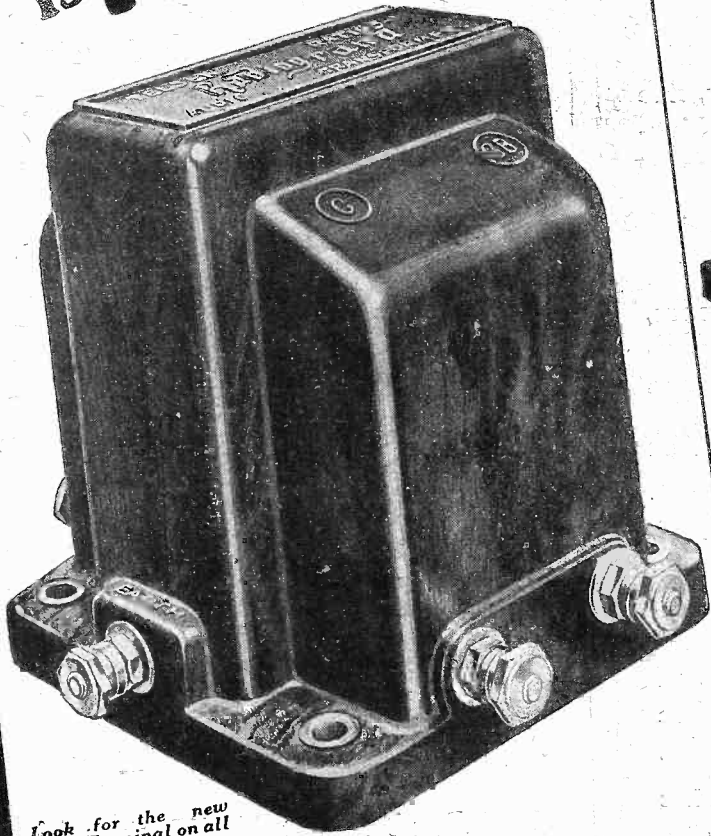
You cannot afford to take risks with high voltages. Breakdown may have serious results. Your High Voltage Condensers must be infallibly reliable—they must be Dubilier because they never let you down. They are built to stand up to strain far greater than that imposed by ordinary use. Always use Dubilier High Voltage Condensers and work with a bigger margin of safety.

**PAPER CONDENSERS.**  
TYPE LAG. Tested at 2,000 volts D.C. Capacities up to 6 mfd. Prices from 7/- to 35/-.  
TYPE LSG. Tested 2,500 volts D.C. Capacities up to 6 mfd. Prices 8/- to 40/-.  
TYPE LSA. Tested at 1,000 volts D.C. Capacities 5 to 10 mfd. Prices from 4/3 to 27/-.

# DUBILIER CONDENSERS

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

# TELSEN COMPONENTS now embody GREATER PERFORMANCE SMARTER APPEARANCE but there is NO CHANGE IN PRICE



Look for the new Earth Terminal on all Telsen Transformers.

Perfected in every detail, Telsen Transformers now represent the embodiment of the very latest practical principles of Radio Transformer construction. Built to give long and satisfactory service—the highest quality reproduction . . . in fact . . . built as well as it is possible to build a transformer—and yet the prices still remain the same—one of their attractive features.

ALL "TELSEN" TRANSFORMERS ARE NOW FITTED WITH AN "EARTH" TERMINAL.

Which will improve the quality of the reception and greatly assist in stabilising the receiver in cases where the general layout is apt to produce inter-capacity action.

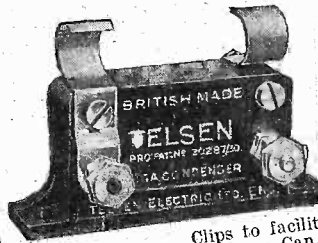
"Radiogram" Ratio:  
3-1 and 5-1 .. Price 12/6  
7-1 .. Price 17/6  
"Ace" Ratio:  
3-1 and 5-1 .. Price 8/6

## NEW TELSEN COMPONENTS



TELSEN H.F. CHOKES designed to cover the whole wave band range from 18 to 4,000 meters, extremely low self-capacity. Inductance, 150,000 microhens; resistance, 400 ohms. Price 2/6 each.

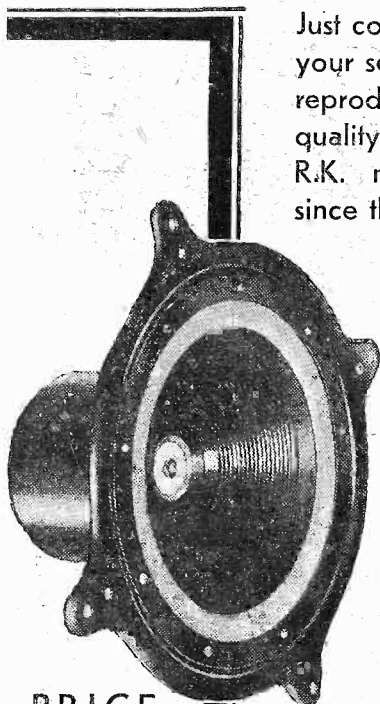
TELSEN VALVE HOLDERS. Prov. Pat. No. 20286/30. An entirely new design in Valve Holders, embodying patent metal spring contacts allowing the valve to be inserted or withdrawn with an easy sliding movement. Low capacity, self-locating, and made in Genuine Bakelite Mouldings. Also 5-pin model. Price 1/- each. 1/3 each.



TELSEN FIXED MICA CONDENSERS. shrouded in Genuine Bakelite, made in capacities up to .002 mF. Prov. Pat. No. 20287/30. .0003 supplied complete with Patent Grid Leak Clips to facilitate series or parallel connection. Can be mounted upright or flat. Tested on 500 volts. Price 1/- each.

# TELSEN COMPONENTS

THE PERMANENT  NEW MAGNET REPRODUCERS which work without extra power . . . .



Just connect this new R.K. to your set and it will give you reproduction of the tone and quality which have made R.K. models famous ever since their introduction.

If you live in a district where there is no electric supply, the R.K. Permanent Magnet model is the finest Loud Speaker you can buy.

There are two other R.K. Reproducers, both obtainable complete in handsome cabinets of polished oak, mahogany or walnut; the Senior with built-in rectifier for use with A.C. mains from £20, and the Standard Senior from £16 16s., as well as the Junior Model, without cabinet, £4 15s., all of which are obtainable through your radio dealer.

Ask your dealer for particulars of hire purchase terms.

PRICE  
**£6 15 0**  
Speech Transformer  
15/- extra



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Incorporating the Wiring Supplies, Lighting Engineering, Refrigeration and Radio Business of the British Thomson-Houston Co., Ltd.  
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**EDISWAN** W.106

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The November  
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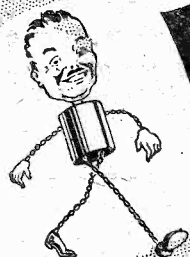
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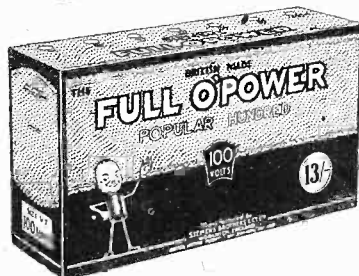
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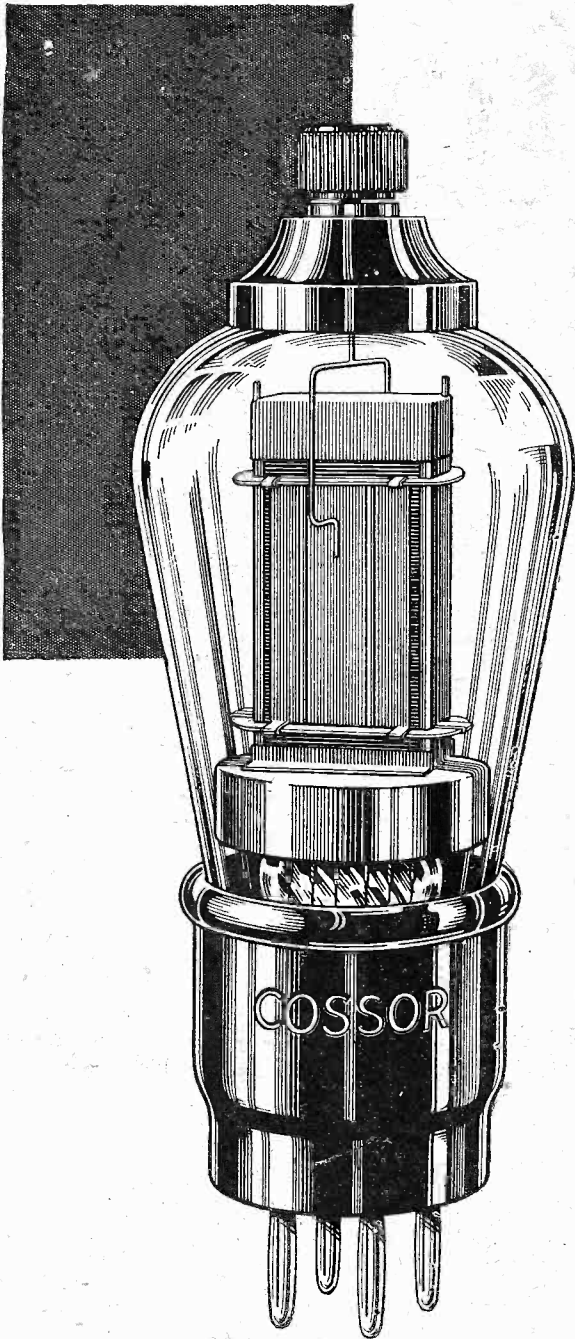
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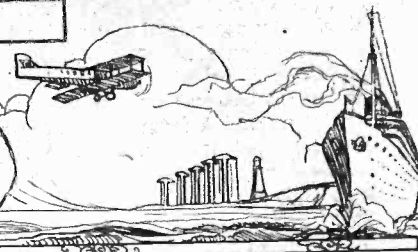
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"P.W." GIFTS.  
 AN OLD FRIEND.  
 ULTRA SHORT WAVES.  
 A SAVOURY TIT-BIT.

## RADIO NOTES & NEWS

RAISING RASIN.  
 THE OSCILLATOR.  
 RADIO SHORTS.  
 THE "TINY" TWO.

### Blue Print Bouquets.

JUDGING by a host of joyful noises last week's blue prints were, to say the least of it, greatly appreciated. I may as well confess that, though those blue prints mean a lot of work, I personally look upon them as Bread Upon the Waters. For every time that "P.W." gives away blue prints, "P.W." readers give back bouquets. (I am not being flowery—that's a solid fact that back numbers of "P.W." will bear out.)

### "The Key to the Ether."

UNLESS I am very much mistaken, "P.W." is going to get another batch of appreciative *billet-doux*-ings about the "Key to the Ether." So far as I know nothing like it has ever been done before, and, although it seems like taking coals to Newcastle to attempt to tell some of you chaps how to handle a set, there are many others who are only just "getting their hands in" to this great game of radio. Lucky lads! I wish I could start it all over again.

Well, we have played the opening move. You have the "Bloops." You have the facts and tips for tuning. Now it's up to you.

### An Old Friend.

BEFORE I leave this subject I should like to thank an unknown friend for the bit of a shock he gave me. Enclosed in his envelope was a well-thumbed, read and re-read, torn and tattered mass of paper, which, upon careful examination, proved to be the remains of a gift book that "P.W." gave away on October 18th, 1924. (Hoy tempus fugits!)

With it no name and address, but the message "All that remains of an old friend—going but not forgotten. His offsprings are doing splendidly."

### The Yorkshire Station.

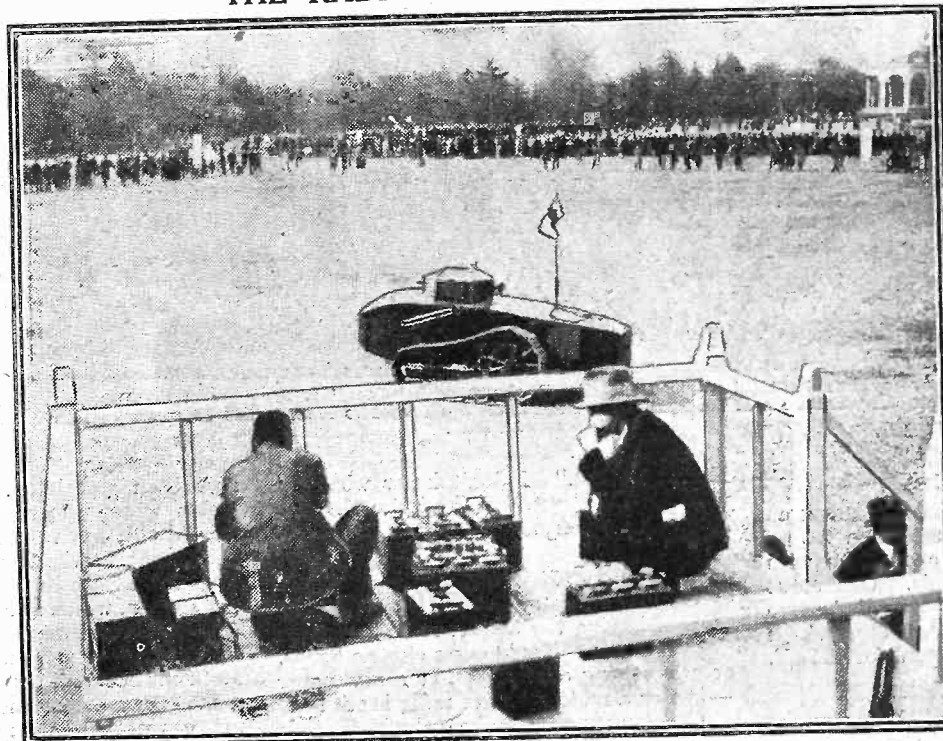
HUDDERSFIELD and district listeners will soon be sitting up and taking notice of Moorside Edge, for the station is growing apace and waxing lofty

### An Interesting Service.

THE other day I ran into an old friend of mine—an interesting chap who always reckons to build three or four sets a year. But the sets he builds are not receivers. They are transmitting stations, and he must have put up more than one of those that you have heard, for Europe is fairly dotted with them.

And he told me about the Sardinia service, of which I knew nothing at all.

## THE RADIO TANK OF TOKIO!



Thousands of excited Japs gathered round and shouted "Banzai" when this radio-controlled tank obeyed its wireless orders in a public park of Tokio. It is the invention of an army officer, who has trained it to obey his radio commands with uncanny promptitude.

### Ultra Short-Wave Telephony.

IT appears that Sardinia—which, you remember, is just south of Corsica—has a first-class telephone service to the mainland of Italy. Not cable, mark you, for the Mediterranean between is a hotbed of earthquakes and volcanic disturbances.

Not ordinary wireless either, because the district is a home for X's. But a short-wave regular and reliable service on about five or nine metres. (I forget which.)

It's been working for quite a time and is absolutely satisfactory. Yet only a few years ago telephony on that wavelength would have been looked upon as a minor miracle!

### A Savoury Tit-Bit.

EVERYONE who has dabbled about with expensive instruments, and every owner of a milliammeter or a voltmeter, must have envied the people who play with possibilities of radio and work in huge research laboratories. The envious man in the street wonders what goes on behind those closed doors. Sizzling sausages!

(Continued on next page)

withal. Two of the masts are practically completed, and as the lengths go up at the rate of about 36 ft. a day it will not be long before they are thinking of hauling up the aerials.

They say that Huddersfield is taking it very coolly at the moment, but wait till their Uncles start testing. There will be just one big rush for radio. "Huddersfield United!"

## RADIO NOTES AND NEWS

(Continued from previous page)

### Sizzling Sausages.

**Y**OU might not think it, but, according to Dr. Willis R. Whitely, the director of the General Research Laboratories, that is what they are now doing with wireless waves. Testing heat radiation.

He explained it scientifically, and said: "By putting a wire over a table a few feet from a radiating aerial, formed by a copper bar about ten feet long, a sausage in a glass container suspended from the bar was soon thoroughly cooked."

But what I want to know, and what you will want to know, is *Who Ate It?* Radio's First Sausage!

### Raising Rasin.

**"RASIN"** is the name of the place just outside Warsaw where the great new Polish broadcasting station is to be erected by Christmas. It is far and away the most powerful broadcasting station in the world, with an aerial power of no less than 160 kw.

And as they have erected already on the site two of the highest broadcasting masts in the 'whole world, it's pretty safe to say that in raising Rasin they're raising Cain!

### The Oscillator.

**I** SUPPOSE you think you know what an oscillator is, don't you? But have you ever had one to drink? A convivial pal of mine, always ready for an excuse, tells me that the "Oscillator" is now all the go at the Trocadero cocktail bar. It is the very latest in cocktails.

And it's no good writing to ask me if I went round and tried one, for, like the cork, I refuse to be drawn.

### That Hornet's Nest.

**T**HERE is still a bit of buzzing going on around that hornet's nest I stirred up a few weeks ago in connection with reception on earthed acrials. One stout fellow (who writes from Cromwell Avenue and constitutes himself my Protector) wields a pretty pen, so I'll let him speak for himself.

### "Up and Smite Them."

**T**HIS is what he says: "A few weeks back I was told that signals were just as strong when the aerial was earthed as when it was not. 'Strange,' thinks I to myself; 'it was not always thus.'

"On investigation I found the earthed contact very much blackened owing to corrosion and the sooty nature of London's atmosphere, and now, after a few minutes' work with a file and emery cloth, I defy the hornets to detect the trace of a signal when our aerial is earthed.

"Up, then, and smite them!"

So, ye doubters and earthed aerial-users, consider yourselves smote.

### Radio Shorts.

**I**LFDOR Town Council has passed a by-law prohibiting the carrying of L.T. batteries and accumulators inside the council's trams.

\* \* \*

The Columbia Broadcasting system has applied for permission to put up an experimental television broadcast station in New York to work on a wave-length of about 120 metres, with the power of  $\frac{1}{2}$  kw.

\* \* \*

The Irish Radio Traders' Association arranged to hold their Wireless and Gramophone Exhibition in the Mansion House, Dublin, from October 20th to October 25th.

### The Thunderer.

**A** WRITER to the "Catholic Times" has beaten all the radio critics with one terrific blast of heavy artillery. He was criticising a "talk" and levelled against the editor of "The Listener" a "severe criticism of the Professor's rigmale of paradoxical nonsense—ultra crude pragmatism, with its concomitant jargon of spurious metaphysics, topsy-turvy psychology and deplorable logic—which I stigmatised, apparently, I contend,

### Television at the Berlin Show.

**I**N the article on page 169 ("P.W.," October 4th issue) it is stated, "... the two leading German television companies, the Fernseh A. G. and the Telehor Co., working with Mihaly patents ..."

etc. The Baird Television Co. points out that "the Fernseh A. G. is a combination of companies, and the patents worked are the Baird and not the Mihaly patents."

### The Tiny Two.

**B**ACK at the end of September (27th issue) I referred to a New Southgate reader's experiences with the "Tiny Two." At the same time, alas! I dropped a brick.

The farm where this reception feat was carried out was not "some hundreds of feet below sea-level," but some hundreds of feet below the level of the top of the moor, and in acombe.

Actually it was 800 feet high and dry above sea-level.

### An Accidental Exaggeration.

**I** HASTEN to correct this because the reader in question says he wonders whether it was a genuine mistake or just a bit of "Arielesque" exaggeration.

Old readers and keen critics will bear me out when I say I never knowingly exaggerate such reception reports, but I try to give them fairly for the benefit of others interested in the sets.

As a matter of fact, there is no need to exaggerate. You fellows keep me primed with so many good things in the way of remarkable radio reception that the bare truth makes good enough reading!

### The Vatican.

**A**LL good Catholics will be interested in the news that the Vatican wireless station has

now been completed. Marchese Marconi, under whose supervision the work was carried out, has formally handed over the equipment to the Pope, and Father Gian Francheschi has been appointed director of the station, which is now ready for working.

Father Gian Francheschi is a distinguished scientist who has spent much of his life in mathematical and chemical research. His name was quite recently before the public in connection with General Nobile's Polar expedition, of which he was a member.

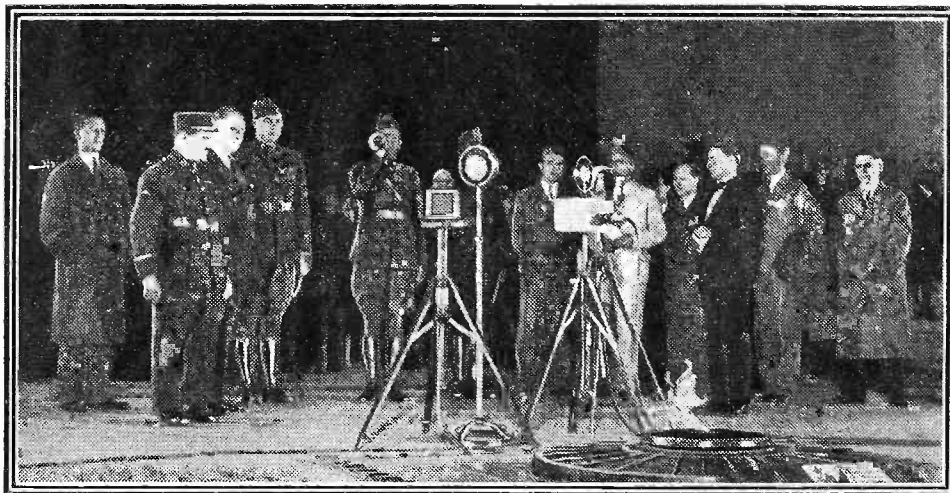
### Too Much Like Home?

**N**OW that Turin has its lady announcer going strong, they say that the Italians are wondering whether they have done the right thing in banishing men from the "mike." One paper puts it: "What man will buy a wireless licence just to hear a woman talking—he can get that at home any time!"

Somewhere behind that quip I see a sad journalist, speaking from experience.

**ARIEL.**

## ALL AMERICA LISTENS TO A COMMEMORATIVE BUGLE-CALL FROM FRANCE



The scene at dead of night when an American bugler sounded "Taps" at the grave of the Unknown Warrior, under the Arc de Triomphe, Paris. The sound was relayed to America and broadcast from all stations there.

Macmuddleism." I don't know what the row was all about, but I admire the way he goes into a fight!

### It Pays to Advertise!

**T**O which industry belongs the distinction of having the biggest roof sign in the country? You'd guess electric lamps, or advertising contractors, or a newspaper—but as a matter of fact radio has it!

The sign runs right along the E. K. Cole Southend-on-Sea factory (which is 400 ft. long) and it tells the world about "Ekco All-Electric Radio."

### "Mullard Magazine."

**T**HIS is the name of a monthly periodical issued by the Mullard Social and Athletic Club, price threepence. There are no circuits in it, but lots of fun, naturally of more interest to Mullardites than others. Welcome to the little stranger and good luck to its editors. As I have edited a "house organ," I know that they need our prayers.



# WHAT I SAW AT MANCHESTER

By G.V. Dowding, Assoc. I.E.E.

A racy review of the Great North Country Radio Exhibition that is now in progress.



WELL, here I am in Manchester. And, at the time of writing it is *not* raining. But then, although there is often rain in Manchester, Mancunians do enjoy quite a lot of fine weather during the course of the year, despite the statements of music-hall comedians.

Personally, I like the great city, and always enjoy my visits to it. It is a very workmanlike, busy centre, and it hasn't the architectural frills to be encountered in other places.

But one feels its importance, its vitality, the moment one steps from the train.

Taken all round, it is just that part of the country where one would expect, as a matter of course, to find the north country replica of the National Radio Exhibition.

As I explained last week, the Manchester Radio Exhibition is organised jointly by the "Manchester Evening Chronicle," (an enterprising newspaper that has sponsored wireless almost since its inception), the Radio Manufacturers Association and Provincial Exhibitions, Ltd.

### "Come Inside."

The show is always very well supported by the trade and it is becoming as traditional as the yearly Olympia display.

And it grows in size like its Southern brother. On this seventh occasion I also find it improved in its whole presentation.

I think, on the whole, it is now slightly superior to Olympia from that point of view. And you see just as much diversity of apparatus at the City Hall, although for sheer bulk it must take second place.

In general the exhibits are of a more inexpensive character—not so many of those sets-for-the-very-rich.

But come with me, spiritually, on a visit to this very attractive exhibition.

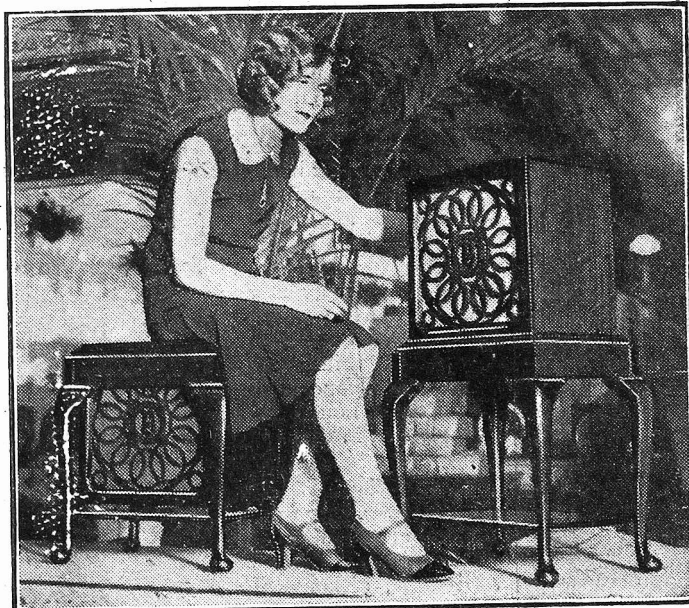
The approach to the City Hall is via a long, rather depressing thoroughfare lined with dingy buildings ranging from the squat to the very tall.

### A Blaze of Colour.

The City Hall stands back a bit from the main thoroughfare, and it is not particularly inviting in appearance. The tiny splashes of colour on it, due to the posters, form the only relief from a dark, forbidding pile that reminds one of an old-fashioned railway terminus.

But once you are through the entrance, you find yourself in an entirely new world.

### A COLLAPSIBLE LOUDSPEAKER.



Many moving-coil loud speakers are shown at Manchester. Above is one, carrying a very famous initial, that expands and contracts in an ingenious and unusual manner.

Here are scores of bright lights and heaps of gay colouring and crowds of chattering people. The difference between the City Hall and Olympia is at once most apparent.

It literally hits you in the eye.

At Olympia some authority has laid it down that stand decorations must be uniform, and the result is a somewhat

monotonous blue and gold that is repeated year after year. That, above everything else, in my mind, is the one great mistake.

Olympia is too big to carry such uniformity. It kills it! You have 200 stands, for the most part displaying the same sort of gear, blended into one huge blue and gold whole.

But at the City Hall the exhibitors seem to be left an entirely free hand. And don't they take advantage of it. Why the result is one riotous blaze of colouring rendering the entire interior of the building a sight worth travelling hundreds of miles to see.

### Outstanding Stands.

And this added to really artistic stand layouts focuses attention on individuals. The exhibitors seem to achieve a vital personality that is lacking at Olympia, except in a few outstanding cases.

Who could help noticing the Ferranti stand in the City Hall? This is a bright medley of glittering sparkles against a full-bodied background of tints.

Then, again, there is Cossor, with a blue, gold and cream scheme, and Varley in restful green, with cunningly illuminated window effects.

G.E.C. with very bright blue and Lotus with bright greens "get over" with considerable artistic forcefulness. But Ediswan, with more sombre browns, is just as effective in its way, and the stand constructed in Cubist form is holding visitors' attention.

### Plenty of Valves.

The Graham Amplion show reveals a burst of colouring giving just that happy blend of the futuristic and orderly that marks the master hand at this kind of thing.

Marconis have let themselves go on valves. Their stand is absolutely studded with them. Valves are used as liberally as buttons on a pearly king's barrow. I am sure few amateurs will have seen so many valves before in one place.

The Exide display has a character entirely of its own. In the centre there is a huge pylon and at the corners of the stand are gigantic replicas of Exide cells.

R.I.'s play on their "Nickel Age" slogan, and their imitation road safety signs strike a novel note.

I said last week that the stands at the  
(Continued on next page.)

## WHAT I SAW AT MANCHESTER.

(Continued from previous page).

Manchester show are usually on the small side. I now stand corrected. This year they are of generous dimensions all round, and far from being "pocket" duplicates of the London stands, they are in many cases just as large.

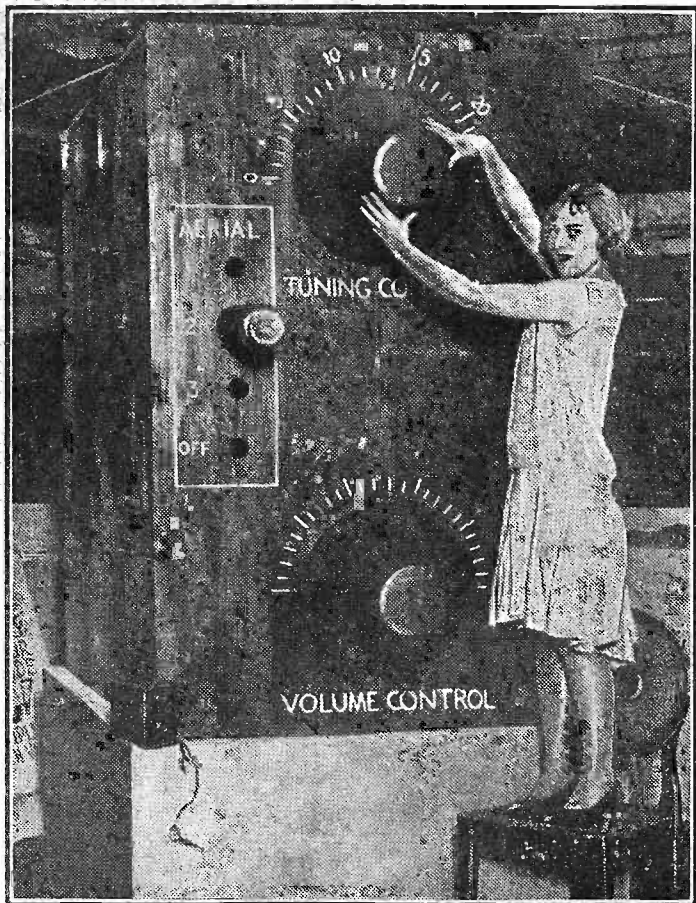
The whole of the ground floor is packed with stands. You have the main hall and from that you pass first through one large annexe—a small exhibition in itself—to another large annexe. And in neither is there an overflow of "small fry," but both hold their shares of exhibitors, large and small.

### Unbounded Enthusiasm.

There is a gallery after the style of Olympia, and up there are located demonstration rooms. A full-size talkie outfit is being exhibited. I spent a few minutes in this theatre and the results were excellent. The pictures are brilliant and the speech and music as good as anything I have heard.

In the other demonstration rooms models of various sets are being put through their paces by urbane young gentlemen

### THE BIGGEST TWO-VALVER SHOWN



This huge model of a two-valve set, which was exhibited at Olympia, is also to be seen at the Manchester Show.

extolling the virtues of the various pieces of apparatus.

Standing on the gallery, looking down on the stands in the main hall, another

point of real importance strikes one, and that is that the display is arranged to be just as attractive from above as from ground level.

The roofs of the stands are gaily coloured and you get the effect of a sea of people swirling round brightly-tinted islands.

The floral decorations are lavish and this contributes greatly to the attractiveness of the scene.

There is music from scores of loud speakers working from artfully-placed amplifiers. And altogether it is a show that makes one feel there is unbounded enthusiasm behind it. Olympia is the bigger show, but honestly I think Manchester is by far the better show as an exhibition.

And isn't it packed! The public are backing it up to the extent it deserves.

I am sorry to see that the home constructor is rather badly catered for. It is true that plenty of components are being shown, but the trade must be concentrating very largely on complete sets. And this applies to all the exhibitions.

But at Manchester they are not giving the mains sets quite as much prominence as they did at Olympia.

In general, though, I think the exhibits follow very much on the same lines as those at the National Radio Exhibition.

You know by now what was shown there, and in this regard I think you can say Manchester follows London in fashion as in data!

### Good Grouping.

However, there are concerns exhibiting that did not go to Olympia, although I have seen no gear that is peculiar to the City Hall.

There are about 130 stands as against Olympia's 200 odd. The grouping is rather similar. There

are the smaller stands around the sides of the main hall, and those stands occupying the centre are broken into convenient blocks by "avenues."

The "avenues" are narrow and, of course, there is no lavish outlay of "walking" space anywhere.

When I paid my visit it was hard to make one's way round. And I went in the

### SHOW-TIME AT VIENNA



Huge crowds invaded the Radio Exhibition recently held at Vienna.

afternoon, when by all precedents it should have been only partially filled with visitors.

What it is like in the evenings when the Mancunians descend on the City Hall in full strength I hesitate to imagine.

### "Go To It!"

However, crowded or empty (which it never is), it is a wonderful show and I am sure no one will regret having visited it.

By the time you see these words the Exhibition will have only a day or two to run. My advice to all those who possibly can is to find time to go along to the City Hall.

The "Evening Chronicle" and its collaborators are to be complimented on the best show they have put over to date. And that is saying a good bit!

### RECEPTION WRINKLES.

Some cone loud speakers are inclined to over-emphasise the high notes, so a pentode valve should not be used with these unless it is provided with a pentode output transformer.

One way of making a valve "soft" is to employ far more H.T. than the makers recommend for it.

To get the maximum amount of power from a crystal set both the aerial and crystal circuits should be tapped into the tuned circuit.

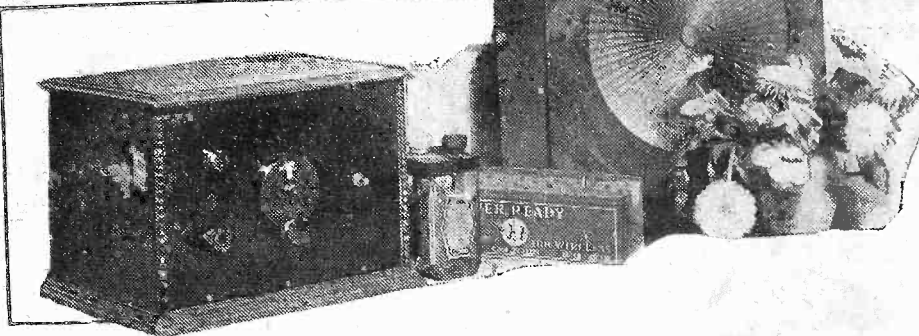
A sure way of shortening the life of an H.T. battery is to place it in warm quarters like a cupboard backing on to a fireplace or a shelf with hot-water pipes underneath it.

As atmospheric disturbances generally come from a definite direction it is sometimes possible to minimise them by using a frame aerial.

Although the joining of a .25-meg. grid leak across the secondary windings of an L.F. transformer is apt to cut down the strength a little, it is often very efficacious in stopping a slight tendency to instability.

# THE "SHARP-TUNE" TWO

Here are some interesting notes to supplement the constructional details of one of the sets described in the blue prints given away last week.



"SELECTIVITY," how tired we are all getting of that word! It can't be helped, though, for "Regional" conditions have come to stay, and sharp tuning has become the first essential in all sets to be used in many large areas.

How to get it, too, is no easy question to answer where the simpler kind of set is concerned. At least, it is not easy if the set is to stay simple. Anyone can add

keep the simplicity which is one of its greatest attractions.

Experience of a tremendous variety of circuits working under all sorts of different conditions has shown us that much can be done to help these sets to cope with "Regional" conditions with the aid of a very simple device.

### Simple But Effective.

Most readers of experience will know that a series condenser of suitable size in the aerial lead produces a marked increase in selectivity with the majority of circuits. The difficulty is, as a rule, to find just the right capacity, for if it is too large the selectivity is not improved sufficiently, and if it is too small there is an undue sacrifice of volume.

A condenser of fixed capacity is obviously not an ideal method, for you really want different capacities on different aeri-als, and even in some cases at different points on the tuning scale on the same aerial.

A fixed condenser may be satisfactory with a fair-sized set, particularly if it has the advantage of the greater selectivity inherent in two tuned circuits, but for the smaller type of "det. L.F." you really want an adjustable capacity for the best of results.

### Need For Close Control.

The point is this: what you really require is the power to reduce the capacity only just far enough to get the selectivity you must have for any given occasion. In this way you can avoid going too far and losing strength unnecessarily.

One expedient which is sometimes used is to provide an adjustable type of condenser, such as the compression variety, and put it on the baseboard near the aerial terminal. This, again, is a method more suitable for the larger type of set than the smaller. With a set having a good reserve it is easy enough to hit upon a setting for the condenser which represents a good compromise for the whole of the tuning range. With a small set, on the other hand, a

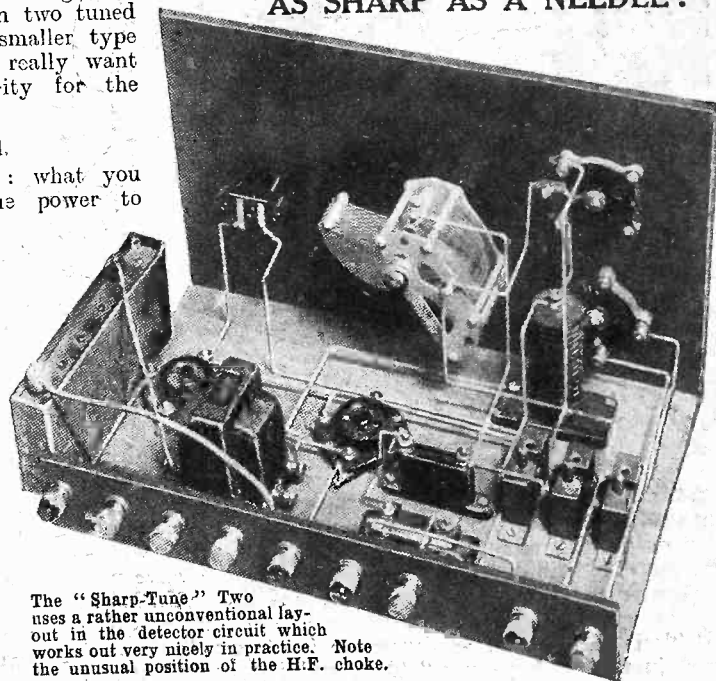
compromise method doesn't go so well. Here you really cannot afford to lose any unnecessary power, and so it is advisable to adjust your series capacity pretty exactly to the needs of the moment, and even alter it for different parts of the tuning range.

This is likely to become a bit of a nuisance if you have to open the cabinet and grope inside every time. It is evidently desirable to have it on the panel in the case of these smaller sets. Given this location, you have it right under your hand, and can reset it with ease to meet exactly the conditions you find at any particular point on the tuning range.

### Perfect Control of Selectivity.

This last really means the nearness of the wave of the station you are trying to receive to that of the local station. If it is very close you will have to cut down the capacity very considerably, but with care you can take it only just far enough, and so avoid any more loss of volume than is inevitable when you try to extract the last drop of selectivity from a small set.

### AS SHARP AS A NEEDLE!



The "Sharp-Tune" Two uses a rather unconventional layout in the detector circuit which works out very nicely in practice. Note the unusual position of the H.F. choke.

Then when the station you want is further away on the dial from the local you can bring up the capacity again and get better volume once more. (You won't be needing so much selectivity then, of course.)

(Continued on next page.)

### THE PARTS YOU WILL NEED.

- 1 Panel, 8 in. x 12 in. (Paxolin, or Lissen, Trolite, etc.).
- 1 Cabinet with baseboard, 7 in. deep, to fit (Pickett, or Cameo, etc.).
- 1 .0001-, .00013-, or .00015- mfd. differential reaction condenser (Ready Radio, or Lissen, Igranic, Lotus, J.B., Formo, Dubilier, Wearite, Magnum, etc.).
- 1 .0005-mfd. "Brookmans" condenser (Ready Radio).
- 1 .0005-mfd. variable condenser (Lotus, or Lissen, J.B., Ormond, Dubilier, Ready Radio, Formo, etc.).
- 1 Slow-motion dial if condenser not of slow-motion type (Igranic, or Lissen, Ormond, J.B., Ready Radio, Lotus, etc.).
- 1 On-off switch (Igranic, or Benjamin, Lissen, Lotus, etc.).
- 1 H.F. choke (Lewcos, or Lissen, Varley, Dubilier, R.I., Ready Radio, Telsen, Lotus, Wearite, Magnum, Parex, etc.).
- 1 2-meg. grid leak and holder (Dubilier, or Lissen, Ediswan, Ferranti, Mullard, Igranic, etc.).
- 3 Single-coil holders (Wearite, or Lissen, Bulgin, Red Diamond, Igranic, etc.).
- 2 Sprung valve holders (Benjamin, or Lissen, Lotus, Igranic, W.B., Telsen, Bulgin, Dario, Junit, etc.).
- 1 .0003-mfd. fixed condenser (T.C.C., or Lissen, Dubilier, Ediswan, Mullard, Ferranti, Igranic, etc.).
- 1 L.F. transformer (Lissen, or Ferranti, R.I., Lewcos, Varley, Igranic, Telsen, Mullard, Lotus, etc.).
- 1 Terminal strip, 12 in. x 2 in.
- 8 Terminals (Belling and Lee, or Eelex, Igranic, etc.).
- Screws, wire, flex, plugs, etc.

another tuned circuit with some sort of loose coupling, but that means an extra dial, a certain amount of difficulty with the reaction arrangements, and almost certainly rather awkward handling.

The kind of set we have in mind is the detector and one or two low-frequency stages, and the extra-dial method is obviously barred here if the receiver is to

## THE "SHARP-TUNE" TWO.

(Continued from previous page.)

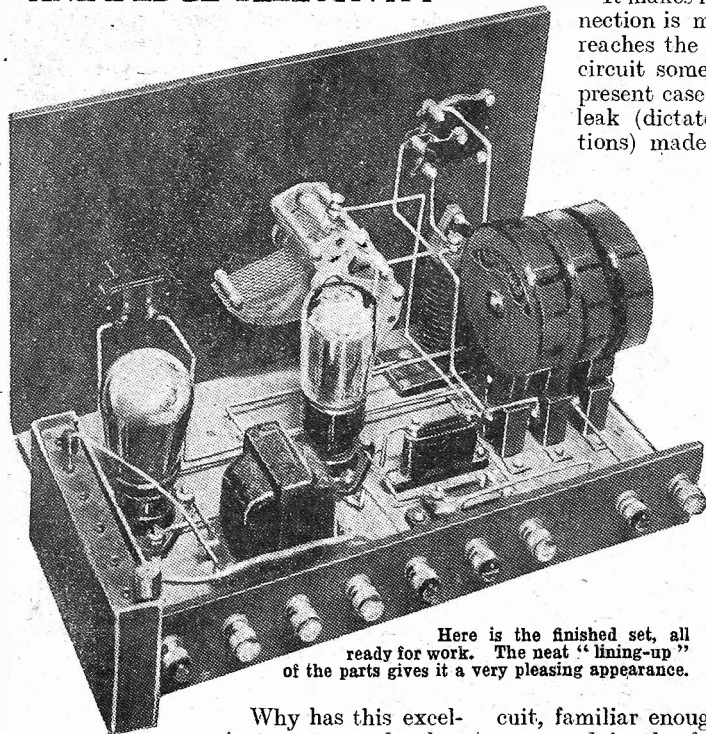
This idea of a real panel-operated control of selectivity is one of the main special features of the "Sharp-Tune" Two, the very attractive little set you see illustrated in the photos on these pages, and of which complete constructional details appear in the sheet of blue prints given away with last week's issue. It may seem a small point, but you have only to try the set to discover what a surprising and impressive difference it makes.

### A Valuable Feature

The way a correct setting of this control can sharpen up the tuning is most extraordinary, and you need not be alarmed about its effect on the volume. As a matter of fact, you can reduce the capacity of this condenser quite a lot before it begins to have any serious effect on strength so long as you make judicious use of reaction.

It is particularly easy to do this last in the case of the "Sharp-Tune," of course, because it uses one of the best forms of differential reaction, just as do practically all "P.W." designs nowadays.

### KNIFE-EDGE SELECTIVITY



Here is the finished set, all ready for work. The neat "lining-up" of the parts gives it a very pleasing appearance.

Why has this excellent system of selectivity control not been more largely employed in small sets? It was probably a matter of cost until quite recently, but now we have available the solid-dielectric type of variable condenser at very reasonable prices, and this objection vanishes.

This is the kind of condenser we have used in the "Sharp-Tune" Two, and it only means a very small increase in the cost of the set which we think you will agree is well worth while, in view of the wonderful things it enables you to do. It really gives you a degree of selectivity when required which is far above the usual level for a set of this type.

To identify the condenser in question just observe that it is on the panel immediately underneath the reaction condenser. Its control knob is therefore the lower one on the left as you look at the front of the panel.

The general scheme of the circuit is otherwise extremely straightforward, as a glance at the diagrams on the blue print sheet itself will show you. Here you will recognise all the well-tryed features of a modern, efficient design. There is differential reaction in one of its best forms, a separate aerial (primary) coil to give a rough adjustment of selectivity by the choice of different sizes, and a quite normal transformer-coupled L.F. stage.

There are some miscellaneous points about the circuit which we had better attend to before we go any further. These are rather matters of detail, for you will get the general idea elsewhere.

For a start, there is the matter of the detector grid leak. Its connections may look a little peculiar at the first glance, but they are really normal enough.

### Why It Was Done

If you will examine the circuit diagram on the blue print (No. 57) you will discover that the leak is wired between the grid of the valve and a point on the L.T. circuit between the L.T. switch and the L.T.+ terminal. More often, of course, the leak would be wired straight to a point on the L.T. circuit close to the detector valve itself.

It makes no difference how the connection is made, really, so long as it reaches the positive side of the L.T. circuit somewhere or other. In the present case the position of the grid leak (dictated by layout considerations) made it better to adopt the connection we have mentioned.

A glance at the wiring diagram on the blue print will show you why. Just note how nicely the wiring of the grid leak (marked "2 meg.") works out with the scheme we have used.

The reaction circuit may look a trifle out of the way to those accustomed to the older form of Reinartz, and again there is a matter of detail which might be the better for a little explanation.

In this type of circuit, familiar enough to regular readers (it was used in the famous "Magic" Three) the reaction coil is included directly in series in the anode circuit of the detector valve.

Observe that the steady anode current of the valve passes through the reaction coil, then the H.F. choke, and finally the primary winding of the L.F. transformer in order to get to the H.T. positive terminal on its way to the battery.

### Those Detector Currents

Next remember that when signals are being received there is what is called an H.F. component in the anode current, as well as the L.F. currents which are passed on by the transformer to be amplified by the

next valve. These H.F. currents cannot get through the choke, so they make their way down to the filament circuit through one or other half of the differential reaction condenser.

Which way they go depends on with which set of fixed plates the moving ones are chiefly engaging. Refer to the circuit diagram again, and you will see that when the moving vanes engage completely with the "F<sub>2</sub>" fixed ones the H.F. currents pass straight from plate to filament without going through the reaction coil.

### How Reaction Is Obtained

In this position you get no reaction, but a plain by-passing effect which improves the sensitivity of the valve. Then when the moving vanes engage with "F<sub>1</sub>" the H.F. currents pass through the reaction coil before getting down to filament by way of the "F<sub>1</sub>-M" path in the reaction condenser.

In this case you get full reaction and the set will oscillate. By choosing various intermediate settings for the reaction condenser you can get any desired amount of reaction, the currents dividing up and passing through both the paths we have explained.

There, now you know how your reaction circuit works, and when you turn the knob you will be able to imagine what is happening inside the set.

You will probably have gathered that the "Sharp-Tune" Two will work on short waves, and a few notes on the necessary adjustments may be welcome. Well, it's really very simple, and requires little more than the substitution of suitable sizes of coils.

### On Short Waves

First, though, you should set the selectivity control (C<sub>3</sub>) almost to its minimum (moving vanes right out). This is not because you want exceptionally high selectivity, but because the aerial circuit behaves rather differently on short waves.

Now you just want the coil sizes, and then you are ready to have a try at the short waves. Here they are for the interesting band of wave-lengths between 20 and 50 metres: L<sub>1</sub>, No. 4; L<sub>2</sub>, No. 4; L<sub>3</sub>, No. 6 or No. 9.

## ROUND THE STATIONS

Barcelona has two radio stations, one on 349 metres and the other on 268 metres, the latter being the more powerful.

Belgrade, working on 432 metres, can often be identified from the fact that it employs a metronome which beats 60 times per minute.

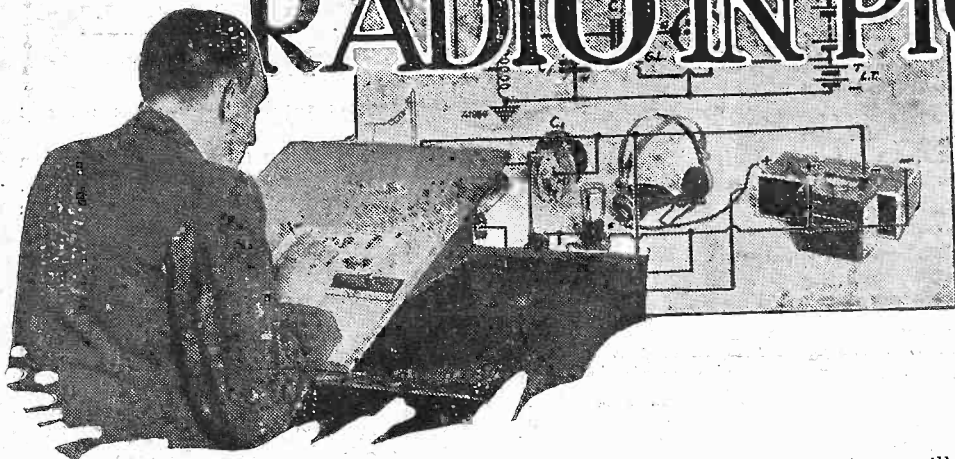
"Achtung," the German call, means "attention."

Most of the German broadcasting stations close down with "Deutschland Uber Alles," which is set to the familiar hymn tune (by Haydn) called "Austria."

A tune on a musical box is the opening signal of the Berne, Switzerland, station which works on 403 metres.

Bratislava, Czecho-Slovakia (wave-length 279 metres), has a lady announcer and an interval signal of the four musical notes C E G G.

# RADIO IN PICTURES



By "PENTODE."

A popular "P.W." contributor shows you, in a short series of articles, how easy it is to read and understand diagrams. His novel and fascinating system of diagram pictures should prove most interesting and helpful to all classes of radio enthusiasts.

## 1. SELECTING THE STATION.

**T**HEORETICAL diagrams are the simplest possible things to understand providing you know exactly what all the various symbols indicate and providing you have some idea as to the work the components symbolised have to do, and how they do it.

Perhaps you think that the "providings" infer too much. Well, in the course of three or four articles I hope to show that there is a fairly quick way to the acquisition of sufficient knowledge to enable you both to understand and appreciate diagrams.

And I am writing these articles so that they should prove useful and interesting to a very large number of readers. The regular reader will find them a helpful refresher, and the new reader a nice high stepping-stone to a fuller appreciation of radio and all its possibilities.

### Photographic Diagrams.

The constructor who does nothing but assemble and operate receivers is missing a great deal of the real fascination of his hobby; circuit reading, to mention only one further aspect, is much more absorbing than cross-words!

However, all this will be so very obvious to the "old hand" that I had better get down to brass tacks.

A glance at the accompanying illustrations will show you exactly what line I am going to take. Each illustration comprises a theoretical diagram and a photograph of the actual parts symbolised. And these parts are connected up in accordance with the diagram.

Before I describe the actual circuits there are one or two important things you should note. The symbols used are quite standard and are not liable to change in form except in very unimportant details. But components of different makes are sometimes very different in appearance. However, you will soon learn to recognise the purpose of a component by its main structure and, in any case, their names at least, are fairly standard.

### What Tuning Is For.

Thus a condenser is never called anything else, although there are several kinds of condensers in general use, viz., "variable," "fixed," "differential," etc.

The relative physical dimensions of components form no safe guide as to their electrical values or dimensions. One coil that looks much bigger than others might not tune to such long wavelengths and so on.

Now for the circuits. The first one shows an aerial tuning circuit which comprises a

coil and a variable condenser, and you will have no difficulty in identifying the symbols for these in the theoretical diagrams.

The purpose of the aerial tuning circuit is to adjust the wavelength of the aerial to that of the station you want to receive. You will notice that the aerial wire can be joined to either one of two points on the coil. These are known as *tappings*.

### Connecting the Coil.

The earth lead, a wire from a metal rod driven into the ground or from a water pipe, is connected to the one end of the coil. The particular coil shown in the photo is of the "X" type.

An "X" coil is one that has two *tappings* placed well down towards one end of the winding. Connection to these *tappings* is via the two terminals that can be seen fixed to the sides of the coil, while the ends of the

*tappings* too far down the coil, otherwise you will lose in sensitivity (the amount of energy you are able to derive).

The two *tappings* on an ordinary "X" coil are admirably disposed to provide a compromise between these two conditions, and you have the choice of two degrees of selectivity.

The larger the coil the more you step up the wavelength of the aerial. The variable condenser gives you an adjustment of wavelength which is very smooth and very gradual, from the minimum imposed by the coil used, up to a maximum depending upon the capacity that the variable condenser adds to the circuit.

Capacity is reckoned in farads, but a farad being a unit that represents an enormous amount of capacity, for practical purposes it is divided into millionths, and so we get the microfarad (a millionth of a farad).

The maximum capacity of a variable condenser such as is generally used in an ordinary tuning circuit is .0005 mfd. (microfarads). A variable condenser labelled thus, (.0005 mfd.) provides you with a variation of capacity from a certain minimum up to that value of .0005 mfd.

### "Fixed" and Moving.

The minimum capacity will depend upon the construction of the condenser and it is generally about a fifth of the maximum.

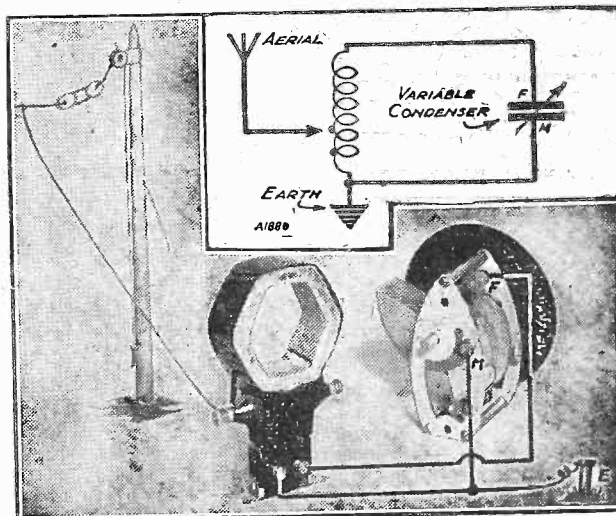
You will see that the letters "F" and "M" occur in reference to this condenser. These denote "Fixed" and "Moving" vanes respectively.

Although you do not often see such letters in a theoretical diagram they assume considerable importance

when it comes to a wiring diagram. From a theoretical point of view it does not matter a scrap which way the condenser is joined in circuit, but in an actual set it is often very much better to join the moving plates to earth, because these vanes are electrically connected to the metal framework of the condenser and thus provide a kind of shield over the fixed vanes.

(Continued on the next page.)

## THE FIRST STEP



Before anything else can happen you have to tune your aerial to the wave-length of the station which you wish to receive. Here is a simple tuning circuit shown both theoretically and in pictorial form.

windings are connected to the plug and socket which fit into the coil holder, the two terminals of which are clearly to be seen in the illustration.

The lower down on the coil the *tappings* are taken, that is the nearer to the earth, the greater will be the selectivity. That is to say, the more sharply defined will be the various stations to which you tune. There will be a smaller tendency for any of them to overlap. But you must not have your

## RADIO IN PICTURES.

(Continued from the previous page.)

By the way, if you find that you are not able to follow closely anything I write here, do not get disheartened, and turn to some other article. I am aiming to get over the few essentials and I think you will absorb these almost without knowing it. At least, I hope so.

We have got our aerial wire going direct to the tuning circuit, and you will notice how the wire is insulated from the mast by means of aerial insulators.

### Tuning the Circuit.

By adjusting the variable condenser we can tune in a station whose wavelength lies within the range covered by our coil and condenser combination. When a station is tuned-in in this manner it develops high-frequency electrical current, which flows round that circuit comprised by the coil and condenser.

High-frequency currents are so called because they flow backwards and forwards at terrific speeds, the actual frequency (that is, the number of times per second they flow first in one direction and then in the other) depends upon the wavelength and can be discovered by dividing the wave-length in metres into 300,000,000.

When you tune in a station of, say, 300 metres, a current flows backwards and forwards one million times per second. This current is of little use to us, owing to its rapidly alternating nature.

### Very Rapid

As you can see, these reversals occurring a terrific number of times per second, from ordinary points of view, almost constitute a wipe-out. The H.F. currents would never work a loud speaker or telephone receivers, because such devices would not be able to respond to them.

A loud speaker might try to start operating while the current was flowing in the one direction, but before it could get going, the H.F. would be off in the other direction, with a completely cancelling effect.

The simplest way to use the H.F. is to employ a simple crystal detector, for a crystal detector allows current to flow through it only in the one direction.

### The Rectifier

Put a crystal detector and a pair of telephone receivers across the variable condenser in our tuning circuit and every time the H.F. goes off in the one direction, a little of it would be able to filter through the

phones-detector path. Of course, in the other direction the current would find that path barred to it owing to the "one-way" properties of the crystal detector. (We have said nothing yet about modulation!)

Another way of dealing with this H.F. current is to employ the thermionic valve. So let us leave our aerial circuit with its H.F. energy "oscillating" backwards and forwards in it, and build up some suitable valve apparatus.

Our second illustration shows two new items—a valve and an L.T. battery. In the photograph the valve is stood in a holder, the holder does not appear in the theoretical diagram and there is no reason why it should, for a valve holder is merely a terminal adapter. It provides the terminals for the valve and enables it to be connected to the other parts of a set.

The L.T. battery in this particular instance is an accumulator, although there is no reason why it should not be a special type of Leclanché battery.

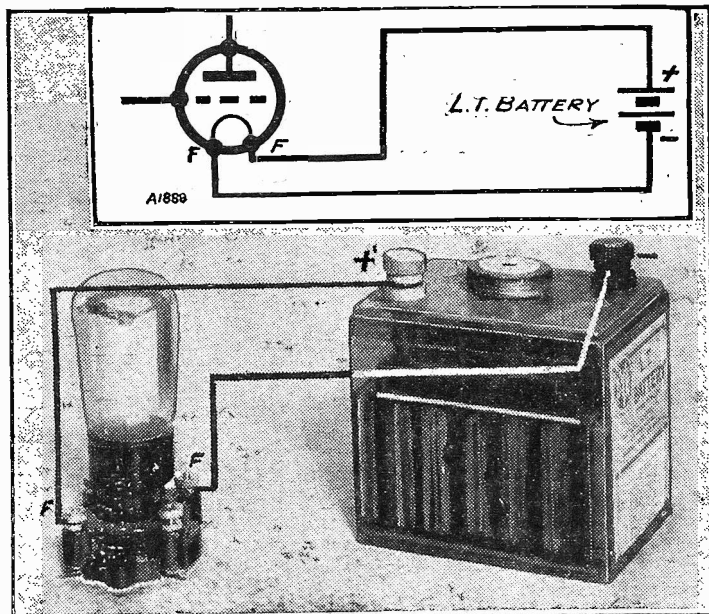
### Note the Marking

Take careful note of the markings on the accumulator; you will see that there is a + and a - sign and these stand for positive and negative respectively. The positive and negative terminals of batteries represent important points in a circuit, and you must not join a negative where the positive should go, or vice versa.

You will see that the L.T. battery is symbolised by small strokes, two long and two short. A long stroke denotes a positive terminal and a short stroke a negative terminal.

Thus the symbol really indicates two cells—the negative terminal of one cell being

## "LIGHTING" THE VALVE



The filament (an L.T.) circuit of a valve. There is a slight discrepancy between the theoretical and pictorial representations. Can you spot it? Don't trouble to write, it will be explained next week.

connected to the positive terminal of the other cell, the two remaining terminals, denoted by the + and - signs on the diagram, being connected to the circuit.

I have purposely introduced a slight discrepancy between the theoretical diagram and the practical hook-up in the illustration. Can you spot it? I will explain what it is in my next article.

## H.T. FROM THE MAINS.

FOLLOWING the successful application of nickel iron in the cores of L.F. transformers, comes its application to H.T. mains units.

First in this field of radio research, Radio Instruments, Ltd., have produced two all-insulated H.T. units in which the advantages of compactness, small size, and low weight, conferred by nickel-iron cores are strikingly demonstrated.

### NICKEL NOW!



The first H.T. mains unit to employ a nickel-iron core for the smoothing chokes.

They are intended for use with self-contained and most other receivers of up to five valves. The A.C. model, which retails for £4 15s. is for mains with voltages from 200 to 250, and 40 to 100 cycles.

Adequate current and voltage are available from the three output tapings, one of which is marked S.G. +, and gives up to 80 volts for S.G. valves. The detector tapping is variable up to 150 volts, and approximately 3 milliamps can be taken from it.

The "power" H.T. positive terminal gives 140 volts at the 20 milliamps, and as the unit measures only 9 in. x 5 in. x 3 in., there is no doubt that the claim for compactness is amply substantiated.

### Pleasing Appearance

Moreover, there are no projecting plugs to bother about and get in the way, for these have been cunningly recessed so that they are protected when in use. The variable H.T. control knob also is recessed into the body of the instrument.

A particularly pleasing external appearance has been obtained by making the case of handsome bakelite, and when tested on a large four-valve set taking 18 milliamps there was not the slightest trace of hum, motor-boating, or any other of these troubles often associated with mains units supply.

A Westinghouse metal rectifier is incorporated in the A.C. model, and ample ventilation has been arranged for, the whole instrument being quite a triumph of compact efficiency.

The D.C. unit is even smaller than the A.C. model, measuring only 6 in. x 4 in. x 3 in., and although nominally able to give the same output as the A.C. type, the milliamps available are nearer 30 than the 20 claimed by the makers.

Here, again, the voltage of the detector is variable from 0 to 150. The price of the D.C. model is £2 12s. 6d., and upkeep costs are hardly worth considering.



# CAPT. ECKERSLEY'S QUERY CORNER

**AERIAL FOR A FLAT-DWELLER—  
DECOUPLING VALUES—SILENCING  
A RADIOGRAM MOTOR.**

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

### Aerial for a Flat-Dweller.

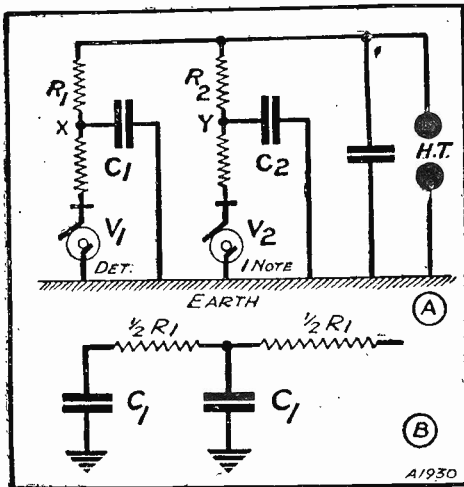
M. A. (Ilford).—"I have been told that the regulations require the metal casing of house lighting wiring to have no greater resistance to earth than two ohms."

"If this is the case, it seems that connecting the earth terminal of a wireless set to this metal casing would provide an excellent earth for flat-dwellers and others to whom the provision of an earth is a problem."

"Would so doing be safe? Or is it similar to earthing to a gas-pipe, which I have been told is unsafe?"

If you earth to the electric conduit of house-wiring, it is true that you are connecting the earth through a low resistance. But suppose you are in a flat, 30 ft. above the earth level, then you will see that you are really connecting your earth to a very effective aerial because the waves get picked up by the casing; and the casing is, from the point of view of high-frequency currents, alive.

### HOW MANY OHMS?



This diagram illustrates the reply to A. R. B. (Chichester).

If you are on the ground floor, you are tied on to a considerable aerial system; but, of course, the path to earth is shorter and you will not, in all probability, get deleterious effects.

As a matter of fact, frequently when I am confronted with this problem I do not use any earth at all, and use the earth conduit of the electric-light wiring as an aerial. So it comes to this that if you are

on the ground floor, use an aerial on to the aerial terminal and the earth on to the conduit; that should be quite satisfactory in the majority of cases.

If you are high up in a flat, do not use an earth at all, but put the aerial terminal on to the conduit. If you are in a flat high up, and you connect an indoor aerial to the aerial terminal, and the earth terminal to the conduit, you will find that you get less signals than if you take off the earth, but the best signals if you put the aerial on to the conduit (at least, this has been my experience in two or three cases).

### Decoupling Values.

A. R. B. (Chichester).—"What determines the value of a de-coupling resistance for the anode circuit of a detector valve, assuming the question of reducing the H.T. voltage is of no importance? I notice the value normally given is 20,000 to 25,000 ohms."

I have drawn the two valves of a low-frequency chain as  $V_1$  and  $V_2$ . Now points X and Y must be at A.C. earth potential, otherwise  $V_1$  is going to affect  $V_2$  spuriously, and more particularly  $V_2$  is going to affect  $V_1$ .

So if we merely parallel points X and Y by a common condenser, this condenser has to be enormous to be an effective A.C. "short" to earth. So we take resistances and condensers  $R_1, C_1$  and  $R_2, C_2$  to make the current from  $V_1$  and  $V_2$  go straight back to earth.

Thus the impedance of  $R_1$  must be much greater than  $C_1$ , and  $R_2$  much greater than  $C_2$ . At the worst condition (lowest frequency),  $C_1$  at 4 mfd. has a resistance of 1,000 ohms, so  $R_1$  has to be great compared to 1,000. 25 to 1 is a good ratio, so 25,000 ohms is usually about right. But, if it's not, instead of increasing  $R_1$  do as shown at B.

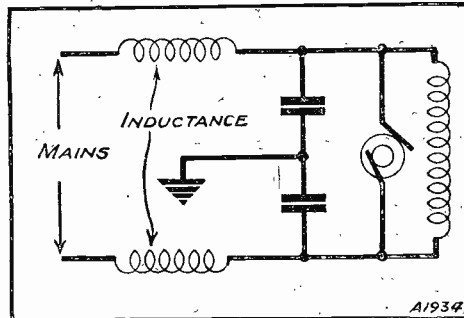
### Silencing a Radiogram Motor.

R. W. T. (Hackney).—"Is it possible to purchase a D.C. electric motor for driving a gramophone turntable that does not cause trouble by 'sparking' after some few weeks use? Alternatively, assuming such a motor is not available (I have not yet

come across one), can you please offer suggestions for definitely overcoming the 'interference' from sparking?"

Well, you know there is quite sparkless clockwork. I am not particularly knowledgeable on the whole subject, but if, as you say, you have not found a D.C. motor which is electrically silent, I should think it was hard to come by one.

### GETTING RID OF HUM

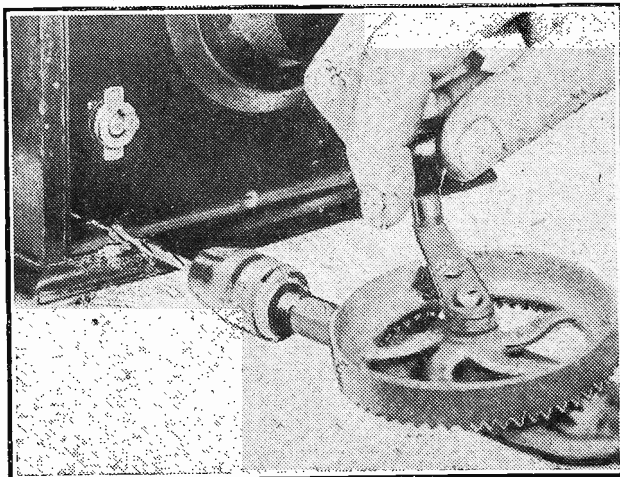


A method of mid-point earthing.

It's so difficult, too, to know if the brushes on a motor initially silent will stay put without endless trouble. Of course, I assume you have tried shunting your D.C. motor by condensers, and been careful to see the motor is not earthed also? And perhaps tried inductance in the way shown?

Really, if I were you, I'd use clockwork.

### ENSURING A GOOD FIT



When fitting the panel to the baseboard put it in the new cabinet before drilling for the fixing screws if you want to make sure of a good fit.

## LATEST BROADCASTING NEWS.

**DR. BOULT'S DEBUT.**

**SCOTTISH PROGRAMME PLANS—A SOCCER COMMENTARY—"MEDICINE AND THE STATE"—LORD RIDDELL ON CAREERS—ETC., ETC.**

**D**R. ADRIAN BOULT makes his first appearance on the concert platform since his appointment as Music Director of the B.B.C., when he conducts the opening concert of the 1930 season at the Queen's Hall on Wednesday next, October 22nd. This will also be the first opportunity the public will have of seeing the full B.B.C. orchestra of 114 players.

**Scottish Programme Plans.**

Mr. David Cleghorn Thomson, the Regional Director for the B.B.C. in Scotland, is quite convinced that there are occasions when something should be done to make himself and his work known to listeners. The policy of the B.B.C. generally is that programme builders and other high officials of the Corporation should stay rather in the background than push themselves into the limelight.

Although this may be a perfectly sound ruling on most subjects, there are, nevertheless, times and places when a little more of the personal element would help listeners to better appreciate the problems of those who direct the vast machinery of broadcasting.

So Mr. Cleghorn Thomson has decided to tell Scottish listeners all about their forthcoming programmes and his plans for Scottish broadcasting during next year.

The "Aberdeen Press and Journal" has recently published a series of critical articles which have no doubt caused the Scottish Regional Director to think a bit, so that here is an opportunity for him to get a little of his own back. In any case, his talk will no doubt be as interesting as it is unusual.

**A Soccer Commentary.**

No running commentary on an Association Football Match has been broadcast to London listeners this season, although several have already been included in Scottish programmes.

This fact of itself must therefore accentuate the importance of Mr. George F. Allison's description of the game between Arsenal and West Ham which is to be relayed from Highbury on Saturday, October 25th.

**"Medicine and the State."**

Another new series of talks of outstanding importance is due to begin next Monday, October 20th, when Sir George Newman will speak on "Medicine and the State."

The series is intended to acquaint the layman with medical subjects under the general heading of "The Future of Medicine," and several of our leading authorities on the science of health will contribute talks, among them being Dr. John Mellenby, Sir Norman Bennett, Professor Russ, Lord Moynihan, Dr. John Freeman, and Sir Humphry Rolleston.

**Lord Riddell on Careers.**

The series of talks dealing with Careers is to be brought very much to the forefront on Tuesday, November 18th, when Lord Riddell speaks on "Salesmanship."

Lord Riddell takes the view that people should not be allowed to drift into a job without proper preparation, and he will show how the adolescent may be trained expertly for skilled employment.

**"A Sister to Assist 'Er."**

Few items were more popular with music-hall audiences of pre-war days than the humorous sketch by Sydney Fairbrother and the late Fred Emney entitled "A Sister to Assist 'Er," which is to be included in a vaudeville programme for London Regional listeners on Saturday, October 25th.

It will be played by Vernon Watson (in the part in which he succeeded Fred Emney) and Fred Emney's daughter, Doris, in Miss Fairbrother's part.

**L. du G. Up North.**

Amateur theatrical societies in the North may consider themselves lucky,

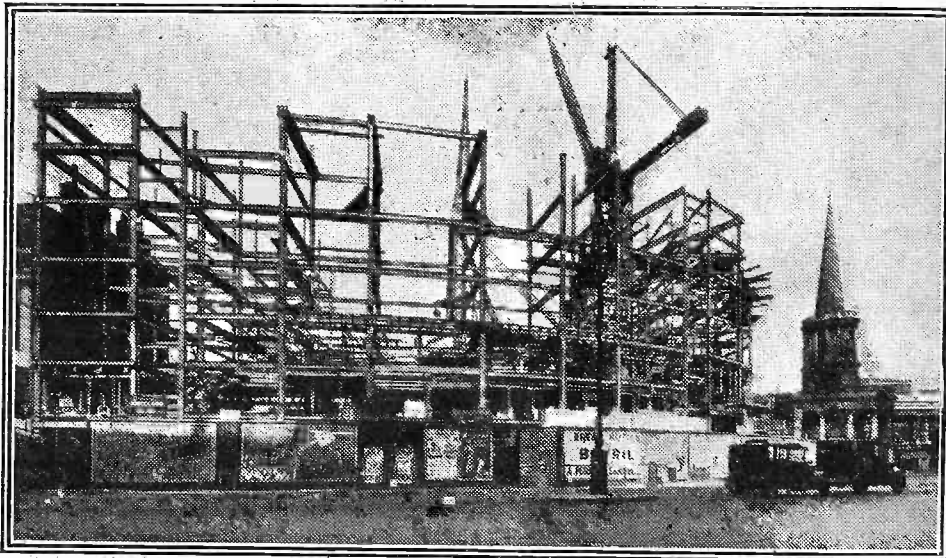
inasmuch as their members are to have an opportunity of hearing a series of four talks by Mr. L. du Garde Peach on Play Producing.

L. du G., besides being a writer of distinction, has his own little theatre at Great Hucklow in Derbyshire where performances are given by a company of villagers. Mr. Peach is a member of the Council of the British Drama League and his talks should be valuably informative to a wide audience.

**Huddersfield Choir.**

Yorkshire is a county of famous choirs, but none has a greater reputation than that of the Huddersfield Choral Union, whose performance of Handel's "Solomon" is to be relayed from the Town Hall, Huddersfield, for North Regional listeners, on Sunday, November 2nd.

This choir, which is under the direction of Sir Henry Coward, is well-known on the Continent. It visited the Hague in 1928 when the Dutch press acclaimed it as the best ever heard in that country.

**NEW LONDON HEADQUARTERS FOR THE B.B.C.**

Having outgrown Savoy Hill, the B.B.C. is building a new headquarters in Portland Place, London, W., and this illustration shows the building in progress.

**TECHNICAL NOTES.**

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

**CHANGING OVER TO THE MAINS**

Re-Wiring the Set—Modern Receiver Design—Background Noise—Dual Purpose Amplifiers.

**I** AM often asked by readers of these notes whether it is a difficult matter to convert a set which is working on batteries so that it will work direct on the electric light supply.

Of course, any set can be made to derive its H.T. current from the electric light by the very simple process of using an H.T. mains unit. This involves no interference with the set; it merely means substituting the H.T. unit for the H.T. battery.

**Re-Wiring the Set.**

When it comes to the low-tension supply, however, as I mentioned in these notes a week or two back (unless you use a low-

tension mains unit, which is not the general practice now) you are under the necessity, for all practical purposes, of changing your valves and substituting the indirectly heated A.C. type.

Inasmuch as there are the usual three-electrodes, anode, grid and cathode (I use the word "cathode" as a substitute for "filament" in the ordinary valve) and as, in addition, there are two terminals required for the heating element, it means that there are five terminals altogether instead of the usual four.

This involves using a five-pin holder, and also, of course, the low-tension heating

(Continued on page 309.)



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**THE AMAZING**

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**RADIO VALVES**

FULL-WAVE RECTIFIERS					
Type	Filament Volts	Fil. Amps	Max.R.M.S. Anode Volts	Max. Output Current	PRICE
UU.30/250	4	1.0	250	30	12/6
UU.2	4	1.0	250	60	17/6
UU.60/250	4	2.0	250	60	17/6
UU.120/250	4	2.0	250	120	22/6

HALF-WAVE RECTIFIERS					
Type	Filament Volts	Fil. Amps	Max.R.M.S. Anode Volts	Max. Output Current	PRICE
U.30/250	4	1.0	250	30	15/-
U.75/300	4	2.0	300	75	15/-
U.60/500	4	2.0	500	60	17/6
U.65/550	7.5	1.25	550	65	17/6
U.120/500	4	2.0	500	120	22/6



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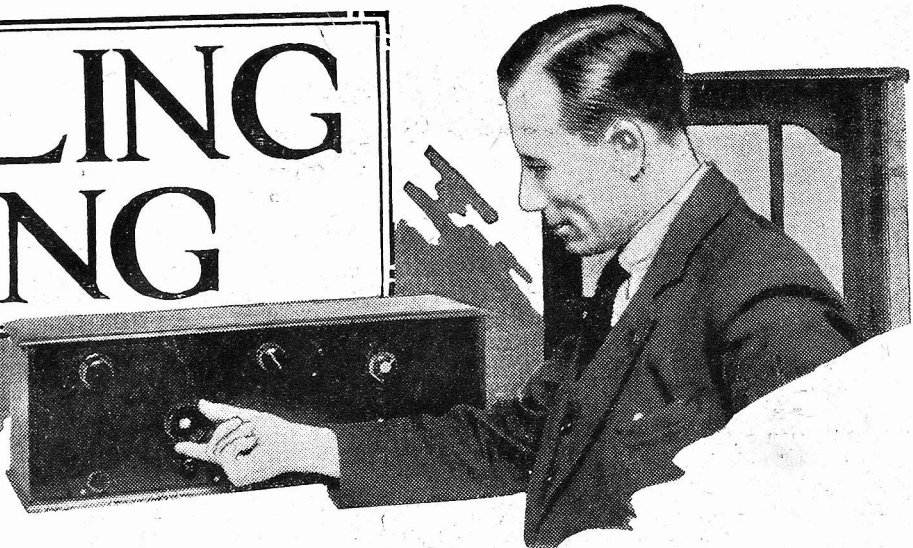
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**EDISWAN**

# TACKLING TUNING

By P. R. BIRD.

A helpful article on the operation of different types of receiver, with special reference to the sets described in the Blue Prints given away in last week's "P.W."



WHEN that new set is finished down to the last screw, when you have connected up aerial and earth, when the loud-speaker leads are on and you have proved that the set sounds all right, does your heart sink a bit when you come to tackle tuning?

The "old hand" never gives a second thought to it. He simply ropes in the stations. But how about the man who has just built or bought a set and does not know how to handle it properly—what is the easy way for him to bring in foreign programmes?

## Invaluable Book.

Obviously "The Key to the Ether"—"P.W.'s" gift book presented with this week's number—is going to be invaluable in such a case. Especially to those who have not an experienced friend at hand to help them with tips on tuning.

But some people will tell you that every set is different from every other set, and the only way to learn to handle it properly is to keep on trying until you get the knack. That is not true.

Although different sets have little peculiarities of their own, all the popular present-day sets fall into two or three different classes, and once you have had experience with any particular class of set you can handle the whole tribe.

Suppose you have just built the "Sharp-Tune" Two, from "P.W." blue print No. 57. What is the right way to handle it?

## One of the Sets.

The "Sharp-Tune" Two belongs to the detector and low-frequency class. That is to say the aerial is fed into the detector's grid circuit, and there is no high-frequency amplifying valve stage in front of the detector, such as has been employed for the "Three-Coil" Three or for the "Maxi-Power" Four (blue prints Nos. 59 and 60 respectively.)

In sets which do not employ an H.F. amplifying stage, the reaction control is very important for long-distance work. As soon as you look at the panel of the "Sharp-Tune" Two you see that the tuning condenser is the big one in the middle, and you know that turning this alters the wavelength to which the set is tuned. To the

left of it are two other condensers, the upper one being the aforesaid reaction control, and the lower one ( $C_3$ ) a selectivity control.

## Selectivity Control.

The chief function of  $C_3$  is to prevent your aerial being "overpowered" by the local station. As you know, a big aerial erected very close to a powerful broadcasting station cannot pick up many foreigners because the strong local signals monopolise it.

Proper adjustment of  $C_3$  will have the same selectivity-increasing effect as shortening your aerial, so that a point can be reached where the local station is not too troublesome, and yet it is still possible to receive the foreigners, though not quite so strongly as before.

If you adjust  $C_3$  "all in" you get maximum power from the foreigners, but too much maximum power from the "local." Correct adjustment of  $C_3$  reduces foreign stations slightly, but nevertheless you will

it has to be adjusted to bring the powerful local station's programme within a reasonable margin on the dial.

If your local station is within a few miles you will need  $C_3$  set towards its all-out position, and you should use a small coil in  $L_1$ . At greater distances the larger coil may be used and the  $C_3$  capacity increased, as recommended in the blue print.

## Reaction Control.

Once the degree of selectivity required has been adjusted by  $C_3$ , this condenser can be considered as finished with, and the handling of the set resolves itself into the correct operation of  $C_1$  and  $C_2$  (tuning and reaction). You will find all about how to handle reaction and tuning in "The Key To The Ether" which "P.W." is giving away this week.

Read it carefully and then take the trouble to have half an hour's practice in oscillation-control, etc., at some time when the local station is not working, training yourself to keep the set sensitive, but not oscillating as you alter the tuning. Once you have mastered this you can handle the "Sharp-Tune" Two or any other detector-L.F. set in a way that will seem amazing.

Worked in this way the "Sharp-Tune" Two will probably give you a dozen stations on the ordinary broadcasting allowed in any one evening without the slightest difficulty, and it will be surprising if some readers do not tune in thirty, forty or even more stations in one evening!

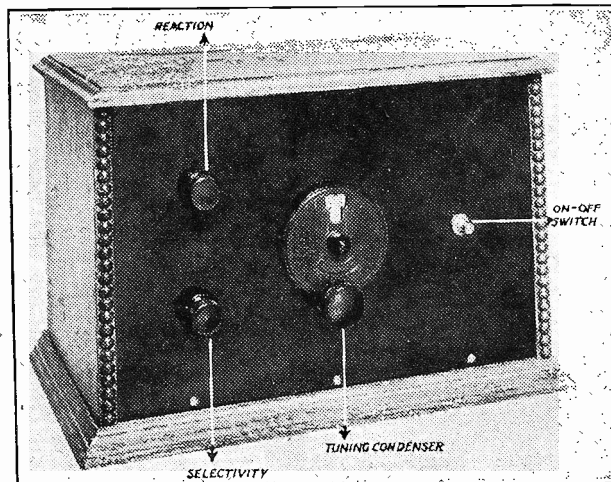
## Two Important Dials.

Tuning to blue print No. 58. The "Easy-Change" Three, we find that this also is a detector and L.F. set. True, it has two low-frequency stages, instead of one. But this does not affect the main point mentioned before—namely the absence of the high-frequency amplifying valve between the aerial and the detector.

So in this set, as in the "Sharp-Tune" Two, the two really important dials are the tuning dial ( $C_1$ ), and the reaction condenser control ( $C_2$ ). When you can handle these two in unison, as explained in "The Key To The Ether," following up the tuning and the reaction and keeping the set sensitive all the time without oscillating,

(Continued on next page.)

## HANDLING THE "SHARP-TUNE" TWO



This is a very easy set to handle, the tuning being "backed up" by reaction when necessary, and the selectivity control left alone after it has once been set to cope with the conditions prevailing.

hear them far better because the new  $C_3$  adjustment has "narrowed down" the local station so that it does not interfere with the foreigners.

So you see there is nothing to worry about in the selectivity adjustment. In practice  $C_3$  does not need constant readjustment, but when the set is first installed

## TACKLING TUNING.

(Continued from previous page.)

you can be sure of a steady stream of foreign stations pouring out their programmes from the loud speaker.

And, of-course, they will be really loud, for here you have detector, two low-frequency amplifying stages (R.C.C. unit and L.F. transformer) giving much greater power than a two-valve set can possibly provide.

Remembering how important reaction is for long distance work with all detector-L.F. sets, you will appreciate the fact that to get good long-distance results you must set the  $L_3$  socket properly on the base-board if you are going to get plenty of foreign programmes. It is very easy provided you follow the blue print instructions.

### Coil Adjustments

If you line up the three coils close together you will probably find that although reaction is "beautiful" on long waves—coming up stronger and stronger as you move away from zero to more and more capacity on the reaction condenser, and giving you plenty of oscillation when full in—the medium waves do not, at first, give such good control.

You may find that even when the reaction condenser is turned right off, the set still oscillates, or has too much reaction and is too near the oscillation point. So swing the coil holder round on its screw, getting it further and further away from  $L_1$ , until it gives just as good reaction control on the medium waves as on long, and then you can screw it securely to the baseboard.

Do not forget that in order to obtain this desirable state of affairs it may be necessary to readjust the wander plug which goes from H.T. +1 terminal on the battery, and that different sizes of coil for  $L_1$  will have a marked effect on reaction results, the larger size giving stronger reaction than the smaller.

Here is another tip about the tuning of this particular set that will interest you if you have built it, or intend to do so. On the blue print it states that for medium waves the panel plug goes into No. 1 socket, and for long waves in No. 2.

### Unusual Effect

The change-over of the flex on the panel and alteration of  $L_2$  is simple enough, to be sure, but you may find that for 5 X X it is not even necessary to do this. In some localities 5 X X will come in strongly if you open  $S_2$  but leave the aerial on the No. 1 terminal and simply retune on the main tuning condenser ( $C_1$ )!

If you get good reception of 5 X X in this way there is no objection to doing it, but much will depend upon local conditions, so you may find it necessary to do as explained on the blue print when changing over from short to long waves. It is just a matter of aerial distance, and luck, etc.

Now we come to the other main class of receivers, namely, those in which a high-frequency valve is employed. Both the "Three-Coil" Three and the "Maxi-Power" Four use an S.G. high-frequency valve, and with these, as with the older-fashioned neutralised stages, the reaction control has to "take a back seat."

### Keep in Step

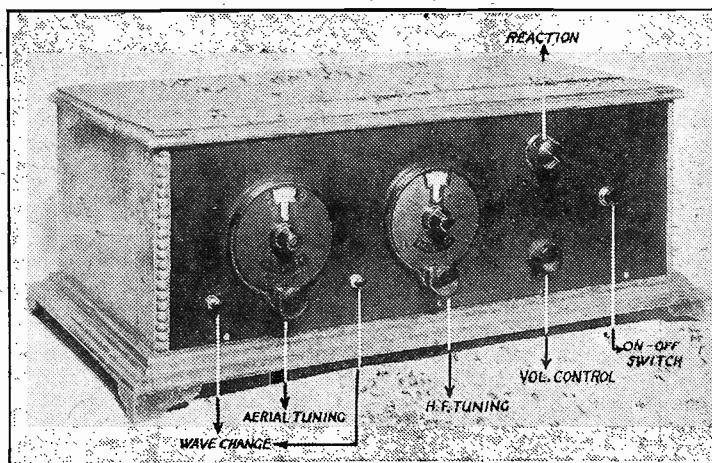
It still plays a big part in programme-getting, of course, but with all high-frequency receivers, the great thing is not so much to keep aerial and reaction in close co-operation with each other, as to keep the aerial and the high-frequency tuning "in step." It is absolutely vital that you do this for if you do not, you might as well throw your high-frequency valve away.

Just to make it perfectly clear, let us suppose you have the "Three-Coil" Three in action. There are two tuning dials  $C_1$  and  $C_2$ , and one reaction dial,  $C_3$ . The latter is now comparatively unimportant.

With this receiver, with the "Maxi-Power" Four, or with any other receiver employing an H.F. stage, you must keep the two tuning dials in step, even if you have to neglect reaction. And keeping the two tuning dials in step is quite an easy matter if you will only give your mind to it.

Once you have mastered it you will find it is so easy that you wonder however anyone could light-heartedly just twiddle knobs about, and listen for stations. But unless you knew the trick you might twiddle

## THE KEY TO THE CONTROLS OF THE "MAXI-POWER"



Plenty of control is afforded, and yet there is no confusing complexity on the panel. The main thing when searching with a set of this type is to keep the two tuning dials "in step." All the other controls are subsidiary.

the dials for hours without getting much from the set, so be sure that you understand the following hints upon how to keep two tuning dials in step.

The underlying idea is simplicity itself. The first condenser (in this case  $C_1$ ) is tuned to receive a certain wave-length or station. These signals are to be amplified by the H.F. valve, and passed on to the next stage, which consists of the condenser  $C_2$  and the condenser coil  $L_2$ .

Now if this second coil and condenser ( $L_2-C_2$ ) are tuned to exactly the same wave-length as the other coil and condenser ( $L_1-C_1$ ) the foreign station signals go straight through from aerial and land on the detector dial with a bang! All other signals are excluded because the circuits are out of tune with them.

But if  $L_2$  and  $C_2$  combination are out of step with the  $L_1$  and  $C_1$  combination, nothing happens except perhaps the owner's sighs and lamentations. For if the  $C_1$  adjustment is bringing in one station and the  $C_2$  adjustment is bringing in a different station, the net result is not worth listening to.

They must be set to receive the same wave-length. They must be "in step."

This does not necessarily mean that when one dial is reading ten degrees the other must also read ten exactly, or when one is reading twenty-six the other must also read twenty-six. True, that would be the ideal plan, but unfortunately coil sizes, etc., vary, and it is impossible except in a set made under stringent factory conditions.

Even in such a set the tuning gets a little "out" usually, as wave-lengths are altered. But there is no need for you to put up with wrong tuning, for you can easily tell exactly when the circuits are in tune.

### The Best Method

Here is the way to do it. Prop the loud speaker up close to your ear, and choose a quiet moment when every sound from it can be heard distinctly. It must be quiet in the ether, too, so a Sunday morning is ideal.

What you have to do first is to listen to the effect of tuning. So turn your first tuning dial,  $C_1$ , somewhere near the middle of its travel, say about  $80^\circ$  and clear of any signals, turn the reaction to zero, and then bring your H.F. tuning dial  $C_2$  slowly round from zero to maximum.

Listen intently as you do this, for although no station may be sending, the set will probably, just in one place, sound suddenly "alive" and perky. With  $C_1$  set to, say,  $80^\circ$  you will find that there is just one position of  $C_2$ —it might be  $83^\circ$ , or perhaps  $79^\circ$ —where the loud speaker sounds lively.

### The "Lively" Position

Make a note of the two readings on a piece of paper, and then turn the  $C_1$  dial round towards the bottom of the scale, say  $20^\circ$ , and find a corresponding "lively" position on H.F. dial for that reading. It may be exactly  $20^\circ$ , or it may be a little more or less, but it will be somewhere near that, so make a note of that reading, too.

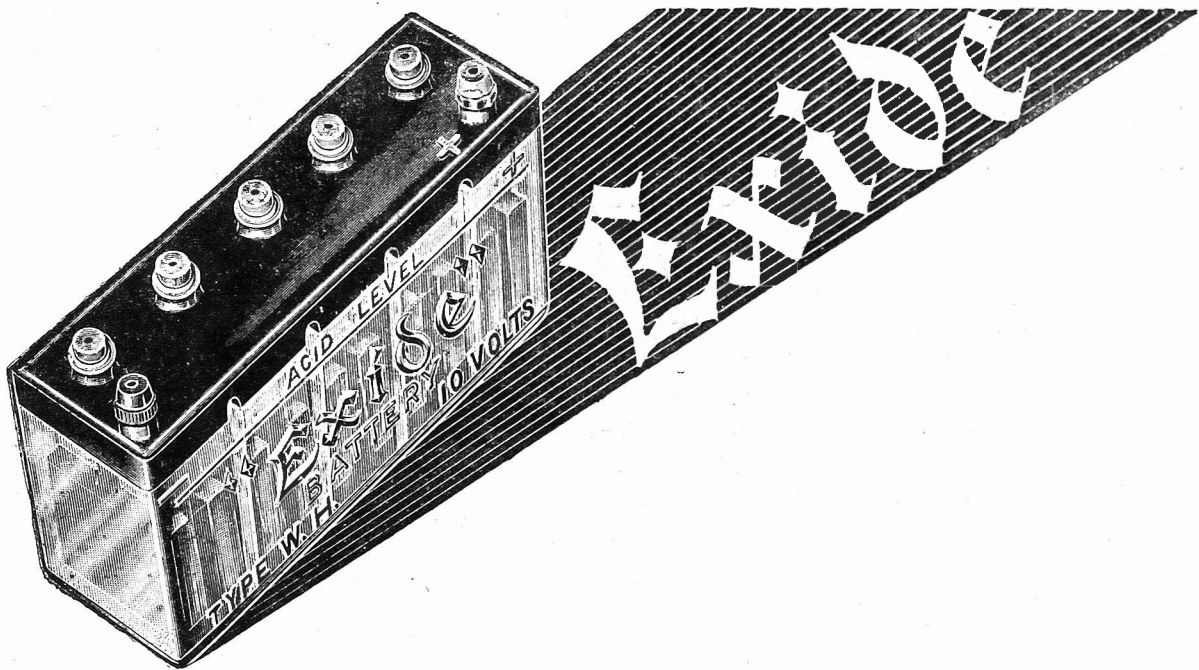
Finally go up to the top of the  $C_1$  dial (somewhere about 90 on a 100 dial, or 160 on a 180 dial), and see if you can get the same result up there. There should, of course, be no real oscillation, but if you listen carefully you will soon tell when the circuits are exactly in tune because of the tiny little noises that always occur then.

But let us suppose that you cannot be sure when the set is "in tune," because really it seems to make very little difference. This is where reaction comes in!

You advance the reaction condenser a few degrees, taking care not to make the set oscillate, and then try bringing the H.F. dial into step with the other dial again. With a little reaction you will soon find quite unmistakable signs of extra liveliness when the two circuits come exactly into step.

**Constant, clearer reception**— the Exide High Tension Battery gives you the programme full and faithfully . . . it adds nothing, no background of buzz or crackle, no harshness . . . . . it makes your set more stable.

**Improved selectivity** — the Exide H.T. Battery helps to cut out interfering stations . . . its voltage does not fluctuate or fall. It gives silent, steady service to the end of its charge . . . and it can be easily, cheaply recharged — no new batteries to be bought . . . you listen at less cost with the Exide H.T. Battery in your set.



Make sure it is an Exide — keep in mind that nine out of every ten British ships rely for their wireless on the **Exide Battery**

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From Exide Service Stations or any reputable dealer. Exide Service Stations give service on every make of battery

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L15a

**Pages 284-285 are missing**

**SIMPLICITY** is a term which can mean much or little when applied to a wireless set. It may only mean that the designer hasn't taken the trouble to include any of those little refinements we all like, and that is just what most people suspect it does mean when used as a description of the main feature of a set.

Then, again, there is the kind of simplicity which is the result of the designer having taken not less but much more trouble than usual over his work. In these cases he has spent lots of time and care in obtaining the results he wants from really simple means rather than the usual more complicated ones.

Instead of taking the easy way in getting his effect by elaboration he has done it by dint of perseverance and ingenuity with quite simple schemes.

#### Points About the Design.

That kind of simplicity is worth having, for it means that you get the sort of performance you want at a lower expenditure of cash and work in building, and with less trouble in operating the set. This is the only kind of simplicity which we tolerate in "P.W."

Looking back over the last year or two we cannot remember any set which was quite such a good example of this worth-while kind of simplification as the "Three Coil" Three which we are just going to describe. It is a really outstanding bit of work.

Just look at the photos. Isn't it obviously one of the simplest possible "threes" of the H.F., detector, and L.F. type? Yet just consider what it is and does: it is a highly sensitive long-range receiver, it gives you *real* selectivity, it is beautifully easy and pleasant to operate, and it has those desirable refinements of differential reaction, efficient volume control, adjustable selectivity, and so on, which make such a difference to a set.

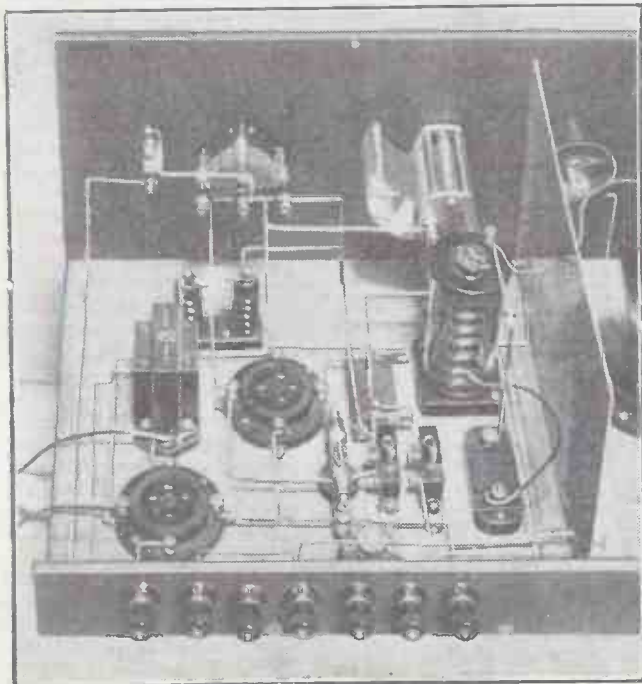
#### Simplicity, Economy and Performance.

To get all this and yet maintain such wonderful simplicity and economy in first cost (note the use of entirely standard components, many of which you will have) meant a lot of hard work and scheming. As a matter of fact, we probably spent more time over the design than any of the others in this year's batch of blue print sets, with the possible exception of the "Maxi-Power" Four.

Of course, similar efforts in the direction of what we may call rational simplification were made in all four of these receivers, but it was in this one that the greatest difficulty was met. It is almost always in the H.F., detector, and L.F. type of three-valve that the temptation to elaboration is greatest, and it is just here that it should be most carefully resisted. This is, above all sets, the average man's ideal of a general-purpose receiver.

We feel sure that even the most casual glance at the photographs will convince you that we are justified in our claim to have suc-

### RESULTS GUARANTEED



Really neat and simple wiring is only possible when the layout is a good one, and it is one of the best possible guarantees of efficient performance.



Here are some interesting general details (intended for the builder) of the finest "threes" ever designed. It is a set which is guaranteed to give you the most efficient and reliable performance.

#### DESIGNED AND I

ceeded in giving the set real simplicity of the best sort. We are even more sure that if you build the set you will soon come to realize our claim that we have at the same time achieved a most exceptionally fine performance.

We have the utmost confidence that you will, because the original set gave extraordinarily good results, and the circuit is one which can be guaranteed to give the same performance every time it is made up.

#### Absolute Reliability.

It is one of the most reliable of all types of circuits, and it is delightfully free from any kind of preliminary adjustment calling for any degree of skill on the part of the user to ensure proper results. All you have to do is to make a reasonably good copy, refrain from taking any serious liberties, use good parts and accessories (especially the valves and coils), and the result is as near to a certainty as anything can be in radio.

This is a set which you can confidently expect to bring you in a real string of foreign stations any night after dark so long as

#### PLENTY



Selectivity without other

#### HERE ARE THE PARTS

- 1 Panel, 18 in. x 7 in. (Lissen, or Paxolin, Goltone, etc.).
- 1 Cabinet to fit, with baseboard, 9-in. deep (Camco, or Pickett, etc.).
- 2 .0005-mfd. variable condensers (Ready Radio, or Lotus, Lissen, J.B., Ormond, Igranic, Dubilier, Formo, etc.).
- 2 Slow-motion dials, if condensers not of slow-motion type (Lissen, or Igranic, J.B., Ready Radio, Ormond, etc.).
- 1 Filament rheostat (Gecophone or Igranic, Lissen, Wearite, etc.).
- 1 .0001-, .00013-, or .00015-mfd. differential reaction condenser (Ormond, or Lissen, Dubilier, Lotus, J.B.,

# Three-Coil Three



to supplement the full practical instructions on last week's blue print sheet) for building one which gives you real simplicity of the best sort; easy and economical construction, simple tuning adjustment, yet the finest possible results.

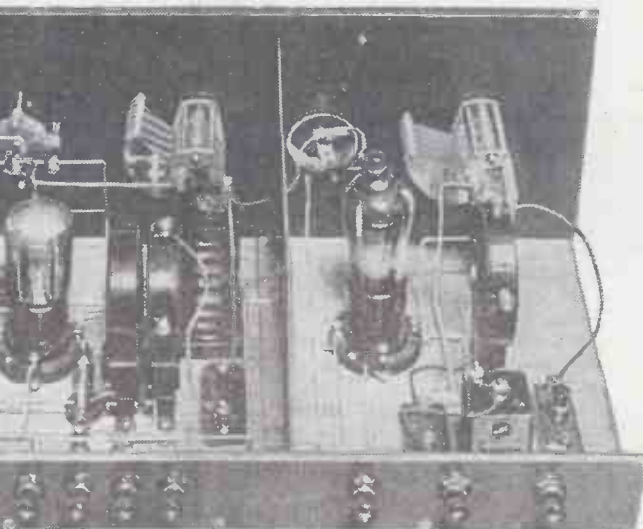
DESCRIBED BY THE "P.W." RESEARCH DEPARTMENT.

We are  
confirm also  
most excep-

you can give it anything like a decent aerial. Once you have got the hang of the dials it should bring them rolling in one after another.

On the long waves it should even do it in daylight, and give you programmes from, at any rate, Hilversum, Kalundborg, Eiffel Tower, and Huizen. We must be careful not to mislead you, though; we are assuming an outdoor aerial of just reasonable efficiency. Neither this nor any other normal "three" can be expected to do a great deal on the foreigners on an indoor aerial.

## OF PUNCH, POWER AND PURITY



qualities is useless, but this magnificent "three" has colossal power in addition to wonderful purity and high selectivity.

### THE PARTS THAT YOU WILL NEED TO BUILD THE "THREE-COIL" THREE.

- |  |  |
|--|--|
| Igranic, Polar, Ready Radio, Wearite, Magnum, etc.).   | 1 001-mfd. fixed condenser (Dubilier, or Lissen, Ediswan, T.C.C., Mullard, Ferranti, etc.).            |
| 1 Filament switch (Junit, or Igranic, Lissen, Bulgin, Ready Radio, Benjamin, Lotus, Red Diamond, etc.).                | 1 0003-mfd. fixed condenser (Graham-Farish, or Lissen, etc.).  |
| 3 Sprung type valve holders (Lotus, or Igranic, W.B., Lissen, Bulgin, Telsen, Junit, Magnum, Wearite, etc.).           | 1 2-meg. grid leak and holder (Graham-Farish, or Lissen, Igranic, Dubilier, Ediswan, Mullard, etc.).   |
| 3 Single coil holders (Lotus, or Lissen, Igranic, Bulgin, etc.).   | 1 L.F. Transformer (R.I., or Ferranti, Lissen, Varley, Igranic, Telsen, Lotus, Lewcos, Mullard, etc.). |
| 1 01-mfd. fixed condenser (T.C.C., or Mullard, Lissen, Dubilier, Ferranti, Ediswan, Goltone, Igranic, etc.).           | 1 Fuse (Magnum, or Bulgin, etc.).  |
| 1 001-mfd. (max.) compression-type condenser (Formo, or Lissen, Lewcos, Polar, R.I., etc.).                            | 1 Standard "P.W." screen, 10 in. x 6 in. (Wearite, or Paroussi, Ready Radio, Magnum, etc.).            |
| 2 H.F. chokes (Varley & Watmel, or Lewcos, R.I., Lissen, Telsen, Lotus, Dubilier, Ready Radio, Wearite, Magnum, etc.). | 1 Terminal strip, 18 in. x 2 in.   |
|  | 10 Terminals (Igranic, or Belling & Lee, Eelex, etc.).   |
|  | Screws, wire, flex, etc.   |

There remain, however, quite a few general matters to tell you about. For example, there is the question of wave-change switching.

Here the reader may be inclined to wonder whether we have not taken our simplification too far, and sacrificed something worth having. Well, granted that the set is not one having wave-change switching, just consider whether what you gain by its absence is not in some cases a sufficient compensation for the lack of this convenience.

### Only Three To Change.

The point is that wave-change switching inevitably puts up the cost of a set, and means, at any rate, a slight increase in the constructional work involved. Note that the present instrument uses entirely standard plug-in coils, which most people already have, and you will realise how much the cost has come down as a result of our decision to make it non-wave-change.

Naturally, the set will not suit everybody, and some will feel that they would prefer to face the expense and extra work involved in one possessing wave-change switching. All the same, we felt that very many would appreciate a set in which economy and simplicity had been taken to even this length.

Non-wave-change it is, then, but part of our simplifying effort was directed to reducing as far as possible the inconvenience of coil-changing on going over to long waves. Accordingly we took pains to limit the number of coils requiring to be replaced, and you will see that we have got it down to only three.

A look over the circuit diagram will show you how we have done it. Really, it is a matter of the judicious employment of the ever-useful "X" coils.

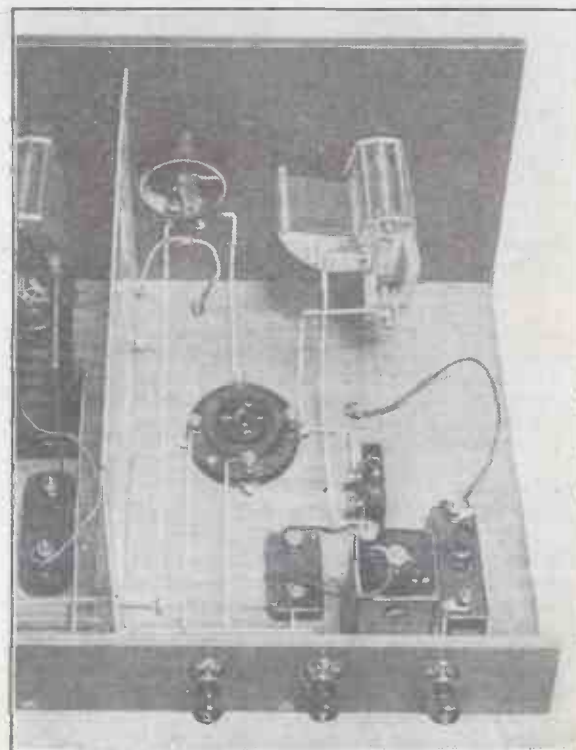
### The Final Flex-Lead Adjustments.

These are used in both tuned circuits. In the first place, one provides the tuned grid circuit of the H.F. valve and at the same time takes care of the aerial coupling arrangements. The second forms the detector tuned grid circuit, with the "X" portion of the coil giving us our intervalve coupling.

Now, just a point or two about the selectivity adjustments, and then we have finished. First, there are the flex-leads to the tapping points on the "X" coils. In general you will find it best to put the one for the second coil ( $L_2$ ) on the point which gives the best volume, and get your control by means of the one to  $L_1$ .

The compression-type condenser in the aerial lead is meant entirely as a supplementary control. Keep it at maximum (knob screwed right down) if you can, and only reduce it if you must.

### WONDERFUL SIMPLICITY



Here is the H.F. end of the set, and the first thing you will notice is there is hardly anything to be seen! That's just another proof of the care and ingenuity expended on the design, for simple as it is the results are wonderful.

# RADIO—EAST AND WEST

By OUR AMERICAN CORRESPONDENT.

Having been present at the opening of the London Radio Exhibition, our correspondent immediately left for New York, where he was able to attend the Radio World's Fair at Madison Square Garden. Below he contributes exclusively for "P.W." an impartial comparison between the two shows.

As the "Aquitania" steamed out of Southampton, bound for New York, it occurred to me that I perhaps would shortly be the only person who had actually been present at both the London and New York Radio shows.

Although the shows ended concurrently, the London one opened three days ahead of the New York counterpart, otherwise it would not have been possible by present methods of transport to reach New York in time to be at Madison Square Garden, before the show closed on September 27th.

As it was, however, we steamed into New York Harbour with a good few hours in hand, and I was able to view in comfort the exhibits at the Radio World's Fair (as my compatriots prefer to call it!).

## Plenty of Portables.

I was asked after I had visited Olympia what struck me most about the British exhibition. My reply was: "The overwhelming popularity of portable radios." In New York there never was a vogue for portable sets, and to find every firm in England manufacturing one sure is strange.

In America we are now perhaps nearer than we ever were to the portable set, for automobile manufacturers are incorporating compact, yet powerful, receivers on the dashboard. At first this was a luxury, but it was soon taken up, and at the show in New York there were to be seen many components specially designed for automobile radios.

Among these are several patterns in midget dynamic speakers which are quoted as being equal to their parents in quality of reproduction.

An interesting outcome of the demand for automobile radios is the resultant entry into the ordinary radio set manufacturing field of General Motors, who supply a most efficient line of multi-valve receivers.

They guarantee that if future developments call for the redesign of their receivers, such receivers will be built upon a standard chassis already incorporated, thus it will not be necessary to discard an expensive cabinet which perhaps harmonises with its surroundings, and may even have been chosen for this reason.

## Artistic Sets.

It was disappointing to find so much "junk" at the Wireless Exhibition in London, but presumably this is to cater for a large community who are able to afford a very small minimum for their radios.

In New York we do not have nearly so many of these extremely cheap outfits, the most popular type of radio being the artistic upright cabinet containing a multi-valve radio of six to ten valves.

For this type of receiver the price is perhaps lower than in England, a Brunswick Panatropé radio-gramophone, for example, costing but \$185.00 (£37), or an

ordinary carved walnut upright cabinet affair, \$139.50. These are average prices, which can be exceeded or undercut.

## Better Cabinet Work.

Cabinet work, although perhaps hybrid in character, has reached a much higher level in New York than in London, in so far as the radio industry concerns itself, and I must admit that probably the best-looking receiver housings at Olympia were those of a firm which originated in America.

I am told that the necessity for selectivity in receiver design is just as acute in

## VERY NEAT!



The smallest two-valve portable seen at the National Radio Exhibition. Including the loud speaker, it is only eight inches square.

Europe as in America, yet there were very few so-called armoured, or all-metal, chassis to be seen. Why is this? Their usefulness has been proved by American manufacturers, yet your people do not seem to have "cottoned-on" nearly so quickly as they might have done.

A general survey of the New York show denotes it to be an exhibition of refinements. There are no radical developments, but rather a general tendency to perfect

and elaborate upon existing and tried circuits.

The super-heterodyne seems to be in its element once again; there is universal adoption of the screened-grid valve; there are so-called "fading eliminators" whose function is to control volume automatically so as to render fading unnoticeable; the midget set, calculated to simplify the selling of two or three radios to a family, makes its bow; the A.C. tube appears in a more perfected pattern.

The development of screened-grid tube receivers has come on with leaps and bounds, their inclusion in ten-tube super-heterodynes being common practise. Incidentally, it is to you Britishers that credit must be given for the popularising of the screened-grid valve, for I, personally, remember receiving my first valve of this pattern from London before they were on the market in New York.

The pentode is still on probation over here, and whether it will be universally adopted remains to be seen.

There were the usual novelties at the New York show, such, for example, as the Wurlitzer radio, which embodies a time-clock device for automatic tuning. The receiver may be set in the morning to switch itself on and off for any number of desired programmes, and it will be found to accomplish its duties in most worthy style.

## Talkie Demonstrations.

For those interested (and this included the majority of persons present) a demonstration of talkie film producing was given, an attraction which might very well have been presented at Olympia.

As it was, all I saw among the British exhibits which bore witness to the existence to this closely allied business was a talkie film projector which attracted considerable interest.

The arrangements at Olympia I found worthy of commendation, the demonstration salons being sufficient to excite the envy of any American exhibitor.

Gadgets for making one's own records, electrically recorded, have appeared in New York as well as London. Their main purpose, it appears, is to make permanent the broadcast of a favourite artist as it is received over the air. The first question that arises in my mind is, what will the artists say to this new form of competition to the legitimate record business, which is going to affect their royalties?

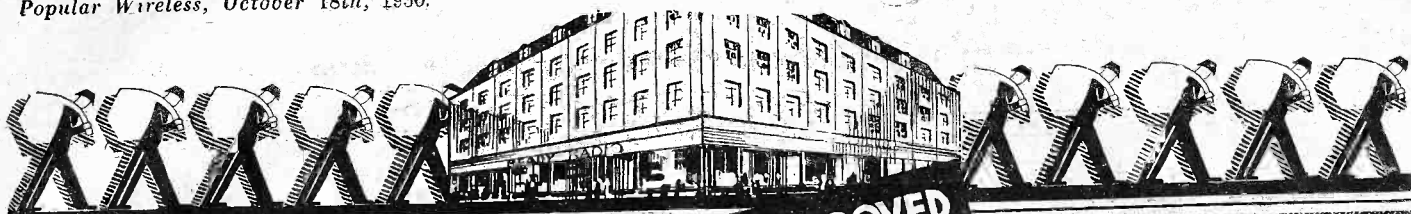
In summing up, the London and New York exhibitions may be compared as follows: Whereas the New York show devoted most of its space to the exhibition of completed multi-valve sets in elaborate cabinets and rarely of less than six valves apiece, the London Show catered for a leaner purse, and as adequately to the home constructor as to the fan interested solely in the purchase of a completed set.

## High Standards.

Cabinet work on the whole was definitely better at the New York show and, for the elaborated type of receiver, the prices lower.

Bearing in mind, however, that America entered the field of radio construction for home use some time before Britain, the difference between the standards of the manufacturers of both countries is surprisingly little. I shall look forward to a flying visit to London again next fall.





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1 ReadiRad on-off switch	2	0	0
1 ReadiRad filament rheostat	4	6	0
3 Benjamin Vibrolders	2	6	0
3 ReadiRad single coil holders	1	6	0
1 Formodensor type G	3	0	0
1 T.C.C. '01 fixed condenser	10	0	0
1 ReadiRad '001 fixed condenser	10	0	0
1 ReadiRad '0003 fixed condenser	9	6	0
1 Varley H.F. choke	4	6	0
1 ReadiRad "Hilo" H.F. choke	1	4	0
1 ReadiRad 2-meg. grid leak and holder	1	1	0
1 R.I. Hypermu L.F. transformer	1	1	3
1 ReadiRad H.T. fuse and holder	2	0	0
1 ReadiRad Standard screen	2	0	0
1 Drilled terminal strip, 18 x 2 ins.	2	6	0
10 Engraved Belling Lee terminals	9	6	0
2 Lewcos coils, No. 60X.	3	6	0
1 Lewcos coil, No. 50 C.T.	13	0	0
2 Lewcos coils, No. 250X.	4	6	0
1 Lewcos coil No. 100 C.T.	1	19	0
3 Valves as specified	2	6	5
1 Set ReadiRad Jiffilink	1	0	0
Screws, plugs, etc.	1	0	0
<b>TOTAL (including valves and cabinet)</b>	<b>£9</b>	<b>16</b>	<b>0</b>

**"SHARP-TUNE" TWO**

	£	s.	d.
1 Drilled ebonite panel, 12 x 8 ins.	19	0	0
1 Hand polished oak cabinet with 7-in. base-board	5	0	0
1 ReadiRad '00015 differential condenser	3	6	0
1 ReadiRad '0005 Brookmans condenser	6	6	0
1 ReadiRad duograph slow motion dial	4	6	0
1 ReadiRad '0005 variable condenser	10	0	0
1 ReadiRad on-off switch	4	6	0
1 ReadiRad "Hilo" H.F. choke	1	4	0
1 ReadiRad 2-meg. grid leak and holder	2	6	0
3 ReadiRad single coil holders	3	0	0
2 Benjamin Vibrolders	10	0	0
1 ReadiRad '0003 fixed condenser	19	0	0
1 Lissen super L.F. transformer	1	6	0
1 Drilled terminal strip, 12 x 2 ins.	2	3	0
9 Engraved Belling Lee terminals	2	6	0
1 Set ReadiRad Jiffilink	3	6	0
1 Lewcos coil, No. 40	3	6	0
1 Lewcos coil, No. 60	3	6	0
1 Lewcos coil, No. 50	4	6	0
1 Lewcos coil, No. 100	4	6	0
1 Lewcos coil, No. 250	4	6	0
1 Lewcos coil, No. 150	19	0	0
2 Valves as specified	1	3	0
Screws, flex, plugs, etc.	1	0	0
<b>TOTAL (including valves and cabinet)</b>	<b>£6</b>	<b>7</b>	<b>0</b>

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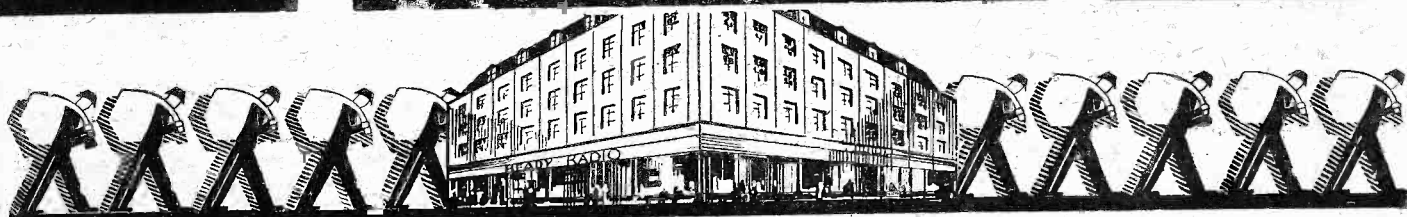
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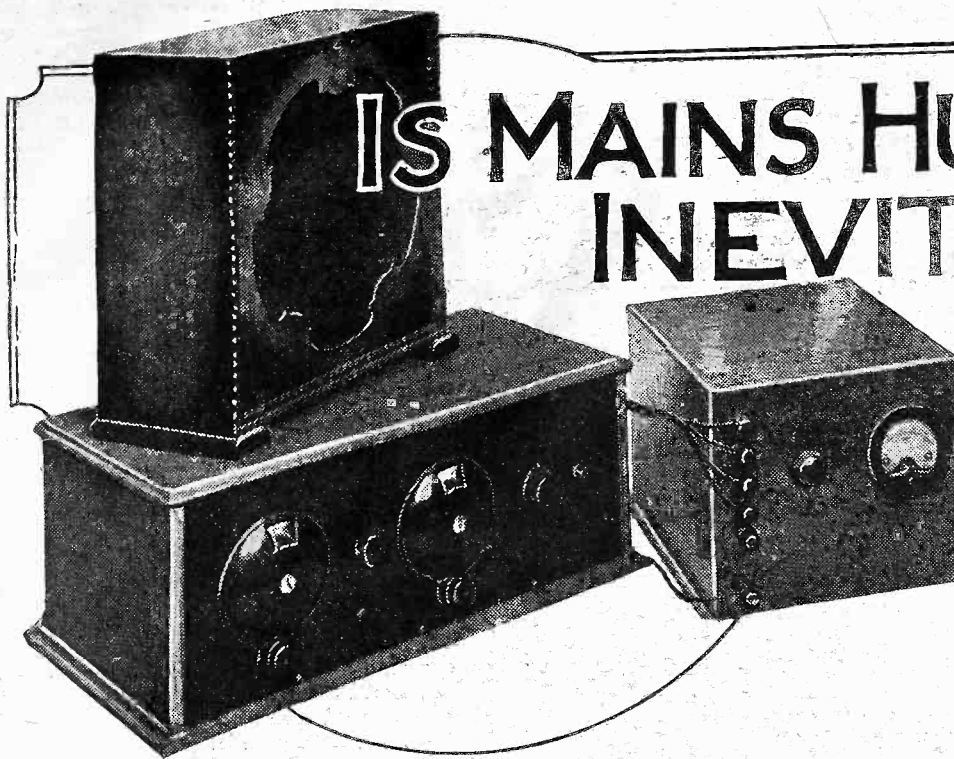
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# IS MAINS HUMMING INEVITABLE?

by  
**VICTOR KING**

Even if it is not, must a degree of hum be tolerated in circumstances where economy is essential? And if so, can we lay down a scale of hum percentages? This challenging article, by one of the world's most eminent set designers, raises and answers many such vital queries in relation to radio power from the mains.

SOME of you may consider that such a question is entirely unnecessary. But

I assure you that that is far from being the case. Within recent weeks I have had the opportunity of examining quite a few mains sets in operation in various districts. Some of these are commercial and some home-made receivers.

In very few instances were there silent "backgrounds." For the most part the "humming" was quite distressingly prominent. That is, at least, to me. Curiously enough, the ears of the owners of these sets seemed to have become rather "blunted" to the persistent interference. When I referred to the noise, "Yes, but you do not notice it much when the music is on," was the kind of reply I received.

## It Can Be Eliminated

But if I now make the statement that with practically any public power supply both L.T. and H.T. can be obtained sufficiently free from ripple not to cause hum I do not want you to think that the question raised by the title of this article has been answered. It hasn't.

If modern valves are used properly, a string of even three will give considerable amplification. The smoothing necessary to silence mains hum is a somewhat costly business in comparison with the components used in the set.

And here we arrive at the crux of the matter. And that is bound up in another reading of this article's title: should a degree of mains hum be tolerated on the grounds of apparatus economy? and if so, how much?

## Hum is a Fault

Pursuing the points further, should any hum at all, even though it is barely audible, be permitted?

I feel it would be impertinent for me to answer that, because it is up to the individual listener to set his own standards. From a purely personal point of view, I must say that I am unable to tolerate any hum at all, for I regard its presence as indicating a

fault, and a fault that can nearly always be removed these days.

I think the makers of the better-class mains sets and units mould their policies around such a view.

Any attempt to build a mains device "down to a price" is almost certain to result in inadequate smoothing. You must

## A RADIO ROBOT



The Hon. Mrs. Victor Bruce and her two-seater 'plane. This is fitted with a complicated automatic radio transmitter, which is able to send out pre-arranged sequences of signals.

have nice big chokes and plenty of "microfarads" before you can smooth out the ripples completely.

Any move towards the toleration of hum on economic grounds on the part of manufacturers is bound sooner or later to lead to disaster for very sound psychological and physiological reasons.

I mentioned just now that I have noticed that listeners tend to get "hardened" or "blunted" to persistent interference.

Well, I might have added then that it is a well-known fact that the ears will adapt themselves almost to anything.

During the war we were afforded ample proof of that. I remember that when I was with an artillery battery, one got so used to continuous bombardment that one hardly noticed the terrific noise! And workers in the noisiest of factories will tell you that they do not find the deafening din unbearable, and that they can converse quite freely through it, although visitors are nearly deafened and have to shout at each other.

Of course, it takes some considerable time to get one's aural nerves acclimatised to such conditions.

## Easily Unnoticed

To revert to our mains apparatus makers. If their testers once tolerate a certain amount of hum they will eventually get quite distorted views as to what constitutes a "tiny hum." Remember, it is a persistent interference and one that generally has a constant frequency. With such a noise ringing in their ears all the time, how can they possibly retain an impartial criticism of its intensity?

You might say that it would be enough to measure the intensity. It is fairly easy to do that, although I have the idea that few concerns in this country carry their tests to such conclusions.

Regarding the listener's attitude to the question, I am afraid that there is a very marked tendency to accept a certain amount of hum with mains sets as being quite inevitable. And that is why I wrote this article; it is an attempt to kill that idea.

## Should Be Silent

Modern mains working should be every bit as silent as when the best of batteries are used. If you pass a certain degree of "hum," then you should do so with a complete realisation that it is a fault that should not exist in any modern high-class set.

It is very hard indeed to classify "humming." Broadly speaking, any hum at all is bad, technically, although a "hum" that can only faintly be heard by

(Continued on page 307.)

# RESISTANCE REALITIES.

Some interesting notes about a very vital factor in radio reception.

THERE are many factors which influence the resistance of a material. Its temperature, its physical structure, and its degree of purity, for instance, all influence a metal's conductivity.

Silver is the best electrical conductor we know of. Then comes copper, and, after copper, in decreasing order of conductivity, gold, zinc, iron, platinum and mercury, to enumerate only a few of the better-known metals.

The physical structure of a metal influences its conductivity. A bar of metal which is crystalline in structure will have a resistance considerably higher than a bar of non-crystalline metal.

## Increase in Resistance.

This fact is one of very great importance because, in time, all wires tend to become more or less slightly crystalline in nature, and, therefore, to increase in resistance. An aerial wire, for instance, which for many years has been subjected to the inclemencies of the weather gradually takes upon itself a slight crystalline structure. It becomes brittle, and eventually it breaks.

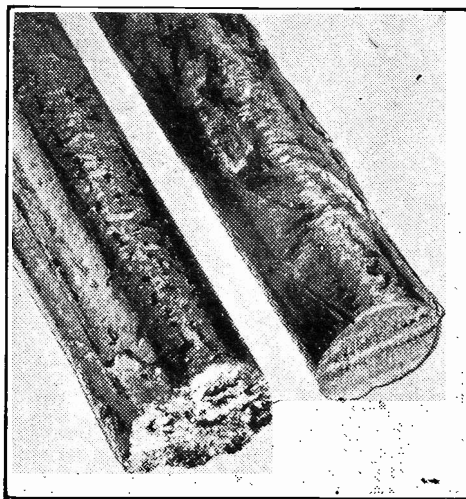
If you examine the fracture under a microscope or even a strong hand-lens, the crystalline cross-section of the fracture will be apparent. It is, of course, very possible that slow changes of this nature may have a lot to do with the gradual decrease in signal-strength experienced by many crystal users, although, of course, there are many other greater factors which work together to produce the same effect.

Another factor which influences the resistance of any material is temperature. Generally speaking, the hotter a wire or a bar of metal is, the higher its resistance becomes.

## The Effect of Heat.

The explanation of this fact is not difficult to grasp. When we put heat into a material, what we really do is to increase the energy of its vibrating molecules, and, more

## INCREASING RESISTANCE



Here are two similar specimens of metal rod—the one on the left has the greater resistance because the metal has crystallised.

usually, a stream of electrons finds it more difficult to push its way through a maze of molecules which are in a state of violent agitation, than it does when the molecules are in a less rapid state of movement.

Some materials, notably carbon, however, decrease in resistance with increase in temperature. A red hot bar of carbon, therefore, has a smaller resistance than a similar bar at normal temperatures. This, however, is one of the few exceptions to the general rule.

What happens, you may ask, to the resistance of a wire when it is very greatly cooled? As you would expect, the resistance of the wire is lowered with decreasing temperature. This, of course, because of the fact that as we lower the temperature of a metal, or of most materials, for that matter, we decrease the vibrational energy of its constituent molecules, thus providing a freer path for the electron stream of the current.

## Elimination of Resistance.

If a metal rod or wire could be cooled down to Absolute Zero, that is, to 273 degrees centigrade below the freezing point of water, all its constituent molecules would be at rest. There would be a perfectly free and frictionless path for the electric current to traverse, and so, one assumes, a current started in a closed circuit, cooled down to Absolute Zero would flow round and round the circuit indefinitely, thus constituting a species of perpetual motion.

But no one has ever cooled a wire down to Absolute Zero, although a temperature only a few degrees above this point has been reached. At such a temperature a current started in a closed circuit has been found to be present many hours after its commencement, the resistance of the wire at that temperature having become vanishingly small.

# SHORT-WAVE NOTES

By W. L. S.

I APPEAR to have been properly "caught out" concerning my flourish of trumpets about the return of good conditions. Conditions, as such, are negligible again at the moment, and all the promise of DX reception has gone once more.

I am not so conceited as to imagine that it is all a conspiracy against me, as was one amateur to whom I listened one Sunday morning, but I admit myself fairly beaten, and retire from the uneven contest. Henceforth "conditions" do not interest me, and I will do without them. If I hear a DX station, so much the better; if I don't, then I have a poor receiver. But "conditions"—never!

## A Truly Crowded Band.

Surely 40 metres, in London, on a Sunday morning, is the most congested spot of ether that one can find. Just before writing this I have heard upwards of thirty British stations on telephony, all fairly loud, intermingled with two South London stations using the most awful R.A.C. notes, dozens of Frenchmen slightly (but not much) worse,

interrupted C.W. from an unknown source, spark from somewhere or other, and a general confusion of noise described by a visitor as sounding "like Hades on a Bank Holiday." The only thing for a modest, unassuming person like me to do is to withdraw and leave it until there is a little more room.

I wonder whether it is possible that at the two ensuing conferences (at Copenhagen and Madrid) the amateur will be allowed a little more space to work on? It is only the spirit of incurable optimism that keeps him alive with the narrow bands he is allowed at present.

## Introducing Short-Wavers.

A station I recently heard, namely ST2C, in the Sudan, probably has the distinction of having introduced the first short-wave transmitter into that country. He is, as a matter of fact, a British amateur away from home, which makes it all the more interesting to hear him.

Another enthusiast, this time from India, also had what I believe was the honour of introducing the first short-waver into British Somaliland, with the Anglo-Italian Boundary Expedition. No transmitter was used, but some very useful work was done.

Two or three readers have reopened the rather puzzling business about hand-capacity effects occurring when the receiver is completely screened in a metal box. I am still of my former opinion that the

whole thing depends upon the length and character of the earth lead.

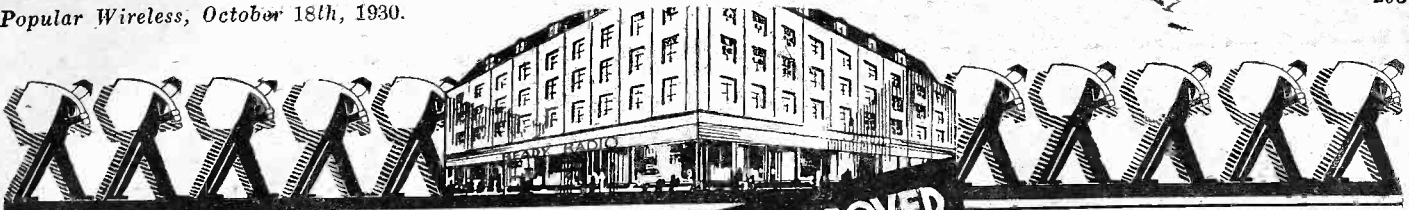
If one loses a signal by approaching the box, then a variable condenser in series with the earth lead will be found capable of tuning it to a position where the trouble completely stops. Unfortunately, the setting will need altering for different wave-lengths.

## A Cure for Hand-Capacity.

I have found a more satisfactory scheme for this, which consists of introducing a .0005 compression-type condenser into the short-waver, and not connecting the filament supply to the metal box at all. Instead, it is taken to the metal in series with this condenser.

For some reason it will generally be found that a value for this can be arrived at which gives immunity from capacity-effects at all frequencies. The circuit arrangement, if you think it out, is not the same as that produced by the external condenser, since the box is earthed but the filaments are not.

An Essex reader wants to know the whereabouts of G F W D, who was heard calling the B.B.C. on 23-25 metres or somewhere in that region. Telephony was used. The same reader has a single-valver that works perfectly, and yet gives trouble with threshold howl when an external R.C. amplifier is coupled up. Probably an H.F. choke in either or both of the headphone leads would cure this, E. H. It is worth trying.



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	£	s.	d.
1 Drilled ebonite panel, 18 x 7 ins.	6	0	0
1 Hand-polished oak cabinet with 10-in. base-board	1	10	0
1 ReadiRad '0005 variable condenser	4	6	0
1 ReadiRad '00015 differential condenser	5	0	0
2 ReadiRad on-off switches	1	8	0
3 ReadiRad single coil holders	2	6	0
3 Benjamin vibrolders	4	6	0
1 ReadiRad '0003 fixed condenser	10	0	0
1 ReadiRad '0002 fixed condenser	10	0	0
1 ReadiRad 2-meg. grid leak	10	0	0
1 Lissen R.C.C. unit with 1/2- and 1- or 2-meg. leak	4	0	0
1 ReadiRad "Hilo" H.F. choke	4	6	0
1 ReadiRad fuse and holder	1	3	0
1 Igranic type J L.F. transformer	17	6	0
1 Terminal strip, 18 x 2 in.	1	8	0
10 Belling Lee engraved terminals	2	6	0
1 Lewcos coil, No. 60X	4	9	0
1 Lewcos coil, No. 250X	5	6	0
1 Lewcos coil, 100	4	6	0
3 Valves as specified	1	7	6
1 Set ReadiRad Jiffilink	2	6	0
1 ReadiRad duograph dial	6	6	0
Screws, plugs, etc.	1	8	0

TOTAL (including valves and cabinet) **£7 2 0**

**"MAXI-POWER" FOUR**

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2 ReadiRad 3-point on-off switches	3	0	0
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2 ReadiRad duograph slow-motion dials	13	0	0
1 ReadiRad differential reaction condenser, '00015	5	0	0
1 Wearite filament rheostat, 15 ohms	1	6	0
1 ReadiRad on-off switch	0	10	0
6 ReadiRad single coil holders	5	0	0
4 Benjamin vibrolders	6	0	0
1 ReadiRad '0002 fixed condenser	10	0	0
1 ReadiRad '0001 fixed condenser	10	0	0
2 T.C.C. or fixed condensers	6	0	0
1 ReadiRad '0001 fixed condenser	10	0	0
1 ReadiRad '0003 fixed condenser	10	0	0
2 T.C.C. 1 mfd.	5	8	0
2 ReadiRad 2-meg. grid leaks and holders	2	8	0
1 R.I. H.F. choke	7	6	0
1 ReadiRad "Hilo" H.F. choke	4	6	0
1 Varley 100,000 ohms resistance and holder	7	0	0
1 Ferranti A.F.3 L.F. transformer	1	5	0
1 ReadiRad H.T. fuse and holder	1	3	0
1 Belling Lee engraved terminals	2	9	0
1 ReadiRad Standard screen, 10 x 6 in.	2	0	0
1 ReadiRad G.B. clip	2	6	0
1 Terminal strip, 21 x 2 in.	2	6	0
2 Lewcos coils, No. 35	7	0	0
2 Lewcos coils, No. 60	7	0	0
1 Lewcos coil, No. 250X	6	6	0
4 Valves, as specified	2	4	0
1 Set ReadiRad Jiffilink	4	0	0
Screws, flex, plugs, etc.	1	6	0

TOTAL (including valves and cabinet) **£11 5 6**

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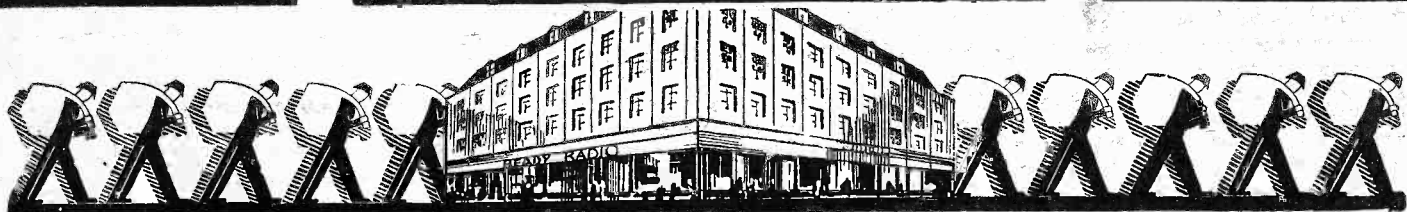
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## FROM THE TECHNICAL EDITOR'S NOTE BOOK.

# Tested and Found-?



## NEW SIX-SIXTY ACTIVITY.

**A**N interesting development is announced by the Six-Sixty Radio Co., Ltd., of 17-18, Rathbone Place, London, W.1.

The many users of their valves will be interested to hear that Six-Sixty are marketing a complete range of grid leaks this season. They are available in 14 different resistances from .01 to 20 meg-ohms and sell at 1s. 6d. each. A neat bakelite holder for use with them retails at 1s.

These new Six-Sixty grid leaks are said to be remarkably silent in operation and extremely accurate, and constructors should make a point of seeing them.

## FOR RADIO-GRAM ENTHUSIASTS.

I recently received a selection of Goodson gramophone records, and I have been trying these out on a radio-gram outfit. I find them quite good, and the following seem to be particularly suitable for electrical reproduction: List No. 240, "On the Sunny Side of the Street" (University Syncopators), "Waiting For You" (Dixie Rag Pickers), and List No. 245, "I'm Needing You" (White Way Serenaders), "Climb Through the Clouds" (University Syncopators).

The Goodsons are, of course, those flexible, unbreakable records. Seven of them weigh no more than one ordinary record. They seem to be well recorded, and there is a brightness and a healthy bass that are associated usually only with the expensive recordings.

I had heard that Goodson's were "scratchy," and tended to "pull up" ordinary motors, but I don't find that the ease on my instruments. Perhaps they were earlier faults that are now eliminated.

## NEW SQUIRE LOUD SPEAKER.

We recently received a Model 21 "Sylphone" loud speaker from Fredk. Squire & Co., Ltd. Squires were early in the field with moving-coil loud speakers, and we have watched their progress with great interest.

The model 21, their latest, shows in concrete form what concentrated specialism can do. Its special features include a new form of diaphragm support, a diaphragm centring scheme that is almost completely independent of the diaphragm's lateral movements, a coil of patented design which has no former and is remarkably light, and a scheme for the reduction of air resistance in the vicinity of the moving coil,

The "Sylphone" is available for either A.C. or D.C. mains, or battery operation, in unit form, and is designed so that it can be fitted to any type of baffle-board or cabinet. The Squire model 21 is sensitive and it has a particularly even response.

## A VOLUME CONTROL.

A volume-control potentiometer, above all other types of variable resistances, needs to have an absolutely efficient action. A faulty contact may mean loud crackles and scrapings while, if the resistance is not evenly spread out, a satisfactory adjustment of volume may be hard to obtain.

One of the most satisfactory potentiometer-volume controls that I have tested for some time is the Super Rotorohm volume control, due to the Rotor Electric Ltd. It retails at 7s. 6d., and the type H has a resistance of 25,000 ohms.

A disc-rocker contact provides an exceptionally smooth adjustment. The component is most robust in character and the finish is high class. A large milled knob with an engraved indicating arrow is provided, and the device can be mounted on a panel by means of one hole.

## NEW BATTERY CONNECTOR.

When coupling up Exide H.T. 10-volt units two different sizes of connectors are required. A 60-volt assembly, for instance, necessitates three large connectors and two small ones.

But in future the Chloride Electrical Storage Company, Ltd., are going to supply one large connector with each 10-volt unit,

together with an instruction card showing how a small connector can easily be cut from the large one.

The connector takes the form of a flat lead strap with four holes cut in it. The marking is very plain and the material easily cut.

## EBONITE COMPONENTS.

The British Ebonite Co., Ltd., recently sent me a selection of their new productions. These include 6-contact coil formers and bases and choke formers of various sizes.

The new Becol multi-contact formers are greatly improved and are superior to the original patterns—good though those were.

Also the price is now only 7s. 6d. for the former and base instead of 10s. 6d. You

Manufacturers and traders are invited to submit radio apparatus of any kind for review purposes. All examinations and tests are carried out in the "P.W." Technical Department, with the strictest of impartiality, under the personal supervision of the Technical Editor.

We should like to point out that we prefer to receive production samples picked from stock, and that we cannot guarantee their safe return undamaged, as it is our practice thoroughly to dissect much of the gear in the course of our investigations!

And readers should note that the subsequent reports appearing on this page are intended as guides to buyers, and are therefore framed up in a readily readable manner free from technicalities unnecessary for that immediate purpose.

can obtain either part separately for 3s. 9d.

Both four and six-contact Becol formers and bases are available.

All these British Ebonite lines seem to me to be particularly robust mouldings, and the ebonite is of a high grade and much superior to some that is on the market.

## THE AMPLION PORTABLE.

The Amplion Portable set is built into a real-hide case and is of the suitcase type.

It employs two screened-grid H.F. stages, a detector, and one L.F.

The loud speaker is contained in the lid and you can see the disposition of the valves and batteries from the accompanying photo, which shows the set with the neat cover removed.

I have recently had an opportunity of testing one of these Amplion portables and I must say I find its performance impressive.

It is very selective and it is sufficiently powerful easily to bring in a number of Continentals in daylight.

Also, its quality is unusually good for a portable.

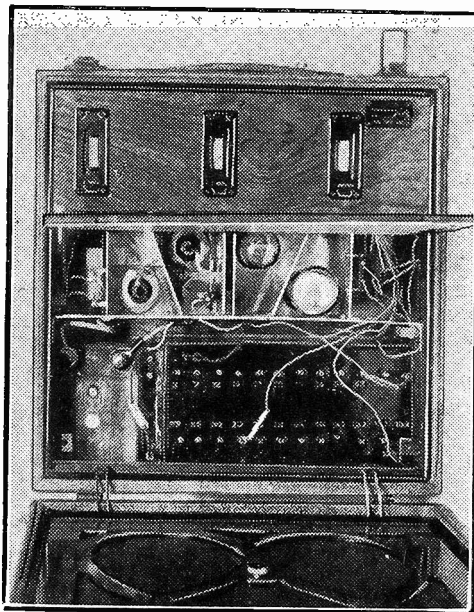
The controls are easy to handle and altogether it is an achievement.

## CONCERNING MOVING COILS.

Messrs. Rotor Electric Ltd. recently issued the Grassman Moving-Coil Booklet which contains interesting notes on moving-coil speakers in general and the Grassman Dynamic in particular.

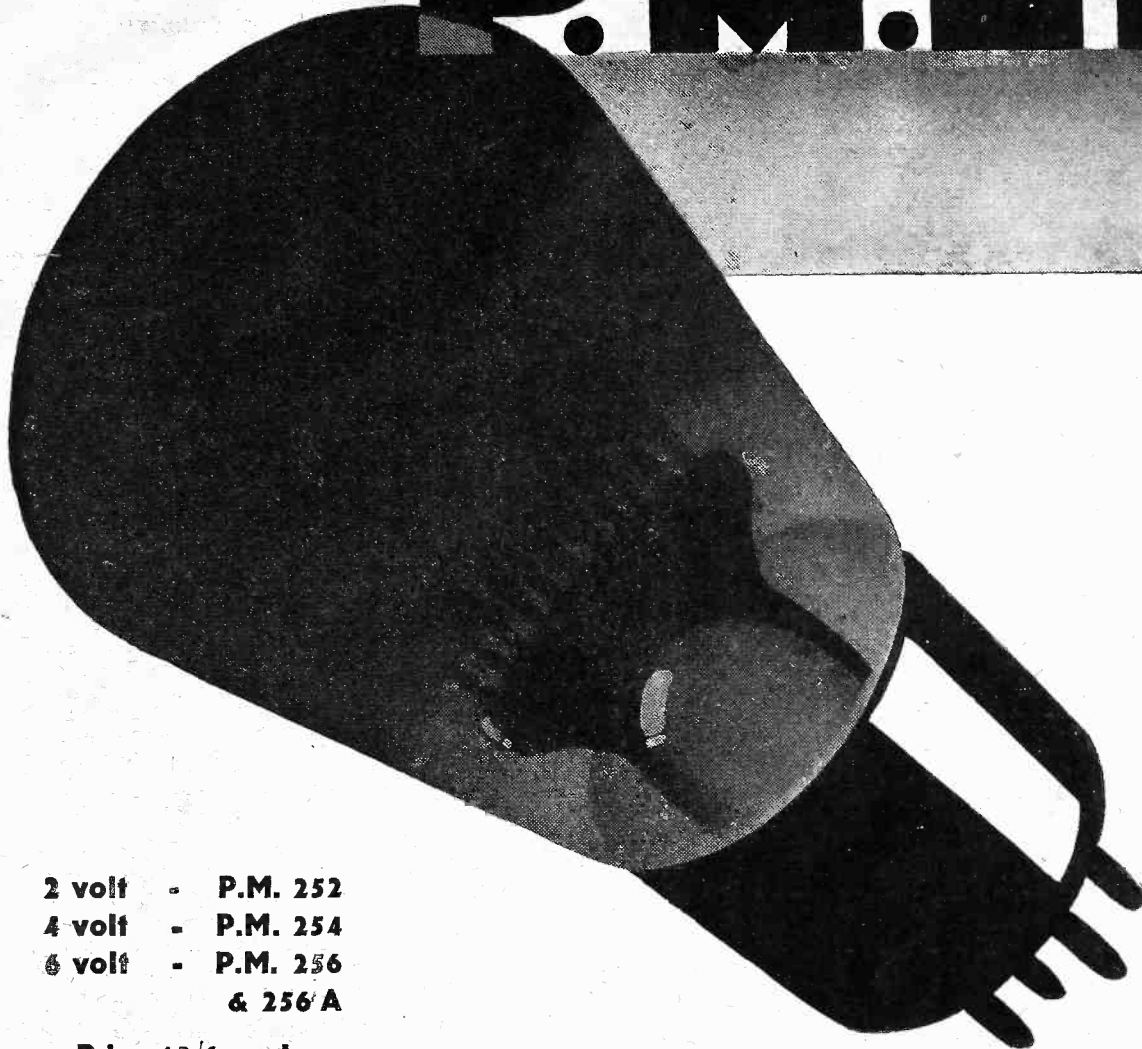
## RADIO CABINETS.

The Carrington Mfg. Co. Ltd. are now distributing a 24-page catalogue describing their "Camco" cabinets.



A view of the Amplion Portable Receiver.

# P.M. 252



- 2 volt - P.M. 252
- 4 volt - P.M. 254
- 6 volt - P.M. 256  
& 256A

Price 13/6 each.

A low impedance valve for use as the output valve in battery-operated receivers, type P.M. 252 is the "super-power" valve of the Mullard 2-volt range. The large permissible grid swing permits the valve to handle big signal voltages while as a result of its low impedance (2,600 ohms) and excellent mutual conductance (2.1 milliamps per volt) it will give a large undistorted output sufficient for operating the average domestic speaker or radio gramophone.

The P.M. 252 is very economical in operation, the filament consumption being only 0.3 amp at 2-volts. It can therefore be employed in portable receivers without imposing too great a load upon the low tension accumulator.

# Mullard

## *THE · MASTER · VALVE*

Advt.: The Mullard Wireless Service Co., Ltd., Mullard House, Gharng Cross Road, London, W.C.2

# GREATEST RADIO SENSATION

## NEW 3-VALVE SET OBTAINS OVER 50 STATIONS ON LOUD SPEAKER WITH DAVENTRY 5GB WORKING

This is the new Northampton Plating Co. Super Selective 3-Valve Loud Speaker set, which is now offered to the public. After months of careful research a circuit has been designed superior in selectivity to a screen grid set, and yet remarkably simple. It can be used, not only for cutting out the local station, but for other disturbances such as Morse. It is the simplest, cheapest, and most selective in the world. No soldering required or coil changing. Experts have declared it absolutely unique. Over fifty stations have been obtained on loud speaker with aerial 20 feet high, using cheap valves, including Cardiff, Paris, Madrid, Manchester, Stuttgart, Toulouse, Hamburg, Glasgow, Frankfurt, Rome, Langenberg, Berlin, Brussels, Hilversum, Kalundborg, Konigswusterhausen, Radio Paris. These were obtained 3 miles from Daventry while 5 G B was working. Thousands of novices with no knowledge of wireless have built the old Northampton Plating Co. Super 2 and 3 in all parts of the world, and have been astounded by the results even with cheap components, but the new Super Selective 3 makes other sets old fashioned, and marks the greatest improvement in valve sets for years. Orders have poured in from all parts of the world, including America, Turkey, Gold Coast, and Nigeria. In order to give everyone the opportunity of testing out the new circuit, two 6d. Blue Prints, one for new Super Selective 2 and one for Super Selective 3 Valve, will be supplied for 3d. each.

### NEW SUPER 4-VALVE PORTABLE SEPARATES TWO BROOKMANS PARK STATIONS UNDER THE AERIALS

This is the latest model circuit by the Northampton Plating Co. offered to the public for the first time. It has been specially designed to satisfy the requirements of the new regional stations. Owing to its wonderful selectivity, it requires no wave trap and obtains under favourable conditions a large number of Continental Stations at loud speaker strength, including Toulouse, Hilversum, Eiffel Tower, Konigswusterhausen, and Radio Paris. At less than half the price of a high-class portable set, it is acknowledged under severe technical tests to be far superior. In order to show what marvellous results can be obtained the set was placed between two aerials at the entrance to Brookmans Park, and the two programmes were easily separated. The set was also taken on 1,000-mile motor-tour over England and Wales. On the South coast and East coast many stations were easily obtained on loud speaker at good strength. Even in Wales, where reception is difficult, excellent results were also obtained. In order that everyone may be able to construct this unique portable set, a full size shilling Blue Print, with full details and instructions, can be obtained from Northampton Plating Co. for 6d. Letters must be fully stamped. NAME AND ADDRESS IN BLOCK LETTERS.

TRADE SERVICE AGENTS WANTED.

### READ THE LATEST REPORTS BY THE LEADING RADIO EXPERTS OF THE DAY :-

I refer to the receiver marketed by the Northampton Plating Co. as a kit set at a price that is more than reasonable. I had a pleasant surprise when I first operated it. I found there were 12 or 13 Stations easily brought in at loud speaker strength on the medium wave in addition to 5 G B. The set has remarkable qualities of selectivity and sensitivity, two characteristics rarely coupled in any one receiver. It must be set down as a definite advance.

("NOTTINGHAM JOURNAL," December 21st, 1929.)

Those who are too far from a station to use a crystal and are deterred from wireless by the present high cost of valves, will find it best to make a set from the Northampton Co.'s blue prints for two or three valves, price 3d. each. If they cannot afford a Mullard, the same company supply excellent valves at 4s. 11d. which give admirable reception, though so cheap. A thoroughly good two valve set ought not to cost more than £2 10s., including everything, and a three valve about 11s. more.

("REYNOLDS' NEWS," January 12th, 1930.)

### READ THESE TESTIMONIALS.

I have had your Super 3 since Sept., 1929, and have had wonderful results, about 50 stations at full loud-speaker strength, and can get most of these any night of the week, chief among them being: Paris, Eiffel Tower, Budapest, Prague, Belgrade, Stockholm, Madrid, Toulouse, Stuttgart, Barcelona, Turin, Maravestra-Ostrava, Rome, Algiers, Langenberg, Oslo, Lahti and Kaunas. Wishing you every success.— W. T. Emsworth, Hauts, 17/1/30.

I must write and tell you I am more than pleased with your three valve set I have just made.

It is the most wonderful bargain I have ever known in wireless, and it is all that you claim of it. I wish to recommend it to my friend who is a keen wireless enthusiast.

W. P. T., Derby, 16/1/30.

I have now built up your Super Three Valve set, and, independent of price, I have never heard or seen a set to beat it. We are still getting fresh stations, and up to the present have logged 20 at full loud speaker strength. As I am writing we are hearing an Aria from Rome. My last set cost me about £25. Your Super Three has cost me less than £5, including accumulators.

W. A. P., Norwich, 3/2/30.

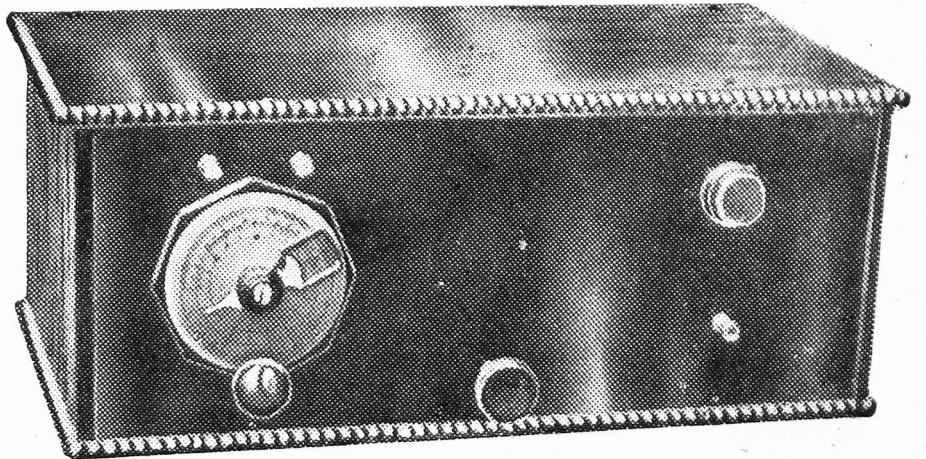
Referring to the 3-valve set recently supplied, I have pleasure in informing you how satisfied I am with it. I recently put up an expensive 4-valver, and had such bad results. I may say I have had many circuits in use up to 5 valves with very good results—that means quality of reception, volume and distance. I purchased your Super 3 really for local use. As you will see, I am on top of the Brookmans Park Transmitter. The results I am getting are equal to my best with 4 and 5 valves. I can still have my Continentals on the loud speaker, and with perfect quality. Wishing you every success.—Yours faithfully, V. M., Cheshunt, Herts.

I feel I must write and congratulate you on a wonderful circuit. I have now had your "Northampton 3" only two nights, but in those two nights it has fully justified itself. I have the poorest of poor indoor aerials, and I have in 10 minutes logged 16 stations on the Loud Speaker. I have had to insert a volume control because of the power of the local station (Bournemouth, 70 miles away) and 5GB. I have just received Oslo, Paris (2), Hamburg, Berlin, Budapest and many others. Your 5GB gives 90 per cent better results than you specify. Wishing your sets the best of luck in the future.—Yours very satisfied, C. D. N.

I have examined the above testimonials, and am satisfied that these are genuine communications.—Advertisement Manager, "News-Chronicle."

## ARE YOU TROUBLED

with Brookmans Park? Test Report on New Brookmans Park Station, from Palmer's Green, about four miles from Station, by our own radio engineers. Using the Northampton Plating Co. Super Selective Set, with the addition of a Type F Formodenser (Price 1/6) in earth lead, it was found that by careful adjustment of set the local station was absolutely cut out. Many British and foreign stations were easily obtained at loud speaker strength, including 5 G B, Radio Toulouse, Radio Paris, 5 X X, Konigswusterhausen. This is a marvellous achievement since the set used is the cheapest in the world.



### SPECIAL WIRELESS AND CYCLE BARGAINS.

Usual Price.	Type	Sale Price	Usual Price.	Type	Sale Price.	Usual Price.	Type	Sale Price.	Usual Price.	Type	Sale Price.
10/-	Latest	4/11	17/6	New Cossor Type Long	9/6	12/6	Mullard Type Cabinet,	6/11	12/6	100 Volt H.T. Battery	8/11
5/-	Ebonite for same, 12 x 8	3/-	7/6	Wave Coils, pair	3/11	7/6	18 x 7	3/11	5/6	2 Volt Accumulator	3/6
5/11	Transformer	3/8	7/6	H.F. Choke	3/11	7/6	Aluminium Panel 13 x 7	3/11	2/-	Accumulator Carr.	11d.
4/6	0005 Variable Condenser	2/11	2/6	Daventry 5 G B Coil	1/3	17/6	Dual Coil for M.M.3	12/6	4/6	Neutralising Condenser	2/11
2/-	002 Condenser	1/3	10/6	6 Volt Amplion Valve	3/11		Triotron Dull Emitter Valve	4/11	4/-	Reaction Condenser	2/6
1/6	0003	10d.	12/6	Cone Unit	6/11	5/-	Cycle Tyre	2/6	5/-	Diff. Reaction	2/11
1/-	Grid leak 2 meg.	10d.	12/6	Cone Speaker Cabinets	7/11	2/6	Cycle Tube	1/3	2/-	Loud Speaker Cord	11d.
1/-	Anti-Mic. Valve Holder	9d.	2/-	12in. Cone Speaker Frets	11d.	6d.	Panel Transfer	3d.	6/-	'Phone Cord	11d.
2/3	Rheostat	9d.	3/-	15in. Cone Speaker Frets	1/11	6/6	Double Reading Voltmeter	3/11	£2	S.L.F. Condenser	3/11
2/-	Indoor Aerial	9d.	7/6	Old Cossor Type Coils	3/11		Triotron Super Power Valve	6/6	£3	Loud Speaker	15/-
5/-	Earth Tube	1/6	15/-	Old Cossor Type Cabinets, 21 x 7	7/11	15/-	Titan Coil	9/11	30/-	Super Telefunken Type Loud Speaker	29/11
10/-	Guaranteed Phones	4/11		Ebonite for same	3/11	9/-	60 Volt H.T. Battery	4/11		Cone Speaker	9/11
3/6	S.M. Dial	1/11								'Phones Repaired	2/6

Parts supplied for all sets at Reduced Prices. Send now to avoid disappointment. Cash with order or C.O.D. Special terms to those making sets. All goods guaranteed and exchanged if not satisfactory. Enquire for anything you want. Trade supplied. Send for our wonderful Bargain Price List P.W.

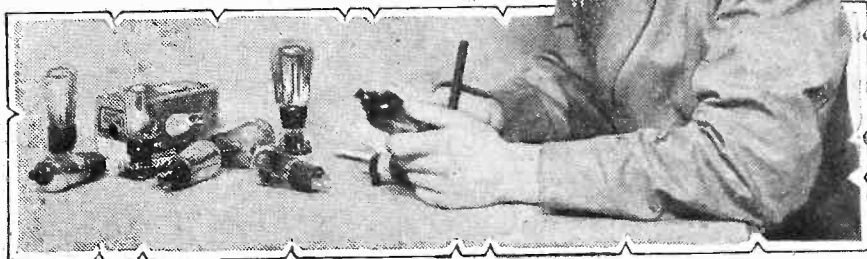
Trade Service Agents Wanted all over the World.

Owing to the enormous number of enquiries and orders, write clearly Name and Address in Block letters to the firm that made Radio Popular. Letters must be fully stamped.

**NORTHAMPTON PLATING CO. (RADIO and Cycle Manufacturers), NORTHAMPTON**



# TWO-VOLTERS of To-day



THOSE of us who can look back to radio experiences in the days before broadcasting began in this country—not so very long ago when you come to think of it—are able to appreciate to the full the tremendous advances which have been made in all phases, not excluding the design of valves.

In those "early days," as we are wont to call them, the only valves available for radio reception were the ordinary bright emitters of the R. type, and valves of the V.24 and Q.X. class for high frequency and special detectors. Not so very long after

**One of the most interesting developments in modern radio has been the growth of the valve—especially the two-volter. It has been an extremely rapid advance and valve-set owners will be interested in this brief description of the present happy state of affairs.**  
**By K. D. ROGERS.**

ments, though in those days it was hailed as a great wonder.

After that valves rapidly appeared. Dull emitters became more general, and we got to the '06 current valve. This was not really a particularly good valve, and it was not very long before it was superseded, and now it is right off the market with the exception, perhaps, of some old stock which I believe is being disposed of at extremely low prices.

But all this time, although detectors were coming along very well and H.F. valves were not too bad, we had little choice in the way of a power valve, and unless one used the D.E.5 or the L.S.5 types of valve, L.F. amplification and loud-speaker reception was rather a precarious business. Quality was not particularly worried about, and, indeed, it would have been little use to worry.

### Dull Emitter Brightens Up!

The dull emitter then found its feet properly, and the design of valves was gone into more closely than ever. At that time also, 2-volt dull emitters began to show that they were going to be the most popular valves among the British public. The valve makers had found a filament which would give a reasonably good emission at 2 volts without a high current (1 amp. being the general rule), and the results were equal to those obtainable with 6-volt valves, except on the low-frequency power side.

So we got dull-emitter valves which needed only .2 filament wattage and held their own against the 6-volters. But we still were up against it from the point of view of quality, for unless we used 6-volt power valves we were unable to get really good power amplification for loud-speaker reproduction. At that time the moving-coil speaker was coming into prominence, and from the 2-volt user's point of view in many cases things began to be rather awkward. But once again the valve designer

rallied, and the result has been very marked during the last eighteen months.

The old days when we used to say that if we used 2-volt valves for H.F. and detector we should still require a 6-volter for power work have gone, and unless we want *super super* power the 2-volt valve will give all we need. Whereas a few years ago nothing in the way of a power valve of the 2-volt variety having an impedance less than about 6,000 ohms was available, now we have valves having impedances well below 2,000 and incidentally—which is much more to the point—having magnification factors which give a mutual conductance of 2 or more.

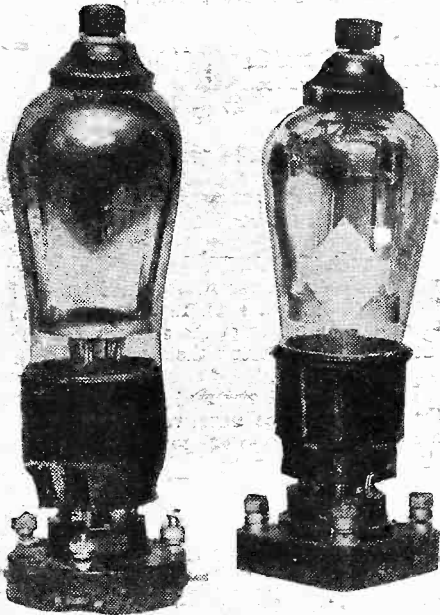
### 2-Volters Throughout.

The result of all this is that for all ordinary purposes and even loud-speaker work, there is no reason why 2-volters should not be used throughout a set. Two-volt screened-grid valves of to-day are rarely surpassed except by the mains types, and the H.F.'s, detectors, and L.F.'s of the 2-volt class can hold their own among any competition.

Power valves are also excellent and super-power valves such as the P.220A., the P.240, the P.M.252, the Marconi and Osram P.2., and so on, are valves capable

(Continued on next page.)

### FOR H.F. AMPLIFICATION



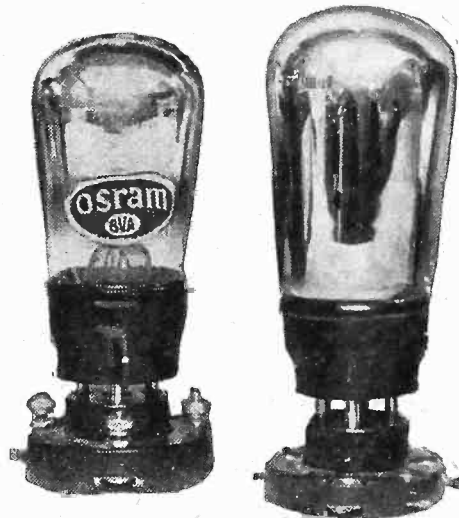
The Marconi and Cossor S.G. two-volt valves—both excellent amplifiers.

others appeared, but at the beginning of broadcasting the chief valve of British manufacture was the ordinary R. type costing about 17s. 6d. and consuming .75 amp. of L.T. current.

### The Old-Timers.

Shortly afterwards the Mullard Ora came out, and prices dropped to somewhere round 15s., and then experiments were made with the D.E.R. type, the first "dull" emitter. This took a good quarter of an amp., and was not a particularly great success when viewed in the light of present-day achieve-

### TWO OF THE LATEST



On the left we have the newest Osram valve—the H2, a 2-volt valve having an impedance of about 35,000 ohms. On the right is the famous Mazda P.220A.

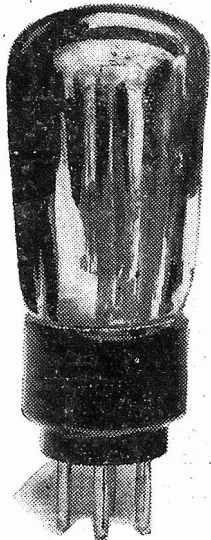
## TWO-VOLTERS OF TO-DAY.

(Continued from previous page.)

of giving really superb results. It is only when you come to the P.X.4 class and the L.S.6A. that one really notices any difference between 2-volt valves and their 4- or 6-volt brothers.

The 2-volters of to-day are nothing like the 2-volters of two years ago in performance. The majority of them have mutual conductances of well over one and in the power valves usually over two, so that whenever we use a low impedance power valve in the last stage of a fairly large set we can be sure of getting good magnification out of it, a thing which was impossible with the 2-volter of two years ago.

### CHEAP & GOOD



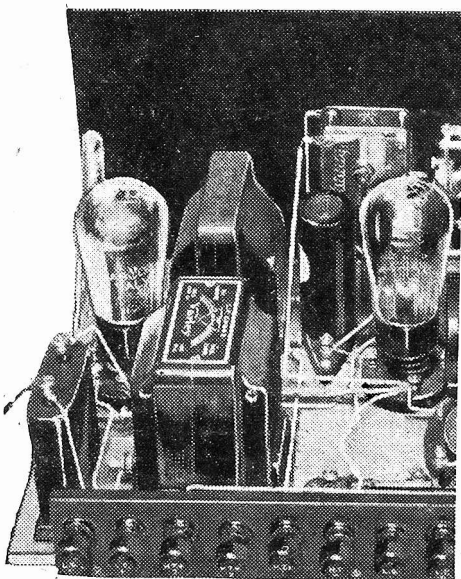
One of the Lissen 2-volt series.

Mazda's have done a great deal to popularise 2-volt power valves, and their P.220A., which has recently been placed on the market, is an example of the extensive research and untiring efforts they have displayed.

### High Output for Small Input.

Marconi's and Osram have the P.2, a really remarkable power valve on the market, while Mullards at the same time paid attention to the Pentone valves. These

### THE OUTPUT END



A couple of 2-volt valves in an up-to-date set. The last valve is a P.2.

5-electrode valves (commonly called pentodes) have done a great deal for the man with the small set, and the P.M.22, which has an amplification factor of 82 and an impedance of 62,500 ohms, is the result of

the Mullard efforts to bring out a really good pentode valve.

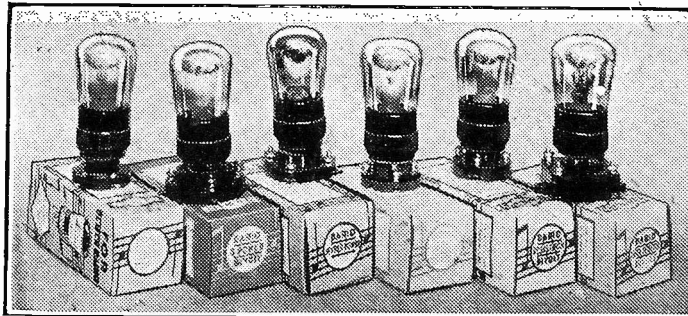
Other valve firms followed suit so that not only in the screened grid and the power, but in the pentode as well have we reached a high degree of excellence.

It is true that pentode valves will not carry the same input as the super-power valves, but it will give an extraordinarily high output for the small input.

### Really Remarkable Figures.

A comparatively short time ago every valve user became enthusiastic about the A.C. power valves brought out by Metro-Vick, and which had an amplification factor of something like 10 with an impedance of 2,500, thus giving a mutual conductance of 4. But since then Mazda's have been at work with the 240 super-power 2-volter, which is a battery-operated valve, and they have now developed it until it is comparable with that A.C. valve which we welcomed so gladly. The P.240 has an amplification factor of 7 and an impedance of 1,900 ohms, giving a mutual conductance of 3.7, really remarkable

### MEMBERS OF A POPULAR FAMILY



Some two-volters of well-known manufacture. These are Dario valves of various types.

figures for a battery valve, let alone a 2-volter having a filament wattage of only .8.

And when we mention these valves we must not forget the fact that quite recently super-power valves have been reduced in price, the P.240 is now 13s. 6d., while the "ordinary" valves are only 8s. 6d. Excellent 2-volters are also obtainable in the Six-Sixty, Dario, and P.R. types, while Messrs. Lissen, Tungram and Triotron have several valves well worth consideration.

### "P.W." Sets.

The position of the user of the 2-volt valve of to-day is an extremely happy one. He is thoroughly well catered for, and in my opinion there is nothing in battery valves for ordinary purposes to beat the 2-volters.

There is no reason for supposing that the 4- or 6-volt valve—except, of course, in very exceptional cases, is any better than the 2-volter of to-day. That is the reason why "P.W." sets are invariably tested with 2-volt valves as well as with those of other voltages, and you will see in the photographs of our sets that they often have 2-volters placed in their valve holders.

Set tests with this type of valve are made because the Research Department feel that not only is it a most popular valve, but it is rightly popular. It is efficient and economic, the two main factors which all set designers and all valve designers try and combine in their products.

## RADIO REMINDERS

Round the Stations—Reception  
Hints—For the Constructor

The German station at Breslau (325 metres) sometimes uses a metronome, time interval signal, ticking 60 times per minute.

A fast-ticking metronome (160 beats to the minute) is the sign that you are listening to Bucharest, Rumania, on 394 metres.

Budapest, Hungary, has an opening signal of four musical notes, repeated and followed by the initial note, G sharp, B A B G sharp B A B G sharp).

A chime of five bells from the Cologne studio is the interval signal used by that station on 227 metres.

### A SLEIGH-BELL SIGN

Crakow, Poland (on 244 metres), has both men and woman announcers, and frequently uses sleigh bells or a gong as the interval signal.

If you are using a screened set which has copper foil covering the baseboard, be sure to avoid creases and inequalities in its surface, as these are a fruitful cause of shorts.

The pentode valve used instead of an ordinary output valve will often give a pleasing "brilliance" to moving-coil loud-speaker reproduction.

There is no need to use a flashlamp bulb of uncertain rating for a fuse in an H.T. circuit, as proper fuses guaranteed to blow at the required limit can be obtained quite cheaply.

Although the B.B.C. stations are now shown with increased power rating (London 45 kw. instead of 30 kw., etc.), the alteration is not in the actual power of the stations, but in the methods of computing their outputs.

Leaving the set switched on while you alter the position of the negative grid bias plug of the power valve from one socket to another is a sure way of shortening the life of the valve.

Poor selectivity on a set using an X-coil for aerial coupling is often due to the coil holder being connected up the wrong way round.

### X-COIL CONNECTIONS

Normally the pin of the aerial coil-holder containing an X-coil should be connected to the earth terminal of the receiver.

Power valves normally have rather low amplification factors, but that for the new A.C. indirectly-heated pentode valve comes out at about 100.

Although the earlier pick-ups used to have in many cases an adjustment for volume control, most of the modern instruments are "set" before being sold, and this adjustment should not be altered.

Failure in soldering is often due to a dirty iron, to an iron which is too cool, or to dirty wires or terminals.

# "EKCO"

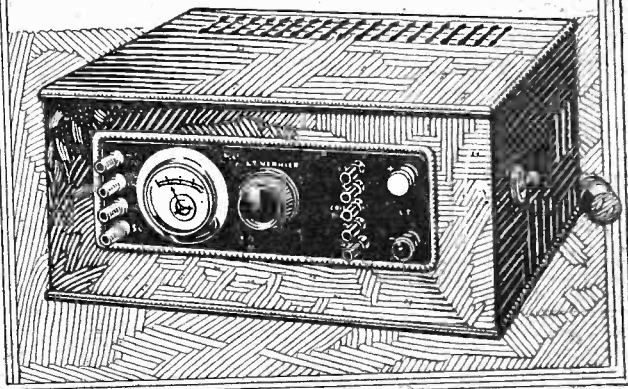
## ALL-POWER UNITS

### SAVE TIME!

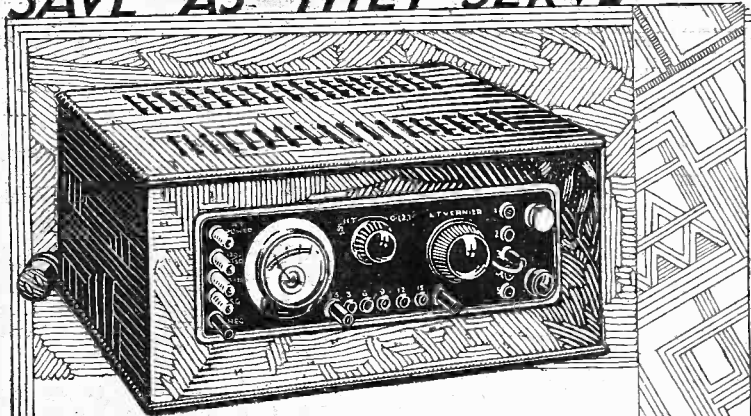
"EKCO" Units are easily and quickly fitted in three minutes and then forgotten for ever. Compare these with the hours spent on fiddlesome, messy, acid-staining accumulators with their constant shop renewals. Once an "EKCO" Unit is fitted, all you have to do is plug the "EKCO" adaptor into any electric light or power socket and then switch on — that's all! Buy "EKCO" and save time.

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#### All-Power Unit Model A.C.C2.A.

(shown above) Provides:

- (a) H.T. 3 Tappings of: S.G. for the H.T. supply to S.G. Valves. 60 and 120/150. Output 20 m/a.
- (b) L.T. 2—6 volts from .2 amp. minimum to .5 amp. maximum, so being suitable for any combination of valves of the same filament voltage, provided that the sum total of current consumed by the filaments does not exceed .5 amp. e.g. up to 5—.1 amp. valves, or 2—.1 amp. valves and 1—.25 amp. power valve, or 3—.1 amp. valves and 1—.15 amp. power valve etc., may be used.
- (c) G.B. 5 Tappings up to 12 volts.

Price £10 . 17 . 6

#### All-Power Unit Model D.C.C2.A.

Exactly as described above except that L.T. Maximum is .35 amp.

Price £5 . 17 . 6

#### All-Power Unit Model A.C.C1.A.

(shown on left) Provides:

- (a) H.T. 4 Voltage Tappings of: S.G. for the H.T. supply to S.G. Valves: 0-120 var., 120/150 and POWER. Output 60 m/a.
- (b) L.T. 2—6 volts from .3 amp. minimum to 1 amp. maximum, so being suitable for any combination of valves of the same filament voltage, provided that the sum total of current consumed by the filaments does not exceed 1 amp. e.g., up to 10—.1 amp. valves., or 2—.1 amp. valves and 1—.8 amp. super-power valve or up to 5—.1 amp. valves and 2—.25 amp. power valves, or 4—.25 amp. valves, etc., may be used.
- (c) G.B. 7 Tappings up to 21 volts.

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Write for details of above and particulars of Easy Payments to E. K. Cole, Ltd., Dept. A., "Ekco" Works, Southend-on-Sea.



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

The Editor will be pleased to consider articles and photographs dealing with all subjects appertaining to wireless work. The Editor cannot accept responsibility for manuscripts or photos. Every care will be taken to return MSS. not accepted for publication. A stamped and addressed envelope must be sent with every article. All inquiries concerning advertising rates, etc., to be addressed to the Sole Agents, Messrs. John H. Lile, Ltd., 4, Ludgate Circus, London, E.C.4. The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless reception. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialities described may be the subject of Letters Patent, and the amateur and the trader would be well advised to obtain permission of the patentees to use the patents before doing so.

### QUESTIONS AND ANSWERS.

#### TESTING FOR A BREAK.

F. L. J. (Gillingham, Kent).—"How do you test a coil or a transformer for a break with a pair of 'phones?"

Faults of this kind, as well as defects in the wiring of a receiver, may be detected by a very simple series of tests with a pair of 'phones and a dry cell.

One tag of the 'phones should be connected to one

terminal of the dry cell, and two flex leads should be connected, one to the remaining 'phone tag and the other to the remaining terminal of the dry cell (a flash-lamp battery is quite satisfactory, or an old G.B. battery).

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

Any break is quickly shown up: A fault in a coil holder, for instance, such as a break between the terminal and the plug or socket to which it is connected, may now easily be detected, since, if one flex lead is connected to the terminal and the other to the side of the holder to which the terminal should make

connection absence of the double click is positive evidence that the component is faulty.

You can test for shorts as well. If one of the flex leads is connected to the socket of the coil holder and the other to the plug and a double click is then heard there is obviously a short-circuit across the holder.

Similar tests may be made with valve holders, both for testing for a connection between each terminal and its socket and for testing for direct short-circuits between the sockets.

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

It is, of course, essential to see that all leads are removed from the components under test, and also that no coils are in position in the coil sockets when these are tested.

The wiring of complete circuits may be tested in this manner. For example, if the A.T.C. is in parallel with the A.T.L., in a simple tuned aerial circuit, one

(Continued on page 302.)

### HOW IS THE SET GOING NOW?

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

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

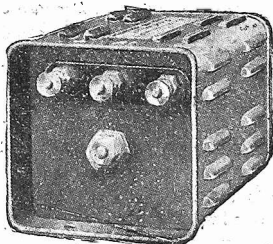
Full details, including scale of charges, can be obtained direct from the Technical Query Dept., POPULAR WIRELESS, The Fleetway House, Farringdon Street, London, E.C.4.

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

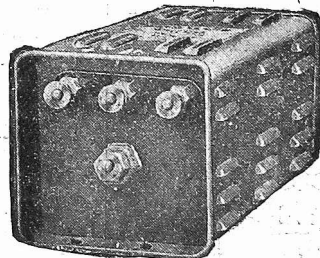
**LONDON READERS PLEASE NOTE:** Inquiries should NOT be made by 'phone or in person at Fleetway House or Tallis House.

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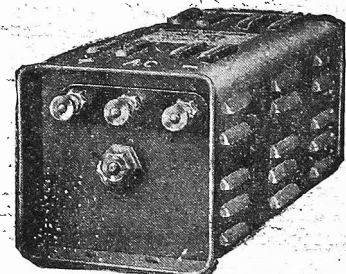
ARE ON SHOW ON STAND 66 MANCHESTER RADIO SHOW



H.T.5 - 15' -  
120 volts. 20 m.a.



H.T.6 - - 17'6  
175 volts. 25 m.a.



H.T.7 - - 21' -  
200 volts. 28 m.a.

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## RADIOTORIAL QUESTIONS AND ANSWERS.

(Continued from page 300.)

flex lead placed on the aerial terminal and the other on the earth terminal will give a certain test for continuity between these points.

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

### THE SILENT AMPLIFIER.

P. M. A. (Kent).—“Being perfectly satisfied with results, I thought I would put the set and the extra valve into one big cabinet to smarten it up a bit. So I made up the set inside, just as it was, and added the extra wiring for the amplifier alongside it, the whole being out of sight when the cabinet was closed. It looks fine, but now the amplifier will not work.

“All the parts and connections are as before, except a new valve holder for the amplifier to replace the old one, which I broke in removing. When using the set only it works like it used to, but on joining up the amplifier I cannot get anything at all from the loud speaker, not even the clicks as the H.T. is plugged in and out. The valve lights up all right.

“Do you think it is the new valve holder?”

Yes, probably the valve holder is causing the trouble. It looks as though it had a disconnection inside. Possibly the socket for the plate of the leg of the valve is not making proper contact with its soldering tag or with the terminal to which it should be internally connected. You can easily check this by examination, or by a 'phones and dry cell test. See the answer to F.L.J. (Gillingham).

### A SUDDEN FAILURE.

C. M. M. (Brighton).—“The set cost over £3, and has been perfect until this week, but when I switched on yesterday it was silent.

And since then not a sound has come from it. What shall I do?”

In such a case, the first thing to do is to look over the set carefully and make sure that no lead has come off. If they all appear to be in order make sure that the telephones themselves are working, either by comparison on another set or by testing with one of the methods described in “Radiotorial” from time to time.

If the telephones themselves prove to be O.K., and the set itself has not been tampered with and appears to be normal in every way, the next thing

result would accrue from a broken battery lead. Generally speaking, any broken contact will disclose itself if gently investigated with the finger by the noises it sets up in the telephones or speaker, but remember if a valve set is being used very great care must be taken not to allow the high-tension wiring (which includes everything connected to H.T. positive) to come into contact with the low tension (which includes everything connected to the filaments of the valves).

Unless great care is taken the batteries may be shorted or, worse still, the valves may be burnt out. If you carefully go over the set on the lines indicated we think it is certain you will come across a fault, but in the unlikely event of your not doing so we are afraid it means you will have to have expert advice to determine the cause of the failure.

By “expert advice” we do not necessarily mean a highly-paid or highly skilled technician, for, as a matter of fact, it is practically certain that anyone who has used a valve set for a few months, and who is interested in it, will be able to suggest where your fault lies after an inspection of the receiver and of the aerial and earth, etc.

### WON'T OSCILLATE.

G. H. (Amersham Common).—“Why do you think I can never get a short-wave set to oscillate? I've tried three different components, but never get reaction effects.”

We should suspect you have been up against the old fault of coupling the aerial too tightly.

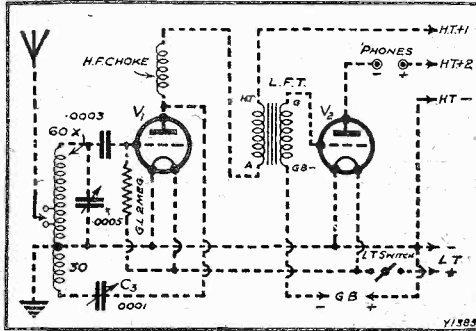
For successful short-wave work it is essential that the coupling between the aerial and the grid circuit should be really loose, and we do not doubt that if you remember this in your next short-waver you will have no difficulty in getting oscillation on very low wave-lengths.

If your set has to employ a separate aerial coil, remember that if you place a coil of too many turns in this coil holder you will be coupling the aerial too tightly to the grid coil, and this is quite sufficient to prevent reaction effects. Consequently you must use a few-turn (say two-turn) coil in the aerial and do not put up with unsatisfactory reaction effects without trying alterations in the size of the coil, or a much shorter aerial.

If the set has an aerial lead terminating in a clip, for putting on to one of the turns of the grid coil, remember that loose coupling is obtained if this clip is adjusted near to the earth end, and not to the grid end of the coil. By varying the position of the clip, you will soon learn to obtain just the right

(Continued on page 304.)

## POPULAR “WIRELETS” No. 21



Here are the connections for the simple two-valve, the “parts” for which were given in last week’s “P.W.”

to do is to examine the aerial and earth connections outside. If the aerial wire is touching on a roof or waterpipe, or if the aerial or earth leads have become disconnected or broken you will hear no broadcasting.

Remember, also, that the earth lead may be broken right underground, out of sight, so this test should be a very thorough one; if you cannot find any trace of a broken wire the only likely cause is a break in the wiring inside the set, or faulty contacts, if it is a crystal set.

Incorrect connections of the batteries would be sufficient to cause silence, and of course a similar

## SOMETHING FOR NOTHING!

If you had carefully collected all the catalogues at the recent Radio Exhibition at Olympia and had them bound into one huge volume you would not then have as good a guide to all that

is latest and best in the wireless industry as the new stupendous 1931 catalogue issued by:

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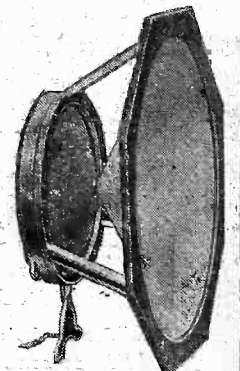
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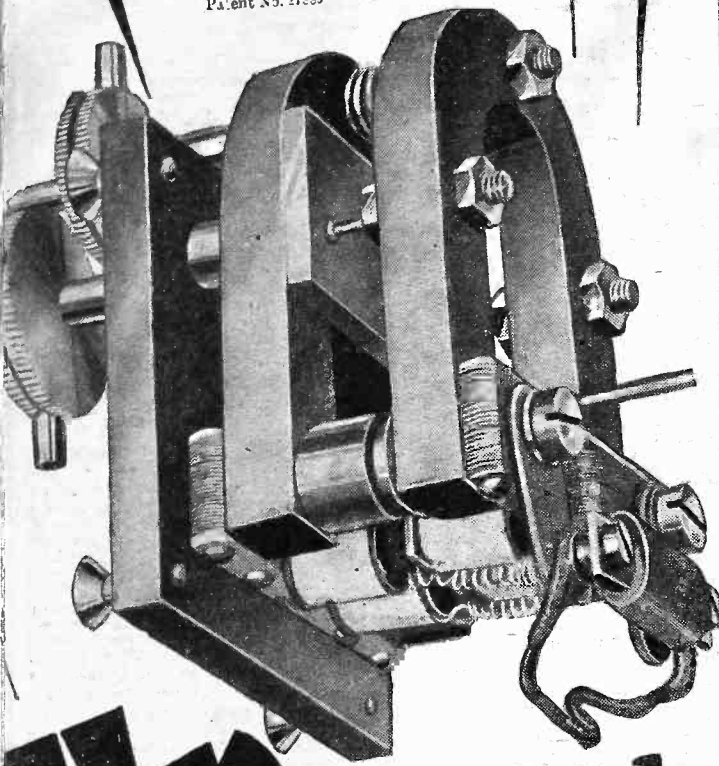


The Squire 101—Double Cone Speaker Cradle with double floating suspension (takes Blue Spot, Hegra, Ormond, etc., units).

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## RADIOTORIAL QUESTIONS AND ANSWERS.

(Continued from page 302.)

degree of coupling to give satisfactory reaction effects over the whole tuning range.

Finally, if this set should be used with a small variable condenser between the aerial lead and the aerial terminal, to vary the coupling, this condenser must be set towards its minimum in order to give loose-coupling effects, as if a fairly long aerial is employed and the aerial coupling condenser is set "all in" the set may refuse to oscillate, even though everything else is in perfect order.

Remember also that the H.T. applied to the detector valve has an important effect upon the oscillation control, which is to some extent also dependent upon the value of the grid leak, and upon the position of the slider of the detector's potentiometer, if the set incorporates one of these.

### WHAT WAS WRONG?

Last week's was a rather difficult question, because there are several possible causes of such trouble. Among the common ones are wrong relationship of connections to primary windings (reversal will often cure a hum), a not very efficient output filter, a de-coupling or by-passing circuit that is not functioning properly, or an imperfect earth.

In this case the earth wire was broken underground, and gave no trouble with batteries, but caused a hum with a mains unit.

dent upon the value of the grid leak, and upon the position of the slider of the detector's potentiometer, if the set incorporates one of these.

### INTERFERENCE BETWEEN INDOOR AERIALS.

T. M. (Earls Court).—"I still have in use the "P.W." blueprint set Det.-L.F. No. 11, and although it has been satisfactory for many years, I am now in difficulty with it.

"The point is that I persuaded my neighbour who lives in the next flat to build one, because he had heard mine and was greatly impressed with it. He did not think that he could do without an outdoor aerial, so I

showed him mine, which is eight wires along the ceiling of the long hall which runs right from the front to the back of the flat.

"With my help, he made up the set very similar to mine, and put up the same kind of aerial. Now either set alone goes splendidly, but they refuse to work properly together.

"If I switch on and tune in, it takes his programme right out, and the same sometimes, when I am listening, if he switches in, it blots out mine. What can we do about it?"

When interaction of this kind takes place the great thing is to try and remove one aerial as far as possible from the other, and especially to avoid running them parallel, as this is the position for maximum interference.

Your best plan would be for one of you to try a totally different kind of aerial, such as, for instance, a wire zig-zagged across the ceiling of one room as far away from the neighbour's aerial as possible. Another tip which is worth trying, if the flat has a metal window, is to endeavour to use this as an "aerial," for very often there is quite sufficient pick-up on a window of this kind, which, if experiments indicate it is likely to prove satisfactory, can easily be drilled for a terminal shank.

You might also try one of the indoor type "sausage" aerials, arranged so that it lies at right-angles to the neighbour's aerial; in which case it would not matter so much if it had one end running close to it, with only the wall dividing them.

Failing all this, you may have to take the other aerial down, and both of you try different aerials, one running, say, from front to back of the house and the other from side to side, or diagonally across the largest room. The probability is that if you experiment in this way (with a quarter of a pound or so of D.C.C. wire, before putting up the aerial permanently) you can both find positions where the sets will not interfere noticeably with one another, unless too much reaction is applied to one of them.

This latter, of course, would be fatal, for it is impossible to overcome the ill effects of strong reaction. We are afraid it may take a little time and

patience, but we think if you tackle the job along the lines indicated you should be able to find a satisfactory solution which will enable either of you to listen to the desired programme without interfering with the other.

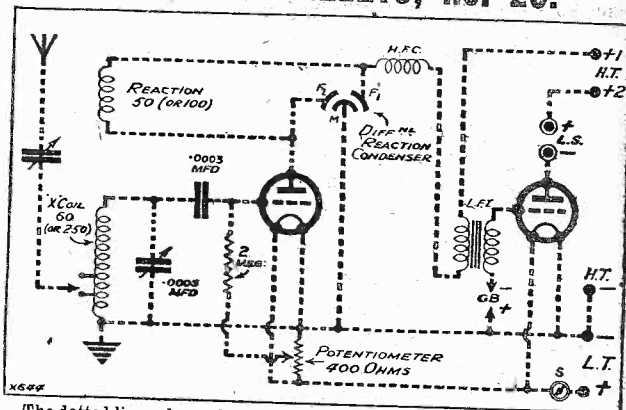
### FITTING A DIFFERENTIAL REACTION CONDENSER.

H. L. P. (Didsbury).—"Being interested in the reports of improved reception with a differential reaction condenser as compared with the old two-vane type, I thought I would alter my set, which has reaction not on the aerial, but from the detector plate to the grid circuit (following a stage of S.G. amplification).

"I worked out the connections carefully, but am very disappointed with results. I find

(Continued on next page.)

## POPULAR WIRELETS, No. 20.



The dotted lines above show how the "components" given in "P.W." No. 435 should be connected to give a straight Det. and L.F. circuit. The potentiometer return for the grid-leak ensures good reaction control, and greatly assists in long distance reception.

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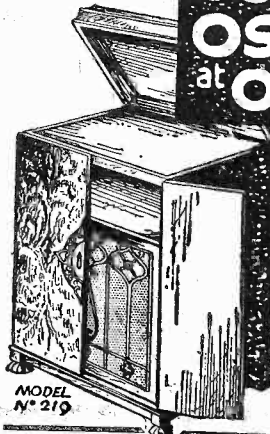


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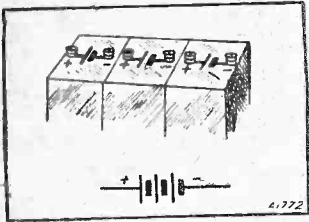


**RADIOTORIAL  
QUESTIONS AND ANSWERS**  
(Continued from previous page.)

not only is reaction not half so good as formerly, but I have completely altered the tuning, which is now extremely flat and altogether unsatisfactory. In fact, I might as well work without an S.G. stage at all. Unfortunately, I spoiled the old condenser by taking it out, and before getting another of the same kind I should like to know whether it is possible I have done wrong in trying to apply a differential reaction condenser to a detector following a S.G. valve, or whether it makes an improvement in any way where the detector is the first valve."

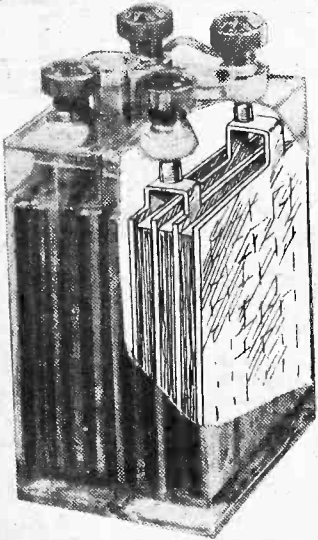
The advantages of the differential scheme of reaction, as compared with the older type, are just

**"INSIDE" INFORMATION**



Above you see the theoretical sign for an L.T. Battery (consisting of alternate plates), and above that a sketch of a 6-volt battery, showing that each cell contains one negative and one positive group of plates.

Below, part of the contents of a 4-volt battery have been sketched in, from which it will be seen how the theoretical diagram does really convey the essential idea underlying battery construction.



applicable when it is used following an S.G. stage when the detector is the first valve.

Evidently, in your case, you have failed to connect properly, and we think that there is no doubt, if you overhaul the connections and get them correct, you will find that your differential reaction condenser gives far better results than the older method. The usual plan is to have the moving vanes of the differential condenser joined to the plate circuit of the valve between H.F. choke and plate, with one set of the fixed vanes going to the non-earthed end of the reaction coil. The other fixed vane goes to earth.

Or you could use the method of correction shown in Popular Wireless, No. 20.

Perhaps you have taken one of your sets of fixed vanes to the H.F. choke and plate?

**READERS' ADDRESSES.**

P. F. (Salisbury), C. C. S. (Belfast), AND "SAMBO."—Sorry, but we regret that it is quite impossible to accede to your requests. It would not be fair to other readers.

**The  
Easy Way  
TO PERFECT RADIO**

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- Balance in 11 monthly payments of **10/6**
- Send **23/4** only. **McMICHAEL SCREENED THREE KIT.** S.G., Detector and Pentode. Provision for Short Wave Reception. **Cash £12:14:0**
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- Send **7/6** only. **STANDARD WEL H.T. BATTERIES.** 144 volts, 20,000 m/a. **Cash £4:2:0**
- Other voltages and capacities available; detailed prices on application.
- Balance in 11 monthly payments of **7/6**
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- Balance in 11 monthly payments of **8/6**
- Send **10/9** only. **REGENTONE W.5 COMBINED H.T. ELIMINATOR & TRICKLE CHARGER.** 1 Variable and 1 Fixed Tappings for H.T. L.T. Charging for 2, 4, and 6 v. For A.C. Mains. **Cash £5:17:6**
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- Send **9/2** only. **CELESTION D.12 LOUD SPEAKER.** An entirely New Model in Oak. **Cash £5:0:0**
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- Balance in 11 monthly payments of **8/3**
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- Balance in 11 monthly payments of **8/3**
- Send **12/4** only. **B.T.H. R.K. PERMANENT MAGNET SPEAKER.** Unit only. **Cash £6:15:0**
- Balance in 11 monthly payments of **12/4**
- Send **11/-** only. **B.T.H. ELECTRIC GRAMOPHONE MOTOR.** An entirely New Model. **Cash £3:3:0**
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- Send **9/-** only. **B.T.H. PICK-UP, TONE ARM AND VOLUME CONTROL COMPLETE.** **Cash £2:9:6**
- Balance in 5 monthly payments of **9/-**
- Send **5/-** only. **UNDY 8-POLE DYNAMIC SPEAKER.** including Cone and Chassis, ready for immediate use; also 9-Pole at 35/-
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contains 40 large pages profusely illustrated and with detailed descriptions of the 1930/1 products of ALL THE LEADING MAKERS. Receivers, Components, Radio Gramophones, Pick-ups, etc. all are dealt with; in fact, you will find the new Easy Way Catalogue a veritable guide to Radio. Get your copy now.

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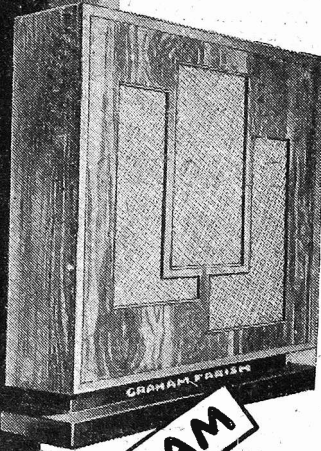
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We make no extravagant claims for the new Graham Farish Speaker. It simply tells the truth — without distortion. We only invite your comparison with any other Speaker near the price, or treble the price if you will—we will let your ear decide. You will agree that never before was such value offered at such reasonable cost.

Driven by adjustable 4 pole unit, the Graham Farish Speaker is obtainable in three distinctive finishes, mahogany, walnut and oak. Price 42/-.

GRAHAM FARISH BROMLEY KENT

Price

42!

BRISTOL'S WIRELESS WEEK.

NOWHERE is there closer co-operation between civic authorities, the B.B.C., and the wireless trade than at Bristol, where, for the fourth successive year, one of the finest radio weeks of the whole country is due to take place between October 26th and November 1st.

Every day throughout the week the Cardiff programmes will include something emanating from or relating to Bristol, beginning with a concert by the Bristol City Police Band, an oratorio programme in which May Middleton, a Bristol soprano, will take part with the National Orchestra, and a service relayed from St. Mary Redcliffe Church, Bristol, on Sunday, October 26th.

The Flying Fox

On the same evening the Lord Mayor of Bristol, Councillor Walter Bryant, will appeal to listeners on behalf of his Wireless for Hospitals Fund, which has, up to date,

"EKCO" POWER SUPPLY UNITS

Messrs. E. K. Cole, Ltd., ask us to announce that an error appeared in their advertisement in POPULAR WIRELESS, September 27th, 1930.

In this the price of the H.T. Unit A.C. Model 1V.30 was given as "£2 19s. 6d." (which is the price of the D.C. Model) instead of as £5 15s. (which is the correct price of the A.C. 1V.30).

Messrs. E. K. Cole Ltd., offer their apologies for any inconvenience which may have been caused, especially as hundreds of enquiries have been received in answer to the advertisement—a tribute to the pulling-power of "P.W." as an advertising medium.

brought in more than £2,500 and over £500 worth of material. All hospital sets in the city have been reconditioned and brought up to date during the past year at a cost of £500 raised by a house-to-house collection, and no expenses have ever been charged to the fund.

On Monday, October 27th, a feature programme will be relayed from the R.N.V.R. training ship, "Flying Fox," which is moored in the Bristol Channel, when life aboard will be portrayed by a description of a gun-loading competition, and band music, songs and choruses contributed by men of the R.N.V.R.

Famous Men of Bristol.

The commanding officer of the vessel will also speak about the work of the R.N.V.R.

Dennis Noble (baritone), a native of Bristol, is taking part in the National Orchestra of Wales concert at Swansea on Tuesday, October 28th, and on the following day the programmes contain a concert organised by the Bristol Children's Concert Society, which is to take place at the Central

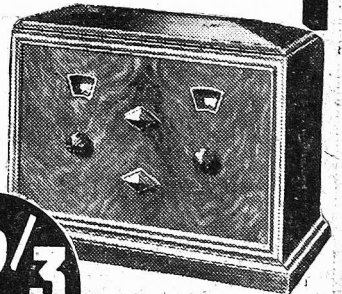
(Continued on next page.)

BROWNIE DOMINION MAINS S.G.3

A REALLY superb all-electric 3-valve receiver in a handsome, richly polished solid walnut cabinet—that's the wonderful new Brownie Dominion Mains S.G.3—the main set for the connoisseur! Just switch it on—then sit back and enjoy the cream of the world's programmes at brilliant loudspeaker strength!

YOUR DEALER will DEMONSTRATE

Your dealer will be delighted to demonstrate the Brownie Dominion Mains S.G.3. In any case send now for illustrated catalogue of the complete Brownie range of battery and mains operated receivers. Prices from 50/-.



PRICE including royalty and valves

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124 PAGES

**BRISTOL'S WIRELESS WEEK**  
(Continued from previous page.)

Hall, Bristol, under the chairmanship of Dr. Ludford Freeman, Director of Education for the city.

Thursday brings an organ recital by Mr. Rowland Shiles at St. Nicholas Church, Bristol, when vocal items will be contributed by George Winstone, a boy soprano, and the Rev. J. M. D. Stancomb (baritone) who was formerly Precentor of Bristol Cathedral. That evening a variety programme will also be relayed from the Bristol Musical Club.

There are talks by Mr. Ben Tillett, M.P., a native of Bristol and a well-known trade unionist among dock workers, who, on Saturday, November 1st, will describe a day in dockland, and by Dr. F. W. Rixon, who, the same evening, will attempt to prophesy what Bristol will be like in A.D. 2000.

**To Which County?**

On Friday evening there is a debate between Mr. W. Irving Gass and Mr. Fred A. Wilshire entitled Somerseset versus Gloucestershire which will revive the age-old problem of whether Bristol belongs to one or other county. Actually, the River Avon, which flows through the city, is the geographical dividing line, but the town was constituted a county of itself by a Charter of Edward III granted in 1373.

Special programmes for the children will also be broadcast throughout the week, one of which will be relayed from the Zoological Gardens, Clifton. There are, too, plays by West Country writers and a feature programme arranged by Mr. Froom Tyler entitled "A Trip Round Bristol."

Finally, there is dance music on Saturday, November 1st, relayed from the Grand Spa Hotel, Clifton.

**IS MAINS HUMMING INEVITABLE?**  
(Continued from page 291.)

"unacclimatised" ears when there is no speech or music to drown it is, I suppose, passable in the case of the smaller, cheaper apparatus.

When the "humming" can be picked out by critical ears during a transmission, then that is a sign that the smoothing is very inadequate.

The cost of "smoothing" rapidly increases as with increases in the size and complexity of a set. There is some excuse for the presence of a small hum in a five-valver using two screened-grid valves that derives both its H.T. and L.T. from the mains and perhaps even the field current for a moving-coil loud speaker.

**Use a Tested Condenser.**

With such gear the suppression of hum does, in fact, become a very difficult affair indeed. Nevertheless, it is possible, although in cases special measures have to be taken.

When it is a question of deriving only H.T. from the mains and that for a more or less straightforward two-, three-, or four-valve set, there are no real problems encountered. An absolutely silent background with complete freedom from humming is not at all difficult to get, and the

(Continued on next page.)

**BUILD YOUR MAINS SET THE**



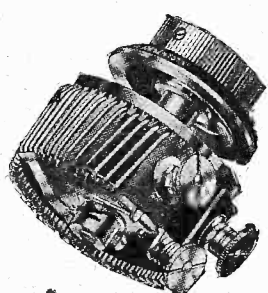
**WAY**



**Regentone A.C. Power Box**  
No. 1. Price £2. 10. 0  
Output when smoothed 120 volts at 20 m.a.  
No. 2. Price £3. 10. 0  
Output when smoothed 160 volts at 50 m.a.



**Regentone Filter Compact**  
No. 1. Price £1.12.6  
No. 2. Price £2. 5.0



British Patent No. 3087.  
In two types, covering a wide range of values. Price 9s. 6d. and 11s. 6d.  
Terminals allow use as a Potentiometer or Series Resistance. Resistance value ranging from 500 ohms to 180,000 ohms.

IT'S simple to build an A.C. Mains Set if you use the Regentone Power Box and Filter Compact. Instead of 8 or 9 separate components to build into your mains drive, there are only two. Both are completely screened, preventing interaction between the mains portion and the rest of your set.

Two connections only, and the Power Box and Filter Compact become a complete H.T. and L.T. Eliminator for A.C. Mains, with two positive H.T. Tappings. An additional variable H.T. Tapping can easily be obtained by adding a Regentstat and a 2-mfd. decoupling condenser.

The Power Box contains a Regentone Transformer and a Westinghouse Metal Rectifier—no delicate Valves to break or wear out. Two tappings deliver L.T. for A.C. Valves—4 amps. at 4 volts. The other two give the H.T. Output, which is smoothed in the Filter Compact.

The Filter Compact is a complete smoothing unit. It contains a bank of high-voltage-test condensers and a Regentone Choke of generous dimensions. Though designed for use with the Power Box, the Filter Compact is equally suitable as a complete smoothing unit for other rectifiers of similar output. In the same way the Power Box may be used with any good smoothing unit.

The new Regentstat is the only TOTALLY WIRE-WOUND variable Resistance of high ohmic value capable of handling power. Wire is the only resistance element used. The resistance element is wound in spiral formation, preventing excessive rise on load. Variable spring-loaded arm does not ride on wire resistance element, thereby eliminating risk of breakdown. Special separate Nickel-Chrome contacts are provided for variable contact arm.

Remember, too, that in addition to saving yourself labour, you are getting the best components that money can buy—the components used by Regentone in their own Mains Units.

Write to-day for your FREE copy of our new Art Catalogue.

**REGENT RADIO SUPPLY CO.**  
Regentone House, 21, Bartlett's Buildings, Holborn Circus, London, E.C.4.  
Telephone: 8745 (5 lines).

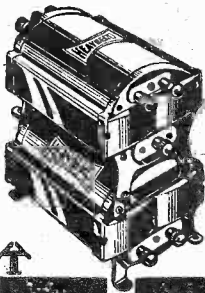


# PRECISION

The passenger-carrying aeroplanes of to-day are models of precise workmanship. Just the same standard of craftsmanship is put into Heyberd Power Transformers and Chokes. It is this that makes them better than any other—makes them models of efficiency, dependability and of long life. Robustly constructed yet perfect in detail. That is why everybody is using Heyberd components in eliminators.



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The new component which is actually two in one. For all mains. State voltage and periodicity when ordering. Prices for combined model from 26/6. Write for lists.

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**AGENTS WANTED** to sell Wireless goods, all makes in sets, components and accessories. Cash or Easy terms. Liberal commission. **NEW AUTO SUPPLY CO., 241, Park Rd., ASTON, Birmingham.**

## MICROPHONES

If you are not a Micro experimenter you are losing a lot of pleasure. Your present valve set will enable you to work in an entirely new field of "talkies" and we stock "mikes" within the reach of all. Prices range from 1/- to £20, and we can supply a fine sensitive pendant made in solid metal case (not a thin stamping) with brass front for only 4/6. Pulpit Pedestal, 12/6. Transmitter's Hand Mike, 15/-. Announcer's P.A., 65/-. Micro-Transformers, 3/6, 5/-. 7/6 and 10/-. If you prefer a separate Amplifier we have these in portable type £2 15 0, or mains model £3 10 0.

Send stamped addressed envelope for our new Sale Bargain List.

## THE DIX-ONEMETER

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PLEASE be sure to mention "Popular Wireless" when communicating with Advertisers. Thanks!

## IS MAINS HUMMING INEVITABLE?

(Continued from previous page.)

gear required is relatively extremely simple and inexpensive.

But even here there is a limit below which it is not wise to go in lowering the quality of the smoothing chokes and the number of "microfarads" or hum will surely creep in.

If you happen to have one of those not-too-good units that does contribute hum, I would advise you to add a little extra smoothing. One good smoothing choke designed especially for mains units such as are sold by the R.L., Wearite, Varley, and other such people, and one 4-mfd. fixed condenser, marked as tested at a voltage about twice that of your mains, will be necessary.

The choke needs to have a low resistance and a hefty inductance at moderate currents. It is in such details that so many chokes fail. Of course, such an item costs a pound or so.

### Watch the Detector

You should first try connecting the choke in series with the H.T. lead that feeds the detector valve connecting the fixed condenser between the valve side of the choke and H.T. minus. The detector is naturally very susceptible to "hum" in that all its energy, complete with all its mush, is amplified further by the succeeding L.F. stages.

Alternatively, the choke can be connected in series with one or other of the mains input leads and the condenser joined across these leads at the unit side.

But I am not going into this extra smoothing business any further, otherwise I shall spoil the moral of this article, which is, any good H.T. unit or for that matter any good mains set should not need extra smoothing, for it should not evince the slightest degree of hum, as humming is far from being inevitable!

## SIMPLE PICK-UP SWITCHING.

THERE are several ways in which a gramophone pick-up may be connected into the circuit of a radio receiver, but there is one simple way which is applicable to any ordinary set.

Just one extra component is required, and that is a single-pole two-way switch. This switch may be of either the ordinary throw-over type, or may be a push-pull one.

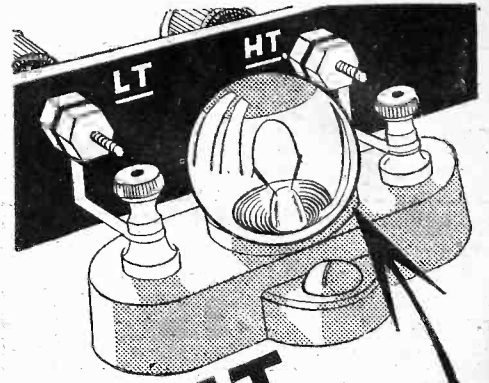
It should be mounted on the panel as near as possible to the grid of the detector valve holder. The connections and alterations to make are then as follows:

Remove the wire which goes to the grid of the detector valve holder and join it to one of the outside contacts of the switch.

Join the now free grid terminal to the common or centre switch contact.

Connect the remaining switch contact to one side of the pick-up, the other side of which has to be connected to a negative tap on the ordinary G.B. battery. Usually 1½ volts will be suitable, but sometimes 3 will prove better.

When the switch is in one direction the set will work just as before, and when in the other direction the pick-up will be brought into play and the radio will be cut right out of circuit.



**FIX IT HERE** Heat Bakelite Holders as shown 9D.

and rest assured that your valves are safe in the event of an accidental short circuit. Can be supplied in following ranges:

06 amp. (60 millamps.)	100 "
15 "	150 "
2 "	200 "

A "FUSE FOR EVERY CIRCUIT" Fusing at 50% overload approx.

# COMPETA FUSES

6 D EACH

**LOOK FOR THE TRADE MARK**  
A. F. BULGIN & CO. LTD. 9-10-11, CURSITOR STREET, CHANCERY LANE, LONDON.

## LOUD SPEAKERS REPAIRED, 4/-

(Blue Spot a Speciality.)

Transformers 4/-; Headphones 4/-, all repairs magnetised free. Tested, guaranteed, and ready for delivery in 24 hours.

Discount for Trade. Clerkenwell 9069.  
**E. MASON, 44, EAST ROAD, N.1.**

**"VERT" WIRING CLIP.** No soldering. No bending wires round terminals. Takes any number of wires to a terminal, any gauge. Tested and approved "Popular Wireless."  
3 gross (sufficient for 3 valve set) 2/-  
Trade enquiries invited.  
W. GREEN & SON, REDCLIFFE, HORLEY, SURREY.

## EASY PAYMENTS

The first firm to supply Wireless parts on easy payments. Five years advertiser in "Popular Wireless." Thousands of satisfied customers. Send us a list of the parts you require, and the payments that will suit your convenience, and we will send you a definite quotation. Anything wireless

**H. W. HOLMES, 23, FOLEY STREET,**  
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**WET H.T. BATTERIES**  
Solve all H.T. Troubles.  
SELF-CHARGING, SILENT, ECONOMICAL  
JARS (waxed), 2½" x 1½" sq. 1/3 doz  
ZINCS, new type 10d. doz. Sacs 1/2 doz.  
Sample doz (18 volts), complete with bands and electrolyte, 4/1. post 9d.  
Sample unit, 6d. Illus. booklet free.  
Bargain list free.  
AMPLIFIERS 30/- 3-valve set, £5  
**P. TAYLOR, 57, Studley Road,**  
STOCKWELL, LONDON.

**DX** THE STANDARD PLUG-IN COIL  
Sold everywhere from 1/-  
DX COILS LTD., LONDON, E.8

### TECHNICAL NOTES.

(Continued from page 276.)

rent circuit has to be rewired throughout set.

Rewiring is not a difficult matter, and when the job is satisfactorily accomplished you are free of all low-tension battery troubles once and for all.

As a rule the heating current for each valve is somewhere about 1 ampere, and this is generally obtained by means of a variable filament transformer.

#### Straightforward Job.

The H.T. current is obtained in the usual way. I should add, however, that the mere substitution of the A.C. valves for the battery-operated valves and the rewiring of the receiver will not in general ensure that the moment you switch on your receiver, it will work precisely as before.

You will almost invariably find that special precautions will have to be taken so

## TECHNICAL TWISTERS

### No. 31.—H.T. MAINS UNITS.

#### CAN YOU FILL IN THE MISSING LETTERS?

There are two chief classes of mains unit—those for use with current mains, and those for use with current.

In the case of D.C. H.T. Unit the output must be . . . . . to eliminate hum, and some form of regulation is required to provide variations for different valves.

The maximum . . . . . available is limited by that of the D.C. supply mains.

In the case of A.C. supply there must be a . . . . . as well as smoothing and voltage regulation apparatus.

By choosing a suitable . . . . . the voltage of A.C. mains can be altered as required.

#### LOOK OUT FOR THE MISSING WORDS NEXT WEEK.

Last week's missing words (in order) were: Recharging; Two; Use; Charge; Current; Capacity; Ampere; Filament; Ten.

to prevent the set from becoming unstable and so as to keep down as much as possible any A.C. hum.

There is no need for any reader, however, to feel in the least afraid of tackling the job of converting his battery set into an all-ans'one.

The rewiring is quite a straightforward matter and the slight adjustments necessary to get the set working efficiently should ally give very little trouble.

#### Modern Receiver Design.

Talking about A.C. sets, it goes without saying—as was very evident at the last Radio Show at Olympia—that many of the new radio receivers are designed for electric working.

(Continued on next page.)

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27 & 28a, LISLE ST., LONDON, W.C.2

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This address is at the back of Daly's Theatre. Phone: Gerrard 2821.

**C.O.D.** Orders despatched same day as received where possible. Send ORDER with instructions and pay Postman. C.O.D. APPLIES TO UNITED KINGDOM ONLY.

All C.O.D. orders must be over 5/-

## "SHARP-TUNE" TWO VALVER

EXCEPTIONAL SET. RAZOR-SHARP TUNING. IF YOU HAVE TROUBLE WITH YOUR LOCAL STATION BUILD THIS SET. KIT AS FOLLOWS:

12 by 7 Panel, 2/6. Ormond 0005, 4/-. Ormond S.M. Dial, 3/6. Ormond Switch, 1/3. Ormond 0001 Differential, 4/-. Ormond 0005 Solid Dielectric Condenser, 3/6. 2 Telsens Valveholders, 2/-. 3 Lotus Coil Plugs, 2/-. Telsen H.F. Choke, 2/6. Telsen Ace Transformer, 8/6. 0003 Fixed Condenser, 1/-. Lissen 2-meg. Leak and Holder, 1/6. 12 by 2 Strip, 1/-. 9 Terminals, 9d. COMPLETE AS ABOVE.

£1-18-0 PLUS CARR. AND PACKING, 3/-

GIVEN AWAY FREE WITH ABOVE Wiring-up Wire, brackets, set of leads, G.B. clips, and baseboard.

OAK CABINET TO SUIT 6/11 Plus 1/6 for carriage.

COMPLETE SET OF COILS 35, 50, 60, 100, 150, 250; to cover short and long wave-lengths can be bought with the KIT OF PARTS. FOR ONLY 8/6 EXTRA.

## THE "THREE-COIL" THREE SET

FULLY DESCRIBED IN THIS ISSUE. A WONDERFUL CIRCUIT. KIT AS FOLLOWS.

18 by 7 Panel, 4/-. 2 0005 Ormond Log Condenser, 8/-. 2 Vernier Dials, Ormond, 7/-. 0001 Differential, Ormond, 4/-. L.T. Switch, 1/3. Ormond Rheostat, 2/-. 3 Telsens Valve Holders, 3/-. 3 Lotus Coil Mounts, 2/-. 0001 Sovereign Condenser, 1/9. 01 Lissen, 1/9. 001 Lissen, 1/-. 0003 Lissen, 1/-. 2-meg. Grid Leak, 1/6. 2 Telsens H.F. Chokes, 5/-. Telsen Ace Transformer, 8/6. H.T. Fuse, Raymond's, 9d. Screen, 1/6. 10 Terminals and Strip, 1/10. COMPLETE AS ABOVE.

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Oak Cabinet to Suit 9/11 extra.

COMPLETE SET OF COILS 2 60x and 50. 2 250x and 100. Can be purchased with Kit for an additional 14/- GIVEN AWAY FREE WITH KIT Wire, Screws, Panel Brackets, G.B. Clips, Set of Battery Leads, and Baseboard.

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OR Complete Kit as above with 3 Valves (1 Screened-grid), 100-volt Guaranteed H.T. Battery, 2-volt 40-amp. Accumulator, 9-volt Grid Bias, £3 10s. Cliftonphone Loud-speaker. £5-0-0 Aerial Equipment.

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84/- Get the thrill of switching on to the Continent. Perfect reception in all districts is guaranteed.

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**SEND NOW FOR THE PILOT CHART** Contains detailed Price Lists of all the latest and best Kits, and over 30 valuable Hints and Tips for the Amateur Constructor.

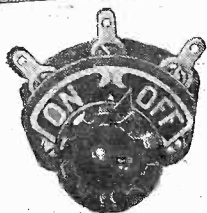
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# BENJAMIN

THE PICTURE PAPER WITH THE MOST NEWS

**SUNDAY GRAPHIC**

## TECHNICAL NOTES

(Continued from previous page.)

There are some cases in which batteries are necessary, and will perhaps always be necessary, but there is no doubt that wherever direct operation from the electric light supply is possible, it certainly is very much more convenient and is making a rapidly increasing appeal to the public.

### Background Noise.

Generally with an A.C. all-electric receiver you will find that when no reception is coming in there will be a slight A.C. "background" which will be heard with varying degrees of loudness.

In a really good and well-smoothed receiver this should scarcely be perceptible. In any case, it is not fair to judge the receiver when it is tuned to a silent position between two stations or when no station can be received, as this gives an altogether wrong impression of the importance of any slight background which may exist.

### Permissible Amount of Hum.

The proper way is to observe the interfering effect, if any, of the background when a fairly weak or distant station is being received. If you find that there is no perceptible interference in these circumstances you can be well satisfied with the set.

I have sometimes heard criticisms made of receivers which were really excellent in every other way simply because at a silent point between stations a faint A.C. background was audible.

To eliminate this last trace of background would have increased the cost of the set very considerably, and the extra cost would have been out of all proportion to the advantage gained. In fact, the advantage would have been negligible.

### Dual-Purpose Amplifiers.

Most receivers nowadays are provided with arrangements for using the L.F. amplifier for the purpose of playing gramophone records, and I think any of you who may be contemplating the purchase of a new receiver would be well advised to make this a definite stipulation.

The electric reproduction of gramophone records is now so popular that it seems to me a commercially made receiver can hardly be called "up-to-date" unless it can be used also for both purposes.

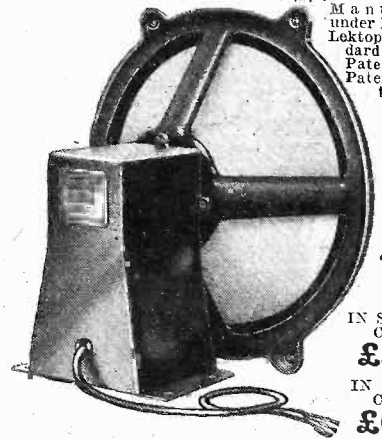
### Variable Selectivity.

Another useful feature of a receiver is the provision of different aerial tapings so that the selectivity can be varied.

For example, when the local station, or any station likely to interfere, is working, the most selective tapping can be used, whilst in other circumstances when there is no danger of interference—or when the local station has closed down—the least selective tapping can be used, which often means much greater signal strength on distant stations.

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INDUCTOR DYNAMIC SPEAKER



Manufactured under Faraday and Lektophone Standard Hopkin Patents and Patent Applications.

CHASSIS COMPLETE £3:10

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**SOUNDS THE "LAST POST" TO ALL BALANCED ARMATURE SPEAKERS and definitely supersedes the Moving Coil.**

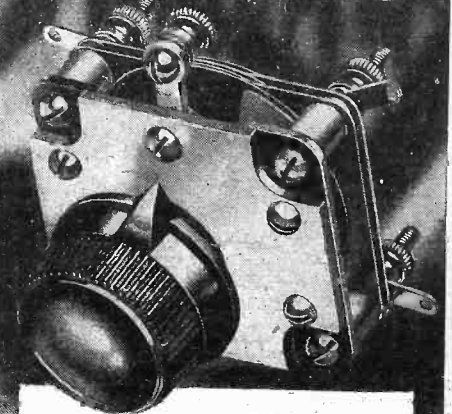
### THE VERDICT OF OLYMPIA.

A revelation in loud speaker construction. It definitely surpasses all present known types of speakers. All the advantages of a moving coil without its drawbacks. No hum. No heat. No rectifiers, transformers, or smoothing condensers required to perfect the reproduction. Double cones and all other artificial methods absolutely obsolete. Is light and beautifully finished. Gives tremendous volume; amazingly faithful reproduction. It must be heard to be believed!

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All brass parts are chemically treated. Price from 5/3 From all Radio Dealers.

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## READ

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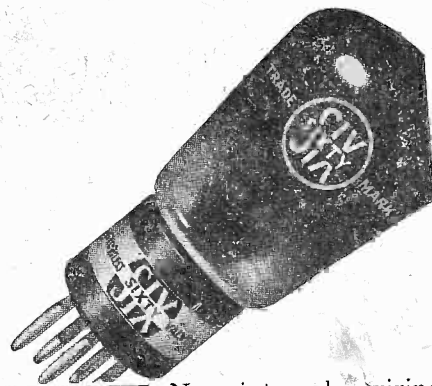
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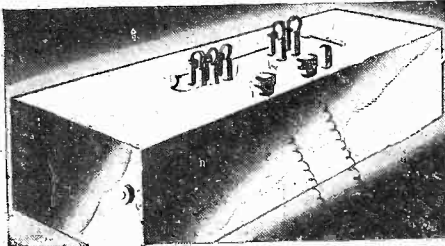
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## FOR THE LISTENER

By "PHILEMON"

Our popular contributor—on his return from abroad—reviews the recent programmes.

### Home Again.

IT is good to be home again. Coming up from Dover on the boat train it was good to see the innumerable aeri-als—yours, gentle reader, perhaps among them!—stretching across back gardens and back yards in every village and town.

It is the rarest thing to see an aerial in Italy. I saw more eagles than aeri-als! There they are so thick that, if I were a bat, I shouldn't flitter round about houses at dusk any more!

## READ MODERN WIRELESS

Full of authoritative articles covering all branches of radio

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## BRITAIN'S LEADING RADIO MAGAZINE

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### The Last Prom.

For the most part I have given music a miss since my return. Except for the last Promenade Concert. One wouldn't willingly miss that.

It is more of a thrill than a performance. The crowd went wild that night. I love crowds which go wild.

The Rachmaninoff Prelude went a bit wild, too; and was, I thought, the better for it. The Concert ended with the usual Pot Pourri of National Airs. The audience combined with the orchestra to raise the roof with "Rule Britannia."

And then, on a pandemonium of cheering, and in a chariot of handkerchief waving, Sir Henry Wood was for the umpteenth time translated into heaven. To judge by the sound, there was no standing-room in the Queen's Hall; and critics who prophesy that wireless will empty the concert halls were once more confounded.

### Listening at Ease.

Most of my notes this week are on Talks. You can't imagine how pleasant it is to listen to a talk, sure that you will not be suddenly interrupted by a brass band from Vienna or an opera chorus from Milan.

(Continued on next page.)

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**SET & SPEAKER CABINET**  
Constructed of finely figured Oak on carved ball and claw legs, hand French polished.  
**THE ACME OF CRAFTSMANSHIP.**  
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**RADIO-GRAMOPHONE CABINET.**  
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Models from £2.2.0 to £20.  
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**GILBERT, Cabinet Maker.**  
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**TIME & MONEY SAVER—THE TREBLE DUTY TERMINAL**

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Give your records the best needles

**"KIRBITONE"**

save the irritating scratch and wooliness inseparable from imperfect needles. Made by the largest Needle manufacturers in the Kingdom, whose 200 years of experience has been devoted to the production of the perfect needle for every purpose. In boxes of approximately 200 needles at 9d. per box, of Gramophone Dealers and Music Sellers.

Hand this **SPECIAL OFFER COUPON** and 6d. only for sample 9d. box to your retailer, who will exchange on behalf of the manufacturers.

**KIRBY, BEARD & CO., LTD.,** Ravenhurst Works, Birmingham.  
Also London, Redditch and Paris.

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Plug-in, mounted on best quality plugs of British Manufacture. Not Cheap Foreign Stuff.

25, 30, 35, 1/-; 40, 50, 1/2; 60, 75, 1/3; 100, 125, 150, 1/6; 175, 1/9; 200, 2/-; 250, 2/3; 300, 2/6; Centre Tapped, 6d. extra. "X" coils, 1/- extra

We are also original manufacturers of **"BROADCAST" COILS**

which we can still supply at the new prices. We strongly recommend "KLEER-KUT" COILS, however, except where the utmost economy is necessary. All orders Post Free.

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**RELIABILITY WIRELESS GUIDE.**

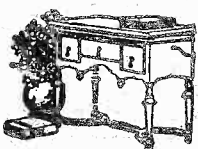
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No. 134

**FOR THE LISTENER**

(Continued from previous page.)

I listened to Mr. S. K. Ratcliffe trying to discover from Mr. Reginald Swing what America thinks of us. The danger of all such conversations is—that they should become too complimentary.

Mr. Swing said quite a lot of very nice things about us. No doubt he meant them. He gave no hard knocks. The worst he was willing to say about us was that we are "reticent." Even that was a compliment.

**Words.**

I also listened to Mr. J. C. Squire talking about the Meaning of Words. Very entertaining. It is a fascinating subject, and Mr. Squire, with his clear, agreeable voice and his dry humour, approaches the ideal talker.

He gives me the impression that he thoroughly enjoys his own talk; but he cannot have enjoyed it more than I did. And you also, if you were wise or lucky enough to be listening at the moment.

**Science and Religion.**

I also heard Sir Arthur Thompson on Sunday evening. (I was just too late for Julian Huxley on the same subject the previous week.)

I love Sir Arthur's books, on birds and beasts and biology. I could probably love him himself quite easily; but I bar his voice on the air. To me it was almost intolerable.

I hung on until he had declared that there was no real conflict between science and religion, since the one was descriptive and the other interpretative—and then I switched off. I couldn't stand it any more. Happily, I could guess what he was going to say.

**Stainless.**

Talking of voices, I was lucky to find Stainless Stephen at the microphone on my first vaudeville night after my return. There is a voice if you like!

There is the old story of a sculptor who, having ruined a piece of work by a horrible slip of the chisel, proceeded to make use of his mistake by making a masterpiece out of it. The voice of Stainless is a mistake.

It is a blot on the vocal universe. It is a moth-eaten thing. But such is the fellow's art and craft that his voice is a living partner with him in his triumphs. There's more than a bit of genius about a man who can turn a limitation into an ally.

**White Skins.**

Harold Nicolson for once in a way disappointed me in his eulogy of Lord Birkenhead and Lord Curzon. He did not sound quite at his ease. He was laboured, probably he felt that he had given himself the hopeless job of getting the ocean into a bucket. I thought that the parallel which he drew between the two men was far-fetched.

But I liked his story of how Lord Curzon, watching some Tommies having a bath after coming back from the trenches into billets, said, "Dear me, I never realised that the lower classes had such white skins!"

Next Week  
**"CONTRADYNE JUNIOR"**

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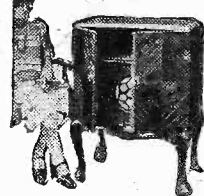
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NOTE THE NEW PRICES

25	10d.	50	1/-	125	1/3	250	2/-
30	10d.	60	1/1	150	1/4	300	2/3
35	10d.	75	1/2	175	1/6	400	2/9
40	1/-	100	1/3	200	1/9	500	3/3

Centre Tapped, 6d. extra. "X" Coils 9d. extra. Post paid two coils or over. Trade Supplied.  
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# I Like that Margin of Safety

All electric's all right for radio, but I like to be careful about anything that's worked by electricity in the home. There's the missus and the youngsters *and* the maid who will monkey about with the set at *any time*. She does like radio—that's why my H.T. Batteries always get spent out when I want a special programme, so I've got fed up with batteries and I've bought an



## ALL-INSULATED H.T. UNIT

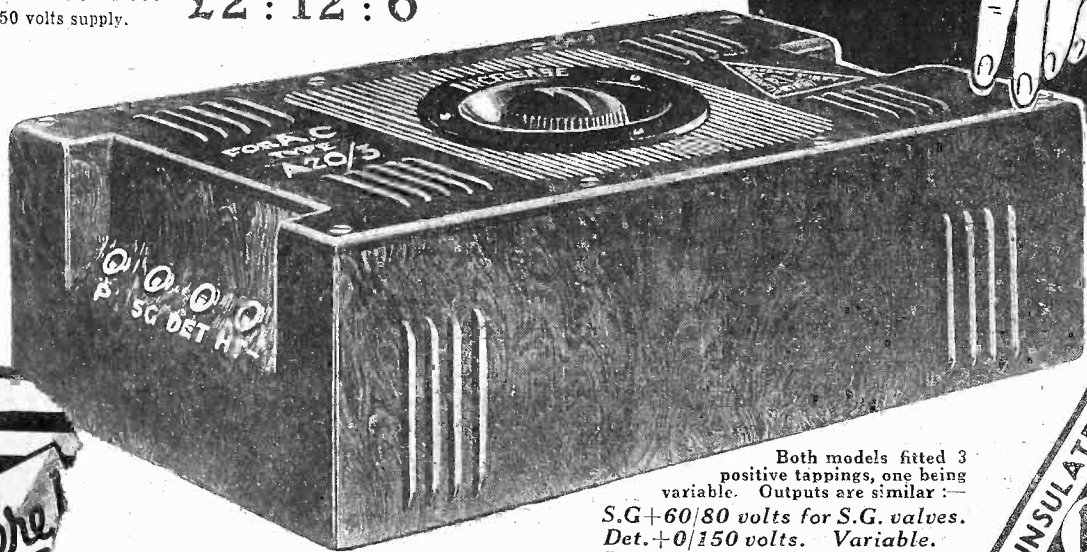
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It's impossible to get a shock and the Unit is the most advanced and efficient you can get. NIKALLOY the amazing new metal is used in it, and although the unit is the same size as a battery it gives results quite unattainable in such a small space without Nikalloy. It fits portables, of course, and works any set up to five valves.

TYPE A20 3 FOR A.C. £4 : 15 : 0  
For 2/2 250v. 40/100 cycle supply.  
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# FINDING FOREIGNERS



It's a great game—and you're going to be good at it!

**F**INDING foreigners is the greatest game on earth. And it is a game that YOU can play.

Plenty of people can pick up foreign stations on crystal sets. And if you have got a valve set you are "on velvet," for the valve set—even a one-valver—is certain to pick up foreign stations if properly handled.

Notice that word "certain." There is no doubt about it, no qualification, no query, no "ifs" or "buts," but a plain statement that with a one-valve set you can get foreign stations.

Note, too, that the word "you" is emphasised. We are coming back to YOU in a minute. First we must say just a few words about crystal sets.

## HANDLING THE SET.

Crystal sets are far more sensitive than they are generally given credit for. If you give a crystal set a good aerial and good earth, it will give you a surprise.

But a valve set is so superior that even if you do *not* give it a particularly good aerial and earth, it can reach out and grab foreigners galore.

The reason that so many valve sets fail to pick up foreigners properly is that they are badly handled. We said a few lines back that we were coming back to YOU again. We have now come back to you, and the question is, "Do you handle your set properly?"

It is not the set, but the man behind the set that matters.

Scores and scores of simple receivers are missing programmes that they could pick up quite easily if controls were handled properly. The foreign programmes are in the aerial, but they never come out

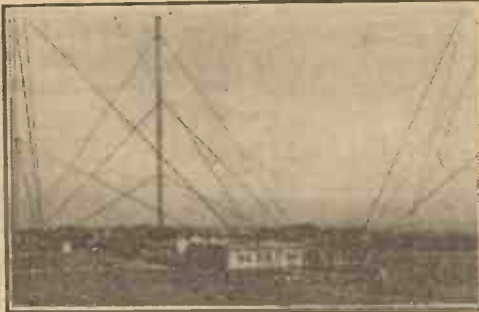
of the telephone or loud speaker because they never have a chance.

The reaction dial is turned too far round or the tuning dial is in the wrong place, or there is a fatal lack of that fine tuning which would do the trick.

Do not blame the set. Probably the set is all right.

If you will read this book through carefully, paying attention to the hints and trying to give your set a fair deal, you will find that those slippery and elusive foreigners are really the homeliest fellows in the world. There is endless entertainment to be had from them.

## VIENNA CALLING!



This is Vienna—787 miles from London, but only "just across the road" from a radio set's point of view.

## KNOWING THE CONTROLS.

But they want coaxing. In order to bring in foreign stations on a simple set you must know *how* to handle the set. You must use its controls knowingly and skilfully and, above all, smoothly.

The following chapters of this book will have to be practical ones, full of hints and tips and "how-

to-do-its." But in this chapter the thing we want to say about finding foreigners is that *you can do it!*

Your set may be a little one, but it has big possibilities. Your pocket may be limited, but the whole wide world is open to you. The great thing is to get the right attitude of mind. Get to know your set.

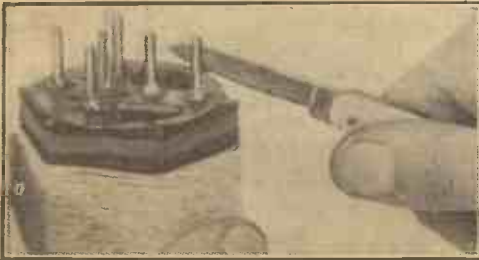
You may not be very skilful at the moment, but you can be. If you read this book, and digest what is told you, *you will be.*

There are plenty of foreign stations to be had.

Get them!

In Europe alone there are hundreds of broadcasters on the air this very hour, flinging out wireless waves all over the country. Why not tune in your share of them?

## A USEFUL TIP



Cleaning and opening contacts doesn't take long, but it puts miles and miles on your range.

## IMPROVING SELECTIVITY



An extra coil of 15 turns or so, tied to your "aerial" coil with cotton, will sharpen tuning. One end of it goes to earth and the other to your aerial lead.

# TIPS FOR TUNING



Some practical hints on handling the dials.

**T**HE tuning dials on a set simply alter the wave-length to which the set is adjusted for reception. If you have a dial which is marked "reaction" or "increase" or "strengthen," that is not a tuning control. Do not confuse your reaction and your tuning dials; they are quite different.

The idea behind tuning is this. Every station that sends out a programme sends it out on an aerial, and that aerial has a coil and condenser associated with it. The wave-length on which that transmission goes on depends upon how that coil and condenser are adjusted.

If a station is instructed that it must send out on 500 metres, it adjusts its coil and condenser until the wave-lengths on which it is sending out is 500 metres, and then it fixes these adjustments permanently and always sends out on that wave.

If you want to pick up that transmission, you must adjust your circuit to 500 metres also. For when you are "in tune" with that station, even the weakest signals from it will affect your receiver; but if you are out of tune, its programmes will pass you by.

## FIX THE DIAL ON TIGHT.

It is only when your set is "in sympathy" with the distant set that a weak transmission from it can be picked up loud enough to hear what is going on.

Just a few words about the tuning dial itself. Obviously, if the markings upon this are to be of any use at all in long-distance reception, the dial must be affixed *tightly* to the spindle which carries it.

Usually a tuning dial is held on its spindle by a little grub-screw, counter-sunk into the dial. Sometimes you can get at it easily, sometimes you can't, but wherever the screw is it *must* be tight.

Do not put up with a loose screw or a loose tuning dial, or you will never be successful with foreign stations.

If the little screw which holds your dial on to the spindle seems loose, and it is too small for your screwdriver to reach and tighten up, get a small-headed screwdriver for it, or else improvise a screwdriver by filing a small bradawl. Be sure and do it somehow, for you cannot possibly set your tuning to a given point unless the dial is *tight*.



Don't grip a dial like this. You get finer adjustment by holding its outer edge.

## MIND YOUR HANDS!



When adjusting a wave-trap condenser you get better results by keeping your hand well away from the trap. A long screwdriver with a wooden handle is very useful in this connection.

To tune-in distant stations on an ordinary receiver you must, first of all, have a reasonably clear dial.

If the local station monopolises one-third or more of the dial, a Brookman's Rejector—or, failing that, a really good wave-trap—is essential, and, when correctly set, should reduce the local station's programme to two or three degrees. Assuming that the dial is fairly clear, what is the best way of receiving foreign stations?

Frankly, the whole secret of success lies in the handling of the reaction control. If you have too little reaction, then your set is not sufficiently sensitive, and you will not hear the weaker stations.

If, on the other hand, you have too much reaction, you will still fail to receive the foreign programmes, and, in addition, your set will be giving out squeals and squeaks, and will be upsetting the reception of all your neighbours. What, then, is the fair amount of reaction to give, and how can this be assured for any particular station?

The answer to the first part of the query is: use as little reaction as possible to get the necessary strength, and always keep below the "oscillation point." What is meant by the "oscillation point" is explained elsewhere in this book.

## STATION UPON STATION.

The method of tuning recommended really does not cause interference with the neighbours, and yet, if practised properly, will enable any intelligent listener with a valve set and decent aerial to pick up more foreign stations than he knows what to do with.

The kernel and heart of the whole matter is to be able to adjust the tuning dial to cover various wave-lengths and, at the same time, keep the set *nearly, but not quite, oscillating.*

## YOUR AERIAL AND EARTH

Long-distance efficiency is like charity—it should begin at home. If you want foreigners it will pay you to read this article and ponder over the practical hints given below.

A GOOD aerial will make an enormous difference to the number of foreigners you can pick up, so you ought to pay particular attention to making it as nearly perfect as possible, and maintain it in good condition.

The best scheme is to have a good high mast, 30 ft. or more, erected in such a position that not only is a long aerial possible, but this is lifted above any roof, building, tree, or similar obstruction, which would "screen" the aerial and impair the results.

### DIMENSIONS FOR THE AERIAL.

The total length from lead-in to the far end must not exceed 100 ft., and generally a very much shorter aerial is perfectly satisfactory. If you can raise it, say, 25 ft. or 30 ft. at the house end and run it to a mast which is about 40 ft. away, you should get excellent and satisfactory reception.

Use a single and not double wire, of stranded copper, or similar high conductive material avoiding any breaks or joins, so that the aerial runs from the farthest insulator right down to the lead-in without a break, if possible.

Take care not to kink the aerial when putting it up, and use an adequate number of insulators of the type that will remain dry (even under severe weather conditions) over parts of their surfaces.

### TAKE CARE OVER THE LEAD-IN.

If you are going to use an aerial lead-in switch (and it is advisable to do so) make sure that the contacts of this are really firm and sound, and arrange that the whole switch is covered with some protective device, such as a box, to protect it from the effects of the weather. Be particularly careful not to take the lead-in through the window close to any metal, bearing in mind that the wire itself should not be within a foot of any wall, etc., except at the point where it enters the house, and here it should be well spaced away from conductive surfaces.

From a high-frequency point of view, which is that point of view with which the aerial is concerned, an aerial is *not insulated properly unless it is spaced well away from adjacent conductors*. If you lay an insulated aerial wire along a metal gutter-pipe, you have, in effect, a condenser, one plate of which is the wire inside the insulation, and the other plate is the gutter-pipe!

### THE SERIES CONDENSER.

Now, oscillating or high-frequency currents have no difficulty whatever in "flowing through" conden-

sers. (You can see for yourself that the aerial currents are very often led through a condenser and the other side of this is connected to the set, so that all currents in the aerial are forced to "cross" this condenser before they reach the set.)

### EARTH JUST AS IMPORTANT.

The earth is just as important as the aerial. Generally you can make a good "earth" by joining up to a water-pipe, employing one of the usual earth-clips to make the connection to it and making sure that the pipe is thoroughly cleaned with a file or emery cloth before the clip is placed in position.

If you make a thoroughly good, clean job of the electrical connections, and then coat the whole of the clip with petroleum jelly, to protect the joint from the effects of the atmosphere, you can be sure that the water-pipe connection will give you an excellent earth. It is sometimes thought that an outside earth

### WHERE MASTS SPRING UP LIKE MUSHROOMS



A typical scene in a London suburb, where everyone tries to out-top his neighbour, because extra height means extra range,

is always better than a water-pipe, but this is not true, and very often the water-pipe is far more satisfactory.

### DO NOT SHARE YOUR EARTH.

It not infrequently happens that the sharing of an earth wire with a neighbour means that the operation of one set will interfere with the other to some extent, so that, for instance, every time he adjusted his crystal you would hear the scratching in your 'phones, or possibly you would be able to hear speech or any loud noise which affected his telephones and caused interaction with your own receiver.

Interaction of this kind is always undesirable. The best plan is to employ a separate earth, because aerials are often necessarily placed somewhat close to one another, which exposes them to risk of interference with one another, unless all precautions are taken to avoid this.

● The photograph on this page shows how closely placed aerials have to be in many suburbs of large towns,



# TWO-HAND TUNING



Some practical information for the heavy-handed dial-twister.

It is hopeless to attempt to handle a two or three dialled receiver without working to a definite plan. Haphazard dial twisting will produce but poor results. It would be as futile as trying to open a combination lock without knowing the combination word or figures.

If your set has two or three dials it has considerable power or sensitivity, and usually that means H.F. stages. If you have these H.F. stages properly neutralised, or if screened-grid valves are used, there is practically no danger of re-radiation from the set. So you will be able to operate the set in an oscillating condition, without causing interference to other listeners.

### FEELING YOUR WAY.

If you have two tuning dials and a reaction control, this is how you should proceed with your station searching. First of all get the feel of the dials, that is to say, twiddle each one round and note how many degrees you pass through for each certain movement of the control knob.

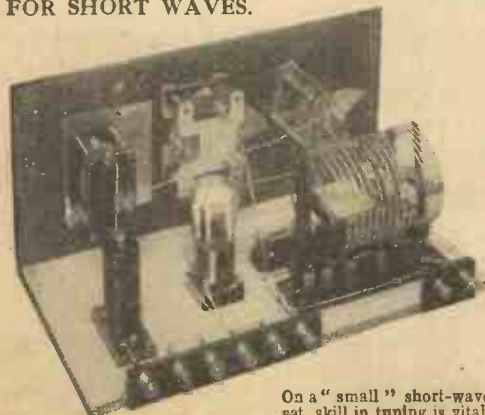
Get the idea thoroughly into your head that the clockwise movement of the tuning variable increases its capacity and, therefore, the wave-length to which the circuit in which it figures will tune. Likewise, the higher the reading on the dial the higher the wave-length.

If it is normal, the reaction condenser should function in a similar way, that is, the farther you turn it to the right the greater the reaction effects. Also note whether or not the reaction condenser needs a greater adjustment, to produce oscillation towards the upper readings of the condenser dial.

This is the more common condition, and it is generally found that very little capacity is needed from the reaction condenser to make the set oscillate on the lower wave-lengths, while it has to be nearly full in to do this on the higher wave-lengths.

The next thing you want to do is to "line up" the tuning condenser dials so that their readings

### FOR SHORT WAVES.



On a "small" short-wave set, skill in tuning is vital.

are approximately the same for each wave-length. You can do this by tuning-in the local station to start with. Put the reaction at zero, and then twist the tuning variables until you find that local station. You should have no difficulty in doing this. You will probably be able to locate the broadcasting by means of the one dial only.

When you have secured the station, tune it in to its loudest on the one dial, then, leaving that, tune in to the sharpest point on the other dial. If the two

### A SIMPLE SCHEME.



Sometimes a small fixed condenser joined in the aerial lead will help to sharpen tuning.

dial readings are widely different it would be advisable to alter the dial of one variable so that the readings more or less correspond.

You will probably be able to do this easily enough by loosening a little grub screw that holds the dial to the spindle of the variable, gently twisting the dial without altering the moving vanes of the variable until the readings coincide, and then screwing up the grub screw again.

You will probably, discover that the tuning is much flatter on the one scale than on the other. You may be able to lose your local station by means of a very small readjustment of one dial, the second dial acting more like a volume control, a big movement of it being needed before the station vanishes.

### YOU NEED NOT OSCILLATE.

In this case, take the sharp-tuning dial as your lead. Adjust this one very closely while you follow up on the other dial with the other hand, perhaps oscillating backwards and forwards over the approximate reading until the coincidence of the two adjustments brings in the distant broadcaster you require.

It is not advisable, nor is it necessary, to have the set in an oscillating condition and so locate stations by their squeals. In the circumstances, a little squealing would not do any harm, as there will be no re-radiation, but the method is not adopted by experienced station searchers.

It is much better to have the set in that very sensitive condition just off oscillation. You then tune in music or speech and do not get lost in a maze of C.W. stations and "carrier" harmonics.



Research Department for the "P.W." "Maag" sets. This special scheme is really a combination of the ordinary differential circuit and the "throttle control" type and its special advantage is that it does not upset the tuning when it is operated.

Moreover, the full sensitivity of the detector is maintained at all times, and, in addition to this effect, which is normal to all "differential" circuits, there is a special one obtained only in this particular form, in that the moving vanes of the reaction condenser are wired to the filament circuit, and so risks of hand-capacity effects are eliminated.

#### COMPARING WIRING & THEORETICAL DIAGRAMS

The theoretical circuit is shown in one diagram, with the parts labelled C, L, etc. These symbols are used on the practical wiring diagram also; so, even if you don't understand the ordinary theoretical diagram, you can trace this one without difficulty by comparing the two together.

Panel dimensions are given in another diagram. There is a special list of the components that are

#### YOUR SHOPPING LIST FOR THE "DX" ONE-VALVER.

- 1 Panel, 9 in. x 7 in. (Lissen, Faxolin, Goltone, Ripault, Resiston, etc.).
- 1 Cabinet, with baseboard 9 in. or 10 in. deep (Camco, Pickett, Lock, Osborn, Gilbert, etc.).
- 1 .0005-mfd. variable condenser, slow-motion type, or plain with vernier dial (J.B., Dubilier, Igranic, Lissen, Lotus, Keystone, Formo, Burton, etc.).
- 1 .0001-, .00013- or .00015-mfd. differential reaction condenser (Utility, Lissen, Lotus, Ready Radio, J.B., Magnum, etc.).
- 1 L.T. on-off switch (Burton, Benjamin, Lissen, Igranic, Bulgin, Wearite, Magnum, Ormond, Red Diamond, etc.).
- 1 Sprung valve holder (W.B., Benjamin, Igranic, Lotus, Telsen, Precision, Lissen, Dario, Wearite, Formo, etc.).
- 2 Single-coil sockets (Wearite, Lotus, Lissen, Ready Radio, Igranic, Bulgin, Magnum, etc.).
- 1 Baseboard-mounting neutralising condenser (Bulgin, J.B., Lissen, etc.).
- 1 H.F. choke (Ready Radio, Lewcos, Lissen, Varley, Igranic, R.L., Dubilier, Telsen, Chimax, Magnum, etc.).
- 1 200- or 400-ohm baseboard-mounting potentiometer (Lissen, Igranic, Ready Radio, etc.).
- 1 .0003-mfd. fixed condenser (Lissen, Dubilier, T.C.C., Ediswan, Ferranti, Atlas, Goltone, Igranic, etc.).
- 1 .001-mfd. fixed condenser (Lissen, etc.).
- 1 2-meg. grid leak and holder (Lissen, Dubilier, Ediswan, Igranic, Ferranti, etc.).
- 1 Terminal strip, 9 in. x 2 in.
- 9 Terminals (Ealex, Clix, Igranic, Belling & Lee, etc.).

## A "DX" ONE-VALVER

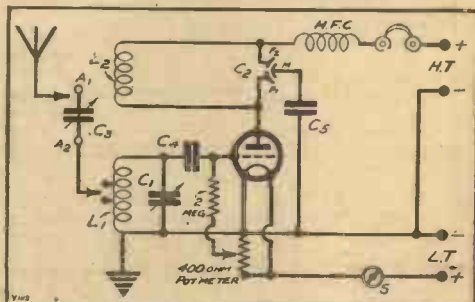
"DX" means "long-distance," and that is just exactly what you get with this wonderful little set.

THE great merit of this circuit arises from the special form of differential reaction which was developed by the "P.W."

required, and it will be seen that they are all of conventional types.

After you have prepared the panel and mounted the two condensers and switch on it, you will fix it to the baseboard in the usual way by means of

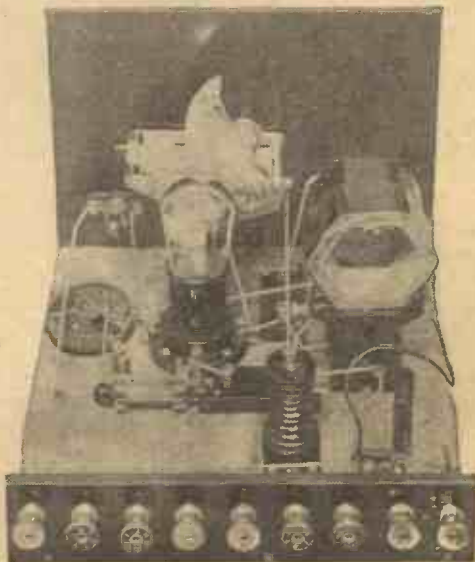
#### A SURPRISING CIRCUIT



Despite its simplicity the circuit is strikingly sensitive.

a row of screws along its lower edge; you hardly need panel brackets for so small a set. You must also cut your terminal strip, drill it and fit the terminals, and fix the strip to the near edge of the baseboard with a row of screws.

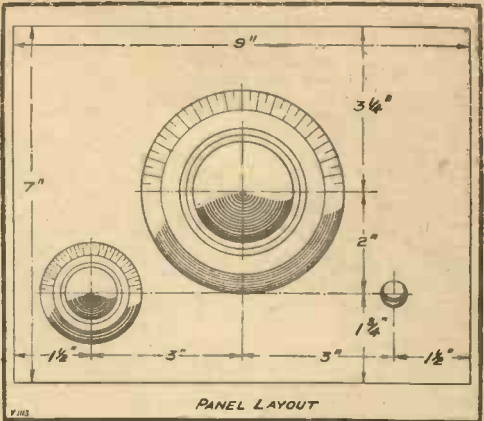
The next step is to mount the parts on the baseboard, and here you should turn to the wiring diagram and copy the layout as closely as you can, particularly with the placing of the coil holders. This is important if you want the best results.



Here is the finished set—a wonder for "distance."

Next comes the wiring-up process, and here you can use either bare wire, or one of the covered materials like Glazite. You will find that the layout makes wiring very easy, and you will soon have it done if you go at it methodically and cross off each wire on the diagram as you put it into the set. Perhaps you are wondering why two aerial terminals are used? In addition to  $A_2$ , we have provided an alternative aerial terminal ( $A_1$ ) which brings in a very small series condenser for short-wave working.

DOZENS OF DISTANT STATIONS



Apart from those for the fixing screws at the bottom there are only three holes to drill.

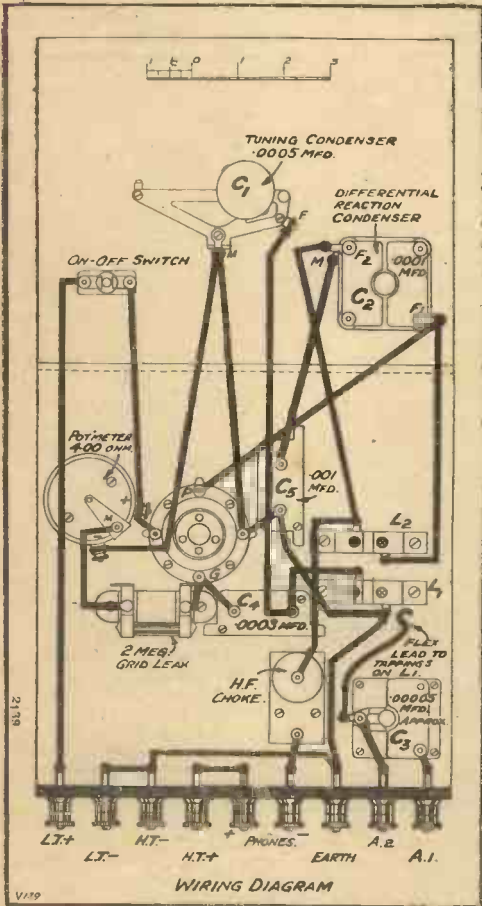
In such cases just leave the aerial on  $A_2$ , exactly as for broadcast reception, and all will be well.

Little need be said about the actual construction because it is so extremely simple, and no one who has ever built a set before will have the slightest difficulty in putting it together successfully.

Let us go on, then, to the practical details you will need for working it to the best advantage. The valve should be of the H.F. type (impedance about 20,000 to 30,000 ohms), and the H.T. voltage something of the order of 60 volts or perhaps a little less.

This voltage really requires adjustment for the best results: Try 60 volts, adjust the potentiometer so that the arm is as far round towards the positive end as possible without making reaction ploppy, and note results. Then try 50 volts, readjust potentiometer, and compare results. You will soon find a good combination, and once found it will not need further attention.

Coil sizes:  $L_1$  (tuning) is an "X" coil, No. 60 for broadcast and 250 for long waves. Coil  $L_2$  (reaction) should be a No. 50 for broadcast and a No. 100 for long waves.

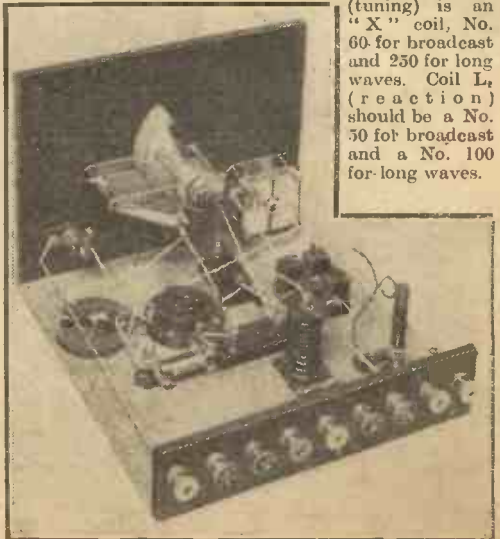


And yet the set is easy to wire!

The object of this condenser ( $C_2$ ) is to permit proper reaction control without "flat spots" to be obtained if the set is used on the short waves.

The condenser is actually one of the neutralising type, with a capacity of somewhere round about .00005 mfd., and the usual procedure is to connect the aerial lead to  $A_1$  when working on short waves, and try  $C_2$  at various settings. As a rule you will find you can leave it set to maximum, and only try other capacities if you experience difficulty in getting sufficient reaction at some point on the dial.

By the way, it is often not necessary to use  $C_2$  at all if the aerial is small or of only moderate size.



Compare this with the wiring diagram when doing the soldering.

# HOW TO GET THEM!

A helpful talk about pulling foreign programmes out of the ether.

SOME people pick up foreign stations like pebbles on the beach. Others, even with similar sets, seem to have no luck at all.

Why? Well, it's largely knack. A matter of "knowing how."

If the aerial and earth are as good as you can get them, and all the ceteras are O.K., you might think the set is ready. So it is—*ready to begin*. But it may want a lot of tittivating before you get far with it.

How's reaction, for instance? So much depends on that. To get foreigners you should be able to bring up reaction smoothly and sweetly until the set begins gently to oscillate. No sudden "plops," no "overlaps."

## WHAT "OVERLAP" IS.

You know the latter trouble, which is shown by the fact that the reaction condenser doesn't stop oscillation at the adjustment which started it, but has to be taken back about five degrees farther?

This is known as "overlap," because instead of the reaction condenser dial reading remaining the same for both advancing and retarding reaction, the latter is different from the former, and the critical positions for reaction "overlap" several degrees of the dial.

Common causes are H.T. or L.T. batteries running down, insufficient bypassing or H.F. choking, a high-resistance H.T. supply causing coupling, wrong size of reaction coil, unsuitable detector valve, unsuitable grid leak, and incorrect H.T. on the detector.

That last-named (incorrect H.T.) is very injurious. The detector's wanderplug really must be made to "wander" until the best voltage for good reaction, etc., is found.

Elsewhere on this page, under the heading "Potentiometer Adjustment for Smooth Reaction Control," you will find hints about that important subject. If your set has a potentiometer for the detector's grid leak be sure to read those hints, which tell you how adjustments should be made.

And always remember that the most important point in long-distance tuning is that the set is in its most sensitive condition when it is nearly, *but not quite*, oscillating.

## THE MOST SENSITIVE POSITION.

You can consider it this way if you like. If you have a set with no reaction (a simple set with no high-frequency amplification), you can increase its sensitivity by giving it a little reaction. But everything depends upon this reaction being applied in moderation and to the right degree.

A little reaction means a little increase in sensitivity,

a little more reaction means a little greater increased sensitivity. Still more reaction means still more sensitivity, etc., *but there is a limit* to this process. That limit is reached when the set has so much reaction that it oscillates.

If it oscillates it easily becomes useless for long-distance reception and is a nuisance to all surrounding listeners. The whole point is to get it near the oscillation point, but *not over*.

## "RESOLVING" THE CARRIER.

When trying to tune with the set on the edge of oscillation you often first hear a sort of "chirp" as your tuning passes through the foreign carrier-wave. Tune back to that chirp, and *slack off reaction slowly*, and the "chirp" becomes a programme!

That is what they call "resolving" the carrier-wave. You heard it first as a "chirp" because you had too much reaction. Keep the set just below oscillation point and instead of chirps you get the music and the "Allos" and the "Achtungs" from abroad.

DON'T  
MISS  
THEM.



Dirty contacts in the set, leads, or batteries, will lose many a fine foreign programme, so go all-out for cleanliness.

## POTENTIOMETER ADJUSTMENT FOR SMOOTH REACTION CONTROL.

In the preliminary tests you should first put the potentiometer slider about half-way round and then ignore it until the other circuit conditions are satisfactorily adjusted. Get your coil couplings right, adjust H.T., etc., and when the set seems O.K. proceed with the final touches to the potentiometer as follows:

Set the tuning condenser somewhere near the middle of its scale and

move the potentiometer slider round to the *positive* end of its travel.

If you now toast the reaction control you will probably find it rather "ploppy," so gently move the slider round slowly towards the negative end, adjusting the reaction control as you do so.

## THE FINAL SETTING.

You will find that it gets smoother and smoother as the slider is advanced farther towards negative, but the disadvantage of proceeding in this way is that signals will probably be weakened the farther round you go.

The detector anode voltage should be readjusted with the object of finding a setting which enables you to bring the potentiometer slider round as far as possible towards the positive end, without spoiling the smooth slipping in and out of oscillation.

Remember that you should not be tempted to carry it round too far towards the positive lead, and thus make reaction go in or out with a plop, for it is hopeless to attempt to tune-in distant stations unless the reaction control is perfectly smooth.

# LONG DISTANCE ON SHORT AERIALS

Don't despair if you can't put up a big outdoor aerial—there are plenty of stations to be had on the indoor types.

"If you are going to pick up plenty of foreigners you *must* have a good aerial." How often that has been said! How true it is! And yet how often we find exceptions!

But some people imagine that the term "a good aerial" means "a good outdoor aerial." And that is wrong. It must not necessarily be assumed that the man with an outside aerial is better off than the one who only has an indoor pick-up system.

## DECIDED DRAWBACK.

With modern sets and especially when working on really short waves a long aerial can be a decided drawback. Working on ordinary wave-lengths, it is often amazing how good reception can be on a short or a "shut-in aerial."

If you are able to fit the aerial in a loft, you are "well away." Should the set be on the ground floor it may be better not to bring the lead-in down inside the house, where it will have to be run along the walls.

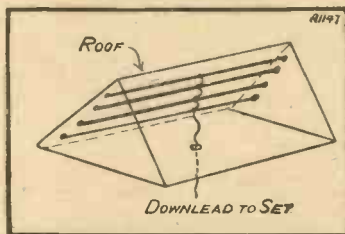
You should have no difficulty in finding a small hole or crack through which a wire can be passed under the eaves and *outside* the house to a window. Use "stand off" insulators to keep the wire away from the walls.

Remember, too, that a good earth connection will sometimes make all the difference. A rather poor indoor aerial with a bad earth may be hopeless, but the same aerial with a good earth will give quite passable results.

Constructors sometimes think that since they have no access to a loft in which to erect their aerial, that they will have to use a frame aerial. In practically all cases a small aerial consisting of a wire round the room will give results far superior to a frame aerial.

There are many ideas which may be tried for an indoor aerial, and the main points to be borne in mind are to keep it as high as possible, and to get a fair length of wire in it. Do not, however, have more than about 60 ft. in all. If the aerial is too long it is almost sure to have a fairly high capacity, which is detrimental to good results, apart from making it difficult to get reaction effects.

## UNDER THE TILES !



Take the lead-in from the centre, as shown, or from one end of the wires, but be sure to well space it.

## OFTEN BETTER.

Very often the height of a loft aerial is greater than that of an outdoor aerial, since it is not usually possible to get a mast as high as the roof of the house. For aerials in a room it is best to use ordinary, medium-size rubber-covered flex-

ible wire. It is not necessary that it should be supported on insulators.

In some cases the best indoor arrangement would prove more efficient and therefore give louder results than the best possible outdoor aerial. But just one warning as conclusion: do not run the aerial parallel or near to any pipes in the wall, or along by bell wires or electric cables, otherwise you will lose much of the power.

FOREIGN STATIONS—		HOW MANY MILES?		—YOU HAVE HEARD				
BARCELONA	720		715	OSLO				
BERLIN	579		214	PARIS				
BUDAPEST	900		640	PRAGUE				
COLOGNE	306		890	ROME				
DUBLIN	286		886	STOCKHOLM				
HILVERSUM	232		453	STUTTGART				
KALUNDBORG	542		552	TOULOUSE				
LANGENBERG	311		767	VIENNA				
MADRID	786		MOTALA	886	MUNICH	570	899	WARSAW

# ADJUSTING YOUR H.F.

You will get twice the number of stations if your H.F. stage is properly "neuted," etc., as explained below.

**H**AVE you an H.F. stage in your set? If so, is it an H.F. stage, or is it a graveyard for foreign programmes?

So much depends upon operating it correctly. A perfectly good H.F. stage can be a snare and a delusion if it isn't adjusted as it was meant to be adjusted.

S.G. stages, for instance. In order to get the best possible results and to obtain the full advantages of the screened-grid valve's extraordinary sensitivity it is important to take every care that the specified H.T. voltages are used.

## H.T. VOLTAGES.

All adjustments should be *carefully* attended to. That doesn't mean, of course, that it is necessary to purchase a potentiometer, as the ordinary "steps" of an H.T. battery or mains unit give quite enough variation of screen voltage, especially with the variations in voltage allowed to the valve's anode.

Where H.T. batteries are used there is sometimes a danger of the applied H.T. voltage falling short of the intended rating. When this happens with an S.G. valve it may behave quite differently from an ordinary valve.

With the latter a voltage fall-off generally means nothing more serious than a gradual diminution in the volume of the reproduction accompanied by a falling off in quality. With the screened-grid valve, if the proper voltages are not used, or if they are allowed to fall away from their proper values, the valve begins to misbehave itself in various peculiar ways.

## ERRATIC RESULTS.

Often the effect is to send the valve into oscillation and to cause generally unsatisfactory and erratic results. Nevertheless, in practice it is quite easy to prevent this by taking care that the applied voltages are correctly applied. Usually the anode of an S.G. valve wants all the H.T. you can give it, up to the maximum laid down by the valve maker. But sometimes *reducing* the anode voltage a little will favourably affect results, so an occasional experiment on these lines will do no harm.

If your H.F. valve is not an S.G., but a "neutralised" valve, you must have it properly neutralised to get good results. *How can you be sure of that?* you ask. Try this method.

## HOW TO NEUTRALISE.

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

The best way to test for oscillation is to touch one or other of the sets of plates of the tuning condensers (this may be either the fixed or moving, according to the particular set). When the set oscillates you get a loud double click.

You will probably find that the set will only oscillate under the above conditions when the two circuits are in tune with each other and this can be used as an indication. (It is convenient to perform the operation at some point near the middle of the tuning range.)

Now increase the capacity of the neutralising condenser. (In the case of most condensers this means screwing downwards.)

## KEEP TESTING.

Test at intervals for oscillation as this is done and you will presently find that the set has ceased to oscillate, and will

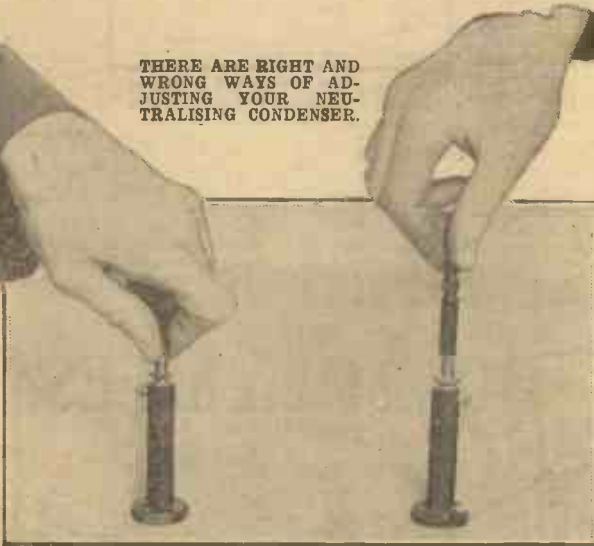
not re-commence even when the tuning dials are slightly readjusted.

Now increase the reaction a *little*, until the set once more oscillates, and again increase the neutralising condenser setting until oscillation ceases. Slightly readjust the tuning condensers again to make sure that the set is completely stable once more.

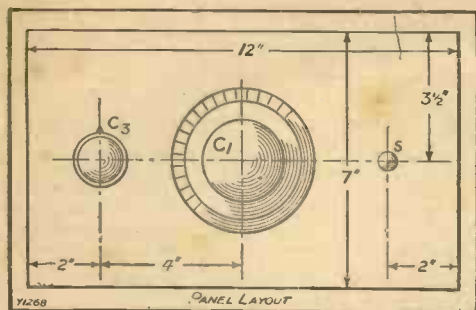
Proceed in this way until it is found that the correct adjustment of the neutrodyne condenser has been "over-shot." Once this point has been passed, it will be observed that further increases of the neutrodyne condenser setting no longer stop oscillation, but cause it to become stronger.

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

THERE ARE RIGHT AND WRONG WAYS OF ADJUSTING YOUR NEUTRALISING CONDENSER.



If you hold low down—as on the left—you get capacity effects. These are not encountered if you adjust as shown to the right.



THE total cost of this receiver is only just about the same as the average two-valver, and it should make a very strong appeal not merely to the enthusiastic constructor, but to any set-builder who

#### IF YOU HAVEN'T THE PARTS IN HAND, YOU WILL NEED—

- 1 Panel, 12 in. x 7 in. (wood or ebonite). See text.
- 1 Cabinet with baseboard 7 in. deep (a home-made cabinet is well within the powers of the constructor who is fond of woodwork).
- 1 .0005-mfd. variable condenser (Lissen, or Lotus, Igranic, J.B. Ormond, Ready Radio, Polar, Dubilier, etc.).
- 1 .0001- to .0002-mfd. differential reaction condenser (Ready Radio, or Formo, Lissen, Lotus, J.B. Burton, Dubilier, Ormond, etc.).
- 1 On-off switch (Junit, or Lissen, Igranic, Benjamin, Lotus, Wearite, Ready Radio, etc.).
- 3 Plain valve holders (the sprung type are not strictly necessary for the modern improved valves). (W.B., or Burton, etc.)

- 1 .0003-mfd. fixed condenser (home-made or commercial). See text.
- 1 Baseboard-mounting two-coil holder (home-made or commercial). See text.
- 1 Resistance-capacity coupling unit (Lissen, or Varley, Dubilier, R.I. Mullard, etc.).
- 1 Low-ratio L.F. transformer (R.I. Hypermite, or Igranic type J, Varley Nicore No. 2, Lissen, Telsen, Ferranti, Mullard, Lotus, Lewcos, etc.).
- 1 2-megohm grid leak and holder (Dubilier, or Lissen, Igranic, Mullard, Loewe, Ediswan, etc.).
- 1 Terminal strip 12 in. x 2 in.
- 9 Terminals (Belling & Lee, or Igranic, Ealex, Burton, Clix, etc.).
- Wire, screws, flex, G.B. plugs, etc.

may be looking for the best possible set for a very moderate expenditure.

You can construct it either from all ready-made components, or from some ready-made and others made at home. (Naturally this works out a little cheaper.)

#### USING A WOODEN PANEL.

Let us explain what this extra constructional work really is before we go any farther. Well, first of all we are suggesting that instead of the conventional ebonite panel the set should be provided with a wooden one, a very pleasing appearance being obtained in this way if you use some suitable plywood, especially if you finish off the edge with a little beading all round, and stain and polish the surface of the wood. (A suitable varnish stain is an effective method of obtaining a good finish.) Those who want to cut out all extra work of this nature can, of course, adopt the obvious expedient of using just the ordinary ebonite panel.

#### MAKING THE GRID CONDENSER.

Next there is the grid condenser. This is a particularly easy component to make for yourself. If you do not wish to make it you can just purchase the usual fixed condenser of .0003 mfd.

If you feel inclined to try your hand at making it, however, you will require two small pieces of ebonite, one measuring  $1\frac{1}{2}$  in. square, and, to fit over the top of this, one  $1\frac{1}{2}$  in. x  $1\frac{1}{2}$  in.

## THE 'ECONOMY' THREE

A set that proves how low cost and long-distance results can be combined with easy operation and construction.

These pieces of ebonite simply form clamps, so you arrange for them to be screwed together tightly by means of four small brass screws passing from the smaller one into the larger one. By the way, if you do not possess means of tapping the holes in the lower piece of ebonite, you can at a pinch use round-headed wood screws, if you drill suitable holes in the lower piece of ebonite.

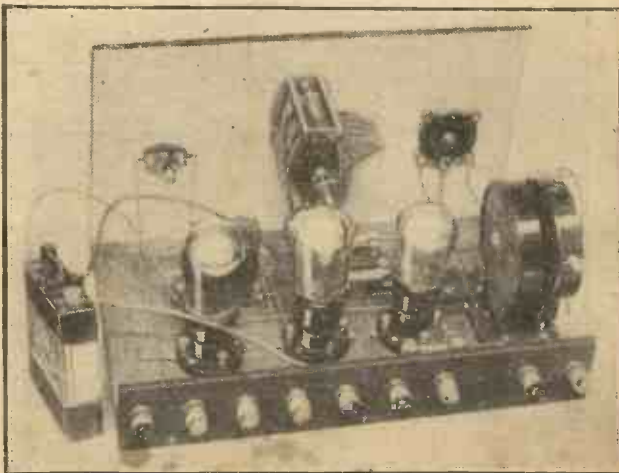
#### THE NECESSARY DIMENSIONS.

This little condenser has only two plates, each measuring 4 x 1 centimetres. These plates overlap

for a length of 3 centimetres, the outer end of each plate being left projecting outside the unit.

The plates are, of course, clamped between the two pieces of ebonite, with a sheet of thin mica between them, the correct thickness for this mica being about .002 in. Connections are made to the condenser by soldering direct to the projecting ends of the plates, which should be of fairly thin copper foil, so that they can easily be cut to size with scissors.

#### READY FOR THE TEST



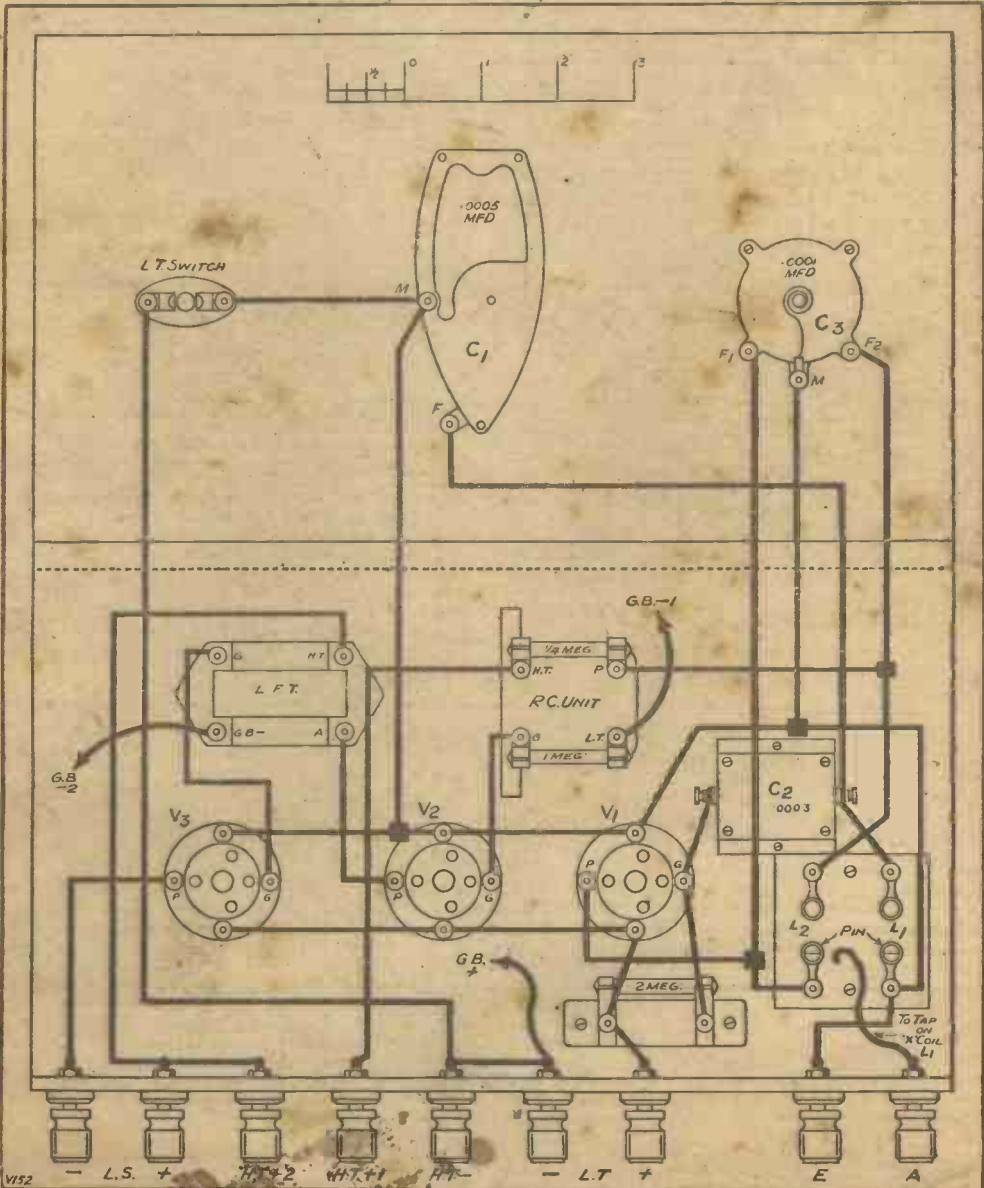
When you try out the set you will be amazed at its pulling powers.

The other home-made component is a baseboard-mounting two-coil holder to replace the usual pair of single-coil sockets which would be screwed down upon the baseboard. (Of course, if you like you can use just the ordinary two separate sockets of the ready-made variety.)

The idea is that you should obtain a small piece of 1/4-in. ebonite measuring about 2 in. square, and mount upon this the metal parts obtained from a couple of the cheap single-coil holders you can get from many dealers. Between the pin and socket of

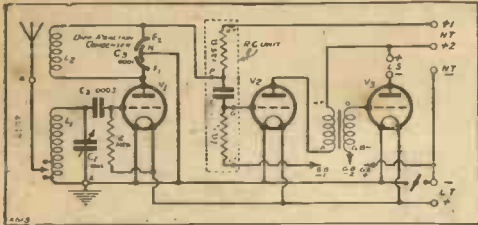
each holder there should be a space, measuring from centre to centre, of 1/2 of an inch. Between the two holders a suitable spacing is 1 1/2 in., again measured from centre to centre. (This latter is the space from the centre of one coil to the centre of the next, when placed in the holders.) If preferred, you can obtain the whole thing ready-made. (Wright and Weaire.)

The rest of the work is a perfectly straightforward job of laying out the components and wiring them up and in doing it we think you cannot fail to



It looks easy—and you'll find that it is.





The detector employs differential reaction, and is followed by one R.C. stage with an L.F. transformer to back it up.

appreciate the exceedingly simple and straightforward arrangement we have adopted. On the baseboard you will find there are actually only eight components to be mounted, which must be something of a record for a three-valve set.

**VALVES TO USE.**

It was possible in this design to dispense with the usual H.F. choke, the necessary plate circuit impedance to enable reaction to be obtained being found in the anode resistance of the resistance-capacity coupling unit which transfers the signals from the detector to the first low-frequency valve.

The second L.F. stage is transformer-coupled, and you will note that there is space upon the baseboard at this end of the set for the usual 9-volt grid-bias battery, for which you could provide a pair of clips if you desire.

The remainder of the constructional work you will find is so simple that just a glance at the photographs and then at the wiring diagram will be all the assistance you need. We would just point out, however, that the wiring is so simple and well spaced that you can quite well use ordinary bare wire for the connections if you wish.

Now for the necessary operating details. The valves should be two of the "H.F." type with an impedance of perhaps 20,000 to 30,000 ohms for V<sub>1</sub> and V<sub>2</sub>, and a small power or else super-power for V<sub>3</sub>. There are only two H.T. positive terminals, so the connections here are very simple.

**H.T. AND G.B.**

Terminal H.T. + 1 supplies the detector, and here you will want a voltage of perhaps 60 to 70, with a little adjustment to secure the smoothest possible control of reaction. Terminal H.T. + 2 supplies both the low-frequency valves, and here you want some 100 to 120 volts. The set will work with considerably less, of course, but in the interests of good quality it is not advisable to go much below 100 volts.

Grid bias is very much a matter of the particular valves you employ, although on G.B. - 1 you will almost certainly want 1½ volts negative, while G.B. - 2 will usually want from 6 to 9 volts negative for the ordinary power valve. Super-power types vary considerably in the grid bias they require, and so you should be guided by the makers' data slip.

There is just one point about the anode resistance which is worth mentioning. You may have an anode resistance on hand which you wish to use. But it is worth noting that you will probably find that it is not possible to deviate with safety far from the value specified (.25 megohm) or otherwise you may find your reaction results are adversely affected.

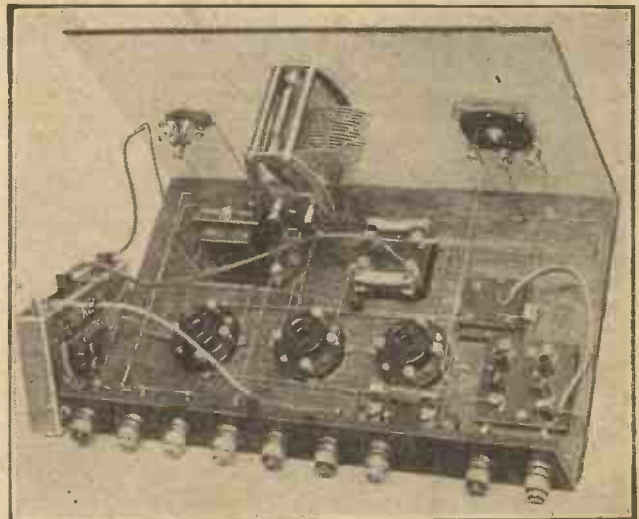
**THE COIL SIZES.**

The sizes are as follow :

L<sub>1</sub> will usually be somewhere about a No. 35 or 40 for the lower wave-band, and L<sub>2</sub> should be a No. 60 of the "X" type. The long waves will need for L<sub>2</sub> a 75 or 100, and for L<sub>1</sub> a 250X. The flex lead from the inner side of the aerial terminal, by the way, should be tried first on one and then on the other tapping on the "X" coil to see which gives you the best results with your particular aerial.

There, now, you are ready to put the set into operation, and we do not think there is much doubt about your verdict. The receiver put up a really excellent performance on test, and when you bear in mind its extraordinarily low cost we do not think that any constructor can fail to be thoroughly pleased with it.

**HOW THE PARTS ARE PLACED IN POSITION**



The coil-holder in the foreground was home-made, but you can buy one if you prefer.

If you feel the fascination of

**THE WORLD'S PROGRAMMES**

—the tinkling music of Spain, the swing of a German orchestra, the lilt of a waltz from Vienna—you will want to keep in touch with foreign radio affairs.

There is no need to dive into depressing lists. You will get all the latest station information, and details of When, Where and How to Listen, in

**MODERN WIRELESS**

It gives you "all the news and the views" of the month,

and is acknowledged to be

**BRITAIN'S LEADING RADIO MAGAZINE.**

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# LONG-WAVE FAVOURITES

**L**ISTENING on the long waves is not as popular as it ought to be, for some of the best of Europe's stations are "up there" above 600 metres. And, moreover, long-wave listening has certain advantages over and above the alternative programmes which are available there. These advantages apply either in country or town districts.

In the town, for instance, a change over to long waves will generally enable the listener to escape from a local oscillator, the most annoying blot on the fair face of broadcasting. In some populous districts a good set may prove disappointing because near at hand there is an inexperienced listener who, switching on a set with too much reaction, spoils the quality or strength of his neighbour's reception.

Such a spoil-sport is rarely to be found upon long waves, so if you are unfortunate enough to suffer from this form of interference, a set of long-wave coils is the gateway through which you may escape from it.

## ALTERNATIVE PROGRAMMES IN DAYLIGHT.

In country districts the silent-point oscillator is generally unknown, but as the listener is not usually cramped for space he can erect a really long aerial. This often gives—even with a simple set—the advantage of being able to hear long-wave broadcasting from abroad in daylight.

Wave-lengths above 1,000 metres are not so adversely affected by sunlight as the shorter waves,

so no listener to the daylight programmes should fail to investigate the advantages of the long-wave stations.

The wide choice of programmes available on the long waves will be apparent from the accompanying list of stations, including as it does the most popular European stations. Daventry 5XX is a host in itself (especially for those listeners who do not in the ordinary way tune in to 2LO), the strength and efficiency of this station being now traditional. Paris has two powerful long-wave stations, whilst Germany's high power station at Zeesen is famous for its orchestral items.

## BIGGEST STATION IN THE WORLD !

All the other transmissions are of interest on the long waves, but the programmes from Hilversum, Kalundborg, and Motala deserve special mention on account of their strength and reliability. In certain districts, Lahti (Finland), Warsaw (Poland), or Stambul (Turkey) take pride of place after the French and German stations, so it is very rare that a set of long-wave coils on a good receiver fail to produce an enjoyable alternative programme.

The future, too, is full of promise, for several new stations are being planned, including the world's super-station at Warsaw. This is due to open on Christmas Day, on 1,411 metres, with the colossal power of 160 kw.

Wave-length in metres	Name of Station
1961	Ankara (Turkey), 7 kw.
1935	Kaunas (Lithuania), 7 kw.
1875	Huizen (Holland), 8.5 kw. Sometimes gives Hilversum programme and announcements.
1796	Lahti (Finland) (relays Helsinki), 54 kw.
1725	Radio Paris (GFR), 17 kw.
1635	Königswusterhausen (Zeesen) (Germany), 35 kw. Relays Berlin.
1554	Daventry National Station (Gt. Britain), 35 kw.
1481	Moscow (Old Komintern) (R A I) (Russia), 40 kw.
1445.7	Eiffel Tower (F L), 15 kw.
1411	Warsaw (Poland), 14 kw.
1350	Kasbah (Tunis), 0.5 kw.
1348	Motala (Sweden) (relays Stockholm), 40 kw.
1304	Moscow (Trades Unions), 75 kw.
1200	Kharkov (Russia), 25 kw.; Istanbul (Turkey), 5 kw.; Boden (Sweden), 0.75 kw.

Wave-length in metres	Name of Station
1153	Kalundborg (Denmark), relays Copenhagen, 10 kw.
1116	Novosibirsk (Russia) R.A., 4 kw.
1103	Moscow, Popoff (Russia), 40 kw.
1073	Rostov-Don (Russia), 4 kw.
1071	Hilversum (Holland), 8.5 kw. Sometimes gives Huizen programme and announcements.
1010	Basle (Switzerland), 0.25 kw.
1000	Leningrad (Russia), 20 kw.
870	Tiflis (Russia), 4 kw.
840	Nijni Novgorod (Russia), 1.8 kw.
800	Kiev (Russia), 20 kw.
778	Petrozavodsk (Russia), 2 kw.
770	Ostersund (Sweden), 0.75 kw. (relays Sundsvall)
760	Geneva (Switzerland), 1.5 kw.
720	Moscow (Experimental), 20 kw.
700	Minsk (Russia), 4 kw.
680	Lausanne (Switzerland), H B 2, 0.6 kw.



Don't tap the diaphragm with a pencil to see if it is "free"—a match is infinitely better!

If you are really keen on picking up foreign stations you will find a pair of 'phones a great help. Scores of stations are missed on the loud speaker because they didn't sound worth listening to, but they would have been clear enough with 'phones.

'Phones are not only very sensitive, but they shut out unwanted sounds in the room—they lessen the rustling of papers, voices, creaking of footsteps. This is a double gain. With 'phones on you can concentrate on "distance."

You can arrange a switch to use 'phones, and cut out the speaker and amplifying valves. Or, if you like, you can just "tap-in" on 'phones by connecting these in place of the R.C. unit or L.F. transformer, inside your set.

### HOW TO TEST THEM

#### A SIMPLE TEST.

One 'phone tag goes to the unit's (or transformer's) terminal marked H.T. + (or B. + ; or I.P.). The other 'phone tag goes to the terminal that is marked P. (or A. ; or O.P.).

First of all, you must be sure that the 'phones are working well. This is the correct way to test them.

Place the earpieces over the ears in the ordinary manner, and then put one of the tags at the end of the cord into the mouth, holding it firmly between the lips. Now, in one hand take the other tag of the telephones, and in the other hand take a key, a nail, or a similar piece of metal, and rub this gently on the second tag. If the telephones are in good order you will hear noises corresponding with this rubbing in the telephones.

The noises, of course, will not be very loud, for in the absence of an external battery you are working the telephones by a kind of human electricity, generated in your own body. But so sensitive are a good pair of telephones that if they are O.K. the noise will be absolutely distinct and unmistakable.

#### HOW TO COMPARE EARPIECES.

If you wish to test each earpiece separately, you can do so by removing one of the earpieces from the ear and listening only with the other. Or, alternatively, you can place a pad between the ear itself and the adjacent earpiece, so as to cut off the sound from the latter. In this way you can compare the loudness

## WHEN USING TELEPHONES

Here are some eminently practical hints about using 'phones that will enable you to get full service and long life from these too-often-neglected instruments.

of the two sounds, but do not forget that most people hear better with one ear than the other, so before definitely pronouncing one earpiece less sensitive than the other, turn the telephones round and try both earpieces on one ear.

When used with a valve set, some telephones must be connected in circuit the right way round. Many earpieces are marked with a red cord or with a +, to denote which side of them should be connected towards the H.T. +. If these are connected so that the current goes in the *wrong* direction, in the course of time they become insensitive.

Most valve sets have one red (or +) L.S. terminal, and it is this one to which the red 'phone tag (or the one marked +) must be joined if the 'phones are to be given a fair chance in life.

#### DON'T DROP THEM.

On no account drop the telephones on the floor or knock them off the table, but treat them as you would any other sensitive electrical instrument. The diaphragms should not be removed, or the inside of the instrument interfered with by an inexperienced person, as it is very easy to bend the diaphragms, which will result in insensitivity.

If 'phones are worn for long periods, they should be gently wiped over with a soft cloth, to remove all traces of perspiration, etc., and should the diaphragm become rusty through long use the experienced listener can prevent a repetition of this trouble by carefully removing the cap, *sliding* off the diaphragm, and cleaning it, and then lightly smearing it with petroleum jelly, the greatest care being taken not to bend the diaphragm during the operation.

#### REMOVING THE DIAPHRAGM.

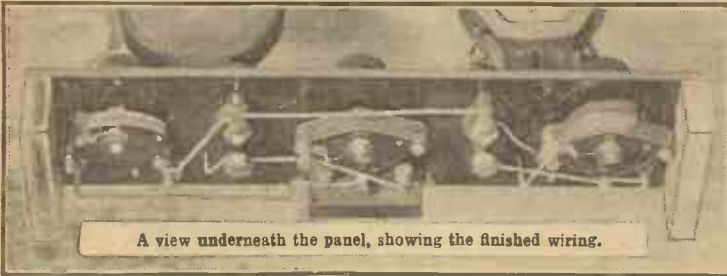
So easy is it to bend the diaphragm, and thus to decrease the sensitivity of the 'phones, that it is not good practice when removing it to pull it straight off from the magnet, as the magnetic pull alone is quite sufficient to cause harm in some cases. A better plan is to *slide* it sideways off the ear-cap so that there is no direct magnetic pull at the centre. Remember that the little flat disc has to speak to you, sing to you, and play every instrument in the band for you, and that the least you can do for it is to treat it with respect.



Don't test your 'phones with a dry-cell—a far more sensitive method is shown here and described on this page.

# DROPPING THE LOCAL

Here is a simply-made device that connects in front of your set and enables you to cut out your local programmes easily and at will. There are two switches, each of which removes an interfering programme, so even near a twin-wave Regional station you can be freed from interference.



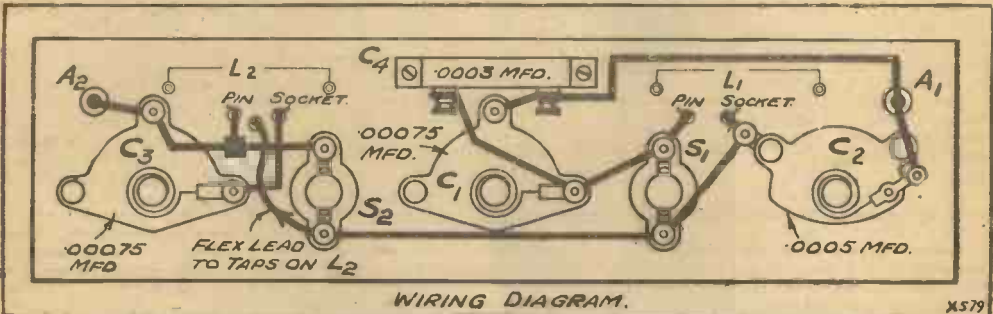
A view underneath the panel, showing the finished wiring.

So far as local work is concerned that is enough, no doubt, and will enable you to get either transmission without interference from the other, but what about the foreign stations? Obviously, it won't do, because if you can only eliminate one of the waves the other may still spread over the dial and cause trouble. The device to be described below gets over that trouble in all ordinary circumstances.

To get plenty of alternatives you must be able to reach out through the local station's programmes. Of all the ways of doing this the most satisfactory method is to fit a "P.W." Brookmans Rejector. The one to be described here is a special twin-wave rejector, for what is wanted in the difficult areas fairly near one of the B.B.C.'s Regional

It consists of a Brookmans Rejector circuit to remove the more powerful local wave and an ordinary auto-coupled trap to deal with the other local programme. (Most listeners find one "Twin" station comes in better than the other from the same Regional station.) Each is provided with a switch to put it out of action when it is desired to hear that particular

## HOW THE PARTS ARE PLACED AND CONNECTED



WIRING DIAGRAM.

X579

The wiring is very easy, but should be carried out with care in accordance with the above plan.

stations is a device which will cut out either or both of the two transmissions.

To cut out merely one programme is easy; the ordinary Brookmans Rejector will do it with remarkable completeness on any receiver employing ordinary aerial coupling arrangements.

station, in a manner we will explain more in detail later on.

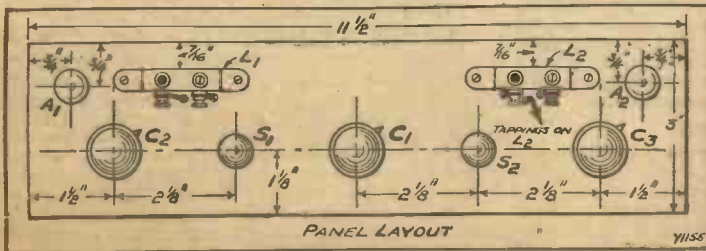
## GENERAL CONSTRUCTIONAL DETAILS.

Now for some practical details of its make-up and actual use. Since it will stand against the left-hand end of the set, a convenient form for the unit is a long, narrow strip.

Accordingly we have assembled all the parts on a narrow piece of ebonite, which can form the lid of a shallow box if you like. We did not make up a box for our own model, and merely fitted a piece of wood at each end to act as a support, a detail you will be able to follow from the photos.

Mounted in the usual way on the ebonite are the two

## HERE ARE THE DIMENSIONS FOR THE PANEL



PANEL LAYOUT

Y1155

Mark your panel positions carefully, as correct spacing helps efficiency.

terminals, two on-off type switches, and the three "Ready Radio" variable condensers. Attached to the underside of the panel is a .0003-mfd. fixed condenser, and to the upper surface two ordinary coil sockets. These parts are best fixed with some small brass nuts and bolts.

The coil  $L_1$  and condensers  $C_1$ ,  $C_2$  and  $C_4$  form the Brookmans Rejector circuit which deals with the more powerful transmission, and the switch  $S_1$  puts it out of action when it is desired to hear this programme.

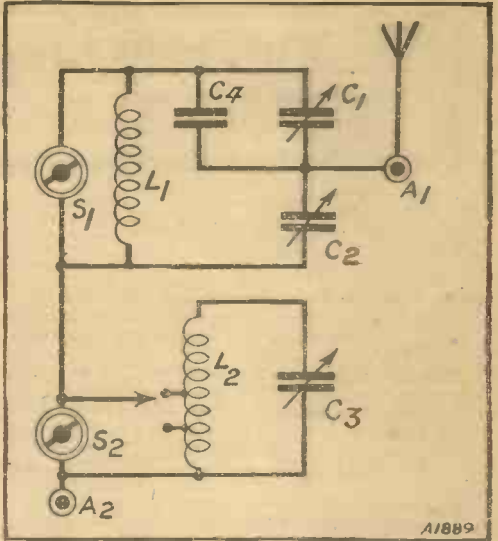
**CONNECTING UP THE UNIT.**

Coil  $L_2$  and condenser  $C_3$  makes up the auto-coupled rejector circuit which is intended to cut out interference from the other wave. Switch  $S_2$  "outs" this part of the unit when you want to hear the lower-wave transmission.

The photographs and diagrams show how the unit is constructed. To connect it to your set proceed as follows:

Remove the aerial lead from its usual terminal on the receiver and place it instead on  $A_1$  on the unit. Connect  $A_2$  on the unit to the aerial terminal on your set (keep this lead short) and the job is complete.

Now for the preliminary adjustments. This is how, for instance, a London listener would proceed with the setting of each rejector to deal with the appropriate station.



Here's the circuit, with component references.

general, those combinations in which  $C_2$  is fairly small and  $C_1$  large (vanes well engaged) give the most complete rejection.

So much for that. Now for the setting of the auto-coupled rejector to cut out the 261-metre wave. To do this, push  $S_1$  downwards and pull  $S_2$  upwards, and tune in the station.

**THE FINAL ADJUSTMENTS.**

Next, place a No. 60 "X" coil in the  $L_2$  socket and attach the flex lead to one of the tapping points on the coil. (Try each, re-setting the circuit each time, and see which is best.) Now de-tune your set so that the station is heard at rather reduced volume.

Next, push  $S_2$  downwards and turn to  $C_2$ , and adjust it until you find the rejection point where signals go down almost to nothing. They will not disappear completely, because this type of rejector is less drastic than the other; but they should go down so much that they will only be heard when fully tuned in, and so will cease to trouble you.

**THE PARTS YOU WILL NEED.**

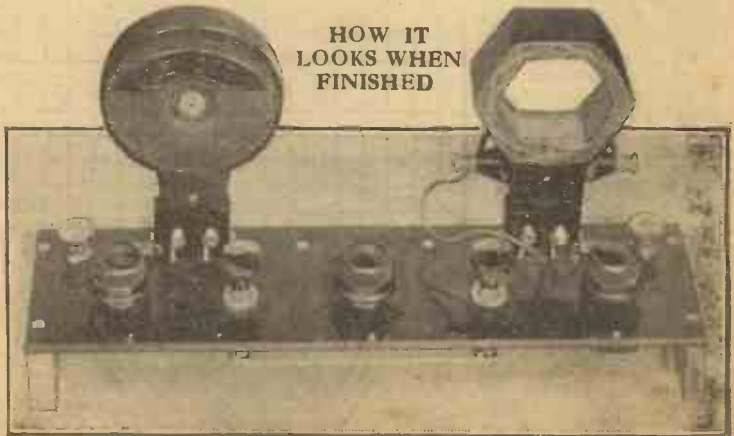
- 1 Piece of ebonite, 1 1/2 in. x 3 in. or 12 in. x 3 in.
  - 2 Pieces of wood, 3 in. x 1 in., or shallow wooden box to take panel (see text).
  - 2 Terminals (Ealex, Igranic, Belling & Lee, etc.).
  - 1 Fixed condenser of .0003 mfd. (Lissen, Dubilier, T.C.C., Clarke, Mullard, Igranic, Ferranti, Ediswan, etc.).
  - 2 Single-coil sockets (Lotus, Igranic, Lissen, Magnum, Wearite, etc.).
  - 2 On-off type switches (Lissen, Lotus, Wearite, Benjamin, Bulgin, etc.).
  - 1 Set of "Twin-Wave Rejector" condensers (Ready Radio), consisting of one .0005 mfd. and two of .00075 mfd.
- Wire, screws, etc.

The first step is to set the Brookmans Rejector circuit to eliminate, say, 356-metre transmission, and it is best to perform this operation when the 261-metre station is not working.

Place  $S_1$  to its "outing" position, i.e. knob pulled upwards, and push the  $S_2$  knob downwards. Put a No. 50-plug-in coil of good make in the  $L_1$  socket, set  $C_1$  to minimum (moving vanes all out), and  $C_2$  to about a half-way position.

Now tune in the station, then turn to  $C_1$  and adjust it until you find a setting which causes the signals to go down suddenly, practically to nothing (on many sets they will vanish completely unless a good bit of reaction is being used), and on either side of which they reappear.

You will find that you can put  $C_2$  at various positions, then reset  $C_1$  to find the rejection point. In



One coil is of the ordinary plug-in type and the other an "X" coil.



# "PLACING" THE STATIONS

How to make a chart that tells you who the "stranger" is, or where to tune for a wanted foreigner.

If the dial-readings were all wave-lengths tuning would be a very simple matter. You would set your dial to the wave-length wanted and that would be that!

Although dials are not usually marked in wave-lengths, it is a simple matter to make a chart showing the relationship between wave-length and dial-reading. All you want is a list of European stations and wave-lengths, a pencil, a rule, and a sheet or two of squared graph paper. You can get the latter from any stationer's for about twopence or threepence, and for this modest sum and with this simple equipment you can make those elusive foreigners "toe the line."

## VERY EASY TO DO.

The first job is to prepare your graph paper. Look at the sketch on this page. It shows a partly finished calibration chart, and along the bottom of it you will see the numbers from 0 to 180 corresponding with the numbers on the tuning dial.

With this nicely squared paper you can make a scale (as long as you like or as short as you like). Every fifth and tenth line on the paper is usually printed a little heavier than the others so that marking out is simplicity itself. When you have got the 10, 20, 30, and so on in their correct relative positions to correspond with the dial, you leave the bottom of the chart alone and turn to the side.

On one side of the chart you have to put the wave-lengths ranging from the lowest station you can receive to the highest.

## DIAL DEGREES.

Thus the calibration chart illustrated on this page shows wave-lengths starting from 240 and going right up to 600. You need not do exactly the same figures, of course, but this is a very useful range, with 2 LO "National" coming in near the bottom of the dial.

Just as every square along the bottom line re-

presents a certain number of degrees on the dial, so every square on the side line represents a certain number of metres, or "wave-lengths."

Having got the degrees along the bottom and the wave-lengths up the side, you have formed the framework of your chart. And all that now remains is to fill in the curve by the aid of some of the regularly-received and well-known stations. On your first rough chart (you will draw a nicer one later on) it is a good plan to first "dot" your stations' dial-readings at the top of the chart, as shown.

Probably you already know most of their positions so there is not much difficulty in this, and we are now getting to the exciting part. For once you have them fixed on your new chart the unknown others will simply fall into place like ninepins. (While you are about it, try and get one station dial-reading as near the top of the dial and another as near the bottom of the dial as possible.)

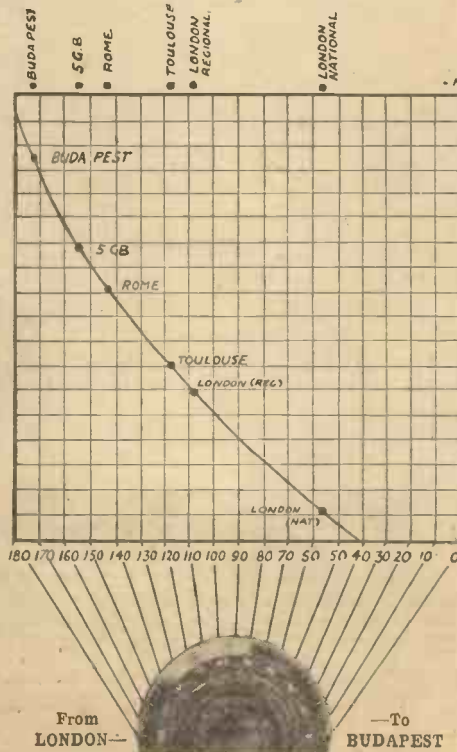
Now the next thing to do is to get your wave-length table out and to look for those stations on it. In the chart shown, Budapest was one station, and

Budapest's wave-length is 550 metres.

Halfway between 540 and 560 metres is the thin line running right across the chart and corresponding with 550 metres. Put your rule along this line and then "bring the Budapest dot down" by making a dot on the chart where the 550-metre line crosses the line corresponding with 173 on the dial. (Your own reading may not be 173, but you see the idea?)

## THE FINAL LINE.

Next you must "double-cross" 5 G B, and pass on merrily to Rome, Toulouse, etc. Fill in all your stations like that, and then lightly pencil a line across the chart connecting all these points together. It will not be a perfectly straight line, but it will be a perfectly wonderful line for foreign stations. If an unknown station comes in at, say, 163 on your dial and starts "chirping," who is he? You find that 163 on the curve you have drawn corresponds with 501 metres, and on your wave-length chart 501 is shown to be Milan!—And so you can "place" all your stations!



# EVERY COMPONENT FOR THE "ECONOMY" THREE BY RETURN OF POST

## KIT OF PARTS

	£	s.	d.
1 Hand-polished oak cabinet, 12 x 7 x 7 .. .. .	1	0	0
1 Ebonite panel, 12 x 7 .. .. .	..	4	0
1 ReadiRad '0005 variable condenser .. .. .	..	4	6
1 ReadiRad Duograph dial .. .. .	..	6	6
1 ReadiRad differential condenser .. .. .	..	5	0
1 ReadiRad on/off switch .. .. .	..	..	10
3 W.B. valve holders .. .. .	..	3	9
1 ReadiRad '0003 fixed condenser .. .. .	..	..	10
2 ReadiRad single coil holders .. .. .	..	1	8
1 Lissen R.C. Unit .. .. .	..	4	0
1 R.I. Hypermite .. .. .	..	12	6
1 ReadiRad 2-meg. grid leak .. .. .	..	..	10
1 ReadiRad grid-leak holder .. .. .	..	..	6
1 Terminal strip, 12 x 2 .. .. .	..	1	6
9 Belling Lee engraved terminals .. .. .	..	2	3
3 Valves as specified .. .. .	..	1	7
1 Lewcos 60x coil .. .. .	..	..	4
1 Lewcos 40 .. .. .	..	..	3
1 Lewcos 250x .. .. .	..	..	6
1 Lewcos 100 .. .. .	..	..	4
Wire, screws, plugs, etc. .. .. .	..	1	5

TOTAL (including Valves and Cabinet).....£5 16 10

### EASY PAYMENTS

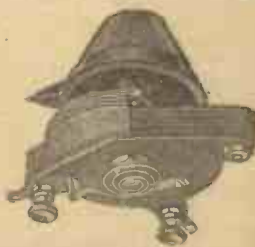
12 Equal monthly payments of 10/9d.

## READI-RAD BROOKMAN'S CONDENSER

*Specially recommended in this booklet*

FOR USE IN "THE BROOKMAN'S REJECTOR"

This amazingly popular range of condensers now includes all capacities suitable for tuning and reaction. Heavy gauge brass vanes are of true logarithmic design, with bakelite dielectric. Phosphor bronze spring pigtail provides thorough noiseless contact with moving vanes. One-hole fixing. Particularly small dimensions and light weight. Prices, complete with bakelite pointer-knob. Capacities '00075, '0005 and '0003, 3/6 each; '0001 mid., 2/6.



# Ready Radio

159, BOROUGH HIGH STREET,  
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Telephone: Hop 5555 (Private Exchange) - Telegrams: READIRAD, SEDIST.

Ready Radio (R.R. Ltd.), 159, Borough High Street, S.E.1.

# BOOSTING "WHISPERS"

All about that very important subject—the handling of reaction.



**A**FTER you have juggled and jiggled about with the dials, and you find you have a foreign station whispering something to you, how can you make it louder?

If you had tons and tons of money and could afford to buy the finest set in the land—a regular ten-valve "super-cum-hyper-cum-listen-to-this"—you would get foreign stations as easily and as clearly as the local. But on a small set *skill* is nearly everything.

## THE ALL-IMPORTANT REACTION.

With an ordinary simple one- or two-valve set there is only one way to pick up weak foreign stations with any degree of regularity, and that is by learning how to handle reaction and tuning. When you alter a tuning dial you alter wave-length. That's easy. Anybody can turn a tuning dial.

(If your set has two tuning dials you have to keep them "in step," so that they are covering the same wave-length. And that would be very easy if it meant exactly the same dial readings, but generally the dials differ a little, so skill is required.)

Generally it is that reaction dial that causes all the trouble. And yet it's easy enough, if you think about it like this:

*Too-little-reaction* means that the set is not as sensitive as it might be.

*Too-much-reaction* means oscillation. It means that you make your set (and your neighbours' sets) howl and whistle, you get poor quality, and poor long-distance results.

*Just-right-reaction* means foreign stations, and plenty of them.

If you listen-in when there is no local broadcasting station working, you can, in a few minutes, give yourself a thoroughly sound object lesson in the use of "just-right-reaction." Set the tuning dial half-way round for a start, and place the reaction control at zero, making sure that all batteries, etc., are connected up as usual, and that the set is in working condition.

## PRACTISE IT FOR YOURSELF.

Now bring up the reaction control *slowly*. Just a few degrees at the time.

Listen carefully to the loud speaker, or preferably to the 'phones, and notice exactly what is happening as the result of moving the reaction dial. Do not touch the tuning—just the reaction—listening carefully all the while.

The probability is that at first you will notice no

difference. As you advance another 3 or 4 degrees listen very carefully and presently you will hear in the 'phones a very faint hissing, breathing noise.

The reason that you are hearing these noises is that the increase in reaction is making the set more sensitive. The farther you go the more sensitive it becomes, up to the oscillation point.

If you continue to advance you will come to a point where there is a more or less distinct "plop" followed by a rather louder continuous breathing or hissing noise. *This is oscillation*, and you have gone too far. For good reception you must be below the oscillation point, so turn back the reaction dial immediately.

What you have got to remember is this. With the reaction all-out the set is comparatively insensitive. As you increase reaction the set gets more and more sensitive. But the moment your set starts oscillating you must "come back a bit" in order to get just below the oscillation point.

## BEFORE MOUNTING A SWITCH—



It's often advantageous to tighten the spring—especially if it is for wave-change purposes.

## KEEPING IN STEP.

If this were all, handling reaction would be a very easy matter—but we have not yet considered the effect of tuning.

Unfortunately, the tuning and reaction dials are not independent of one another. Every time you alter one the other needs a little readjustment, too. And as you keep altering the tuning to find different stations you must keep

altering reaction, too, to keep "in step."

A little further experiment will demonstrate this. First set your tuning dial mid-way, and then bring up reaction carefully until the set is very, very nearly—but not quite—oscillating. Now leave reaction alone, and see what tuning does.

You will find that when set thus the effect of "tuning down" to lower wave-lengths is to send the set over the oscillation point; whilst if you "tune up" to higher wave-lengths you draw away from the oscillation-point. Consequently, to keep the set just below oscillation when tuning you must work both dials at once. You must not leave reaction alone, but gently increase it as tuning goes up, or gently decrease the reaction as the tuning goes down! And when you can do that successfully without making the set oscillate you will find that boosting whispers is easy, and that foreign stations fairly fall in.



# "HEARD THIS ONE—"?

Some practical information that tells you where the programme that you heard came from.

**F**OREIGN broadcasting stations are just like people—they have their own little peculiarities that help you to recognise them.

Spanish stations, for instance, can be heard singing and dancing away at 2.30 a.m. very often, when the rest of Europe has gone to bed. Just what you would expect of them!

The German stations, on the other hand, get up early and keep hard at it all day.

Some of the stations broadcast distinctive call or interval signs. Here are some noteworthy ones:

**Sleigh Bells**, softly striking, are the sign that you are listening to Cracow.

The Cuckoo's Call has been chosen by two widely separated stations, and is probably the most easily recognised of all musical calls. The stations in question are Leningrad (Russia), 1,000 metres, and Ljubljana (Yugo-Slavia), 575 metres.

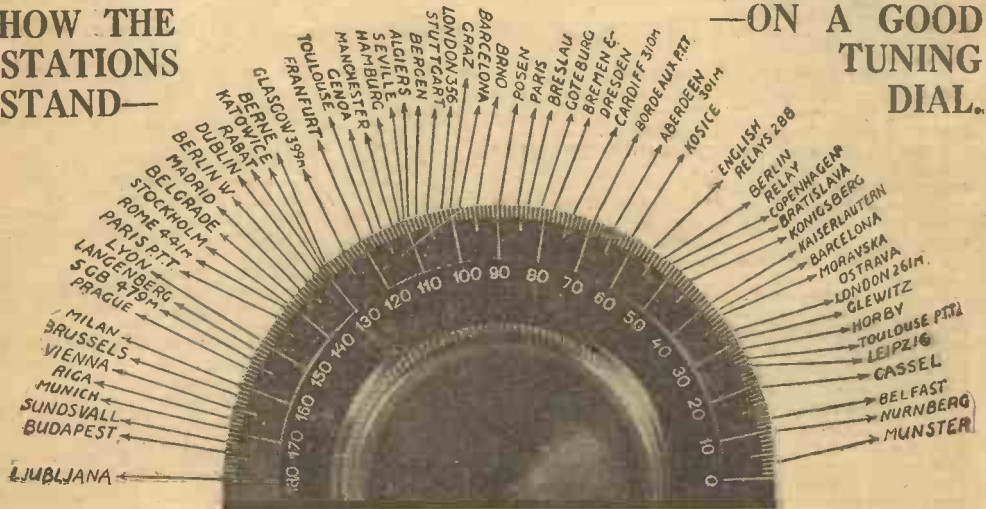
Some stations give a clue from the fact that they employ women announcers. Amongst these are:

- Bratislava, Czecho-Slovakia, 279 metres.
- Bucarest, Rumania, 394 metres.
- Genoa, Italy, 381 metres.
- Milan, Italy, 501 metres.
- Rome, Italy, 441 metres.
- Wilno, Poland, 312 metres.

The Nightingale's Song has been chosen as a musical interlude sign by Turin, Italy. It is played on a gramophone with electrical pick-up, and is a very effective station-marker at most seasons of the year. But this very pleasing call has the disadvantage that in the summer it may be confused with stations which relay the actual nightingale's song as a "stunt" broadcast.

**Hammer Strokes on an Anvil** is the pleasing and distinctive sign of Katowice, Poland. The sounds indicate the industrial nature of the neighbourhood.

## HOW THE STATIONS STAND—



## EUROPE'S STATIONS, AND HOW TO KNOW THEM

**BARCELONA.** 349 metres.

Between intervals says "Radio Barcelona" and closes down with Spanish National Anthem and the words "Buenas noches, Señores; hasta mañana si Dios quiere."

**BARCELONA** (Radio Catalana). 268 metres.

Says "Union Radio Catalana," and closes down with "Buenas noches, Señoras y Caballeros."

**BASLE** (Switzerland). 319 metres.

Man announcer. "Hallo, Radio-Basel."

**BELGRADE** (Yugo-Slavia). 432 metres.

"Radio Beograd." Metronome ticks sixty beats a minute during intervals.

**BERGEN** (Norway). 364 metres.

Announces "Bergen her."

**BERLIN** (Witzleben), Germany. 418 metres.

"Achtung, Berlin." Metronome ticks thirty-six beats in ten seconds.

- BERNE** (Switzerland), 403 metres.  
Opens with tune on musical-box. Man and woman announcers.
- BRATISLAVA** (Czecho-Slovakia), 279 metres.  
"Hallo, Bratislava." Plays the four musical notes C, E, G, G as interval signal.
- BRESLAU** (Germany), 325 metres.  
Sometimes uses a metronome, ticking 60 times a minute.
- BRNO** (Czecho-Slovakia), 342 metres.  
"Hallo, Radio-journal Brn-no." Man announcer.
- BRUSSELS** (Radio Belgique), 509 metres.  
"Ici Radio Belgique." Opens with a high-pitched whistle.
- BUCAREST** (Rumania), 394 metres.  
"Radio Bucuresti." Opens with metronome ticking 160 to a minute, for five minutes.
- BUDAPEST** (Hungary), 550 metres.  
"Hallo! Itt Budapest." and/or "Hier Budapest."
- COLOGNE** (Germany), 227 metres.  
Chime of five bells from the Cologne studio, during intervals.
- COPENHAGEN** (Denmark), 281 metres.  
"Kalundborg-Kobenhavn." Opens with three strokes on a gong.
- CORK** (Irish F.S.), 224 metres.  
Usually man announcer, speaking Irish and English.
- CRACOW** (Poland), 313 metres.  
"Hallo! Hallo! Polskie Raadjo Krakooov"! Man and woman announcers. Clock gong or sleigh bells in intervals.
- DUBLIN** (Irish F.S.), 413 metres.  
Announces in English and Irish. Opens with tuning note.
- FRANKFURT** (Germany), 390 metres.  
"Frankfurt-am-main und Kassel." Man and woman announcers.
- GENEVA** (Switzerland), 760 metres.  
"Allo Ici Radio-Genève." Man announcer, speaks French.
- GENOA** (Italy), 381 metres.  
"Eh-yar Radio Genova." Closes down with the words "Buona notte a tutti."
- GOTEBORG** (Sweden), 322 metres.  
Closes down with the words "God Natt, God Natt."

## A CONTACT—OR A SNAG?



Fit your leads with nice spade terminals and you can get a good tight contact. Stray and straggling wires are simply snags.

- GRAZ** (Austria), 352 metres.  
Opens with V's in Morse (. . . -, . . . -, etc.). Announces "Hallo! Hallo! Hier Radio Graz auf Welle!"
- HAMBURG** (Germany), 372 metres.  
Strokes on a gong indicate the number of minutes interval; and one stroke of gong before each item. Also sends the letters H.A. in Morse (. . . . -).

- HANOVER** (Germany), 560 metres.  
Usually relays Hamburg. Sends Morse letters H R in intervals (. . . . -).
- HILVERSUM** (Holland), 298 metres or 1,071 metres.  
No interval signals. Man announcer.
- HUIZEN** (Holland).  
Usually man announcer. Closes down with "Goeden avond, Dames on Heeren. Wel te rusten." (Good-night, ladies and gentlemen. Sleep well.)
- KALUNDBORG** (Denmark), 1,153 metres.  
"Kalundborg Kobenhavn." Opens and ends with three strokes on a gong.
- KAUNAS** (Kovno, Lithuania), 1,935 metres.  
"Allo, allo, Lietuvos Radio Kaunas."

## DON'T FORGET TO COUNT THE

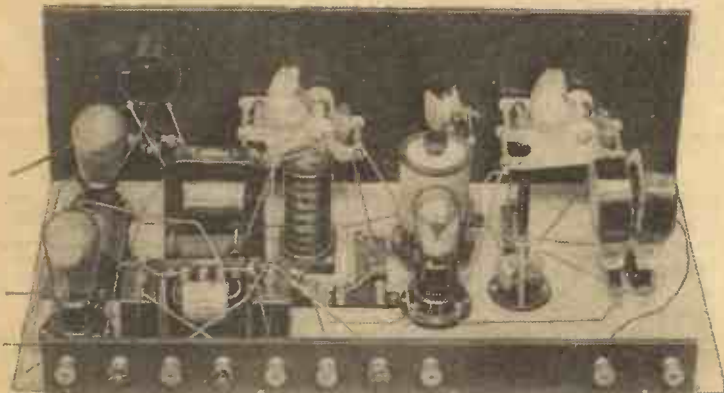
# TELL TALE TICK TOCKS

Loud-ticking clocks or metronomes are employed by many Continental stations, and usually the number of ticks per minute will enable the station to be identified.

- KONIGSBERG** (Germany), 276 metres.  
"Achtung! Konigsberg und Danzig." Closes down with "Gute Nacht" (good-night).
- KONIGSWUSTERHAUSEN** (Zeeseen, Germany), 1,635 metres.  
"Achtung! Konigswusterhausen." Metronome beats 40 beats in 10 seconds.
- KOSICE** (Czecho-Slovakia), 293 metres.  
"Hallo Kosice." Closes down with "Dobrou Noc" (good-night).
- LANGENBERG** (Germany), 473 metres.  
Relays Cologne—see notes under that heading.
- LAUSANNE** (Switzerland), 680 metres.  
"Allo! Ici Radio-Lausanne." Usually announces in French, but sometimes German. Short tune for interval signal.
- LEIPZIG** (Germany), 253 metres.  
Calls "Achtung! Achtung! Hier sind die mitteldeutschen sender Leipzig und Dresden . . ."
- LILLE** (France), 265 metres.  
"Allo! Allo! Ici Radio Lille." Closes with an air played on musical box.
- LYON** (P.T.T., France), 466 metres.  
"Allo! Allo! Ici le poste radio-diffusion de Lyon La Doua." Closes down with a few bars of the Marseillaise.
- MADRID** (Spain), 424 metres.  
Opens with Seigfried's bugle-call theme, usually given on piano. Closes with "Buenos noches, Señores; hasta manana."
- MARSEILLES** (France), 316 metres.  
"Allo! Allo! Ici le poste radio-telephonique de Marseilles."
- MILAN** (Italy), 501 metres.  
"Stazione de Milano." Closes down with "Buona notte a tutti" (Good-night, everybody).
- MORASKA-OSTRAVA** (Czecho-Slovakia), 263 metres.  
Closes with "Radio-journal Moravska-Ostrava. Dobrou noc" (Good-night).
- MOTALA** (Sweden), 1,348 metres.  
Relays Stockholm and other stations. Closes down with "God-Natt. God-Natt."
- MUNICH** (Germany), 533 metres.  
Musical-box for interval signal. Relays (and announces) Augsburg and Nurnberg.
- NAPLES** (Italy), 332 metres.  
"Stazione di Napoli." Closes with "Buona notte a tutti" (Good-night, everybody).

- OSLO** (Norway).  
 "Hallo, Oslo her." Closes down with "God-natte. God-natte."  
**PARIS, EIFFEL TOWER** (France), 1,445 metres.  
 "Allo! Allo! Ici le poste radio-telephonique de la Tour Eiffel." Closes down with a few bars of the Marseillaise.  
**PARIS, ECOLE SUPERIEURE** (France), 447 metres.  
 Relayed by many other French stations, and seldom announces station's name. Usually begins "Allo! Ici le poste radio-diffusion de l'Ecole Supérieure des Postes et Telegraphes de Paris."

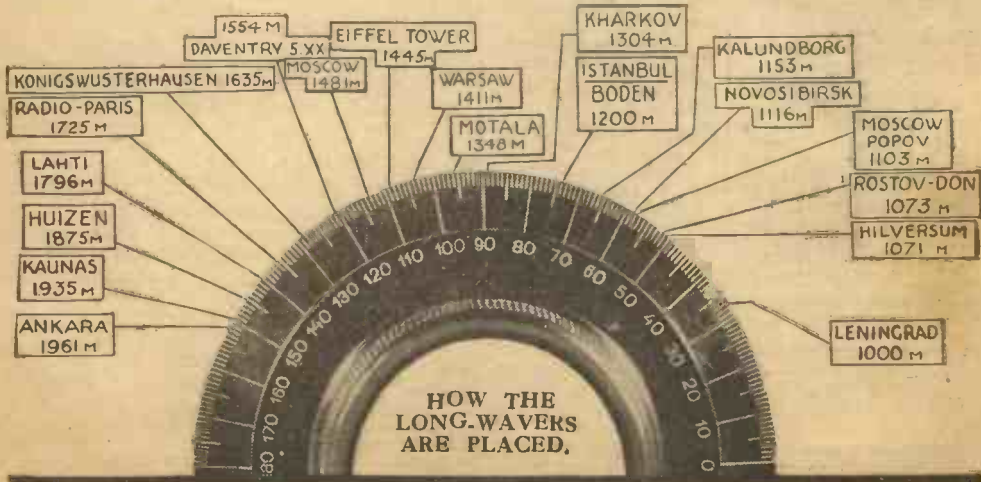
- SAN SEBASTIAN** (Spain), 459 metres.  
 "Union Radio San Sebastian."  
**SEVILLE** (Spain), 368 metres.  
 "Union Radio Sevilya." Closes with "Bucnas noches, Señores: Hasta mañana."  
**STOCKHOLM** (Sweden), 436 metres.  
 "Stockholm Rundradio," or "Stockholm-Motala." Closes down with "God-natte. God-natte."  
**STAMBOUL** (Turkey), 1,200 metres.  
 Announces in French and Turkish. Gong strikes 77 times a minute in intervals.  
**STUTTGART** (Germany), 360 metres.



With all the European stations going "all out," high selectivity is an essential requirement of the modern set. This is one of the earlier band-pass designs.

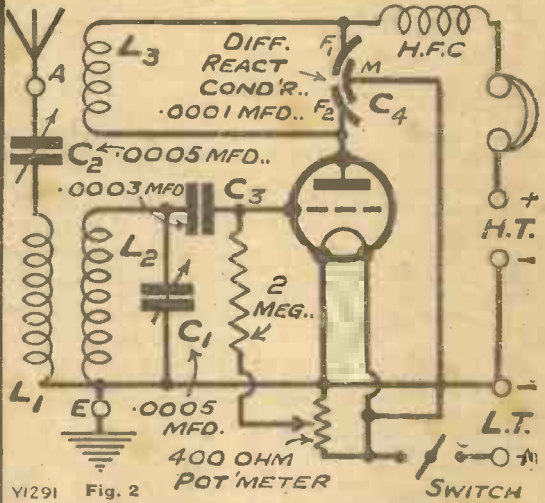
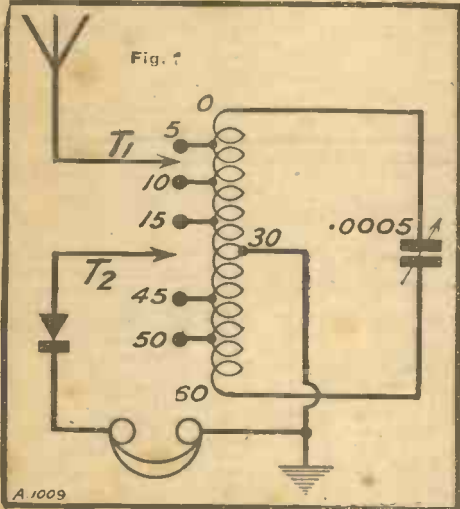
- PARIS, PETIT PARISIEN** (France), 320 metres.  
 Announces frequently in both French and English.  
**PARIS, RADIO PARIS** (France), 1,725 metres.  
 "Ici Radio Paris" (sometimes announces under old title of "Radiola"). Usually studio clock chimes the hour.  
**PRAGUE** (Czecho-Slovakia), 487 metres.  
 "Hallo, Radio Praha," or "Hallo! Praha." Man and woman announcers. Closes with "Dobrou noc" (Good-night).  
**ROME** (Italy), 441 metres.  
 "Eh-yar Radio Roma." Usually woman announcer. Closes with "Buona notte a tutti" (Good-night, everybody).

- Uses the three musical notes C, D, and G as interval signal (played on oscillating valves).  
**TOULOUSE** (P. T. T., France), 255 metres.  
 "Ici Toulouse-Pyrenees."  
**TOULOUSE** (Radio du Midi, France), 385 metres.  
 "Allo! Ici Radio-Toulouse." Strokes on a gong at one-second intervals, during programme pauses.  
**TURIN** (Italy), 273 metres.  
 "Eh-yar Radio Torino." Song of the nightingale (on gramophone) during intervals.  
**VIENNA** (Austria), 517 metres.  
 Sends V's in Morse (...-) for tuning signal. "Hallo! Hallo! Hier RadioWien." Closes with "Gute nacht, meine Damen; Gute nacht, meine Herren; Gute nacht."  
**WARSAW** (Poland), 1,411 metres.  
 "Hallo! Hallo! Polskie Raadio Varshava." Man and woman announcers.  
**WILNO** (Poland), 313 metres.  
 Cuckoo's call, or huntsman's horn, as interval signal.  
 "Oovagha Polskie Raadio Wilno."  
**ZAGREB** (Yugoslavia), 308 metres.  
 "Radio Zagreb" announces in Serbo-Croatian, French, and German.  
**ZURICH** (Switzerland), 459 metres.  
 "Hallo, Radio Zurich." Interval signal, clock striking two notes (repeated).

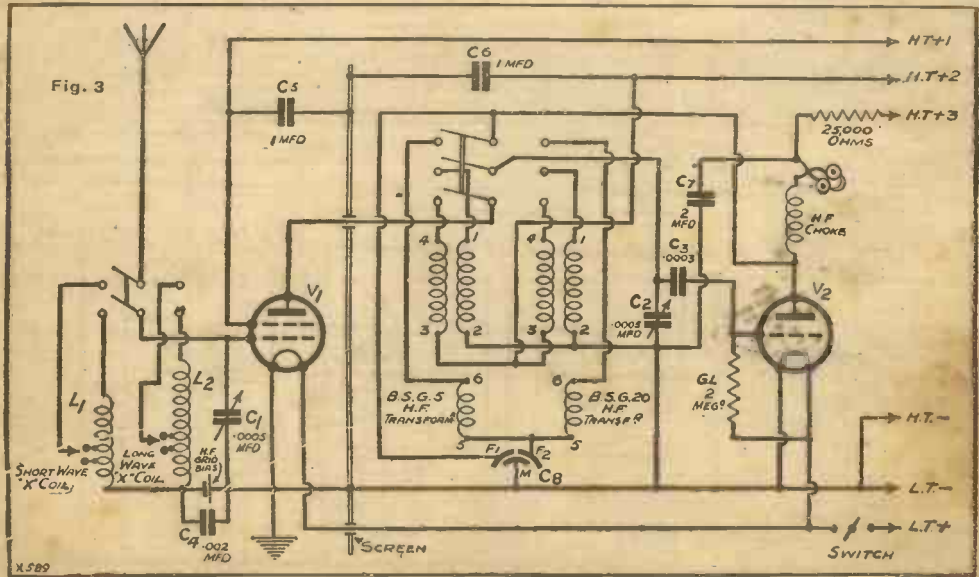




# SOME GOOD CIRCUITS TO TRY



A crystal set based on Fig. 1 gives unusually good long-distance results because the crystal and the aerial connections are tapped (by means of crocodile clips) on to the main coil. This consists of 60 turns of 24 or 26 D.C.C. wire wound on a 3-inch tube, and tapped at the turn numbers shown. The one-valver (Fig. 2) is a good DX (long-distance) receiver using ordinary plug-in coils. The coil sizes are :  $L_1$ , 35 or 50 ;  $L_2$ , 60 ; and  $L_3$ , 50 (or 75). For long waves,  $L_1$ , 100 or 150 ;  $L_2$ , 250 ; and  $L_3$ , 100 or 150.  $C_3$  is chiefly useful for improving selectivity with long aeriels, and may often be omitted without detriment.



Excellent long-distance results are obtainable with this set (Fig. 3), which is not intended to work a loud speaker, though an L.F. amplifier can be added for this purpose if desired. The differential reaction condenser is marked  $C_2$ .  $L_1$  is a 60 X-coil, and  $L_2$  a 250 X-coil, the two switches being of the low-capacity type (1 D.P.D.T. and 1 three-pole double-throw). A tapped G.B. battery is generally employed for the H.F. (1½, 3 or 4½ volts) and this assists in keeping down the H.T. current. Station-getting is simplicity itself with this kind of circuit.



# IMPROVING YOUR SET

How many of you have asked yourselves whether it was worth while altering your ordinary receiver to include a screened-grid stage, or building a new set incorporating a screened-grid valve? How many of you have queried whether it was worth while using a super-power in the last stage, whether an ordinary power would not be just as good or even better, or whether a pentode would meet your purpose?

Have you ever queried whether anode-bend or grid-leak rectification is the better? And the old query as to whether transformer or resistance coupling on the L.F. side is preferable is still being asked, while a hundred and one other little points crop up every day in the life of the home constructor.

## THE FIRST IMPORTANT QUESTION.

In the first place let us discuss the screened-grid valve question, to which the answer depends upon two main features which can be expressed as questions themselves. The first is: "Do you want selectivity or sensitivity?" Which of the two is more important? And the second is: "Can you supply the valve with sufficient H.T.?"

The answer to the first question depends somewhat on your distance from the local station. There are means of getting both sensitivity and selectivity from a screened-grid valve circuit, but if you want *ultra selectivity* and you only want to use one H.F. stage, then the ordinary neutralised valve is more likely to give it to you than the screened grid.

If, on the other hand, you prefer to use a wave-trap, or a rejector, or a special circuit for your screened-grid valve, in order to cut out the local station, which is rather too near to you, and you want at the same time *sensitivity* to give you distance, then the screened-grid valve will give you what you want.

## THE S.G. VALVE.

There is no doubt that the screened-grid valve has much more "punch" than the neutralised valve, but it has the drawback that it consumes far more H.T. current, and, as a rule, unless the circuit is carefully designed the selectivity will not approach that obtained by the neutralised stage.

The screened-grid valve is certainly worth it if you are prepared to use a proper circuit, and not

merely to adapt the present set and hope that a screened-grid valve will give better results, even though its anode circuit may not be suited to it; and also if you are prepared to supply, say, four milliamps or so of H.T. current instead of the usual one milliamp which is needed for the neutralised valve.

## BIASSING H.F. VALVES.

You must also be prepared to bias your H.F. valve. To work properly an S.G. valve nearly always needs biasing, and many valves of the screened-grid type are exceedingly uneconomical in their anode current consumption unless they are biased. The bias varies from  $1\frac{1}{2}$  volts up to about  $4\frac{1}{2}$ , which is the maximum we have ever found a screened-grid valve to require. The usual bias required is about  $1\frac{1}{2}$  volts.

Thus assuming you are prepared to provide a bit more H.T. and some grid bias and to use a circuit really suited to the valve, go ahead and you will certainly find the screened-grid valve worth while; but if, on the other hand, you are going to make a makeshift circuit of it, not worrying about getting the proper anode circuit impedance, not worrying about the grid bias, and probably attempting to run the screened-grid valve with a number of other valves in your set from only small-size H.T. batteries, then stick to the neutralised stage, for it will give you far better service and greater satisfaction.

The super-power, power, and pentode problem is rather more difficult to unravel. Perhaps it will help us if we have a look at the valves themselves and see what types of things they are.

## THE SUPER-POWER TYPES.

What is usually known as the power valve generally has a magnification factor of anything from 4 to 10 or so, and an impedance of 4,000 ohms upwards. It will not carry any very great grid swing. That is, you cannot put a tremendous signal into it without causing overloading; but if, on the other hand, you put a moderately strong signal on to the grid, then it will give you good amplification in return.

The super-power valve is not nearly so generous in its amplification. Many people imagine that the super-power valve is a valve which will give more power; in other words, a far greater punch for unit input, i.e. more amplification. But that is quite an erroneous translation of the term "super-power."



With a pair of telephone receivers connected in series with a small dry battery, you can test components for both continuity of windings and for short-circuits.

## TESTING YOUR SET

This valve is one which will handle more power, not necessarily give you more amplification. As a matter of fact, a super-power valve rarely has an amplification factor greater than 6, unless it be of the special A.C. mains type.

But it has a much lower impedance than the power valve, and will carry a far greater input without overloading. Therefore, if you get a bigger input on the valve you should expect a bigger output, provided the amplification factor is reasonably good. That is exactly what happens with a super-power valve, you have a greater input which can be put into it without overloading, and it will give you a bigger power output, operating the loud speaker louder than is the case with the ordinary power valve.

#### CONCERNING THE "PENTODE."

Naturally, in wireless, as in everything else, we do not get something for nothing, so that if you use a valve which will enable you to handle more power you have got to give it more electrical energy, and as a rule the super-power valve takes a little more L.T. current, for you must be prepared to give it anything up to 20 milliamps or so of H.T. if you are going to work it at its best.

The pentode valve is rather in a class by itself. It is an output valve which has a very high magnification factor and at the same time a very high impedance.

It will not carry a very large grid swing, no larger as a rule than the ordinary power valve will, but it will give a tremendous magnification, much greater than the power valve, and input for input the output is several times louder than that obtained with either the power or super-power assuming that none of these valves is being overloaded. But the characteristics of the pentode are such that it is often not worth while using a pentode in place of a power or super-power.

#### FOR MOVING-COIL LOUD SPEAKERS.

With the ordinary loud speaker the pentode valve is hardly suitable unless an output transformer is employed, unless you want the maximum magnification, say, for short-wave working, or on a two-valve set, when you are using a loud speaker which is not very high-pitched.

If your loud speaker is inclined to be very high-pitched or lacking in bass, then the pentode valve, without the special output transformer, is liable to make it very "hard" in quality. For moving-coil work the pentode valve is perhaps more useful, because it imparts a brilliancy to moving-coil reproduction which it is sometimes difficult to get with the ordinary super-power or power valve without a specially-designed loud speaker.

Some of the modern pentodes (such as the P.M.24A) will provide quite sufficient power to work a moving coil really well.

#### IS IT WORTH IT ?

If we were asked "Is it worth it?" when discussing the pentode, we would say, "In the average case, no. Use a power or super-power valve." If you are using a moving-coil speaker, however, we should advise you to try the pentode unless your loud speaker is "peaky" in the high register. Where you want maximum volume with the minimum number of valves the pentode valve is very useful, but you want to know what you are doing, or to work on advice from the set designer himself, before you rush to place a pentode in the output stage of any ordinary receiver. You always know where you are with a power or super-power valve, but with a pentode, unless you are certain of what you are doing, you may be disappointed.

And that brings us to the question of rectification.

Which is the better? Anode bend or leaky grid. This is purely a personal question for the constructor himself to answer. It is often stated that with anode-bend rectification a great deal of sensitivity is lost, but it has been the experience of many that anode-bend rectification is very nearly, if not quite, as sensitive as the ordinary grid-leak rectification.

#### ANODE-BEND RECTIFICATION.

With transformer-coupling after the detector-valve anode bend is not as a rule satisfactory, but with resistance coupling then anode bend will often give a "clean up" to the signals which is very beneficial.

Smooth control of reaction with anode bend is usually more difficult to obtain than is the case with the grid-leak rectifier, and the type of valve certainly does make a difference. You want a valve which has a fairly steep slope and a fairly sharp bend at the bottom end of the slope in order that really good anode-bend rectification may be obtained.

#### STATEMENTS NEEDING QUALIFICATION.

We could go on for a long time discussing various points in wireless receivers and whether they were worth while, for there are nearly always two sides to each question. It is difficult to lay down any rule, and in wireless one certainly cannot be dogmatic, for so much depends upon the requirements and the tastes of the owner of the set.

We have those who say that the moving-coil speaker is the best. Well, it may be the best on the best set, but if you put a moving-coil speaker on a poor set it will sound about the worst thing on earth. Every statement in radio has to be qualified, and that makes it very difficult when one queries the worth of any particular component or type of circuit, or even set.

It all depends upon circumstances.

## CONNECTING LEADS

The wires running from batteries to set are often completely neglected, but here are several points of importance connected with them

THE external leads to a set are often straggling, sorry things, with kinks in their middles and whiskers frayed on their ends. That is all wrong. They should be stout, tidy cables, frequently renewed.

Non-corrodable terminals can be bought for a few pence for the accumulator leads.

These external leads are of very great importance, more particularly those which join the batteries to the set. Faulty insulation, a loose end wriggling about, a "whisker" shorting across a pair of terminals, and damage to the batteries or even valve burn-outs might result.

#### KEEP THE WIRES SEPARATED

Having put in some nice new cables of ample gauge and well insulated, do not proceed to bunch them together indiscriminately. You may achieve neatness at the cost of good results.

The aerial, earth and loud-speaker leads must be well separated, each taking their quickest routes—more particularly the aerial lead. You can group the L.T., grid bias, H.T. negative and earth leads, but it is as well to keep the H.T. positive out of the way of this bunch.

If you are using a mains unit of any kind very special attention indeed should be paid to all the wiring to and in the set.



# DIVING DOWN TO SHORT WAVES

There is a great fascination about short-wave work, and here you read how easy it is to "dive down."

It used to be difficult. In fact it used to be considered impossible. But nowadays if you want short-wave stations you simply dive down for them.

There was a time, and that not so very long ago, when short-wave reception was regarded as a quite isolated branch of radio reception. Those were the days of "supers," "ultras," and "low-lossers," when in order to join the "ham" throng one had to construct a skeleton-looking arrangement with something akin to a broom handle on the condenser in order to keep the hands away from the tuning control!

But those days are over.

## THE TYPE OF SET.

Now almost any set of the straightforward type can be used equally successfully for the 'phone reception of "Pittsburg, Pa." as for the L.S. reception of Brookmans Park—conditions permitting, and with certain reservations. You might think there is a snag hidden in those "reservations." Not a bit of it, for this is all that is meant:

(a) The first valve must be the detector. It

Short-wave tuning is so sharp that a .0005 tuning condenser often seems too big. But if you connect another .0005 (fixed) in series with it, across the coil, you bring your tuning capacity down to about .00025 mfd.

## ON HIS ORDINARY SET!



He is using a converter unit that brings in short-wave stations on an ordinary set.

## DEAD SPOTS

Sometimes a perfectly good short-wave set refuses to oscillate in one place on the dial, though it is O.K. above and below this.

Such a "dead spot" is nearly always due to a tuning effect, and can be overcome by altering the aerial circuit's tuning, by means of a small condenser in series.

matters not whether it is followed by one or more L.F. stages so long as it is not preceded by H.F. stages.

(b) The set must employ plug-in coils. Preferably, but not absolutely essentially, with reaction on the Reinartz or other capacitative control system.

## WHAT COILS TO USE.

(c) A slow-motion dial or other means whereby the tuning condenser can be rotated very slowly is indispensable.

There are hundreds of sets which fall into this grading, and the following hints should therefore be of fairly general interest.

You will need a set of short-wave coils to replace those ordinarily in use. Place a four-turn plug-in short-wave coil in the holder which normally takes the grid coil (the one which is connected to one side of the grid condenser), and a three- or four-turn plug-in coil of the same type in the reaction coil socket.

If on the ordinary broadcast band your set uses a separate coil for aerial coupling, the socket with the coil removed can now be ignored, thereby doing away with the necessity for three plug-in coils.

Alternatively, you can plug-in a 2-turn coil there. If not, fix a new terminal (which we will refer to as A<sub>2</sub>) to the panel or terminal strip, and join the shank

of this terminal to one side of a small variable condenser. It must be small—a neutralising condenser of .00001 will do—and can be fixed at any convenient point on the baseboard.

## TRY DIFFERENT TAPPINGS.

To the other side of this condenser attach a short length of flex fitted at the remote end with some form of clip. This clip has to be clipped to one of the turns on the short-wave grid coil. (The best point to start at is the middle turn.)

The set is now quite ready for use, and it can be switched on and operated in exactly the same manner as previously, only this time it should be remembered that tuning will be exceedingly sharp,

and very careful manipulation of the controls will therefore be necessary.

If you experience any difficulty in obtaining reaction, try first using the tap on the grid coil at a position nearer to the earth end of the winding, and if this should not do the trick the distance separating the plates of the series aerial condenser should be increased. For best results, however, these plates should be used as close to one another as possible, providing the set can still be made to oscillate satisfactorily.

By the way, if you find it consistently impossible to obtain reaction, it may be due to the H.F. choke not being suitable for short-wave work. In this connection it is only fair to mention that this fact does not necessarily cast reflections upon the choke in use.

## MAKING YOUR OWN CHOKE.

A choke which may function perfectly on the broadcast waves may not be suitable for short-wave work, and if you come up against this difficulty wind 80 turns of No. 30 D.C.C. or D.S.C. wire single-layer fashion upon a former of roughly 1 in. in diameter, and use it in place of the normal H.F. choke for short-wave work.

## MAKING CERTAIN OF SUCCESS

If you haven't had any luck on the short waves, read this article and try again!

ONE of the most remarkable things that occurs when "diving down" to the short waves is the alteration in the tuning. Even if your set is fitted with slow-motion dials, the probability is that if you are a novice on the short waves you will at first turn the dials much too quickly for success under the new conditions.

### ROTATE VERY SLOWLY.

The tuning dial must be rotated not merely slowly, but absolutely "dead slow," or otherwise you will miss the short-wave carriers altogether. So easily can a transmission—even a powerful one—be passed over that short-wave enthusiasts practically always wear 'phones instead of using the loud speaker, so as to make sure that nothing escapes notice when tuning. At the faintest sign of a chirp or whistle the tuning should be very, very carefully adjusted, the reaction being slackened off so as to keep the set only on the very verge of oscillation.

So sharp are the tuning effects that very often it will be found that when condenser-controlled reaction on the Reinartz principle is being applied, even a slight alteration of the reaction condenser will throw the tuning so far out that all trace of the faint whistle disappears!

### KEEP IN STEP.

Therefore, both hands must be used, one on the tuning control, and one on the reaction, and the two must work together in perfect accord, the tuning dial following up or down the carrier or whistle which is being investigated, whilst the reaction is being varied to the necessary degree.

Only the lightest possible touch is required, and the co-ordination between the two dials must be close and complete if the various signals which are received are to be fully investigated.

Apart from the very fine degree of tuning and of reaction control that is required, there are other simple things which make or mar short-wave reception. One of the most important is aerial coupling, which in nearly all cases of operation by a novice is made far too tight.

There is no doubt that a very large proportion of short-wave failures are due to this fact, and to this alone—that the aerial has been wrongly connected to the set. What, then, is the correct aerial connection?

### LOOSE COUPLING BEST.

First and foremost, it must be a "loose" connection, not from the mechanical standpoint, of course,

but from the view of electrical coupling. Practically all the important work in a short-wave set takes place in and around the grid-circuit coil, and if the aerial is too closely linked with this the whole set is "held down," and is inefficient.

One method of coupling the aerial to the grid is to have a separate aerial coil holder in which one of the set of short-wave coils is placed. If you place a coil of too many turns in this aerial coil holder you will be coupling the aerial too tightly to the grid coil, and this is quite sufficient to prevent the set from oscillating. Consequently, you should use a few-turns coil in the aerial, and do not put up with unsatisfactory reaction effects without trying the effect of altering the size of the aerial coil (or the position of the clip attached to this).

### ANOTHER METHOD.

Sometimes there is no separate coil employed in a short-wave set, so that the aerial lead terminates in a clip, which can be clipped on to one of the turns of the grid coil. This arrangement gives tight coupling if the clip is adjusted near the grid end, and loose coupling if it is adjusted near to the earth end (minimum or no coupling is obtained when the clip is attached to the earth end of the coil).

When working with an arrangement of this type, do not forget to alter the position of the clip not only from one turn to another on the grid coil, but from one part of the turn to another part, until just the right degree of coupling has been obtained and reaction effects are satisfactory over the whole tuning range.

### FINAL ARRANGEMENT.

There is yet another method of coupling

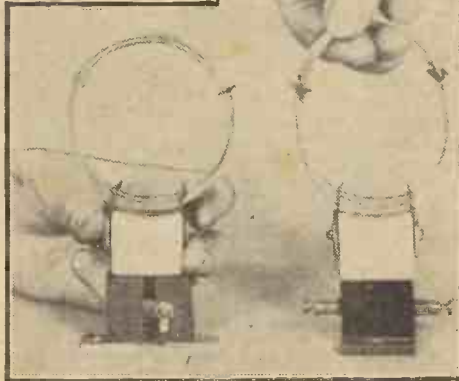
which is in pretty common use in short-wave receivers, namely, the method employing a small variable condenser in series between the aerial lead and aerial terminal. Provided a really small variable condenser, such as a "neutrodyne," is employed, this is a very satisfactory method, but here, again, it is advisable to shift the coupling until the exact degree has been found to be best for the particular operating conditions.

### DON'T FORGET THE H.T.

It will thus be seen that although the aerial itself is not very important in short-wave work, the method of connecting it and the adjustment of the aerial clip are two of the most important movements of a successful station getting.

Remember, too, that readjustment of the H.T. voltage is of great importance, and should never be neglected.

HOW NOT  
TO DO IT!



A coil should not be pulled out as on the right, but lifted by the base as in the left-hand example.

# WHAT WAVE-LENGTH WAS THAT?

All about an easily-made instrument that tells you just where the short-wavers are.

It is often said that in short-wave working it is difficult to know what wave-length you are on. That is wrong.

There is no reason to flounder in a sea of unknown wave-lengths, because anyone who knows the business end of a screwdriver from its handle can make up a satisfactory short-wave meter with very little trouble, and probably from components already in stock.

It is called an absorption short-wave meter, and the only snag is in the name! "Absorption" sounds complicated, but, as a matter of fact, it is extremely easy to make.

## MOVE THAT CLIP



If your short-waver won't oscillate properly, move the clip that controls aerial coupling.

that the condenser must be a condenser and not merely a piece of casual contact, and that the short-wave plug-in coils must be soundly and solidly made.

A slow-motion condenser is essential, and the dial must be of the non-slipping, non-skidding type, for unless it will always return to the same setting accurately it is a waste of time to put it into a wave-meter.

## BUILDING THE UNIT.

To make the unit, then, all you have to do is to mount a coil holder close to the variable condenser and join them in parallel, enclosing the whole gadget in a box, which preferably should be large enough to take the plug-in coils and so keep them out of harm's way. The coils, of course, will cover the same tuning range as your tuning coils. Having done that you have made your absorption wave-meter, and all that remains is to use it.

Unlike some wave-meters this one does not have to be sent to the National Physical Laboratory to be calibrated! Many experimenters have found to their cost that it is one thing to make a short-wave meter and another to calibrate it. The beauty of the type which we are now describing is that it can be calibrated in a few minutes by the experimenter himself.

You require the usual squared paper for showing dial readings at one side and wave-lengths in metres at the bottom, and all that is necessary is to draw a curve for each coil, showing how the condenser

setting alters the wave-length. As everybody knows nowadays the best way to do that is to ascertain the condenser setting for as many known wave-lengths as possible so that a line on the paper drawn to connect these points together will indicate intermediate settings also.

## CALIBRATING THE WAVE-METER.

In practice, all you do is to tune in a station (on your set), the wave-length of which is known exactly. Suppose, for instance, it is Schenectady, New York, W 2 X A F, working on a wave-length of 31.48 metres.

Tune this in in the ordinary way with your set right on the verge of oscillation. The tuning condenser must be carefully adjusted and left alone at exactly W 2 X A F's setting.

Now bring out your absorption wave-meter, plug in a coil similar to the one in the grid circuit of the short-wave set (approximately the same number of turns, and experience will soon prove which is the best form of coil to use), and place the wave-meter about 8 in. away from the short-wave set's grid coil. As stated, the short-wave set is tuned in to W 2 X A F's wave-length, and if the wave-meter is suitably placed and then slowly tuned, you will find at one condenser setting reception on the set ceases.

## MAKING THE READING SHARP.

Why? Because energy that was helping to make the short-wave set sensitive has suddenly been absorbed by the wave-meter. The point is, that this will only happen when the instruments are exactly in tune, and the reading on the wave-meter can be rendered very sharp if this is placed as far as possible from the short-wave set whilst still allowing the absorption effect to take place.

So all you have to do is first of all to transfer to the calibration chart as many wave-lengths from the set as possible. Once you know the exact wave-length covered by the wave-meter readings you can transfer these to any set simply by placing the meter in the required position near the set, with its condenser tuned to the required wave-length. Then, keeping the set gently oscillating, turn the tuning dial until suddenly oscillation ceases.

## A VALVE TIP



Don't pull on the glass or you may loosen it. Get a grip on the base as well before pulling out a valve.

# Selecting Circuits



IN these days, especially when screened-grid, pentode, old "point-o-sixe," and "R" type valves almost rub shoulders, as it were, the powers of a set can no longer be judged by the illumination it provides.

Indeed, radio has become a very complex business, and the choosing of a circuit or set is as difficult as can be.

No doubt many take the advice of expert friends, while others probably ignore technical aspects and confine their choices to particular patterns of sets, thinking (with some justification) that all radio sets nowadays are good, so let's go for the one with the prettiest panel.

## A MULTITUDE OF DIFFERENT HOOK-UPS.

You might accuse "P.W." and all the rest of the radio press of making confusion more confounded by emitting a steady stream of new designs. But we can't hold back new designs; that way lies stagnation, retrogression, decay, and whatnot.

At this very moment of writing we could compile a list

of 500 different sorts of sets, each one having some distinctive feature. And out of that 500 you could not possibly pick out one set which would satisfy everybody.

You see, we don't manufacture little differences merely for the sake of producing a large number of designs. There is a lot of variation to be seen in the following list of three-valvers. A det., 2 L.F., resis. trans.; an H.F., det., L.F., split-primary neut., L.F. trans.; an S.G., det., L.F.; S.G., det., pentode; det., 2 L.F., trans.

You can double this list by making wave-change an alternative in each case. With four valves the list is three or four times as long. And all these are broad types of circuits. There is still the variations of choke-capacity outputs, layout designs, coil designs, the inclusion or exclusion of refinements, such as volume controls or pick-up schemes, mains smoothing circuit, etc.

## ALL WITH ADVANTAGES.

In the three-valve class alone you already have some 40 distinct arrangements indicated, and each one of these may be variable to some extent. Bring in circuit variations, such as methods of detection, reaction control (Reinartz, throttle, swinging coil, Schnell, etc.), and your list grows to enormous dimensions.

You will not need us to point out that all these variations have their individual advantages and disadvantages, and that it is for the individual set buyer or builder to make up his mind as to the compromises he must make.



A modern multi-valver with a double-drum tuning control.

YOU build or buy a new set. You plug-in the valves, tie up the batteries, adjust the H.T. and G.B., and that is that. Every now and then you have the L.T. accumulator charged and every more widely spaced "now and then" you renew the H.T. In the interim you do a lot of knob twisting, get many stations and enjoy hundreds of programmes.

Meanwhile, that little G.B. battery sits on the baseboard as modestly as a fixed condenser. In a way, it is a pity that the G.B. battery does not have to deliver a current, and thereby run down fairly quickly. As it is, the G.B. battery merely deteriorates.

We expect, if a voltmeter census of grid-bias batteries were taken, you'd find that over fifty per cent. of those in use were hopelessly exhausted. Now this is all wrong, not merely from the point of view of the quality of reproduction, which must suffer when the G.B. battery runs down below the figure needed for proper biasing, but because the H.T. may be wasting away.

## EFFECT ON H.T. CONSUMPTION.

In the case of a power valve—and it is here that G.B. is always used—the amount of G.B. (in volts) determines the H.T. current that shall flow, given a certain definite H.T. voltage.

A power valve connected to 120 or more volts

## Watch Your Grid Bias

H.T. may need 10 volts grid bias according "to the book." Perhaps at this there will be 10 milliamperes current drain on the H.T. battery. But generally you can, with no ill-effect, give a valve more grid bias than the makers specify, so that if you are a careful amateur that valve will perhaps have 12 volts bias. and be "using" only 8 or less milliamps H.T.

Should the G.B. battery have depreciated so much that the 12-volt tapping is providing a potential difference of only 2 or 3 volts, then the H.T. consumption may have risen to 20 or more milliamps. Enough to run down a large dry battery very quickly indeed.

## GRADUAL DETERIORATION UNNOTICED.

Large batteries are expensive; they cost many more tens of shillings than the wee battery that supplies that regulating G.B.

Don't jump in here and say that quality will have gone "phut" and plainly indicate that things are not as they should be. Only a milliammeter will clearly show this.

You see, that G.B. battery will have run down very gradually, and you may have become slowly acclimatised to the distortion. And this, at its worst, might be by no means as bad as the valve curve, etc., will make out. It is surprising what fairly good results you can get under such conditions.

# PILOT RADIO KITS



## SPECIALLY PREPARED FOR THE SPLENDID SETS IN THIS HANDBOOK

### PILOT RADIO KITS INCLUDE

1. Every specified Component. 2. "Red Triangle" guaranteed ebonite panel, highly polished and drilled to specification. 3. Handsome cabinet, made in our own Factory and beautifully french polished by hand. 4. The specified valves. 5. All nuts, screws, plugs, connecting wire and flexible leads contained in neat partitioned carton. 6. A written guarantee of service. 7. THE PILOT TWO-RANGE TEST METER.

### ● IMMEDIATE DELIVERY TO APPROVED ORDERS ●

#### SHARP TUNE TWO ("P.W." 18/10/30)

Kit A.	Cash	£3 18 0	or 12 monthly payments of	7/2
Kit B.	"	£4 17 0	"	8/11
Kit C.	"	£5 13 0	"	10/4

#### THREE COIL THREE ("P.W." 18/10/30)

Kit A.	Cash	£5 4 6	or 12 monthly payments of	9/7
Kit B.	"	£7 3 6	"	13/2
Kit C.	"	£8 8 6	"	15/5

#### EASY CHANGE THREE ("P.W." 11/10/30)

Kit A.	Cash	£3 18 3	or 12 monthly payments of	7/2
Kit B.	"	£5 5 9	"	9/8
Kit C.	"	£6 10 9	"	12/-

#### MAXI POWER FOUR ("P.W." 11/10/30)

Kit A.	Cash	£6 10 7	or 12 monthly payments of	12/-
Kit B.	"	£8 18 1	"	16/4
Kit C.	"	£10 15 7	"	19/9

#### ECONOMY THREE (See Page 11)

Kit A.	Cash	£3 4 7	or 12 monthly payments of	5/11
Kit B.	"	£4 12 1	"	8/6
Kit C.	"	£5 5 10	"	9/8

#### D.X. ONE-VALVER (See Page 6)

Kit A.	Cash	£2 18 1	or 12 monthly payments of	5/4
Kit B.	"	£3 6 7	"	6/1
Kit C.	"	£4 1 1	"	7/6

IMPORTANT NOTE: Kit "A" is less valves and cabinet. Kit "B" is with valves less cabinet. Kit "C" is with valves and cabinet.

### ● ACCESSORIES, MANUFACTURERS' KIT, Etc. ●

Send **10/9** Only  
Regentone W.5 Combined H.T. Eliminator and Trickle Charger. 1 S.G., 1 variable and one fixed tappings for H.T.; L.T. charging for 2, 4 and 6 volts. For A.C. Mains. Cash price £5 17 6

Balance in 11 monthly payments of **10/9**

Send **7/4** Only  
Eko 3F.20 H.T. Eliminator 20 m/A. Tappings for S.G., 60 volts and 120/150 volts. For A.C. Mains: Cash price £3 19 8

Balance in 11 monthly payments of **7/4**

Send **8/6** Only  
Exide 120 volt W.H. Type Accumulator in Crates. Cash price £4 18 0

Balance in 11 monthly payments of **8/6**

Send **7/6** Only  
Standard Wet H.T. Batteries. 144 volts, 20,000 m/A. Cash price £4 2 0. Other voltages and capacities available, detailed prices on application.

Balance in 11 monthly payments of **7/6**

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Ultra Model U.99 Loud Speaker. Incorporating 14" x 14" Double Linen Diaphragm Air Chrome Chassis, in oak or mahogany cabinet. Cash price £4 10 0

Balance in 11 monthly payments of **8/3**

Send **6/5** Only  
Farrand Inductor Speaker for perfect reproduction. Unit and Chassis complete ready mounted. Cash price £3 10 0

Balance in 11 monthly payments of **6/5**

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**PILOT CHART**  
Contains detailed Price Lists of all the latest and best Kits, and over 30 valuable Hints and Tips for the Amateur Constructor.

**EASY WAY CATALOGUE**  
Contains 40 large pages profusely illustrated, with detailed descriptions of products of ALL THE LEADING MAKERS. Receivers, Components, Radio Gramophones, Pick-ups, etc. The New EASY WAY CATALOGUE is a veritable guide to Radio. Get your copy.

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Every Month.

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“M.W.” gives you, in attractive variety,

THE LATEST CIRCUITS	NEW STATIONS TO LISTEN FOR	NEW IDEAS IN BROADCASTING	NEW SETS TO BUILD!
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“Invaluable to the long-distance enthusiast.”

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“M.W.” covers every field of radio reception, and is of absorbing interest to the listener, set-builder and long-distance enthusiast.

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EVERY  
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# Popular Wireless

Every Thursday  
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No. 438. Vol. XVIII.

INCORPORATING "WIRELESS"

October 25th, 1930.

## *The* 'CONTRADYNE' JUNIOR

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SIMPLE

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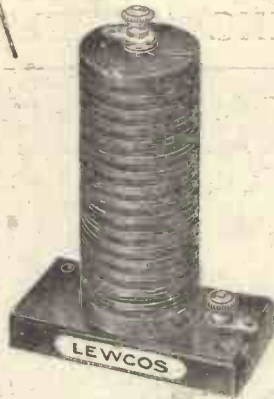
ASTONISHINGLY  
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DEVICES



THE  
'CRYSTATUBE'



# Four Strings that make the Perfect Instrument



**LEWCOS H.F. CHOKE**

The terminals are arranged, one at the top and the other at the base of this choke to eliminate the risk of additional self-capacity in the wiring of the receiver.

Price 7/9 each  
Write for leaflet Ref. 33.

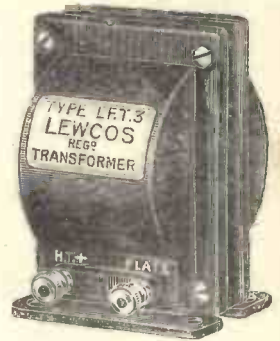


**THE LEWCOS  
CENTRE-TAPPED  
COIL**

C.T. 25-75 Price 3/6

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Write for fully descriptive  
leaflet R.34.



**THE LEWCOS  
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Has a constant inductance for different values of anode current.

Type 22. Price 20/-  
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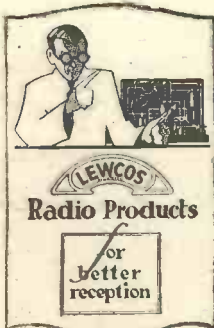


**GLAZITE  
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# LEWCOS<sup>Regd.</sup> RADIO PRODUCTS

Many of the most successful receivers in the past depended to a large measure on the superlative qualities of Lewcos Radio Products.

Any one or all of the LEWCOS components illustrated above would improve your receiver to an astonishing degree. "Perfection in every detail" is the keynote of the Lewcos Factory where these components are constructed.



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PERFORMANCE AT ITS BEST!**



*The*  
**ORMOND  
CONE UNIT &  
CHASSIS!**

Like all Ormond products the Ormond Cone Unit and Chassis is convincing in its superiority. Tone, volume, sensitivity — every factor of perfect reproduction denotes ideal design and construction.

The Chassis is constructed of aluminium 11½ in. in diameter, ribbed to ensure absolute rigidity and provided with two brass pillars to ensure easy assembly of the unit. The whole may be secured to a baffle board or cabinet, screw holes being provided in the outer ring for this purpose.

Also supplied separately:

Chassis & Cone, 7/6

Unit, 12/6



Registered

Trade Mark.

*for* **PUNCH  
POWER &  
PURITY!**

*The* **ORMOND  
LARGE CONE &  
CHASSIS**

Of similar construction to the small Chassis and cone but measuring 16½ inches in diameter. The Unit may be attached and the whole secured to baffle board in the same manner as the small chassis.

Price 11/6

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Telephone: Clerkenwell 5334, L. & 9344/5/6  
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The  
Paramount  
A.C. Mains  
Valves

**F**OR all-electric radio of the highest efficiency, for unfailing reception and a background of perfect silence—the improved series of “Marconi” indirectly heated A.C. Mains Valves stands supreme. Every feature desirable in modern receivers is included in this range—high conductivity, rigid construction, mesh anode to prevent overheating and grid emission and exceptional vacuum—each will contribute towards better reception in your own set. There are types for every receiver.

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	Amplification Factor	Impedance	Price
M.S. 4 Screen Grid ...	550	500,000	25/-
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M.H.L. 4 Detector and L.F. Amplifier ...	20	8,000	15/-
M.L. 4 Power ...	9	3,000	17/6

Remember!

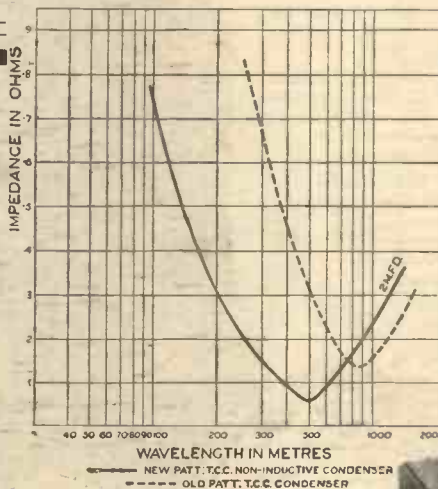
Marconi Valves are used by The B.B.C., Imperial Airways, Croydon Control Tower, Metropolitan Police, Trinity House Beacon Stations and Lightships, Empire Wireless Communications, large Passenger Liners, &c., &c., because of their longer life, clearer tone, greater range and volume.

USE THE VALVES THE Experts USE!



VALVES

Non-inductive  
Condensers  
the Latest  
T.C.C.  
Development



Here's the latest T.C.C. development—a Non-Inductive Condenser at no extra cost. The advent of the Screened Grid Valve has emphasized the need for a condenser having the minimum of impedance in order that small high frequency currents may be readily passed. How the new T.C.C. Non-Inductive Condenser achieves this result is shown on the curve above. The ordinary 1 mfd. condenser has a resonant point at about 900 metres whereas in the new T.C.C. Non-Inductive Condenser this has been reduced to nearly 500 metres. Be wise: always use

Available in all capacities from .005 mfd. to 2 mfd. from all wireless shops.

The above illustration shows the T.C.C. 2 mfd. Non-Inductive Condenser in moulded case 3/10.

Telegraph Condenser Co., Ltd., N. Acton, W.3



Always ahead in Condenser Design

# GREATER PERFORMANCE SMARTER APPEARANCE NO CHANGE IN PRICE

Ask your dealer to show you the new range of Telsen Components, each one embodies many new and exclusive features making for better and cheaper radio.

The already famous Telsen Transformers have been entirely re-designed, each model now embodies new windings and core, in addition to which they are fitted with earth terminals, a very desirable feature in these days of high-efficiency, two-transformer-coupled sets, finally they are shrouded in Genuine Bakelite Mouldings.

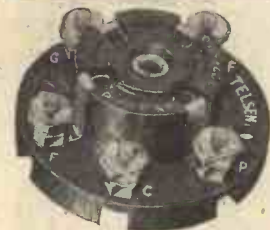
The complete range of Telsen Components include Valve Holders, four and five pin types, H.F. Chokes, Fixed (Mica) Condensers, etc. They are so scientifically designed that no real radio enthusiast will ignore their claim as "Radio's Choice" for "Better Radio Reception."



**TELSEN "RADIOGRAND" TRANSFORMER**, new model, shrouded in Genuine Bakelite, with new windings and core, fitted with earth terminal. Made in ratios 3-1 and 5-1. Price 12/6 each.

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**TELSEN VALVE HOLDERS.** Low capacity, self-locating, supplied with patent soldering tags and hexagon terminal nuts. Price 1/-



**TELSEN FIVE-PIN VALVE HOLDER.** Pro. Pat. No. 20286/30. Genuine Bakelite Mouldings fitted with Nickel Silver shock-absorbing spring contacts. Price 1/3 each.

Perfected in every detail, Telsen Transformers now represent the embodiment of the very latest practical principles of Radio transformer construction. Built to give long and satisfactory service—the highest quality reproduction . . . in fact . . . built as well as it is possible to build a transformer . . . and yet the prices still remain the same . . . one of their attractive features.



**TELSEN H.F. CHOKES**, designed to cover the whole wave-band range from 18 to 4,000 metres, extremely low self-capacity, shrouded in Genuine Bakelite. Induction 150,000 microhenries, resistance 400 ohms. Price 2/6 each.



**TELSEN FIXED (MICA) CONDENSERS**, shrouded in Genuine Bakelite, made in capacities up to .002 mfd. Pro. Pat. No. 20287/30. .003 supplied complete with Patent Grid Leak Clips to facilitate series or parallel connection. Can be mounted upright or flat. Tested on 500 volts. Price 1/- each.

# TELSEN COMPONENTS

Advt. of Telsen Electric Co., Ltd., Birmingham.

**DON'T MISS THIS!**

The November  
**WIRELESS  
CONSTRUCTOR**

Contains a particularly fine selection of articles by leading radio authorities, and covering all phases of radio reception.

Among the contents are full constructional descriptions of

**THE "PARATUNE" THREE**

A set of exceptional powers;

**THE STANDARD A.C. UNIT**

A mains H.T. supply that will give you ample power free from all trouble; and

**THE "MAX-AMP" LIMITER**

Of incalculable value to valve-set owners.

*Don't forget YOUR Copy of*

**THE WIRELESS CONSTRUCTOR**

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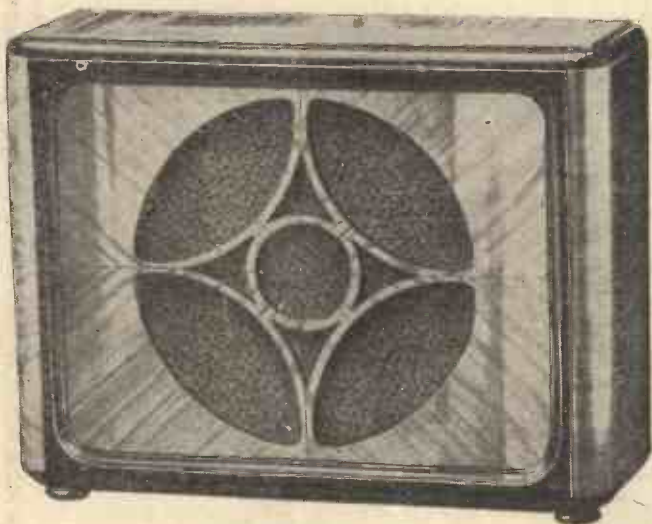
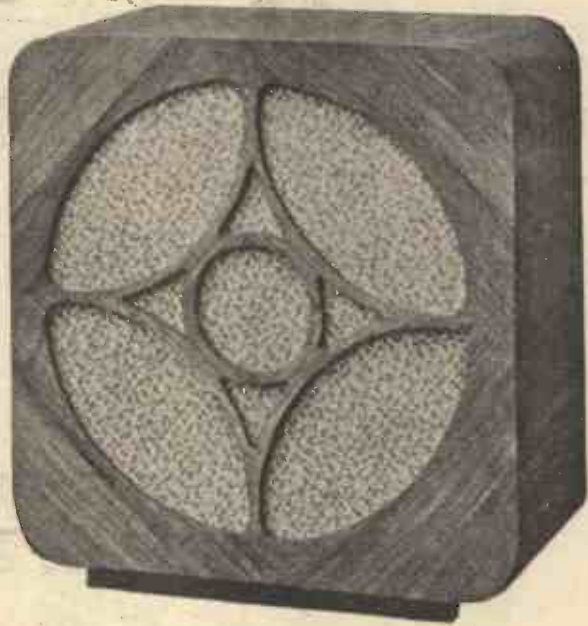
**GET YOUR COPY NOW!**

# Two wonderful Speakers!



**41 K** This speaker's arrival on the market is a great event in wireless history—accurate reproduction at a popular price. Almost every home in England can now have its Blue Spot Speaker. Housed in a beautiful walnut case, this fine speaker costs

**50/-**



**71 R** This new and splendid speaker represents all that is highest in loud-speaker reproduction. The walnut case is a perfect piece of the cabinet maker's art, and the driving unit is 66R, the finest unit in the world. Price

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• **THE BRITISH BLUE SPOT COMPANY LTD.** •

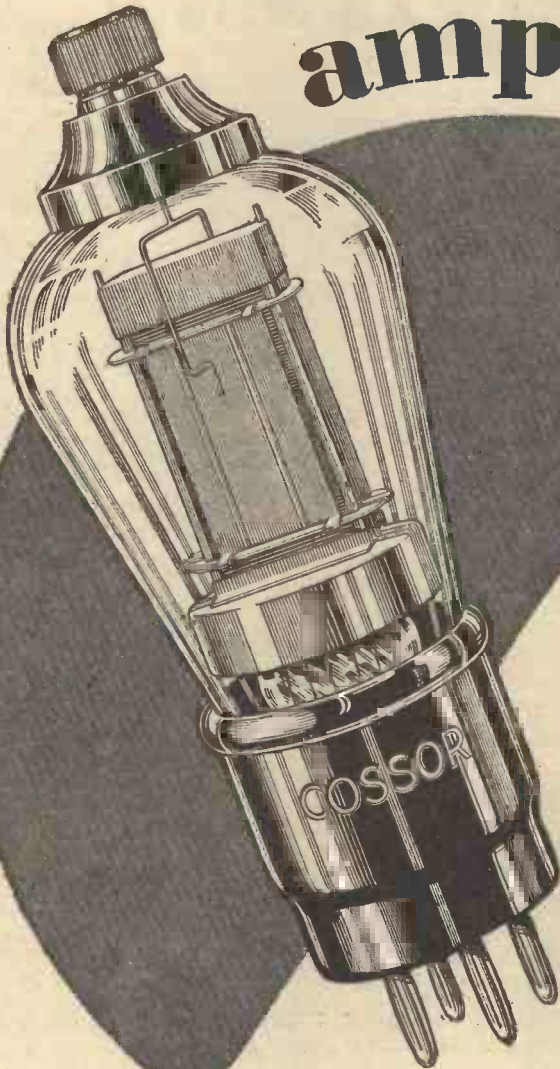
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Phone: Clerkenwell 3570.

Grams: Bluospot, Smith London.

Distributors for Northern England, Scotland and North Wales: H. C. RAWSON (Sheffield and London), Ltd., 100, London Road, Sheffield; 22, St. Mary's Parsonage, Manchester; 183, George Street, Glasgow.

# Highest effective amplification



Greater effective amplification is definitely ensured by the New Cossor Screened Grid Valve. This is due to its minute inter-electrode capacity which has been reduced to the order of .001 micro microfarads—lower than that of any other Screened Grid Valve on the market. Because of this and because grid current has been eliminated, the use of this New Cossor Valve will considerably increase the efficiency of your Receiver.

Write for free fully descriptive Folder on "How to increase the range of your Receiver," mention No. L35P.W.

Cossor 215 S.G. 2 volts, .15 amp. Impedance 300,000. Amplification Factor 330. Mutual Conductance 1.1 m.a./v. Normal working Anode Volts 120. Positive Voltage on Screen 60-80. Price **20/-**

## THE NEW COSSOR 215 S.G.

# Popular Wireless

**LARGEST NET SALES**



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**THE WORLD'S MOST POWERFUL STATION.**  
**HAPPY XMAS IN ADVANCE.**  
**A HANDSOME COMPLIMENT.**

## RADIO NOTES & NEWS

**THE FARTHEST NORTH.**  
**A LONG, LONG WAY.**  
**SHOOTING LISTENERS!**  
**"DIAGONALIZATION."**  
**A RUM GO.**

### The World's Most Powerful Station.

NOT long ago I referred to the fact that it was not easy to say which was the most powerful broadcasting station in the world. There seems to be no doubt, however, that the distinction will belong to Poland as soon as the new Warsaw station is erected.

It has just been despatched from the Marconi Works at Chelmsford, and is due to begin operating on Christmas Day. The power in the aerial is 160 kw. as against Daventry 5 X X's tiffing little 35 k.w., so if all the rest of Europe does not sit up and take notice of Poland it will not be Poland's fault!

### 5 S W's Aerials.

SHORT-WAVE enthusiasts in other lands whose chief link with home is 5 S W—the Empire short-wave station at Chelmsford—will be interested to know that this station has two different aerials.

Experiments are continually proceeding to find out which is the best method of radiation, and at the moment two very queer constructions are in use at different periods, one known as "aerial A" and the other as "aerial B."

Some day all the cream will be skimmed off the different experiments, and we shall have a really sumptuous short-waver at Chelmsford to fling out the Empire programme.

### Happy Xmas in Advance.

TALKING of that reminds me of my quaint habit of sending out advance Christmas greetings. I know it seems unnecessarily early to talk about Christmas, but the point is that "P.W." gets all over the world, and some of the copies of this week's issue will just about be reaching the backwoods of Burma, the Leeward Islands lagoons, or the Tibetan tableland by next Christmas Day!

So if when these words reach your eye you are sitting somewhere on the Outside Edge of the Empire, and according to your reckoning

it is Christmas Day or thereabouts, consider yourself seasonally slapped on the back by "Ariel" of "P.W."

### Amateurs and the Army.

WE are so used to the cold, dead hand of the Post Office pressing heavily upon British amateur radio that one can hardly credit the length to which America goes to encourage short-wave transmitters. Not long ago the "boys" were

asked to co-operate with the Army Air Corps in manoeuvres, the idea being to keep in touch with long-distance army 'planes flying right off the beaten track.

The amateurs, self-trained and efficient, absolutely amazed the army operators by their keenness, their accuracy, and their immediate adaptability to act as an army adjunct.

In America the radio amateur is not only recognised—he is encouraged. But what a difference on this side of the Atlantic!

### SURE SOME SPEAKER!



The 7 ft. square orifice into which the attendant is looking is the mouth of the giant logarithmic horn loud speaker installed at the Science Museum, South Kensington, London, S.W. The instrument is twenty-seven feet in length, and has been specially constructed to demonstrate the perfection of quality attainable in present-day broadcast reproduction. It is worked by a receiver built in accordance with B.B.C. suggestions, but only two programmes are available—the London Regional and National.

### A Handsome Compliment.

JUST to show you the difference between the amateurs of America and our own so far as official recognition goes, here is a typical message received by the U.S.A. amateurs this year: "Thank you and your organisation for the splendid support you gave the first Pursuit Group Manoeuvres in connection with short-wave communication. I am perfectly amazed at the results produced by your extremely active and able members. (Signed)

"F. TRUBEE DAVIDSON,

"Assistant Secretary of War, in charge of Army Aviation."

Can you imagine our Assistant Secretary of War writing to the R.S.G.B. in that way?

### The Farthest North.

IF it seems a bit nippy in the mornings now when you "show a leg," pause a moment and thank your lucky stars that you are not the wireless operator in Hooker Island. Setting out from Archangel, some enthusiastic scientists have managed to set up an observatory and wireless station on Hooker Island, where they say the best long-distance reception in the world is obtainable.

This may be, but although I am as enthusiastic over radio as anyone, they certainly won't catch me on the wrong side of the Arctic Circle, trying to test reception conditions. I like the mercury in my thermometer to be visible, not down a well!

(Continued on next page.)

## RADIO NOTES AND NEWS

(Continued from previous page.)

### A Long, Long Way.

THE Marchese Marconi has been addressing the Italian Society for Advancement of Science, and if the report is correct this is one of the things he said: "The waves were reflected by bands of ions outside the magnetic field of the earth, sometimes at a distance from the earth of 25,000,000 miles. The observations of Hals indicated distances up to 48,000,000 miles."

If any of your waves seem a bit late in arriving don't be too hard on them—the probability is they have strayed along the 48,000,000-mile route instead of the mere short-cut of 25,000,000 miles.

### Those Old Telephones.

EVERYBODY knows you should not drop your 'phones on the floor, but the Bradford Royal Infirmary is even more afraid that you will drop them in the dustbin.

They need old 'phones to keep the patients entertained, and listeners who, proud of their new loud speakers, swear they will never listen on 'phones again, should remember that one pair of 'phones in the Bradford Royal Infirmary is worth half-a-dozen pairs rusting their diaphragms away on a top shelf.

### Ireland's Super-Station.

BEDAD; it's good news from Dublin I'm tellin' ye—the contract's signed! "What contrahct, ses ye?" Why, the contract for the new Irish High-Power Station, av coorse.

Marconi's—who have just polished off a Polish super-station—are to build this Irish wonder-worker, which is to be erected out Athlone way, and will provide the whole of the Free State with powerful programmes.

Rumour says 413 metres will be the wave-length—but the site hasn't been fixed definitely, so it seems early to talk of the wave-length with any degree of certainty.

### St. Dunstan's.

THAT concert by the blind two weeks ago, from London, reminded me of a very significant statement in the Fifteenth Annual Report of St. Dunstan's. Referring to sport and recreation for war-blinded men, it says:

"As is only natural, wireless forms probably the keenest source of amusement for St. Dunstan's men. All have been provided with a set."

Well done, St. Dunstan's!

### Shooting Listeners!

COLOGNE hit upon a very ingenious idea when broadcasting a commentary from a rifle-range meeting some little time ago. Listeners heard the usual description, bullets whanging about, and so on, and then an old microphone was connected up and put up as a target!

The first three or four shots put the wind

up the loud speakers, and then suddenly there was a terrible "plonk!"—somebody had "shot" all listeners!

### A Radio Presentation.

I WONDER if any of "P.W.'s" readers I picked up the broadcast from the Radio World Fair, New York, when a presentation was made to Mr. Frank Davidson, the wireless operator of the British liner "Tahiti"?

A gold medal was presented to him for his conduct in the emergency, and for the cool and capable way in which he handled all the messages from the ill-fated vessel. (It will be remembered that no sooner was the S.O.S. and business safely disposed of than he asked a final query: "How goes the Test Match?" which was being played and was at an exciting stage at that time!)

### Foolishness!

POSSIBLY some of you saw the foolishness which was circulated recently in connection with that incident. The unpleasant suggestion was made that the

## HE STOPPED, HE LOOKED, HE LISTENED.



This is Mr. Douglas Walters, of Chiswick, London, W., who picked up a television broadcast direct from New York. He saw on his screen the figure of a man, thus making transatlantic television history.

query about cricket, coming from a sinking vessel in that way, was a bit of "theatrical bravado."

It was nothing of the kind. Mr. Davidson was not going in for any "heroics," false or otherwise, but was simply doing the job of work he had to do, like the good fellow he is.

And when the danger was all over he simply took advantage of his chance to ask how the Test Match was going on. Perfectly natural, probably you or I would have done just the same.

### Back to "Spanspace."

I SUPPOSE it is the effect of the darker evenings, but—whatever the cause—the last few weeks have seen a very big increase in my postbag. So much so that I can only refer briefly to a few of the letters.

In a missive from Kirkcaldy, G.Y. says he is getting A1 results from the "Spanspace 4," but he has a feeling that he isn't handling it as it should be handled. So

G.Y. wants me to dig up the old "P.W.'s" describing this set (May 28th, 1927, and June 5th, 1927). I'm trying, but these archaeological researches aren't too easy in these busy times.

### "Magic" Again.

IT'S a thrill to hear dance music from New York and Chicago, 3,000 miles away. The magic is great on S.W., says "E. Kay" (Peckham). And he goes on to ask in what numbers of "P.W." wave-change switching for the "Magic" was described, and the method of cutting out the first valve.

As many other readers are interested in these adaptations I am giving herewith the dates in which the letters, etc., appeared: Mr. Currie's Wave-change Magic IV—"P.W." No. 428.

Instructions for Cutting Out the H.F. Valve—"This Year's Magic Four"—Radiotorial, "P.W." No. 436.

### "Diagonalization."

FROM Coventry comes a very nice letter in praise of the B.B.C.'s "Diagonalization" policy—and A.M.H., the writer, makes out a good case, I admit. But although this policy of repeating a programme from another B.B.C. station the next evening does give a chance to listeners who missed it the first time, nobody will ever make me like the word "Diagonalization," by which the B.B.C. describe the process.

"Diagonalization" is a verbomaniacal extravaganza!

### KDKA's Aerial.

LISTENERS living near East Pittsburg, U.S.A., aren't half so fond of the famous KDKA station as listeners abroad. To the latter class it is a fine station—"strong," "clear," "reliable," etc. But to those listeners living on its doorstep it is a confounded nuisance.

The high power used shuts out other stations by a "blanketing" effect (so called because when KDKA is going "all out," its neighbours can't get another blankety blank thing!). So a new vertical aerial has been developed by the KDKA engineers, consisting of eight linked aerials in a ring.

The idea is that signals from any one aerial are stopped from spreading round too much by the other seven, and the combined effect of the eight aerials is shot skyward, far from the maddened crowd, for the benefit of the distant listeners.

### A Rum Go.

RUM-RUNNING is not all honey, especially now that the preventive men have called in the infra-red rays to help them. They say that a pair of these invisible "rays" keep a kind of wireless watch over New York harbour, and every ship that passes through them breaks the rays, and so warns the shore stations of its presence.

The order in which the rays are broken tells whether the ship is going out or into the harbour, and the device works equally well by night, in fog, or during storms. Good wheeze, what? **ARIEL.**





# L. F. HOWLING.

by VICTOR KING

Some practical pointers about one of the commonest troubles encountered in modern radio sets. Reference is made to the "popping" and general instability that often follows the substitution of a mains unit for H.T. batteries.

howling or that insidious instability where the set squeaks, moans or pops when you touch certain of its external parts.

A loud howl clearly shows that something is wrong, but conditions of instability, where there is no audible evidence of anything serious happening, should be guarded against. The set may be howling at a frequency above audibility and that will play havoc with the harmonics and, indirectly, with the general quality of results.

### When Using a Unit.

It frequently happens that a set will work perfectly with ordinary H.T. batteries, but that as soon as an H.T. eliminator is coupled to it, an L.F. howling occurs.

This may show that there is not an adequate separation between the H.T.appings on the mains units. The back-coupling results for the simple reason that

are not tempted to be particularly liberal with your voltages; 120 may be the sort of maximum at which you work.

When you go over to the mains, you think nothing of 150 volts, for such a value is obtainable cheaply and comparatively easily.

But when the volts go up like that it often happens that the efficiency of the set is increased, and its valves are able to amplify to better effect, so that a similar feed-back to that which caused no ill-effects when the set was not working from the mains now assumes "ogreish" proportions.

### An Easily-Fitted Cure.

In such circumstances, a cure may be found in the introduction of an anti-motor-boating arrangement. This can even be applied externally to the receiver. It can comprise a resistance of about 25,000 ohms in series with an H.T. + terminal of

IN the earlier days of broadcasting there were many attempts to obtain an L.F. reaction to supplement ordinary H.F. regeneration.

You all know this last, for you find it in practically every modern set. It is obtained by passing back to the grid of the detector valve a little of the energy from its anode circuit for re-amplification. And the control is such that you can adjust the feed-back to a nicety. If it is applied too liberally the set goes into self-oscillation.

### The Cause of It.

For some time it was thought that considerable further amplification could be achieved by taking some of the L.F. current from an anode circuit and feeding it back to its associated grid circuit. Some enthusiasts went so far as to endeavour to feed back from the final L.F. valve to the detector. They generally obtained the reaction all right, but could not control it.

Their reward was L.F. howling. Nowadays, we know that good quality reproduction results only when every effort is made to prevent any such L.F. feed-back effects. Our modern components are so efficient that a set is liable to become unstable if there is the slightest degree of L.F. reaction.

### Inaudible "Howling."

Apart from the H.F. reaction properly applied, our endeavour is to make the energy keep to a definite route through the set.

The main purpose of the screened-grid valve is to prevent any coupling occurring between its anode and grid circuits via an internal capacity of the valve. That, too, is the object of neutralisation.

The anode circuit of the first valve is linked to the grid circuit of the second valve, and the anode circuit of this valve to the grid circuit of the following valve, and so on up to the loud-speaker end of the set.

Any back-coupling between the anode circuit of one of the later valves and the anode or grid circuits of any of the preceding valves must be prevented at all costs.

If it is not prevented, you get L.F.



A photograph of Victor King in his radio laboratory. The loud speakers are gathered together for an investigation into diaphragm characteristics, the results of which will no doubt appear in "P.W." in due course.

### VICTOR KING AT HOME

the unit is feeding the anode circuit of various valves and is providing a coupling between them.

### That Extra Voltage.

There are some who say that every set should, in itself, provide sufficient decoupling between its various circuits to render such happenings impossible. But in view of the fact that it is likely that over fifty per cent of the valve sets in use are not in themselves sufficiently decoupled, it is obvious that mains units should be so designed that they do not introduce any more coupling than H.T. dry batteries.

Indeed, they should provide much less. You see, when you use H.T. batteries, you

the set and the H.T. + terminal of the mains unit.

A 2- or 4- mfd. condenser is then joined from the set side of the resistance to H.T.—. A receiver embodying two stages of low-frequency amplification, transformer coupled, is generally more prone to instability and L.F. howling than a similar set employing resistance-capacity coupling, owing to the fact that it constitutes a more powerful amplifier.

A choke-capacity output will help to remedy matters, and a decoupling arrangement of the nature above mentioned inserted in the detector anode circuit will generally bring back the set to its original stability.

# SIR JOHN REITH AND THE B.B.C. CRITICS.

By virtue of his very position the Director-General of the B.B.C. is rarely free from criticism of some kind or another. Much has been said about the B.B.C.'s attitude to the R 101 disaster, and, as is pointed out below, Sir John certainly seems to have missed an opportunity here.—

THE Director-General of the B.B.C. had some interesting things to say the other day when he opened the Radio Exhibition at Manchester.

Sir John Reith speaks all too rarely in public; and much too rarely in front of the microphone.

Some of the persuasive gentlemen on the "staff" of G.H.Q. at Savoy Hill should get busy, and endeavour, by hook or by crook, to get Sir John to speak in public more frequently. His candour is always

## HEAD OF THE B.B.C.



The Rt. Hon. J. H. Whitley, the recently appointed Chairman of the B.B.C.

refreshing—and sometimes the sting in the tail of his speech a much more effective rejoinder to the carping critics.

As Sir John said, "serious and intense consideration is given to the problems which confront the B.B.C. . . . the critics we shall always have with us." There is a note of philosophical resignation in those last few words which would touch a heart of stone—let alone a critic's. 'Tis too true: we shall always have the critics with us—because we are *all* critics. If there were no critics there'd be no listening public and no B.B.C.

### "Ferocity and Absurdity."

Continued Sir John: "There are some critics who—and this is a common phenomenon in all lines of activity—themselves unable to do anything, are always ready to teach.

"There are other critics the ferocity and absurdity of whose criticism pro-

claims an ulterior motive in that criticism, or else incapacity in their judgments.

"But others there are, still critics, who bring to the consideration of the multifarious and vexed problems of broadcasting a sympathetic mind, with an appreciation of the likes and dislikes of other people, even, perhaps, with some measure of goodwill towards the B.B.C., and, as a result, they come to the B.B.C. with criticism which is reasonable and constructive.

### Constructive Criticism Sought.

"Such criticism, unlike the rest, is heard and needed. Such criticism is welcome, and, more than that, it is sought."

Well—if it is sought—we will step in, right away, and offer some criticism.

What was the B.B.C. doing on that fatal day when R 101 crashed?

Special editions of all the leading newspapers were published—but the B.B.C. was last in the field with the news. In fact, it was not until 3 o'clock in the afternoon that the news was broadcast—together with the text of the King's message. A few further details—very meagre—were broadcast at 4.15, and again at 8.50.

But compared with the press broadcasting was nowhere, and the day, being Sunday, offered the B.B.C. a unique chance of proving its indispensability as a national medium for announcing information of supreme interest and importance.

Was there no one on duty to step into the breach and handle the emergency? Whatever the explanation, we feel justified in criticising the B.B.C. for badly failing to give its enormous public the *first* news of the disaster.

We want some sort of a Sunday morning news broadcast, but we shall have something further to say about this at a later date.

Curiously enough, the first news of the tragedy reached this country via South America!

A radio station there picked up the news of the disaster from the French air station at Le Bourget; it was then *cabled* to London.

### What About Croydon?

Why didn't Croydon hear that message—or if it did, why was the news held up? And what about our other air force stations. And what about Tatsfield—and British amateurs and dozens and dozens of others in this country. Why was it left for a South American sta-

tion to be the one to get the first news? Incredible!

If Tatsfield had been listening—or any B.B.C. official! What a tremendous chance for the B.B.C. to demonstrate its national importance!

Anyway, we congratulate the alert operator at Buenos Aires who was first to receive the fateful news.

## EXTRA CAPACITY.

How to Add Microfarads.

THERE are two vital factors where the smoothing of audio-frequency variations is concerned. They are capacity and impedance.

It often happens, due to one of several possible reasons, that a hum is experienced when working a set from a mains unit, and extra smoothing is desirable. Unless the hum is very bad, this smoothing can conveniently take the form of extra capacity.

No alterations have to be made to the unit. All you need do is to connect externally 2-mfd. fixed condensers across the H.T. positive output terminals and the H.T. negative output terminal.

Another place where extra capacity sometimes helps is across the by-pass condenser of decoupling resistance.

## CLASSICAL AND JAZZ



Mr. Jack Payne and Mr. John Ireland, the famous composer, discussing a musical programme recently broadcast from London.

# THE "CRYSTATUBE"

At a cost of only a few shillings you can easily make this highly-efficient crystal set. Its design represents a triumph of simplification on the part of the "P.W." RESEARCH AND CONSTRUCTION DEPARTMENT



THIS little set gave us somewhat of a shock when it was first tested, for it did something we never expected; on a large and high aerial it separated the two Brookmans Park transmissions quite easily, at a distance of only 14 miles!

This is really a feat which we only expect from crystal sets which have been very specially designed for exceptionally high selectivity, and the present one wasn't. It was intended solely as a simple type for the man who likes to make everything himself at a very moderate outlay.

### Neat and Easily Made.

Its particular virtues were to be an unusually neat and interesting method of assembly, very low cost and extreme simplicity, both in circuit and construction. The circuit used, while probably the best of all the simple types, is not expected to be super-selective.

It gives somewhere about the best selectivity which can be got from a simple circuit, but when tested under the drastic conditions we have mentioned there is normally a little overlap between the Brookmans Park transmissions. As a

matter of fact, it is only very special crystal circuits which do *not* give this overlap under these conditions unless a "Brookmans Re-jector" is used.

Why, then, the behaviour of the "Crystatube"? It seems to have been due to three things. First, one of the tappings happened to suit the particular aerial very accurately. In other words, it gave a degree of coupling exactly weak enough to give maximum selectivity without undue loss of strength.

Secondly, the coil was of unusual efficiency. Note its large diameter and rather robust gauge of wire. The third factor was the crystal detector, which seemed to be a rather unusual specimen. On replacing it with another (of the same type) signal strength improved a trifle, but the selectivity went down perceptibly, and very slight overlap occurred between the two Brookmans Park transmissions.

### Where to Use It.

We are really telling you about this peculiar affair because most people are interested in such happenings, especially when a circuit as ridiculously simple as the "Crystatube" is concerned. We do not think we should be justified in claiming on the strength of it that the set is suitable for use in the "agony area" in a radius of some 12 to 15 miles round Brookmans Park.

The little receiver was certainly not meant for this difficult locality unless a rejector is used. It was intended to be an interesting, easy and economical job to construct, and to give excellent strength with just the amount of selectivity needed in the outer areas, and, of course, in those places where there is only one local transmission to be considered.

So far as results are concerned you must take our word for it that it does its work really well, but its other claims you can judge for yourself when you have had a look at the photos and diagrams. Pretty simple and neat, isn't it?

It is built on an interesting plan, too, for there is no panel

or baseboard and no ordinary tuning condenser. Instead, one of the very inexpensive compression-type condensers is used for tuning, and the whole receiver is assembled on the piece of tube on which the coil is wound. (Hence its name.)

All terminals are mounted in the wall of the tube, and so is the crystal detector, while the condenser is carried on a little wooden strut fixed across the upper end of the tube. It is a wonderfully easy set to

### THE FEW PARTS REQUIRED.

- 1 Piece of insulating tube, 4 in. diameter and 3 in. long (Pirtoid, or other good material).
- 1 Semi-permanent crystal detector (R.I., or Red Diamond, Brownie, etc.).
- 1 Compression-type adjustable condenser, .0003 mfd. (max.) if local station works on wave-length below 400 metres; .001 mfd. (max.) if it works on wave-length above 400 metres (Formo, or R.I., Lissen, Leweos, Polar, etc.).
- 6 Small terminals, 2 oz. No. 24 D.C.C. wire, piece of wood, two screws, a little wire for connections.

### HERE IT IS—COMPLETE!



The only adjustments necessary are those of the little compression condenser and the crystal detector, and yet the set is wonderfully effective.

make (you can finish it easily in an evening and have time to test it thoroughly as well) and when it is done you will have something very novel-looking to show your friends.

A run over the little circuit will tell you how it works before we begin on the constructional side. Note first that there is a single coil winding, of which the bottom end is earthed.

### How the Aerial is Coupled.

There are three tapping points on this to which the aerial can be connected, so giving what is called "auto-coupling." The choice of three different degrees of coupling enables you to suit your particular conditions nicely, and you should try each alternative aerial point (A<sub>1</sub>, A<sub>2</sub>, and A<sub>3</sub>) in turn, noting which gives the best results. Remember, though, to re-tune on the condenser each time.

The tuning condenser is connected across the whole coil in the usual way, but the crystal and 'phones are tapped across only half of it, to obtain both better selectivity and better volume. Observe that the crystal is wired to the third aerial tapping point,

(Continued on next page.)

## THE "CRYSTATUBE"

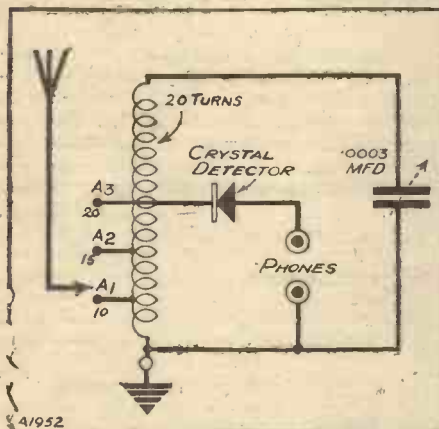
(Continued from previous page.)

which happens to be the centre of the coil. (This particular aerial tap is likely to suit small aerials best.)

Now to make a start. You want first of all a piece of coil former 4 inches in diameter and about 3 inches long. Round the upper edge of this mount six terminals in the positions shown in the wiring diagram. The set will look neater if these are rather small ones, although the pair for the 'phones must be big enough to grip the tags properly.

Next fit the wooden strut to carry the compression condenser. This goes cross-

### A CIRCUIT SUCCESS



By "tapping" the crystal down the coil at a certain definite point selectivity with added power results.

wise in the upper end of the tube, and is secured by two small screws which pass into its ends through the wall of the "former."

The last step in the fitting-up is to drill the hole for the crystal detector and see that it fits comfortably therein. The correct location for this hole is one inch down from the upper edge, in a position you can get sufficiently accurately from the wiring diagram.

Do not at first fit the detector, however, because it would be in your way while winding the coil. Just see that it fits properly, and then put it by for attachment later on.

Now the winding of the coil. This is a very easy job, so don't be alarmed by the idea. You want a little No. 24 gauge double cotton covered wire, and a 2-oz. reel will be ample.

#### Winding the Coil.

First prick two small holes in the tube about  $\frac{1}{4}$  in. from the lower edge, and about  $\frac{1}{4}$  in. apart. They should be located immediately beneath the "E" terminal, which, of course, is on the upper edge of the tube.

Now take the wire and push the end in through one hole and back out through the other one. Then push it in through hole number one again and leave it sticking out inside to a length of about 3 in.

You are now ready to begin winding, and this you do in a single close layer, i.e. with the turns touching and close side by side. Even if you have never wound a coil

before you will find it quite easy with so thick a gauge of wire.

When you have put on 10 turns you have to make the first tapping, and this is very simple, too. Stab a hole in the tube under the 10th turn with a bradawl or other pointed tool, make a loop in the wire and push it in through the hole.

Draw the loop up inside the tube and clamp it under the back nut of terminal A<sub>1</sub>, scraping off the cotton before doing so, in order that a proper connection may be obtained. Before clamping, too, pull the loop up tight so as to hold the 10th turn firmly.

Now carry on winding for another five turns, and make another tapping exactly as before, taking the loop to terminal A<sub>2</sub> this time. Proceed again for another five turns, and tap again, to terminal A<sub>3</sub>.

This is the last tapping, and when that is done you have just to wind on a further 20 turns without taps and the coil is done. Secure the finishing end just as you did the beginning, leaving 3 in. of wire sticking through inside the tube.

As a check, here are the actual turn numbers of the various points on the coil. First tap at 10 turns, second at 15, third at 20, total number of turns 40.

#### Quick and Easy Wiring.

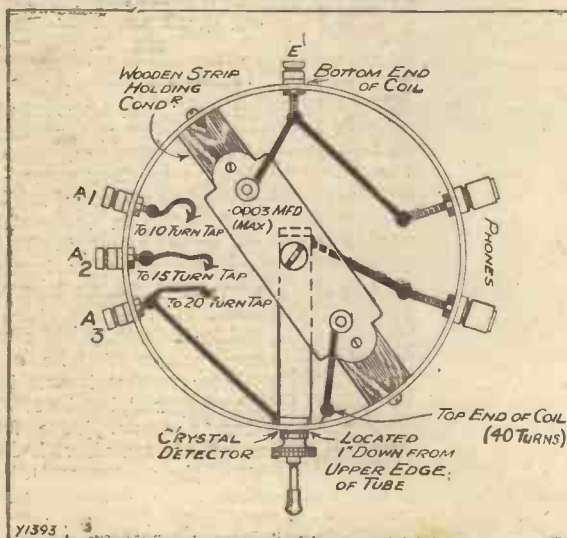
Now fit the crystal detector in place, and you are ready for the wiring process. This will only take you a few minutes, and the wiring diagram makes it all pretty clear.

It may be helpful to have the work described in words as well, however, so here you are. First join the beginning (lower end) of the coil to the E terminal, then wire this terminal also to one 'phone terminal and one side of the condenser.

Join the upper end of the coil to the remaining side of the condenser, then wire one side of the crystal detector to the remaining 'phone terminal. This connection is not too easy to get at, but you will be able to manage it if you turn the set upside down.

Finally, connect the remaining side of the crystal detector to the A<sub>3</sub> terminal and the job is done. That didn't take you long, did it?

### ALL ON THE FORMER



The coil former carries the components as well as the special tapped coil winding.

Now we really ought to give you some "operating instructions," but the set is so simple there is really mighty little to say. Just hitch up the 'phones and the earth lead, put the aerial on A<sub>2</sub>, and tune on the condenser. Having got your signals, try re-adjusting the crystal; draw the knob outwards, give it a quarter of a turn and let it go back gently, and repeat if necessary. Always draw the knob out before rotating it.

Now try the aerial on A<sub>1</sub> and A<sub>3</sub> in turn, re-tuning each time, and so find which gives the best results. That's really all, and it just remains to enjoy the fine reception you are bound to get so long as you have anything like a decent aerial.

## POWER DETECTORS.

JUST recently quite a lot has been heard about power detection, and a certain mystery seems to surround what is often considered an entirely new method of rectifying H.F. Actually there is nothing particularly unique about the scheme.

Strictly speaking, any detector valve which will handle a very large radio-frequency input, and is capable of giving a considerable power output, is a power detector. The valve may work on either of the two common forms of rectification—namely, leaky-grid condenser or anode bend.

In order to get a high magnification in a power detector, and also to obtain a large grid-volts base, a high value of H.T. is employed. It is also usual to employ a low impedance valve so as to be sure that a large grid-swing can be handled without distortion.

#### What it Means.

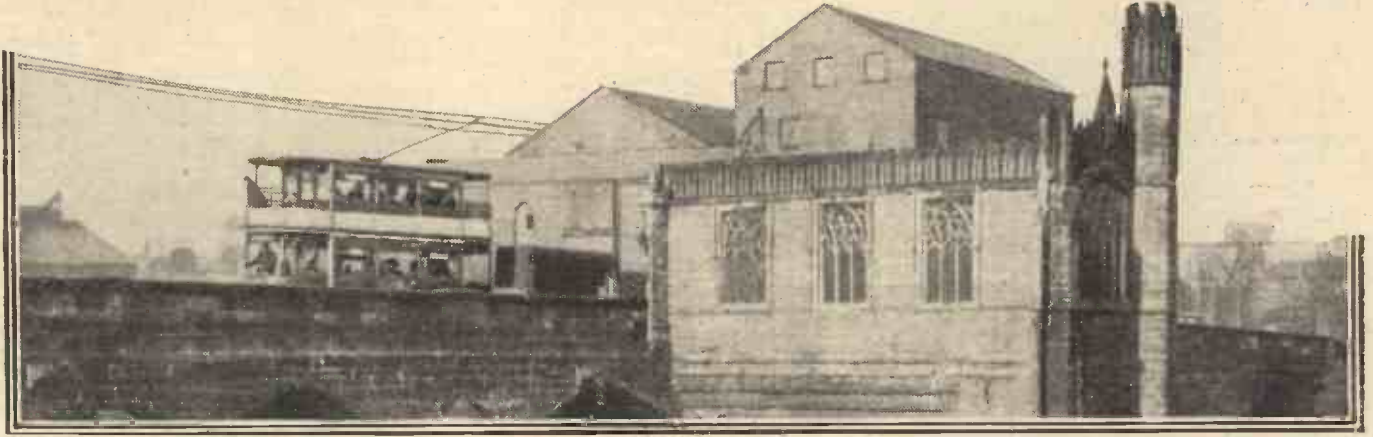
It is sometimes assumed that it is from the latter fact that the name of "power detection" is obtained. In reality the term originated in an altogether different way.

This type of detection was first used in loud-speaker sets with only one L.F. stage, and because there was only one audio amplifier (the output power valve) it was necessary for the detector valve to have a large output. Otherwise the power valve would not have been properly loaded up.

The expression "power detection" was thus applied to a detector valve with sufficient output to load up the power valve.

Power detection is most useful when powerful H.F. stages are used and great volume is desired. Particularly does this apply where local station working is concerned. One of its chief drawbacks is a difficulty of obtaining a smooth reaction control with it.

# PARASITES of the ETHER



**T**HE reach of a modern multi-valve set, using screened-grid amplification, is now limited solely by the electrical "unrest" of the atmosphere. The wider the range, the greater becomes the intake of atmospherics, until the general level of "noise" drowns out the more distant signals.

Luckily such disturbances are not so prevalent here as in the tropics, where a continual succession of crashes, bangs, and rattles often renders ordinary reception quite impossible for hours at a time. In any locality, however, atmospherics are usually more troublesome on the long waves than on the short. They prefer the summer time to winter, and are subject to peculiar variations at sunrise and sunset.

## How the Name "X's" Arose

Here is how Dr. Eccles describes a typical experience:

"Starting to listen about half an hour before sunrise, the strays are loud and numerous—much as they have been all night. About fifteen minutes before sunrise they get weaker and fewer, rather suddenly, until a lull sets in, which lasts for perhaps a minute. They reappear in force, and within ten minutes they have settled down to a steady roar. Usually the day disturbances are fewer and weaker at night, except on rare occasions."

In the early days of wireless, when signals were recorded on a Morse inker actuated by a coherer, atmospherics were responsible for irregular and quite unintelligible markings on the tape, which, because of their mysterious and unknown origin, were called X's. Subsequently they were variously known as "static," "strays," and "sturbs," whilst other and much less polite names have been applied to them from time to time by harassed wireless operators struggling to keep touch with some distant signals through the prevailing din.

## Clicks and Grinders

On a somewhat more systematic basis they can be classified as grinders, clicks, and hisses. "Clicks" are due to definite atmospheric discharges, more or less distant; whilst "hisses" are caused by an intermittent flow of current through the aerial, when it taps a point of high atmospheric potential. The term "grinders" covers all the other miscellaneous noises.

\*-----\*

Ever since the birth of radio investigators have been trying to discover the secret of atmospherics, and the extraneous noises which often interrupt reception. "Man-made" static, too, has come in for a great deal of attention, and the results of recent researches are given in this interesting article

By J. C. JEVONS.

\*-----\*

To understand the origin of atmospheric disturbances one must regard the earth as being surrounded by a sea of so-called "static" electricity. If it were really "static" in the sense of being "quiescent," all would be well. Actually, there are continual dynamic discharges taking place in the atmosphere, and these cause all the trouble.

## NATURE'S BIG NOISES



Crash! Crash! Radio reception is drowned as the great lightning flashes send out their unwelcome broadcasts. This photo shows two of Nature's "big guns" in action.

The potential gradient in the sea of static, moving upwards from ground level, is approximately 100 volts per metre. This, of course, implies a corresponding charge of electricity on the surface of the earth. Interchanges take place between the earth charge and the surrounding sea of "static" whenever any change occurs in the prevailing meteorological conditions.

## The Effect of Snow

During fine weather there is usually a downward positive current, tending to neutralise a positive charge on the surface of the earth, whilst during bad weather, currents may flow in both directions.

When rain moisture, for instance, is first precipitated in tiny drops, the latter acquire the potential of the atmosphere at that particular spot. As they form into a cloud the tiny drops coalesce into slightly larger drops, and the capacity of each diminishes. However, since the original charge is retained, the potential increases, and is communicated to the cloud, which, in this way, accumulates an excessive charge.

Similarly, a fall of snow will cause a redistribution of atmospheric electricity. Or a current of warm or cold air may have the same effect. Sometimes the resultant potential differences between the surface of the earth and a charged cloud (or between one cloud and another) becomes so intense that the voltage breaks down the insulation, and a lightning discharge takes place.

## Nature's High Power

Broadly speaking, however, every factor which tends to upset the static equilibrium is quickly followed by corresponding electrical movements tending to restore equilibrium. All such movements are liable to affect a sensitive wireless receiver and create "noise" in the set.

It has been calculated that an average flash of lightning, two kilometres long, discharges a current of 20 coulombs in about the one five-hundredth part of a second—representing an average current of 10,000 amps. By comparison a modern high-powered transmitter will feed, say, 500 amps. into an aerial 800 ft. long, and has an effective range of some 20,000 miles or more.

The lightning flash, whilst it lasts, is 200 times more powerful than the transmitter, so that there is little wonder that

(Continued on page 352.)

# THE WORLD'S BIGGEST BROADCASTER.

An Account of a Visit to Europe's Super-Station.

By P. R. BIRD.

**SOMEWHERE** on the high seas, pitching and tossing and rolling, is the most powerful broadcasting station in the world. It is going to Poland!

It does not look much like a broadcasting station at the moment, for all the outward and visible signs of it are about three hundred cases, snugly stowed away in a hold of a cargo steamer. But on that ship are half a dozen wireless engineers, going out with the gear, and as soon as they arrive with those boxes in Warsaw things are going to hum!

## "Poland's Super Poles."

For Poland is to possess the premier broadcasting station in the world. No longer will the Poles have to strain their ears to pick up programmes from the weak little Warsaw station, or stretch their ears to get crackles from Cracow. And no longer will the powerful Russian station across the border fling out their propaganda programmes and jam the local items.

Twelve miles from Warsaw, on a little plateau near the town of Rasin, stand the two highest broadcasting masts in the world. They tower up to the sky for 600 ft.—Poland's Super Poles. Beneath them lie the station buildings waiting for the consignment of crates and cases which contain the new station, made in England at the Chelmsford Works of the Marconi Company.

This new super-station is to be ready by Christmas, and will work on 1,411 metres. Some idea of the station's importance can be gained from the fact that whereas Daventry 5 X X—our own high-power station—radiates 35 kw. in the aerial, the new Warsaw station is to have an aerial power of 160 kw.

The only other broadcasting station in the world planned to provide power anywhere near this figure was at Bound Brook, New Jersey, but the Americans admit that this station is a failure. Poland, however, is going to be a success.

Before it was packed up for the voyage I ran down to Chelmsford to see the station undergo its final tests. It was an impressive sight.

## An Electrical Triumph.

As we passed through the works where this triumph of British engineering ingenuity was born I caught glimpses of aeri-als of every conceivable sort, leading from all sorts of inconceivable places, and heard the subdued hum emanating from 5 S W, the British Empire short-wave station, which is situated there.

And then I entered a long, low building where a man was leaning up against a huge valve, and looking reflectively at half a dozen huge cabinets lined along the room.

Those cabinets, linked by mysterious-looking wires, were the world's most powerful broadcasting station, on test. And

the pleasant-voiced, keen-eyed man looking at them was Mr. W. T. Ditcham, the engineer who designed them.

I asked him to tell me about the station, and here came another surprise, for he made this modern marvel seem the simplest thing in the world. He turned to each cabinet in turn, opened the doors and showed me what it contained, and told how it worked with such delightful diffidence that it was only as the facts began to soak in that one realised one was seeing

first in the modulation amplifier, next in the intermediate amplifier, and then by the final power stages.

Superficially the station is very similar to Brookmans Park, but the phenomenal power calls for many special safeguards.

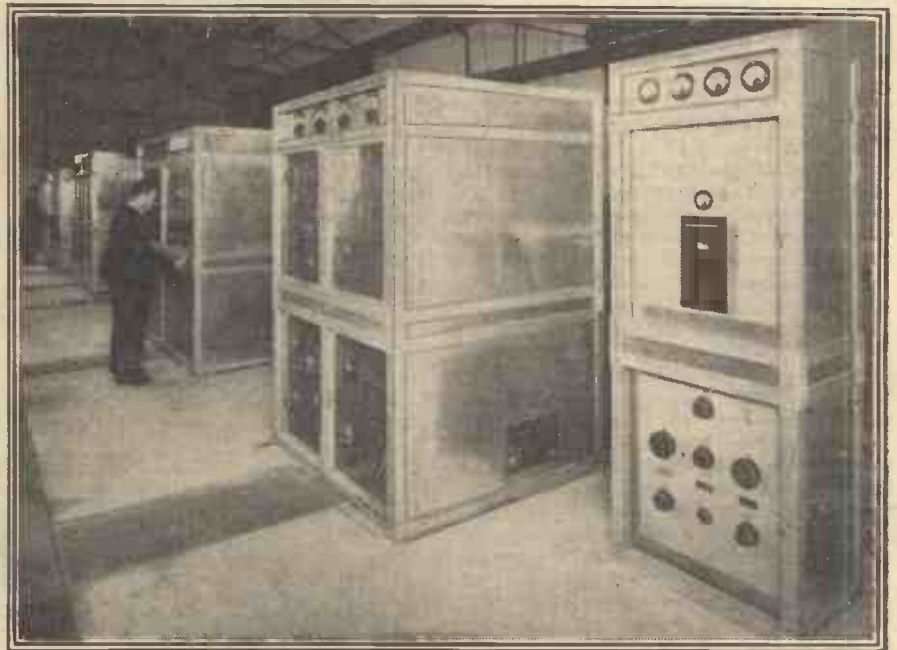
There was, for instance, the "bobber." It was a queer little contrivance bobbing about in a thick glass tube with water pouring past it. And it transpired that it was a sort of sentry, to show that the water cooling the valves was circulating through its pipes properly.

## Water-Cooled Filaments.

Just beside it was another gorgeous little gadget which tested the temperature of the water, and if this should get too hot through any fault it pressed a buzzer and lit a lamp to show the engineers what was wrong!

For several years it has been the practice where high power was employed to cool the anodes of the valves. But Poland's new station has the distinction of having the first *water-cooled filaments!*

## NOT MUCH TO LOOK AT—BUT FULL OF PEP



Poland's new station is to employ the enormous power of 160 kw.—nearly five times as much as 5 X X! It should be picked up very easily in this country, and is due to start on Christmas Day.

a triumph of engineering. There has been nothing like this station before!

In the photograph on this page you will see the six cabinets, plain, and unostentatious, but packed with problems that have been surmounted. The first one is the master oscillator, with a huge tuning coil and an oh-so-silky condenser, contained in a chamber that is thermostat-controlled so that variations in temperature will not throw out the tuning.

## Controlling Wave-length.

There are three ways of controlling the wave-length and keeping it steady, a valve being at present in use, with provision for a tuning fork if required. Or a quartz crystal can be clipped in any moment if desired.

The aluminium cases completely screen one stage from another to prevent interference, and so the programme is stepped-up,

Six of these valves were running in the amplifier, two more acting as stand-by in case of accidents. And each valve is worth £500.

By the time I had seen the power house, rectifying valves, etc., I thought that the marvels were finished, but the queerest of all was to come. The engineer led us to the large open-air tank where the specially softened water that is pumped round to cool the valves is stored.

Picking up a cigarette tin he started to thump the stone sides of the tank with a rhythmic tattoo, gazing earnestly at the water, and within two minutes I saw—why—Goldfish!

Goldfish! Dozens of them, and not little ones, but huge fellows as red as post office pillar boxes, all answering the call to dinner. It appears that this specially softened water, warmed by the valves and continually circulating, is a perfect paradise for gold-fish!

# RADIO IN PICTURES

By "PENTODE."

In his second article of a novel and fascinating series our popular contributor describes a simple valve circuit, and shows you how to correlate the theoretical diagram with a practical "hook-up."

(2) A VALVE DETECTOR CIRCUIT.



**T**HE slight discrepancy between the theoretical diagram and its pictorial drawing, to which I referred last week, is to be found in the L.T. battery. Theoretically, it is represented as two cells, but in the picture there is only one.

I introduced this minor error for a very definite reason. The low-tension battery's symbol on a theoretical diagram varies between one and three cells, and it is just one of those things which you must not read too literally.

If a circuit has only the one short stroke and the one long stroke in its L.T. symbol, it does not necessarily mean that that circuit will work only with valves of the 2-volt variety.

On the other hand, a three-cell L.T. symbol does not confine the application of the circuit to valves of the 6-volt class. I am taking it for granted that you know that each accumulator cell gives you 2 volts, and that when they are joined in series (that is, with the one negative terminal of one cell joined to the positive terminal of another and the negative of the second to the positive of the third), the result is the sum of the individual voltages.

Our first picture this week shows the addition of a pair of telephone receivers and an H.T. battery to our valve. "H.T." means high tension, or high voltage, and an H.T. battery is composed of a comparatively large number of cells joined in series.

**Inside the Valve.**

Its theoretical symbol shows two cells joined by a dotted line, and this stands for an indeterminate number of cells.

If you look at the theoretical part of our first picture you will see that we now have two complete circuits. First of all, there is the filament circuit comprising the L.T. battery and the filament of the valve.

Next we have the plate circuit or anode circuit. The plate or anode of the valve is connected to the one terminal of the pair of telephone receivers, the second terminal of these is joined to the positive of an H.T. battery, and the negative of this is joined to the filament.

Apparently, there is a break in this circuit between the plate of the valve and the filament, but this is not really a break when the L.T. battery is switched on, and is making the filament hot. The result of such is that a stream of electrons, which are particles of electricity, are thrown off the filament and pass from this to the anode in a steady stream.

These electrons form a connecting bridge and so current can flow from the H.T. battery through the valve to the plate and telephone receivers.

The amount of current that flows in the circuit will principally depend upon two things. The first is the voltage or electrical pressure developed by the H.T. battery; and the second, the size of the electron stream or bridge connecting the filament and plate of the valve internally.

**What the Grid Does.**

H.F. and detector types of valves have smaller "electric emissions" than the power or super-power valves that figure in the L.F. stages. But that is quite by the way, and it is hardly probable that you are yet able to see the significance of that.

You will notice that the anode of the valve, which is represented by a thick horizontal stroke, is separated from the filament by a dotted line. This is the symbol for the grid.

The filament is merely a short length of wire made of special metal so that electrons can be emitted at a low temperature, and the grid is a kind of metal mesh that surrounds it. Enveloping the whole is the metal anode

or plate. Thus you can see that all the electrons passing from the plate must get through the grid.

If we put electrical charges on the grid of the valve it will interfere with the passage of electrons passing from the filament to the plate. That is tantamount to altering the current flow in the anode or plate circuit.

It is obvious, then, that we have an arrangement suitable for coupling to the aerial tuning described in the first part of the last article. We can lead the energy from this to the valve grid. But if we couple the tuning circuit direct to the valve circuit shown in the first picture this week, the result will be merely to alter the current flowing from the H.T. battery at a frequency corresponding with the high frequency of the energy of the tuning circuit.

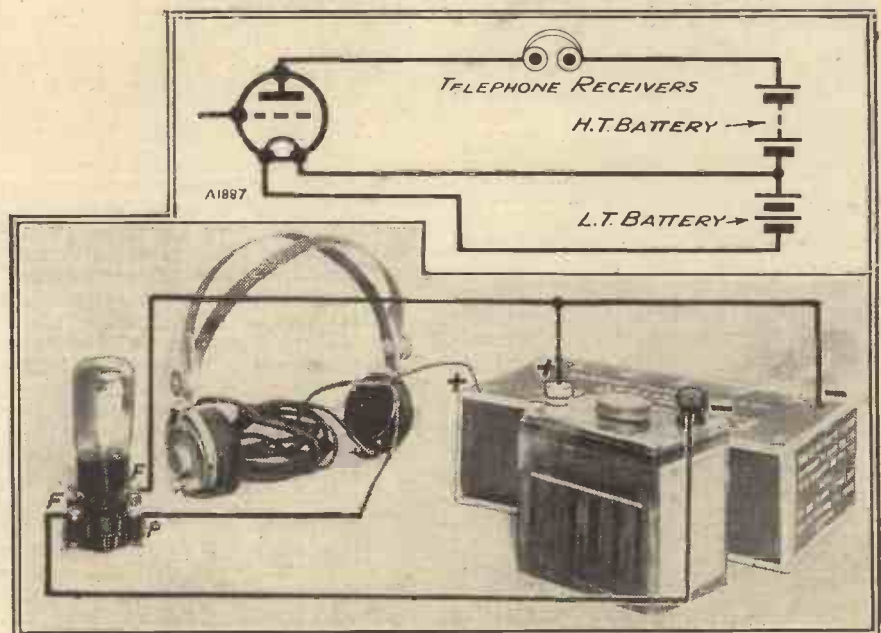
**"Disentangling" L.F.**

The telephone receivers would fail to respond, but we can entirely change the conditions by interposing two little items—a grid condenser and a grid leak, and these are shown in the second illustration.

These two components render it impossible for the charges on the grid to retain all their H.F. properties. The low-frequency form, corresponding with the vibrations of

(Continued on next page.)

**AND NOW FOR THE H.T.**



In this illustration two complete circuits are shown. There is the L.T. circuit comprising the accumulator and the filament of the valve. And the anode, or (as it is sometimes called) "plate," circuit, embodying the H.T. battery and telephone receivers.

## RADIO IN PICTURES.

(Continued from previous page.)

the speech and music built into the high-frequency current at the broadcasting station, affect the grid, and so the H.T. current varies in such a way that the telephone receivers emit sounds.

The grid condenser is a small fixed condenser (that is to say, unlike the variable, you are unable to alter its capacity), having a value of about .0003 mfd. The grid leak is merely a very high resistance. Two megohms is the usual value for this, a megohm being one million ohms.

### The Detector's Duty.

Usually, the grid leak is constructed of a special composition material. It should be noted that to get the best results it is necessary carefully to team up the values of the grid condenser and the grid leak. With a given grid condenser it is not advisable to vary the value of the grid leak to any great extent.

For the benefit of those readers who have a trifle of radio knowledge I am going to

filament are alternatively made positive and negative in relation to each other as the H.F. energy oscillates in the tuning circuit. Meanwhile, there is a very small current flow from the grid of the valve through the grid leak to the filament. This is due to a diversion of the filament-anode electron stream.

The grid current will vary as with the variation of the grid potential. But the variation will not be equal. There is, as we say, a "bend in the grid current curve." Above a certain value of grid voltage of a negative character the grid current rises more rapidly.

The conditions in a normal valve detector circuit are such that the grid current value is situated somewhere near that point of bending when the grid is neutral. Thus you see that the one half-cycle of the H.F. energy will cause a greater increase in the grid current than the other half-cycle will cause a decrease. When the H.F. current is flowing in the one direction the grid current is affected more than when it is flowing in the other direction.

So you have much the same sort of thing as happens when you interpose a detector in a path offered to H.F. energy. With the grid current rising further than its fall

suit, and so the telephone receivers get the low-frequency impulses necessary for their operation.

Nevertheless, there is an H.F. element in the anode circuit because the low-frequency current, you must remember, is derived from distorted H.F. That is, H.F. that is reduced in its effectiveness during its flow in the one direction.

It is a very sticky little point to grapple with, but it is essential that you should remember that one fact—i.e. that the L.F. current impulses flowing in the anode circuit of our second illustration still carries with it a certain amount of H.F. characteristic.

It is essential that you should remember that, for the simple reason that unless you do you will be totally unable to tackle the subject of reaction next week.

I want to make it clear that I am not endeavouring to cover the whole theory of radio in this short series of articles. That would be impossible.

### From Aerial to Phones.

Provided that you have the power to "line up" theoretical with practical diagrams, and you have a fair inkling as to what the various components do, you will be armed with quite sufficient knowledge to read practically any "P.W." article intelligently.

The second of this week's illustrations—as by now, I hope, you know—represents a complete one-valve receiver. You have a tuning circuit, consisting of the coil and condenser, that in conjunction with the aerial enables you to select the one station you wish to receive.

Tuned to the wave-length of this station an H.F. energy is developed. This, in the form of a very small current, oscillates backwards and forwards at the rate of something in the neighbourhood of a million times per second.

The tuning circuit is directly connected to the valve, and the energy in it influences the grid of the valve, and this in its turn varies the high-tension current—the current that flows from the H.T. battery through the telephone receivers.

### Those Low Frequencies.

Inasmuch as the valve, with the aid of the grid leak and condenser, makes that part of the H.F. current that flows in the one direction more effective than the other, you get a low-frequency effect in its anode circuit. For that reason a valve used in this way is known as a detector valve.

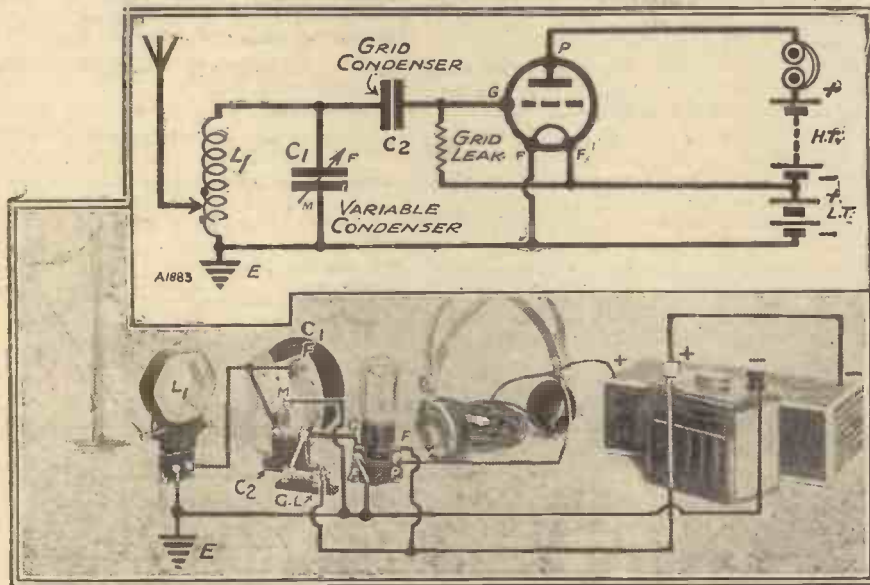
Now just a few words about "low frequency," in case you are not quite clear about it. A low-frequency current is one that varies in its strength, or in the direction of its flow, at a frequency of anything up to 10,000 or 15,000 times a second, as against a million or so of H.F. current.

Speech and music are air vibrations. The frequency of a musical note decides its pitch. Thus a vibration of 256 per second will give you the note of middle C on the piano.

If there were a current in the anode circuit of our detector valve varying in strength 256 times a second, the result would be that the diaphragm of the telephone receivers would also move at this frequency.

They would set up an air wave of 256 vibrations per second and thus reconstitute a musical note.

## A COMPLETE VALVE RECEIVER.



The tuning system is now coupled to the valve, which, with the assistance of the grid-leak and condenser, can operate the telephone receivers.

briefly summarise the action of the grid leak and condenser. Many constructors, even those who are able successfully to build complicated multi-valve receivers, never trouble to go deeply into the theoretical side of radio; and to understand such things fairly well I do not think it is essential that they should.

Nevertheless, inasmuch as the operation of the grid condenser and grid leak are particularly interesting, and many correspondents have written to me asking for an explanation of it, I am going to divert a little for that purpose.

Those who wish only to line up theoretical with practical radio need have no compunction at all in skipping the next few paragraphs.

The grid condenser forms no bar to the high-frequency energy, so that the grid and

from a certain point, you alter its average value, and as the H.F. energy itself is altering in value at a low frequency, it is obvious that the grid current will do this also, although, mark you, the grid current is flowing only in the one direction.

With the grid current altering its value, the outcome is that the potential of the grid itself, in relation to the filament, varies similarly and with a low frequency.

### In the Anode Circuit.

You see, Ohm's Law says that voltage equals resistance multiplied by current. The resistance of the grid leak is a fixed value, but as the current that flows through it varies, so the voltage across its terminals also varies.

With the grid-filament potential varying at low frequency the H.T. current follows



# C.P.C.

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long life to the  
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The Lissen Battery lasts longer because it has the greatest "Current per cell" content. The big and powerful cells will go on pouring out their energy for you month after month. And all the time the current is pure—silent in its flow, without ripple, without hum. You will notice that the Lissen Battery keeps loud-speaker utterance natural and true.

*Big "Current per cell"—you get that from every cell of the Lissen Battery. Ask for "Lissen New Process Battery" by name. 10,000 radio dealers sell it, but ask for it firmly.*

## on "current per cell" Lissen scores every time!

<b>60</b>	<b>7/11</b>	<b>100</b>	<b>12/11</b>
<b>VOLT</b>		<b>VOLT</b>	
60 volt (reads 66)	7/11	60 volt (Super Power)	13/6
100 volt (reads 108)	12/11	100 volt .. ..	22/-
120 volt .. ..	15/10	4½ volt Grid Bias	10d.
36 volt .. ..	4/6	9 volt .. ..	1/6
60 volt (For Portable		16 volt .. ..	2/9
Receivers) 7/11		4½ volt Pocket Battery	
59 volt (For Portable		5d. each (4/6 doz.)	
Receivers) 12/6		Single Cell Torch Battery 4½d	



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**3-in-1 TEST METER WITH POLYSCOPE**

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**DETECTS  
MEASURES  
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**TEST PLUG FOR VALVES**  
**RULES OF COMPETITION:**

Tear from the carton of a WATES 3-in-1 Meter the side which illustrates the meter and from the WATES Polyscope carton the side which reads "The efficient fault finder," and enclose in your letter, describing the new test you have discovered on your Radio set and carried out with WATES instruments.

One test plug only given to each competitor, and the decision of the Company is final and binding.

**COMPETITION CLOSSES SATURDAY,**  
**15th NOVEMBER, 1930. SEND YOUR ENTRY TO—**

There are many other useful tests which enable you to get the best out of your set  
**CAN YOU DISCOVER ONE?**  
Then enter this interesting Competition

The introduction of the wonderful little instrument known as the WATES POLYSCOPE has increased the usefulness of the famous original WATES 3-in-1 Meter enormously. Now, it is a simple matter to make many essential tests on valves, to read all voltages of batteries, to test resistances, shorts, and in fact every Radio test you can desire.

Below is our recognised list of tests you can make. Buy your WATES Meter and Polyscope to-day, and see if you can use them for any other useful tests, and win one of the WATES Test Plugs—Free! Now is your chance to learn how useful the WATES Testing Instruments can be and obtain a free gift of great utility for getting the best out of your set.

Obtainable from all Radio Dealers; or, if any difficulty, apply direct.  
**THE STANDARD BATTERY CO. (Dept. P.W.), 184/188, Shaftesbury Avenue, LONDON, W.C.2.**

**THESE ARE THE 50 RECOGNISED TESTS**

- |  |   |  |   |
|--|---|--|---|
| 1. Measuring Resistance between 50 and 2,000 ohms.                                     | sockets and terminals, and for short-circuit between sockets. | 23. Metal Panel Leakage.                 | 37. Broken Leads in Telephones, Battery Leads, etc., etc. |
| 2. Internal Short-Circuit in Valves.   | 11. Centre Tapped Coils.                                      | 24. Remote Control.                      | 38. Lightning Arresters.                                  |
| 3. Insulation of Condensers.   | 12. Continuity of Winding on H.F. Chokes.                     | 25. Plugs.                               | 39. Moving Coil Loud Speakers.                            |
| 4. Plug-in Coils, 2-Pin.   | 13. General Wiring of Set.                                    | 26. Testing Other Meters.                | 40. Wave Traps.   |
| 5. Short-Circuit in Variable Condensers.   | 14. X Coils and DX Coils.                                     | 27. Earth Leakages.                      | 41. Potentiometers.                                       |
| 6. Continuity of Coils of Wire or Set Wiring.  | 15. Switches.   | 28. Jacks.                               | 42. R.C.C. Stages.  |
| 7. Six-Pin Plug-in Coils.  | 16. As a Linesman's Detector.                                 | 29. Armature Windings.                   | 43. Grid Leak Holders and Grid Leads.                     |
| 8. Testing for Short-Circuit.  | 17. Aerial Coils.   | 30. As Accessory to Wheatstone's Bridge. | 44. Testing Radio Telephones.                             |
| 9. Testing High Resistance Break in Flexible Leads.                                    | 18. Microphones.  | 31. Short-Circuit in Fixed Condensers.   | 45. Testing Morse Buzzers.                                |
| 10. Testing Set Components of all kinds, such as Valve Holders, for connection between | 19. Rotary Converter Windings.                                | 32. Loud Speaker Bobbins.                | 46. Testing Morse Tapping Keys.                           |
|  | 20. Induction Coils.  | 33. Rheostats.                           | 47. Spark Coils.  |
|  | 21. Field Windings.   | 34. Transformer Primaries.               | 48. Morse Inkers.   |
|  | 22. Aerial Leakage.   | 35. Volume Controls.                     | 49. Lamp Fuse Bulbs.                                      |
|  |   | 36. Fuses.                               | 50. Testing Radio Telephone Wiring.                       |



Details of a simply-made little unit which enables you to centralise the control of your loud-speaker extensions.  
By G. P. KENDALL, B.Sc.

SOME day, no doubt, we shall all have our houses wired for radio purposes, just as we now have them wired for electric light, electric bells, and so on. What a convenience it will be!

In those happy times we shall presumably have some kind of distributing arrangement beside the set, and from this concealed leads will run off about the house, terminat-

set will be switched through to whichever room the music is wanted in at the moment.

A scheme like this is not such a dream, after all. There is no real reason why you should not fix up something almost as convenient for yourself if you will spend a little time over it.

**Running the Leads.**

With the aid of a supply of twin bell wire, which is not expensive stuff, and some insulated staples, it is not really difficult to run the necessary extension leads about the house, carrying them round skirting boards and under carpet and so on. When you come to count up you will probably find that only two or three extension points will serve your purpose.

Given the necessary system of extension lines, you then come to the question of some kind of distributor. This is a most essential accessory if your extension system is to work conveniently, and it is a gadget of this sort that we are about to describe.

**Quite Simple.**

To make the "Distributor" you want, first of all, a piece of ebonite measuring about 4½ in. by 7 in. and upon this you have to mount twelve terminals, four small sockets, and an ordinary L.T. on-off switch. We are describing the distributor in the form of a little panel, because actually its mounting up and fixing in some convenient position will depend very much upon circumstances.

The under-panel wiring you will be able to follow quite easily from the diagram on this page, but we should draw your attention particularly to the fact that from one of the terminals marked "input" a couple of flex leads are taken off, pass up

through two separate holes in the panel and terminate in small plugs which fit the sockets we have mentioned. These plugs provide you with the necessary distribution switching scheme.

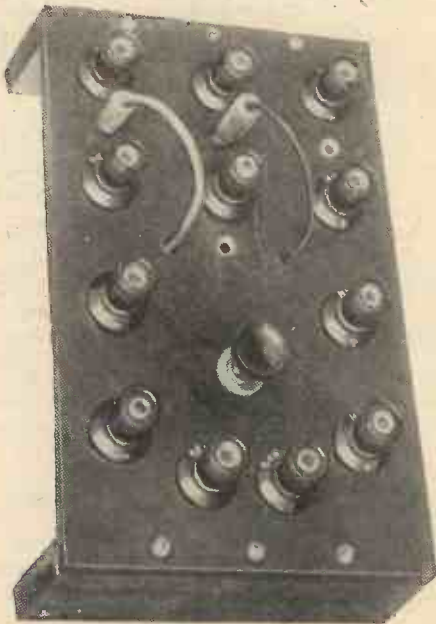
The idea of the unit is that it enables you to switch the output of your set through to any one of the pairs of loud-speaker terminals on the unit. At the same time, it also makes it possible for you to use simultaneously the loud speaker beside the set for tuning purposes, and so on.

**EVERYTHING YOU NEED.**

- 1 piece of ebonite about 4½ in. × 7 in.
- 12 terminals (Igranic, or Belling & Lee, Eelex, etc.).
- 4 small sockets and two plugs (Eelex, or similar type).
- 1 L.T. switch (Lissen, or Lotus, Igranic, Benjamin, Bulgin, etc.).
- A little wire, two pieces of flex and some small screws, etc.

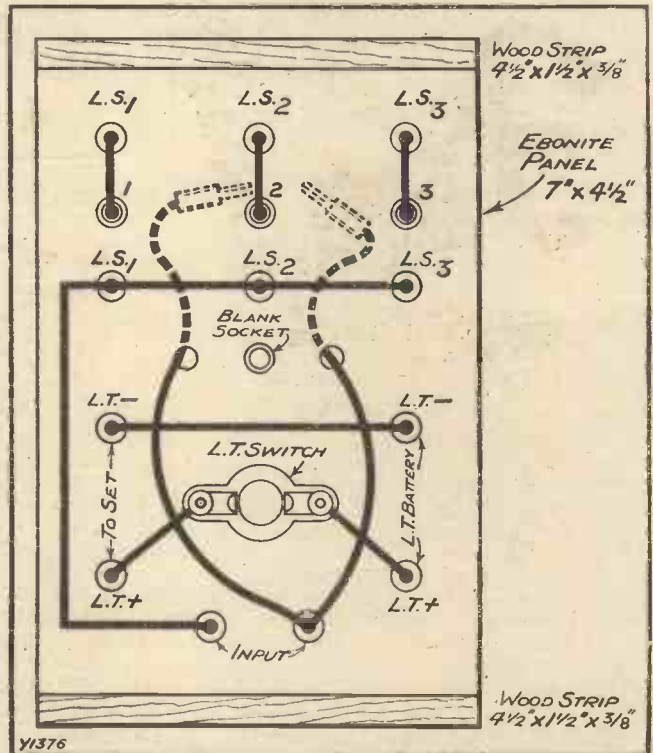
ing in loud-speaker connection points in all the rooms where we are likely to want to listen. Then, by just operating some sort of plug-and-socket device, the output of the

**PRIVATE RELAY EXCHANGE**



A close-up of the control board which enables you to relay a programme to any room desired.

**A USEFUL ADDITION TO YOUR SET**



Here is the wiring, which, as you can see, is extremely simple. The wires which pass through the panel are of flex.

We had perhaps better go into the question of the use of the distributor next. Well, first of all, you should connect up the terminals marked "input" on the distributor to the output terminals of your set, it being understood that the set must have an output filter.

(Continued on page 350.)

## LATEST BROADCASTING NEWS.

**BIRMINGHAM'S  
RADIO REVEL.**

**THE VANISHED VILLAGE—  
"ON THE NAIL"—FILM  
STAR'S APPEAL—ARTHUR  
DE GREEF—PROGRAMME  
MOVEMENTS.**

**T**HERE are thousands of listeners who regret that only one "Radio Revel" has ever been organised by the B.B.C. Many will remember the function, which took place at Olympia, when the old Broadcasting Company, in co-operation with the Faculty of Arts, raised a considerable sum on behalf of the Wireless for Hospitals Fund.

In those days—in 1925—broadcasting was not the power it is to-day, and there must be many people who would welcome an opportunity, such as a gigantic gathering at Olympia would provide, to get better acquainted with our broadcasters.

These thoughts emerge from the news that on Thursday, November 6th, the Birmingham Station is holding a big dance at Tony's Ballroom in aid of charities fostered by the Midland Radio Circle. Scores of radio artistes, as well as every member of the Birmingham staff, will be present, and the programme will be broadcast.

The main object of the evening is to raise the remaining £150 of the £1,000 required to endow another wireless cot at the Birmingham Children's Hospital. The Midland Radio Circle has already endowed one and there is every reason to believe that sufficient money for the second will be handed over before Christmas.

**The Vanished Village.**

There are, of course, talks *and* talks, but one which must surely be looked forward to with interest by all West Regional listeners is in the programmes for Thursday, November 6th, when Mr. George Eyre Evans is to speak on Hawton, the buried village at the mouth of the Towy.

Hawton was swallowed by a terrific tidal wave on January 20th, 1607, a wave which was so huge as also to swamp Cardiff.

In its day the village was sufficiently important to be marked on Saxton's map of 1576, but now only the foundations of the buildings are visible, and then only for a few minutes when the tide occasionally recedes sufficiently.

Mr. Eyre Evans actually stood on the site in 1912, when he carried out investigations for the Royal Commission on Ancient Monuments in Wales. His talk on November 6th will describe what he saw on that occasion.

**"On the Nail."**

In front of the Exchange in Corn Street, Bristol, are four curious bronze pillars bearing inscriptions and arms of their 17th century donors on which, in those days, the local merchants used to pass money and sign documents over business conducted in the street.

These pillars are claimed as the origin of the ready-money proverb, "Down on the nail," which, no doubt, accounts for the

fact that merchants never took kindly to them, and, consequently, transferred their activities to a proper building.

The story of these old pillars will be incorporated in a revue entitled "On the Nail," which is to be broadcast to West Regional listeners on Friday, November 7th.

The revue will be a sort of burlesque of Bristol life, and will also contain scenes of Neolithic, Norman and Elizabethan periods, and the present time. It has been written by Dorothy Worsley and her husband, and the cast on November 7th will include Donald Davies, Glyn Eastman, and Barry Kendall.

**Film Star's Appeal.**

Miss Madeleine Carroll, the famous film star, is to talk to Midland Regional listeners on Sunday, November 2nd, when she describes the work of the West Bromwich

and District Hospital, on behalf of which the Week's Good Cause Appeal is to be devoted.

Before she became as famous as she is to-day, Miss Carroll lived in the Midlands, and only a few years ago she was a student at the Birmingham University, where she took a degree and became associated with amateur dramatics.

She was "discovered" by the film producers while a member of the cast of "The Lash," which was then being presented at Brighton, and she made her film debut in 1927 in "Guns of Loos." This is quite the orthodox manner in achieving film fame, especially when it is remembered that Miss Carroll is still only twenty-three years of age.

**Arthur de Greef.**

Arthur de Greef, the brilliant Belgian pianist, who was a personal friend of Grieg, and is recognised as one of the finest executants of this master's works, is taking part in the Leeds Symphony concert which is to be broadcast to North Regional listeners on November 8th.

**Programme Movements.**

Miss Norah Baring, who has "starred" in both silent and talkie films, is taking the part of Cecily in "The Importance of Being Earnest" when it is broadcast to London Regional and National listeners on Thursday and Friday, October 30th and 31st respectively.

Holt Marvel, whose name cloaks an important official of the Information Staff of the B.B.C., has revised his high-speed revue, "Give Me New York" for its performance for National listeners on Thursday, November 13th.

**LOW POWER—BUT LONG RANGE!**

All continents have been worked (on C.W.) and most of Europe on telephony from this amateur-owned station, at Heathfield, Sussex. It is a low-power outfit (10 watts only), and tests on Sunday mornings (9.30 a.m.—10 a.m.) on 41.88 metres, the music being from a pick-up and amplifier.

**FOR THE LISTENER.**

By "PHILEMON."

A critical survey of some of the recent programmes, with frank comments on the fare provided and the way it is Served Up.

**One Swallow.**

**D**ID my ears deceive me? I had tuned in for the first news a few minutes too soon. Somebody was speaking about Girls' Clubs. She ceased, and a woman's voice—I will swear it was a woman—said, "You have just heard Miss Lena King, Secretary of the National Members' Guild. The weather report and news will follow in a moment."

So the woman announcer has arrived! Or perhaps it was only a hitch. Perhaps Mr. Farrar had suddenly been called out to see a man about a dog. Or was I dreaming? It was a nice voice, a Cecil-Dixony voice. One swallow does not make a summer, but it looks as if the summer of women announcers were "i-cumen in."

She is probably learning at this very moment how to pronounce Polish and Chinese, and how to say, "I beg your

pardon," when she makes a slip. She only made her bow, and the rest of the evening the men carried on. Thank heaven, it was an English voice.

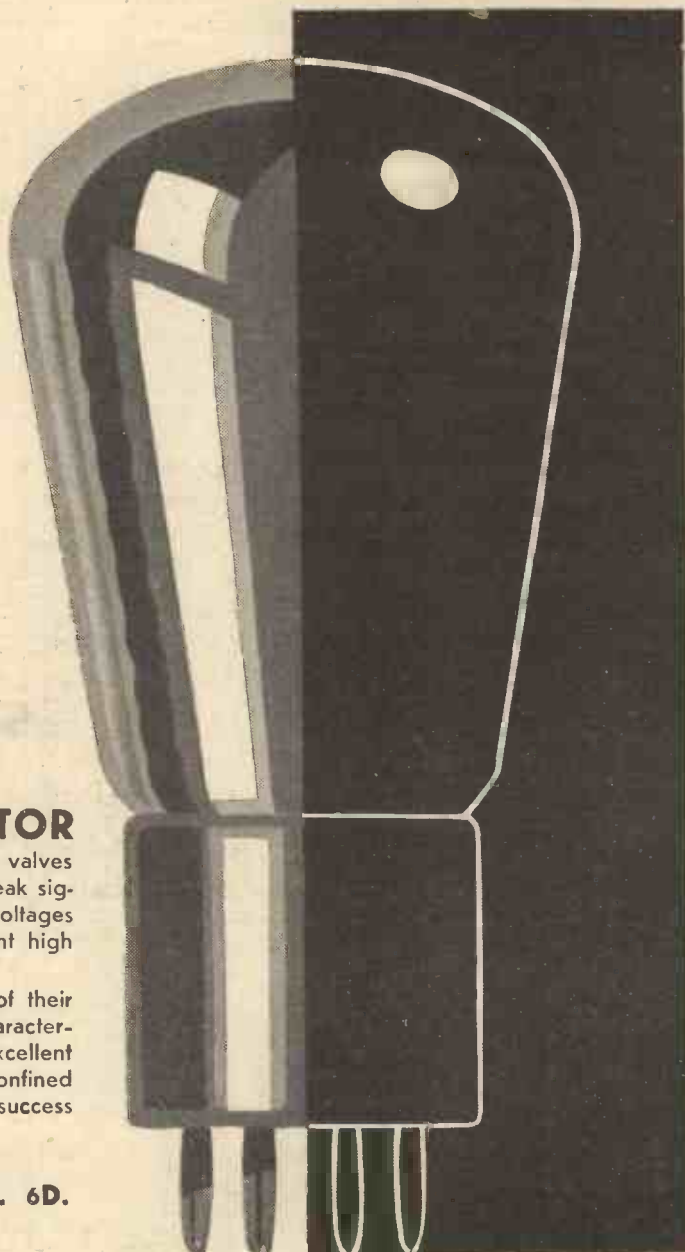
**Dialling.**

Telephones get more and more amusing. I often telephone at a railway station in order to play with Buttons A and B.

Before I put my pennies in, I always press Button B. I got twopence once. And now Mr. Pink has been telling us how to use the Dial.

He didn't tell us what to do when the finger gets stuck in one of the holes. Once I nearly pulled the face off the dial, getting my finger out of chancery. My only objection to dialling is that there is nobody at the other end to "tell off" when I get the wrong number.

(Continued on page 352)



## A SUPER-SENSITIVE DETECTOR

Modern broadcasting conditions demand modern detector valves —valves capable of giving the maximum strength from weak signals yet able to handle without distortion the larger signal voltages obtained in receivers embodying one or more efficient high frequency stages.

The Mullard P.M. series of sensitive detectors, by virtue of their high amplification factors and other efficient electrical characteristics, amply fulfil these requirements and make excellent transformer-coupled detectors. Their use is, however, not confined to the detector stage, for they may also be employed with success as transformer-coupled low frequency amplifiers.

The correct valves to use are:—

2-volt: **P.M. 2DX**; 4-volt: **P.M. 4DX**; 6-volt: **P.M. 6D**.

### P.M. 2DX CHARACTERISTICS.

Max. Filament Voltage	2.0 volts	*Anode Impedance	10,700 ohms
Filament Current	0.2 amp.	*Amplification Factor	13.5
Max. Anode Voltage	150 volts	*Mutual Conductance	1.25 mA/v.

\*At Anode volts 100; Grid volts zero.

**PRICE 8/6**

# Mullard

**THE · MASTER · VALVE**

Advt. The Mullard Wireless Service Co., Ltd., Mullard House, Charing Cross Road, London, W.C.2. Arks



A  
good item  
on any  
programme

*Player's  
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**EDISWAN** W.106



# CAPT. ECKERSLEY'S QUERY CORNER

**CHARGING H.T. ACCUMULATORS—  
THREE TRANSFORMERS — DISTOR-  
TION CAUSED BY A NEIGHBOUR—  
WHEN REGIONAL AND NATIONAL MIX.**

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

### Charging H.T. Accumulators.

J. F. (Ilford).—"I have a battery of H.T. accumulators giving a total voltage of 200. These I charge from my D.C. lighting mains, the charging rate being accurately adjusted to that recommended by the makers by means of a variable resistance and a milliammeter.

"I find, however, that in order to maintain the charging rate at the initial figure it is necessary constantly to readjust the amount of resistance in circuit until finally no further adjustment is possible and, apparently, current ceases to flow. This occurs before there are positive indications of the charge being completed, and I am wondering if I am undercharging the battery.

"The voltage of my mains is 230."

When a battery is being charged the back E.M.F. rises. Thus a run-down battery staggers to give 1.8 volts. You start pumping in juice.

The battery voltage goes up to 2.0, 2.1, 2.2, 2.3, and small batteries even more. So you start charging your battery with 230-volt mains. Your battery gives about 180 volts because it's run-down, and you adjust your resistance so that not too much current flows between 230 volts one way and 180 volts resisting.

But the battery voltage soon rises—200, 220, 230!! And 230-volt mains against 230-volt battery "no can do"!

The simplest way out of it really is to use a 180-volt battery and scrap 10 cells. You'll get enough out of 180 volts, won't you? Or you might try paralleling.

### Three Transformers.

L.S. (Chatham).—"I have on hand a 1.5 ratio transformer which I should like to use in conjunction with my two-stage transformer-coupled amplifier. I have been told by a friend that if I attempt to use three transformers, especially if one of them has a high ratio, there is every likelihood of the amplifier giving trouble.

"Can you tell me, please, whether this is so?"

I must say I do not like a "3-L.F."

receiver! You gain so little except what you don't want. There is an enormous amplification and this has to be cut down if you are to avoid jamming and if you have little relative selectivity before the detector.

Besides which you'd need to be pretty careful to get the thing stable, and when you did a good "2 L.F." might be equally sensitive.

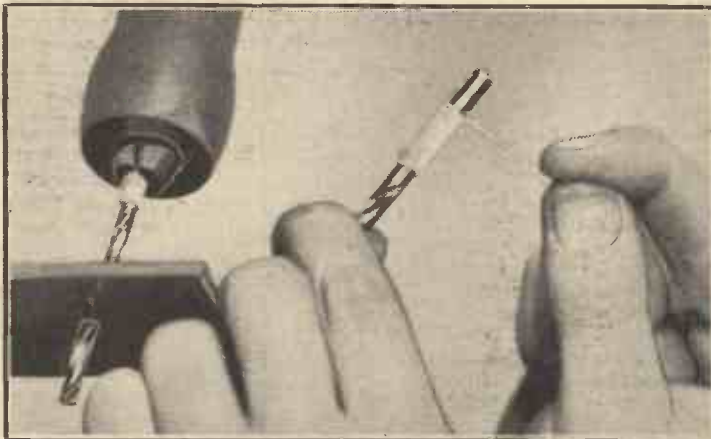
Of course, it could be made to go. You would need strong filtering of each stage so that each stage was independent (de-coupling). You would need to screen very strongly to prevent transformers coupling.

transmitter, the beat note caused by the existence of the two frequencies—receiver and transmitter—gets lower and lower.

It can get so low as to be inaudible. But the existence of this extra frequency is enough to set up locally a distortion of the field caused by the transmitter. Hence bad quality.

And it's awfully hard to find the bloke who is causing the nuisance! The only way to spot him is to be a bit of a detective and see where the effect is worst. That's nearer to him. And write to the B.B.C.

### USING A CARPENTER'S BRACE FOR DRILLING



When you come to hold the drill you often find it too small for the jaws to grip. But wind a "spiral" of wire round it as shown, and you will find it holds perfectly.

Of course, in the B.B.C. we use 3 L.F., and more, but it's a specialised job, and I advise against it.

### Distortion Caused by a Neighbour.

J. B. (Erith).—"Just recently I have been troubled with a continual distortion on the London transmission, which I am of the opinion is caused by a neighbouring receiver. Can you tell me whether it would be possible for this distortion to occur without my actually hearing howls and whistles?"

Yes! If a near-by receiver is adjusted to be oscillating, but in what is called "the silent point," you can get nasty distortion.

If a receiver is made to oscillate it creates a note of heterodyne with the carrier-wave frequency of the transmitter, and the oscillations caused by the receiver are brought nearer and nearer to the frequency of the

of the two stations on one occasion should hold good always.

"I have, however, noticed that the interference (which is not very strong) is confined to those occasions when either or both the transmitters are transmitting matter originating in a distant studio, such as Manchester. Can your better knowledge of transmission conditions suggest an explanation of this and, if possible, a cure?"

I think I can definitely state that this is a B.B.C. fault. Sometimes one programme gets muddled with the other.

This does not happen at Brookmans Park; it happens in the control-room on the lines bringing the programme. The B.B.C. is fully aware of the difficulty, and is rapidly developing methods to overcome the trouble altogether.

### When Regional and National Mix.

M. G. (Barking).—"My receiver is a relatively insensitive arrangement of Det. and 2 L.F. stages for local station reception. In the interests of good reproduction, I have endeavoured to avoid loss of high notes by purposely damping the aerial circuit so that tuning on either of the Brookmans Park transmissions is broad, but not sufficiently so for either station to be heard as a background to the other.

"Unfortunately, however, the arrangement is only partially successful. On some occasions—I can hear the National when tuned to the Regional, and vice versa. This is very puzzling to me, as it seems to me that a degree of selectivity which suffices for complete separation

# CONCERNING CARBORUNDUM



An article of particular interest to the crystal enthusiast.  
By J. F. CORRIGAN, M.Sc., A.I.C.

**C**ARBORUNDUM is an ex-service crystal. Owing to its even sensitivity and enormous stability, it played an almost universal rôle as rectifier in the receiving sets which were used by the Army and Air Services during the Great War.

Even at the present time, when the majority of rectifying crystals have been banished from the face of the land, the carborundum crystal still possesses its little band of enthusiasts who use it either for regular crystal work on their local station, or as a stand-by detector for emergency purposes. Yet, in some respects, carborundum was never a "popular" crystal in the sense that galena and the various proprietary "-ites" were. Perhaps this fact may be attributed to the very prevalent belief that a carborundum crystal will only function when a local voltage is applied. True it is that a carborundum detector is at its best by far when it is given a local

potential of some 0.7 volt, but if you happen to live within a mile or two of a broadcasting station you will find that a good piece of carborundum crystal in firm contact with a flat piece of steel will give quite effective rectification without any applied potential at all.

### Neat Detector Units.

The early carborundum detectors were rather massive and cumbrous affairs, and they were provided with adjusting screws so that the necessary steel contact of the detector could be varied in pressure.

In the modern form of carborundum detector, however, this complication is done away with. The rectifying surfaces are completely enclosed, thereby permanently rendering them entirely free from dust and atmospheric influences; and, generally, a potentiometer unit, together with a small battery for the purpose of applying a small potential across the crystal contact, are assembled on the same base or panel.

There are many curious facts about this radio-sensitive product, carborun-

dum. In the first place it is not a natural product. It consists of a chemical compound—silicon carbide—and it is produced by fusing an intimate mixture of finely-ground sand and purified coke in a high-temperature electric furnace. The current flows through the furnace for a period of eight hours, during which time the temperature of the fused mass reaches no less than 3,500 degrees Centigrade.

After the fused mass has been allowed to cool down, the sides of the furnace are removed, the carborundum dug out and afterwards treated with hot acids in order to dissolve away impurities. The resulting product consists almost entirely of pure silicon carbide, or carborundum.

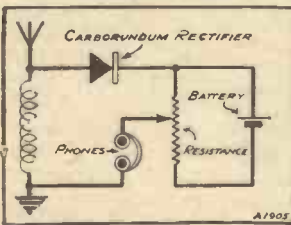
### The Outer Shell.

It is found that the carborundum most sensitive for wireless use is that forming the outer shell of the crude mass after its removal from the furnace, and, curiously enough, this portion of the fused mass is the least suitable for other purposes.

Good specimens of radio-sensitive carborundum should have a needle-like crystalline structure. They should be coarse in grain, and should possess a steely-blue appearance, showing here and there iridescent patches of red and purple. Fine-grain and greyish-looking varieties of this product are almost useless for radio purposes.

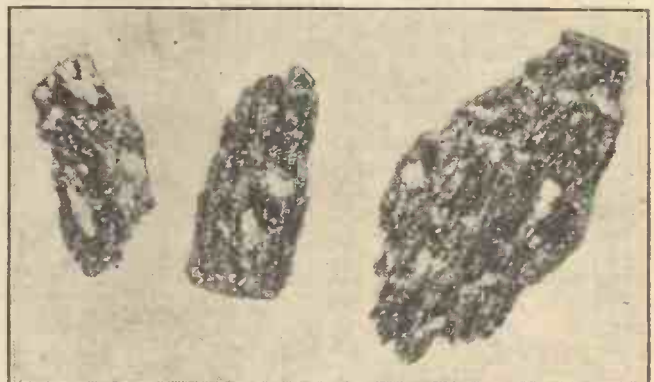
Next to the diamond, carborundum is the hardest substance known to science, and, in view of this fact, it has an enormous use in the manufacture of abrasives and grinding materials. Indeed, even in the heyday of crystal reception the quantity of the material reserved for purely wireless use was an insignificant fraction of the many thousands of tons of the product which are turned out annually.

### A SUITABLE CIRCUIT



This diagram shows you how to connect a carborundum detector so that it gets its required potential.

### SOME SELECTED SPECIMENS



These are radio-sensitive pieces of carborundum. Note the needle-like crystalline structure.

**A**LMOST endless ways of connecting terminal tags to various types of leads have been described from time to time, but I have yet to find an improvement upon the little device herewith illustrated, rough and ready though it may be.

### A LEAD LEAD



How the lead tubing joins the spade terminal to the copper wire.

### CONNECTING TERMINAL TAGS.

A Valuable Hint.  
By L. T.

A one-inch piece of lead-covered wire is procured, and the outer lead covering is carefully removed so that a small lead tube remains. The terminal tag is then inserted in one end of this, and the end of the tube is well hammered down on to this tag. Similar treatment is applied at the other end of the tube in which the wire to be

connected to the terminal tag is inserted.

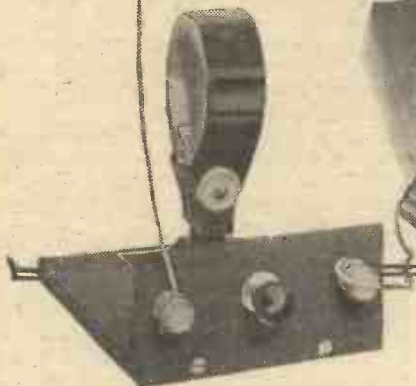
A good and permanent electrical connection between wire and tag is thus effected. For aerial and earth wires and for loud-speaker connections there is nothing to beat the certainty of this method of connection.

It has just one disadvantage though. If the wire is continually moved about from place to place, the time will come when the wire will break away at the place where it is pinched by the lead tube.

Moral, therefore: only employ this type of connection for wires which are to remain permanently in some situation.



# The "CONTRADYNE" JUNIOR



Here is "P.W.'s" latest and most useful discovery reduced to its simplest possible practical form. It can be used with any set, and absolutely kills that short-wave jamming on long waves that proves so troublesome with hundreds of thousands of even modern receivers.

IN our article on the standard version of the "P.W." "Contradyne" we gave you a pretty good idea of what an extraordinarily effective gadget it is. Now let us see how simply it can be made if desired. We almost hesitate to do so, because when it is finished you are pretty sure to say, "Why, there is nothing in it! What are they making all this song and dance about?" We have no misgivings really, of course, because we are sure that you will realise that this is just one more proof of how ex-

cellent a device the "Contradyne" really is. It does its job with 100 per cent efficiency, and there is so little in it that you can make this simplified version in half an hour. What more could one possibly ask?

for advantage which rather surprised us when we first observed it. There are quite sound technical reasons for this gain, but we cannot go into them at this point. As a matter of fact, the interested reader will find some notes on this subject in our article describing the standard version of the instrument.

### What It Really Is.

So much for what the "P.W." "Contradyne" does. Now let us see what it is. Well, actually it is just a lump of inductance placed in series with the aerial lead and provided with a switch to short-circuit it when you desire to work on the ordinary (low-wave) band. Of course, it is not quite so simple as all that, because it requires to be a lump of inductance of approximately the right size.

This is no real difficulty, however, because it is not at all a critical matter. What it amounts to is that if the inductance is not big enough it simply does not do the job, while if it is too big it reduces your selectivity on long waves, and makes the stations spread rather, so that you may find it difficult to separate Radio-Paris from 5 X X.

### The Size of Coil Required.

These limits are quite wide ones, because the size of inductance which begins to spoil the long-wave selectivity is very much

greater than the one which is just big enough to do the job, and it is very easy to find some size in between which serves the purpose properly.

In our original model of the "Contradyne" we used a home-made coil with some tappings to enable the right amount of inductance to be found, and now we want to show you how the same effect can be achieved by using a plug-in coil. A little experimenting with one or two different sizes is all that is needed to obtain satisfactory results in this case.

To make up a "Contradyne" upon these lines, all you require is a small wooden baseboard, a little strip of ebonite upon which you should mount two terminals and an ordinary on-off switch, and a coil holder. Fasten your little terminal strip to the baseboard, screw down the coil socket, and then wire up as follows.

### How to Wire Up.

Join the left-hand terminal ( $A_1$ ) to one side of the switch and to one side of the coil holder. Join the other terminal ( $A_2$ ) to the other side of the switch and to the other side of the coil holder, and you have your "Contradyne" ready for use.

Now to try out the device. Disconnect the aerial lead from your receiver, and instead connect it to  $A_1$  on the "Contradyne."

(Continued on next page.)

### THE PARTS YOU WANT.

- 1 Baseboard, 6 in. x 4 in.
  - 1 Ebonite strip, 4 in. x 2 in.
  - 1 On-off switch (Lotus, or Lissen, Benjamin, Red Diamond, Wearite, Ormond, Igranie, Ready Radio, Bulgin, etc.).
  - 1 Coil socket (Igranie, or Lissen, Ready Radio, Lotus, Wearite, etc.).
  - 2 Terminals (Belling & Lee, or Ealex, Igranie, etc.).
- Some screws and a little wire for connections.

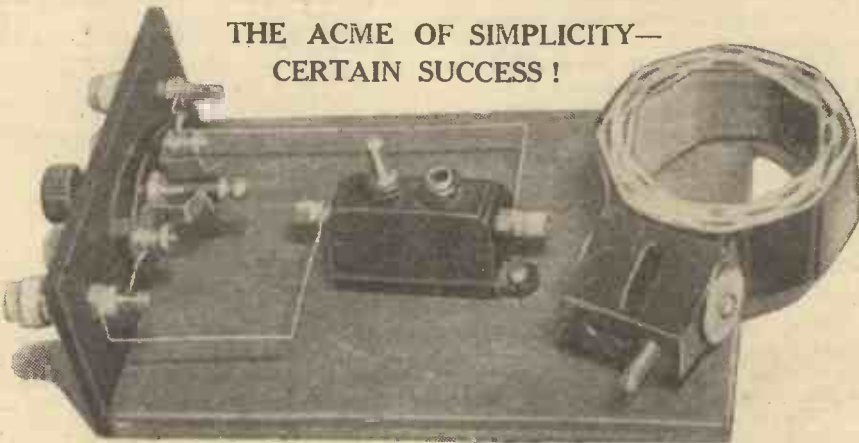
Maybe some of those who read this article will not have seen the article describing the original version of the "P.W." "Contradyne," so perhaps we had better just explain briefly what it is all about.

In a nutshell it is this: A startlingly complete and effective cure for that old problem of the local station breaking through and causing interference on the long waves. Almost every user of a fairly simple kind of set who lives pretty close to a broadcasting station must have been annoyed by this nuisance at one time or other, and will realise in a moment what a blessing the "Contradyne" is going to be to him.

### Increases Strength of Reception.

This in itself is enough to make the Inductor a notable contribution to the pleasure which we all hope to get from radio in the coming season, but it does even more than this. With the great majority of sets it produces a distinct increase in the volume of the long-wave stations, a quite unlooked-

## THE ACME OF SIMPLICITY— CERTAIN SUCCESS!



It is a device that uses only the parts you can see above; it can be made by anyone. And yet it is completely effective.

## THE "CONTRADYNE" JUNIOR.

(Continued from previous page).

Wire  $A_2$  on the "Contradyne" to the old aerial terminal on your set and close the switch on the "Contradyne." Now put the necessary long-wave coils in your set, or operate your wave-change switches so as to go over to long waves, and tune to some point fairly low on the dials, where the local station normally begins to break through fairly strongly.

Next put the switch on the "Contradyne" to the "off" position, so bringing the instrument into operation, and try a plug-in coil of size No. 100 in the socket. You will now probably find that the interference has been enormously reduced and it may disappear altogether. If it does, well and good, the job is done, and you can proceed to tune-in the long-wave stations with all your old trouble removed and note how their volume has gone up perceptibly.

### For Very Bad Cases.

If you find that the No. 100 coil has merely reduced the interference and not satisfactorily removed it, try instead a No. 125 or No. 150, one or other of which will be pretty sure to do the trick. In very bad cases you need to use a No. 200, but this is extremely unusual. The idea, as you will probably have gathered, is to use a coil only just large enough to remove the interference effectively and not sufficiently large to cause selectivity to fall off on the actual long-wave stations themselves.

That is really the whole story, but there remain just one or two miscellaneous points we should like to mention about the general use of the "Contradyne." In the first place, you will find in the majority of cases that if your set has an optional series condenser it is better to cut this out when you are using the "Contradyne."

### Fixed Condenser Not Needed.

This is not always necessary by any means, but we have found one or two cases where leaving the series aerial condenser in circuit caused undesirable effects to appear, and so we suggest that it should always be cut out. It is very rarely needed on long waves in any case, and now that you have got rid of the bogey of interference from the low-wave station you are not likely to find it necessary.

Now let us just repeat our warning about the use of the "Contradyne" with receivers of other types than those described in "P.W." In certain of these it will not work, these types being the ones in which some form of aerial coupling is employed other than the aperiodic or auto-coupled schemes used in practically every POPULAR WIRELESS set. It amounts to this, the "Contradyne" is essentially a "P.W." device to work with all "P.W." sets, but there are certain other types for which we do not recommend it.

### Works Either Way Round.

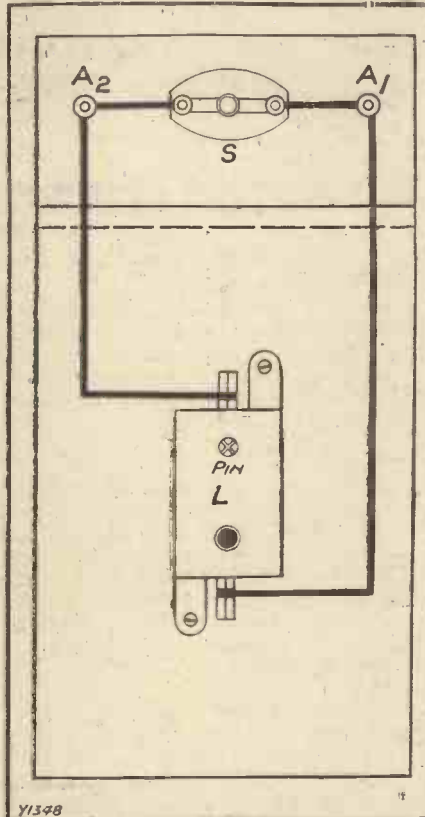
Finally, it is to be noted that it really does not matter which way round you mount the "Contradyne." If it is more convenient to join the aerial lead to terminal  $A^2$  and to wire  $A^1$  to the aerial terminal on the receiver, by all means do so. There is no right way round for this device, and it

works equally well with either system of connection. However you use it, do not forget to close the switch whenever you want to work on the lower wave-band.

This is important, as you will realise when you remember that the function of the "Contradyne" is to prevent low-wave stations getting through to your set.

It will naturally do this on either wave-band, so if ever you find your low-wave results have suddenly fallen right off, have a look at the "Contradyne" switch. You will probably find you have forgotten to close it.

### ONLY FOUR LEADS



The wiring should occupy you for only a few minutes.

## TESTING LARGE FIXED CONDENSERS.

A simple scheme using no devices additional to your set.

**M**OST of you have, no doubt, noticed that when a large fixed condenser of 1 or 2 mfd. is connected across an H.T. + tap and H.T. -, it is possible to remove the wander plug for this tap without the set immediately ceasing to operate.

The smaller the current being taken, the longer will the set go on working; and also the larger the condenser the greater will be the period before results fade away. This fact is, of course, due to the reservoir effect or storing capabilities of the condenser.

It forms a convenient method of testing large fixed condensers of .5 mfd. and upward. All that has to be done is to connect the condenser to be tested across an H.T. + tap and H.T. -, switch on the set, and then remove the wander plug supplying the particular tap and note if reception continues for a while.

It is, of course, advisable to choose a tap which is supplying very little current, and the detector valve terminal will generally prove very suitable.

### Immediately Indicates Fault.

If the condenser has no capacity or has a high-resistance leak, results will stop practically at the same moment as the wander plug is removed. You should naturally test the condenser for a short by means of phones and a battery before testing in the above manner.

If there is already a reservoir condenser across the detector tap inside the set, it should be removed before carrying out tests. A mains unit is just as suitable as an ordinary H.T. battery.

## CONDENSER CONSIDERATIONS.

Two useful little paragraphs.

When trying a circuit in which the primary of the low-frequency transformer is made to serve as an H.F. choke as well, be sure that the transformer you have in mind for this circuit is not one which has a condenser connected permanently across its primary.

Although 2 mfd. is the usual value recommended for an anti-motor-boating condenser, larger capacities are sometimes better, but are not specifically recommended on account of the extra expense.

## WHEN TO CHARGE.

Don't let your accumulator run right down, or you may ruin it.

**I**T is not an easy matter if you do not possess a voltmeter to tell when your low-tension accumulator requires recharging. But if you are to keep it up to scratch, and so get the maximum life from it, it is very important that you do not over-discharge it.

Many people use an accumulator until it is absolutely run right down and will not even produce a feeble whisper from the set. This is the quickest way to ruin the cells of an accumulator.

When an accumulator is discharged its voltage begins to drop very quickly, so that hardly any extra running time is gained by over-discharging it. The voltage to which it is usually permissible to drop each cell is 1.8, and down to this value you will not notice any appreciable falling off in volume from the receiver.

### Unmistakable Indication.

But as soon as the voltage goes below, you will find results getting weaker and weaker, and this should be your signal immediately to disconnect the L.T. accumulator and have it charged. Do not wait until results fade right away.

An even more sensitive indication that it is charging time may be obtained from the reaction control. As soon as the accumulator voltage drops even a little you will find that the reaction condenser has to be turned farther round to give the same effect as usual.



**TROUBLE-FREE  
SET BUILDING**

**USE READY RADIO APPROVED  
NON-SOLDERING KITS ONLY**

**USE "JIFFILINKS"  
FOR WIRING-UP**

**"THREE-COIL" THREE**

	£	s.	d.
1 Drilled ebonite panel, 18 x 7 ins.	6	0	
1 Hand-polished oak cabinet with 10-in. baseboard	1	10	0
2 ReadRad '0005 variable condensers	9	0	
2 ReadRad duograph slow-motion dials	13	0	
1 ReadRad differential condenser, '00015	5	0	
1 ReadRad on-off switch	10		
1 ReadRad filament rheostat	2	0	
3 Benjamin Vibrolders	4	6	
3 ReadRad single coil holders	2	6	
1 Formdensor, type G	1	6	
1 T.C.C. '01 fixed condenser	3	0	
1 ReadRad '001 fixed condenser	10		
1 ReadRad '0003 fixed condenser	10		
1 Varley H.F. choke	9	6	
1 ReadRad "Hilo" H.F. choke	4	6	
1 ReadRad 2-meg. grid leak and holder	1	4	
1 R.I. Hypermu L.F. transformer	1	10	0
1 ReadRad H.T. fuse and holder	1	3	
1 ReadRad Standard screen	2	0	
1 Drilled terminal strip, 18 x 2 ins.	2	0	
10 Engraved Belling Lee terminals	2	6	
2 Lewcos coils, No. 60X	9	6	
1 Lewcos coil, No. 50 C.T.	3	6	
2 Lewcos coils, No. 250X	13	0	
1 Lewcos coil, No. 100 C.T.	4	6	
3 Valves as specified	1	19	0
1 Set ReadRad Jiffilinx	2	6	
Screws, plugs, etc.	1	5	
<b>TOTAL (including valves and cabinet)</b>	<b>£9</b>	<b>16</b>	<b>0</b>

- KIT A** less valves and cabinet **£6: 7: 6**  
or 12 equal monthly payments of 11/9
- KIT B** with valves less cabinet **£8: 6: 6**  
or 12 equal monthly payments of 15/3
- KIT C** with valves and cabinet **£9: 16: 6**  
or 12 equal monthly payments of 18/-

**"SHARP-TUNE" TWO**

	£	s.	d.
1 Drilled ebonite panel, 12 x 8 ins.	6	0	
1 Hand-polished oak cabinet with 7-in. baseboard	19	0	
1 ReadRad '00015 differential condenser	5	0	
1 ReadRad '0005 Brookmans condenser	3	6	
1 ReadRad duograph slow-motion dial	6	6	
1 ReadRad '0005 variable condenser	4	6	
1 ReadRad on-off switch	10		
1 ReadRad "Hilo" H.F. choke	4	6	
1 ReadRad 2-meg. grid leak and holder	1	4	
3 ReadRad single coil holders	2	6	
2 Benjamin Vibrolders	3	0	
1 ReadRad '0003 fixed condenser	10		
1 Lissen Super L.F. transformer	19	0	
1 Drilled terminal strip, 12 x 2 ins.	1	6	
9 Engraved Belling Lee terminals	2	3	
1 Set ReadRad Jiffilinx	2	6	
1 Lewcos coil, No. 40	3	6	
1 Lewcos coil, No. 60	3	6	
1 Lewcos coil, No. 50	3	6	
1 Lewcos coil, No. 100	4	6	
1 Lewcos coil, No. 250	4	6	
1 Lewcos coil, No. 150	4	6	
2 Valves as specified	19	0	
Screws, flex, plugs, etc.	1	3	
<b>TOTAL (including valves and cabinet)</b>	<b>£6</b>	<b>7</b>	<b>0</b>

- KIT A** less valves and cabinet **£4: 9: 0**  
or 12 equal monthly payments of 8/3
- KIT B** with valves less cabinet **£5: 8: 0**  
or 12 equal monthly payments of 10/-
- KIT C** with valves and cabinet **£6: 7: 0**  
or 12 equal monthly payments of 11/9

**"EASY-CHANGE" THREE**

	£	s.	d.
1 Drilled ebonite panel, 18 x 7 ins.	6	0	
1 Hand-polished oak cabinet with 10-in. baseboard	1	10	0
1 ReadRad '0005 variable condenser	4	6	
1 ReadRad '00015 differential condenser	5	0	
2 ReadRad on-off switches	1	8	
3 ReadRad single coil holders	2	6	
3 Benjamin vibrolders	4	6	
1 ReadRad '0003 fixed condenser	10		
1 ReadRad '0002 fixed condenser	10		
1 ReadRad 2-meg. grid leak	10		
1 Lissen R.C.C. unit with 1- and 1- or 2-meg. leak	4	0	
1 ReadRad "Hilo" H.F. choke	4	6	
1 ReadRad fuse and holder	1	3	
1 Irtanic type J L.F. transformer	17	6	
1 Terminal strip, 18 x 2 ins.	1	8	
10 Belling Lee engraved terminals	2	6	
1 Lewcos coil, No. 60X	4	9	
1 Lewcos coil, No. 250X	6	6	
1 Lewcos coil, 100	4	6	
3 Valves as specified	1	7	6
1 Set ReadRad Jiffilinx	2	6	
1 ReadRad duograph dial	6	6	
Screws, plugs, etc.	1	8	
<b>TOTAL (including valves and cabinet)</b>	<b>£7</b>	<b>2</b>	<b>0</b>

- KIT A** less valves and cabinet **£4: 4: 6**  
or 12 equal monthly payments of 7/9
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2 ReadRad variable condensers, '0005	9	0	
2 ReadRad duograph slow-motion dials	13	0	
1 ReadRad differential reaction condenser, '00015	5	0	
1 Wearite filament rheostat, 15 ohms	1	6	
1 ReadRad on-off switch	10		
6 ReadRad single coil holders	5	0	
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1 ReadRad '0002 fixed condenser	10		
1 ReadRad '0001 fixed condenser	10		
2 T.C.C. '01 fixed condensers	6	0	
1 ReadRad '001 fixed condenser	10		
1 ReadRad '0003 fixed condenser	10		
2 T.C.C. 1 mfd.	5	8	
2 ReadRad 2-meg. grid leaks and holders	2	8	
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1 ReadRad "Hilo" H.F. choke	4	6	
1 Varley 100,000-ohm resistance and holder	7	0	
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1 Terminal strip, 21 x 2 in.	2	6	
2 Lewcos coils, No. 35	7	0	
2 Lewcos coils, No. 60	7	0	
1 Lewcos coil, No. 250X	6	6	
4 Valves as specified	2	7	6
1 Set ReadRad Jiffilinx	4	0	
Screws, flex, plugs, etc.	1	6	
<b>TOTAL (including valves and cabinet)</b>	<b>£11</b>	<b>5</b>	<b>6</b>

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but will make scores of everyday articles last years longer! For Pots, Pans, Silver and Brassware; RADIO; odd jobs in the garage—there's always something useful for Fluxite and Solder to do.

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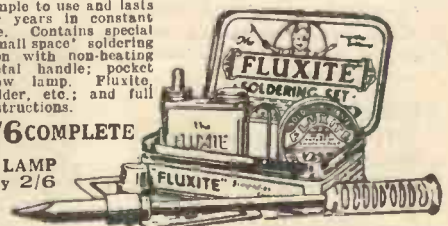
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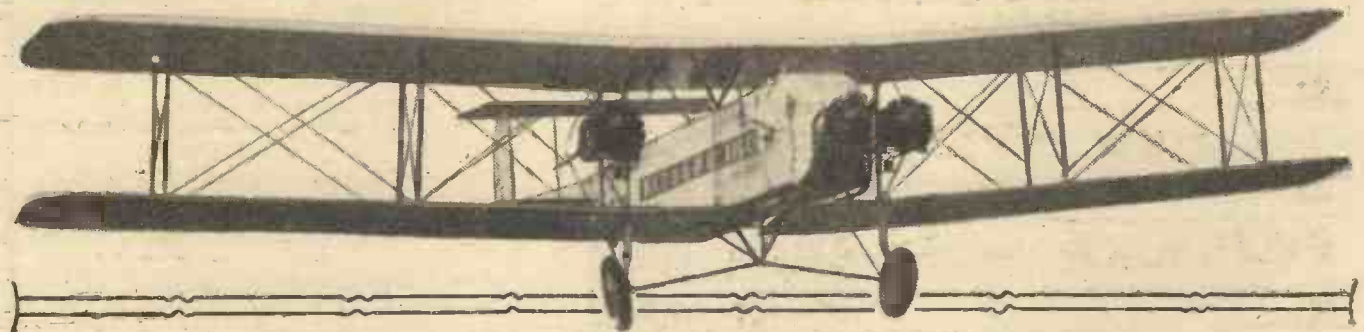
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**ALL MECHANICS WILL HAVE**

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# RADIO IN THE AIR



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

**A**LTHOUGH comparatively few of us have occasion to travel by air, we nevertheless feel the fascination of this latest and most rapid means of transport, and there is no doubt that in the not very distant future aeroplane travel will become as popular as motor-car travel to-day.

One of the reasons why travel by air is so rapidly gaining in popularity is because the attendant risks of air travel have been, if not entirely eliminated, very much minimised, and I believe that statistics show that the safety of air travel is at any rate comparable with that of travel by train or road.

## Safety First.

Perhaps the most important aid in the safety of air travel is the modern radio outfit with which the aeroplane is equipped. Indeed, just as wireless has ensured the safety of ships at sea, so it is now safeguarding planes in the air.

We have become so accustomed to the use of radio for all manner of communication that we may not perhaps realise that each application of radio communication has its own peculiar difficulties, and this is especially so in the case of radio communication between an aeroplane and the ground or between one aeroplane and another.

I have recently received a very interesting description of the radio arrangements on the famous air routes between Chicago, Oakland and San Francisco and between Seattle and Los Angeles.

The Boeing Company, which controls these services, has carried out over a number of years its own special radio experiments and has developed an aeroplane radio equipment which meets all the requirements of these particular routes.

## The Pilot's Enemy.

Pilots on these routes can now carry on direct conversation with ground operators from an altitude up to 12,000 feet and at a distance of 200 miles.

Ground stations for transmission and reception have been established at every 100 miles along the routes and in this way all pilots are kept constantly informed as to weather conditions and other matters of importance.

Everyone knows that bad weather is the great enemy of the aeroplane pilot; in fact it is now almost his only serious enemy.

"Bad weather is the airman's greatest danger," says our contributor. This is where radio is rapidly becoming invaluable, for weather warnings and meteorological charts can now be sent from ground stations to aircraft many miles away, to warn them of impending danger.

The pilot's task is made much simpler, however, if he can be kept constantly informed of weather conditions ahead of him and be given precise instructions with regard to the position of the landing ground, and how he is to make his landing.

All this and much more is now possible by means of the very much simplified radio equipment available for aeroplanes.

ment was settled, a large number of experiments were carried out in order to determine the most suitable wave-length; eventually it was found that a wave-length of 90 metres was suitable for all required altitudes and also for day and night operation.

## Some Special Problems.

Some of the special technical problems encountered are extremely interesting. It is found necessary, for instance, to "bond" the aeroplane completely; that is, to connect electrically together all metallic parts.

The bonding of the aeroplane is necessary not only in order to reduce interference, but also to prevent the possibility of the aeroplane catching fire, since an insulated piece of metal, if of proper size and character and in a certain position, may pick up a sufficient electrical charge to produce sparks.

The ignition of the aeroplane engine must be very carefully shielded, otherwise the interference from it will render radio communication impossible.

## Shielding the Engine.

If you were to listen with a radio receiver in an aeroplane in which the motor had not been properly shielded, all you would hear would be a terrific storm of crashes, these, of course, originating at the make-and-break contacts in the distributor, from the magneto and from the actual sparks in the sparking plugs.

This type of interference is overcome by encasing all the spark leads in flexible

copper armour, and even this apparently simple operation must be carried out in such a way as not to interfere with the efficient working of the motor and of the aeroplane.

In the equipment used on the above-mentioned routes the radio apparatus is mounted behind the pilot.

## WEATHER WARNINGS FOR AIRMEN



Receiving a meteorological chart on an airship from an aerodrome many miles away. This is a recent development in commercial radio service.

The equipment used in the machines, on the routes mentioned above, weighs about 100 pounds and is practically automatic in operation; it requires no adjustment on the part of the pilot, whose full attention therefore may be given to the flying of the machine.

Before the final form of the radio equip-

# SHORT-WAVE NOTES.

By W. L. S.

New Experiences with "Threshold Howl"—Periodic Oscillation—S.G.'s on Short Waves.

THERE seems to have been an epidemic of receiver-building of late; numbers of my readers have written appealing letters about troubles they have run into with their new sets. Added to this, I have made a new set myself, and a friend of mine has also launched out and encountered some of the funniest little "snags" imaginable. All of which gives me a lot to write about; but, I am afraid, nothing very solid in the way of replies to the questions that arise.

First of all, we will dive into the question of "threshold howl" again. Just after having had a lengthy and heated argument with a fellow-fan on the subject, and decided several things about it, I have had to revise all my ideas once more.

## Four Contributory Causes.

Our original argument was on these lines: Threshold howl is undoubtedly made worse if one does the following things: (1) Uses a very good transformer (which will almost certainly have a high primary inductance). (2) Uses a large reaction coil and small reaction condenser. (3) Uses an H.F. choke in the detector anode circuit. (4) Uses the 'phones direct in the L.F. anode circuit instead of employing choke-filter output.

Now each of these four points would lead one to suppose that the basic cause of the trouble is something to do with the total inductance in the detector plate circuit, combined with the phenomenon of the H.F. getting through to the L.F.'s.

Added to this we have the fact that neither of us has ever met the noise unless L.F. amplification is used. Therefore we decided that we should not be going far wrong in deciding that it is a form of L.F. instability. So far, so good.

Now the item occurs that rather upsets the apple cart. I have made myself a new receiver, all in a nice metal box with nice tidy wiring, consisting of an S.G. stage and a detector *only*. Right away on the first test it shows up a terrible threshold howl, the like of which has never been heard in the country!

## Is it a Detector Problem?

This is completely cured by (a) using choke filter output, or (b) slightly compressing the resistance that is across the 'phones as a volume control. H.F. chokes in the 'phone leads and small bypass condensers have no effect whatever.

Now, can we be safe in assuming that it is entirely a detector problem, after all? It rather looks like it.

And now for another mystery. My friend's receiver, construction of which has been proceeding "in parallel" with my own, is completed. It consists of a detector and one L.F., with no S.G. (shame!).

It worked extraordinarily well, immediately, on 40 and 20 metres, and there seems to be no trouble with the reaction control,

although a well-known make of 1:7 transformer is used, which would normally cause a threshold howl audible in Scotland.

The trouble, however, is on 10 metres, and takes the form of a regular sliding in and out of oscillation (quite smoothly) with a regular period of *eight seconds*. Query No. 1 is this: Is this a form of "threshold howl" with a frequency of  $\frac{1}{8}$  instead of the usual 500 cycles or so? Query No. 2: If not, what is it?

Here it may be mentioned that the absence of howl is probably due to the use of a resistance between the reaction coil and the transformer primary instead of the usual choke.

## A NEW POLISH GIANT



A Marconi engineer examining one of the main panels of the new 160 kw. broadcaster to be erected near Warsaw. It will be the most powerful broadcasting station in Europe.

I cannot find anything in the set that is capable of charging up and discharging to give this effect, and although it sounds exactly like a grid choking in some way, it certainly is not that.

## The Useless L.F. Stage.

It is to be hoped that by next week we shall have found out what it is, and I shall be able to enlighten my readers who are interested in problems. Meanwhile, there is no prize offered for the solution.

Leaving these distasteful troubles alone, I have one or two remarks to make about

my own new receiver. First of all, I find that ample volume from all ordinary signals (with a good pair of 'phones) is obtained from S.G. and detector.

When I use a note-mag. at all, I always have to turn down the volume control to reduce the general "mush," and I find, almost invariably, that I turn it down to give about the same level that I get without the note-mag. at all. So why waste space, money and current?

Another point worth mentioning is the "pulling" of an H.F. stage if the coupling condenser to the detector is too large. Naturally I only refer to a tuned stage, from which some amplification is undoubtedly obtained.

## Grid-Condenser Variations.

When working under the ideal conditions one can tune in a signal on the detector grid tuning condenser, and vary the aerial tuning condenser (across grid and filament of the S.G. valve) without varying the pitch of the signal. The last-mentioned control will behave more or less as a volume control. When things are not all that they might be, the signal will completely disappear when the condenser is varied, or the set will even go out of oscillation with a "plop" as it is brought in tune.

If tuned anode coupling is being used (I always use parallel-fed tuned anode) the remedy is to reduce the coupling condenser to the detector grid. Personally I am using a neutralising condenser about half in, which gives ample coupling for 40 metres or anything below, and possibly too much for 10 metres.

Another idea is, of course, to use transformer coupling with an untuned primary, your normal detector grid coil forming the secondary and being tuned quite in the ordinary way.

Incidentally, screening between the two coils (the H.F. grid coil and the detector grid coil) must be good or "pulling" is bound to result.

## NUTSHELL NOTIONS.

Simplifying Soldering—Choke Outputs.

If you find when soldering you have to hold the iron on to the surface for rather a long time, it is a sign that the iron is not hot enough or that the places to be soldered are dirty.

One disadvantage of dirty surfaces and poor heat from the soldering iron is that you are liable to melt adjoining ebonite, etc., through failure to get a quick joint.

Remember that the point of the soldering iron should be kept clean, and must not touch an ebonite or any similar surface, or it will immediately require re-cleaning.

A choke-condenser output for the loud speaker greatly assists in overcoming motor-boating.

*Try-*

# POWER GRID DETECTION..

*with the*

## L210

Power grid detection has been proved to give far better quality than the anode bend method while being at the same time considerably more sensitive. Rectification is linear, providing the correct values of grid condenser and leak are used. Get full details from the "Wireless World" for May 7th, 1930 and try it out with the Mazda L.210—one of the best valves for the purpose.



THE AMAZING

# MAZDA

## RADIO VALVES

**CHARACTERISTICS**

Fil. Volts	-	-	-	2.0
Fil. Amps	-	-	-	0.1
H.T. Volts	-	-	-	150
Amplification Factor	-	-	-	15.5
Impedance (ohms)	-	-	-	10,000
Mutual Conductance (mA/V)	-	-	-	1.55

**MAZDA L.210 PRICE 8/6**



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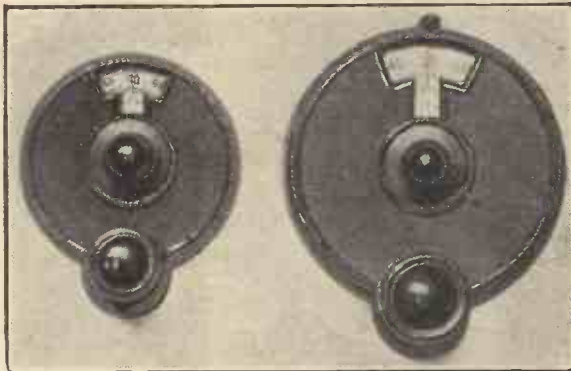
# EDISWAN

## FROM THE TECHNICAL EDITOR'S NOTE BOOK.



## NEW IGRANIC DIALS.

HOW much easier everything is these days for the radio enthusiast in regard both to building and operating sets. At one time, for instance, real skill acquired only after some long experience was needed to tune a set closely.



You will easily be able to see which is the "Minor" and which the "Major" of these two new Igranic dials.

Nowadays, however, slow-motion controls render this a much simpler business.

These thoughts were awakened in my mind by the arrival of samples of two new Igranic slow-motion dials. They are items that raise no price barriers against their wide use for the one, the "Major" (3½ in. diameter), costs only 4s., and the other, the "Minor" (2½ ins.), but 2s. 9d.

They are very nice dials indeed, both to operate and in appearance. Their gearing, 6-1 the "Minor" and 4-1 the "Major," seems just right for fine tuning plus moderately rapid searching.

They are obtainable only in a dark brown finish, but they go well with any panel.

And I must not forget to add that their finish is really good—they may be cheap in price, but they don't look it!

## MAGNUM GANGING SWITCH.

In multi-valve sets, wave-change switching can be greatly simplified in cases by ganging switches. That is to say you couple the two or three separate switches to a central control by means of some kind of linking.

A very easy method of doing this is to be seen in the new Magnum ganging switch. A squared rod passes through the centre of the device and enables any number to be joined together.

constructors who are not particularly keen on soldering.

This Magnum switch is very soundly designed and constructed and its action is good. The list prices are, two-way, 3s.; three-way, 3s. 6d.; four-way, 4s. The push-ball plunger for operating the switch singly or in ganged units costs 1s. 6d.

## A CHEAP L.F. TRANSFORMER.

There is now available a British transformer having a special alloy core that retails at 7s. 6d. This transformer is made by Accessories, Ltd., Birmingham. It has a ratio of 1-3½, and it is built into a green coloured metal casing.

The four terminals are widely spaced at the top and are clearly marked. It is a very light transformer weighing but a few ounces and it is small in size, but the weight and dimensions of an L.F. transformer are no longer indications of its efficiency.

The use of special alloy cores makes it possible to produce tiny transformers having excellent characteristics. I find this Accessories, Ltd., L.F. transformer to be quite good. It has not got the high primary impedance achieved by some makes which, however, cost a good deal more, but, on the other hand, it has not some of the miserable qualities located in quite a few other varieties. At 7s. 6d. it strikes me as being quite competitive.

## LEWCOS PUBLICATIONS.

The new Lewcos catalogue of radio products issued by the London Electric Wire Co. and Smith's, Ltd., comprises 68 pages, and is of a particularly interesting character to home constructors. There is also being circulated free to the public a sheet of blue prints illustrative of four recommended sets using Lewcos coils and other components.

## A FINE CABINET.

Messrs. Picketts, Ltd., of Bexley Heath, are now in production with their Radiola-Gram, a fine cabinet designed to accommodate a complete radiogram outfit. The turntable and pick-up are accommodated at the top on a hinged deck, an original

feature which renders the set completely accessible from the front.

Underneath is the space for the set, and below that the loud speaker and battery or mains unit compartment. The particular model sent us for review is the Radiola-Gram De Luxe, and is in the Queen Anne style.

It is beautifully hand french-polished, and with its piano hinges and tasteful

Manufacturers and traders are invited to submit radio apparatus of any kind for review purposes. All examinations and tests are carried out in the "P.W." Technical Department, with the strictest of impartiality, under the personal supervision of the Technical Editor.

We should like to point out that we prefer to receive production samples picked from stock, and that we cannot guarantee their safe return undamaged, as it is our practice thoroughly to dissect much of the gear in the course of our investigations!

And readers should note that the subsequent reports appearing on this page are intended as guides for buyers, and are therefore framed up in a readily readable manner free from technicalities unnecessary for that immediate purpose.

fittings it constitutes a fine piece of furniture.

A good point is the provision of a heavy, domed lid, which can be closed down while a record is being played.

Those constructors who are turning their attention to the building of a new set would be well advised to get into touch with Messrs. Picketts, and obtain details of this and other of their substantial, well-made and excellently finished cabinets.

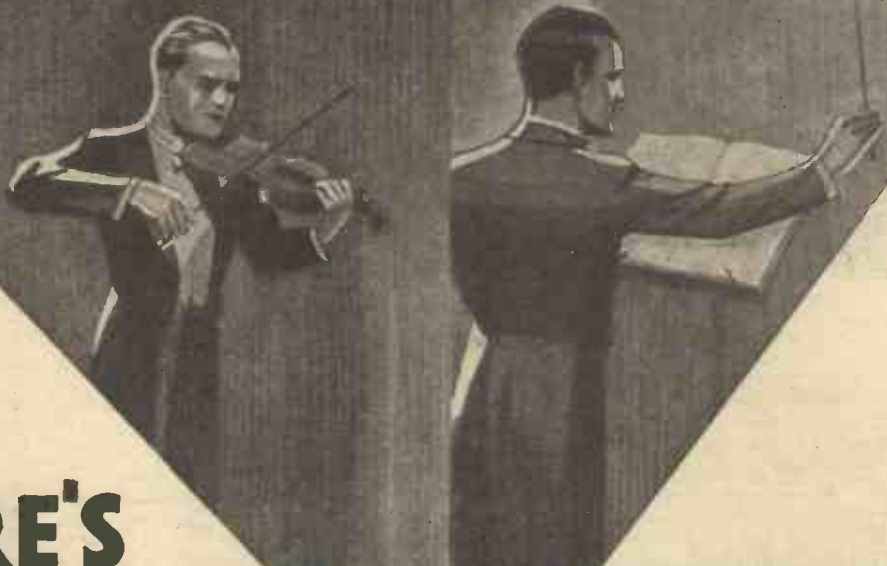
## AMPLION ACTIVITIES.

Leaflets dealing with the Amplion Two-valve All-mains Receiver, Amplion Loud Speakers, and the Amplion Two Screened-grid Cabinet Set are among the interesting publications due to Graham-Amplion, Ltd.

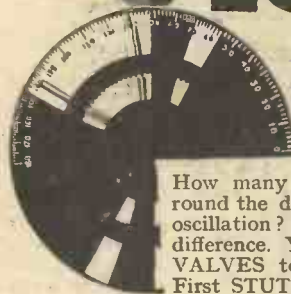
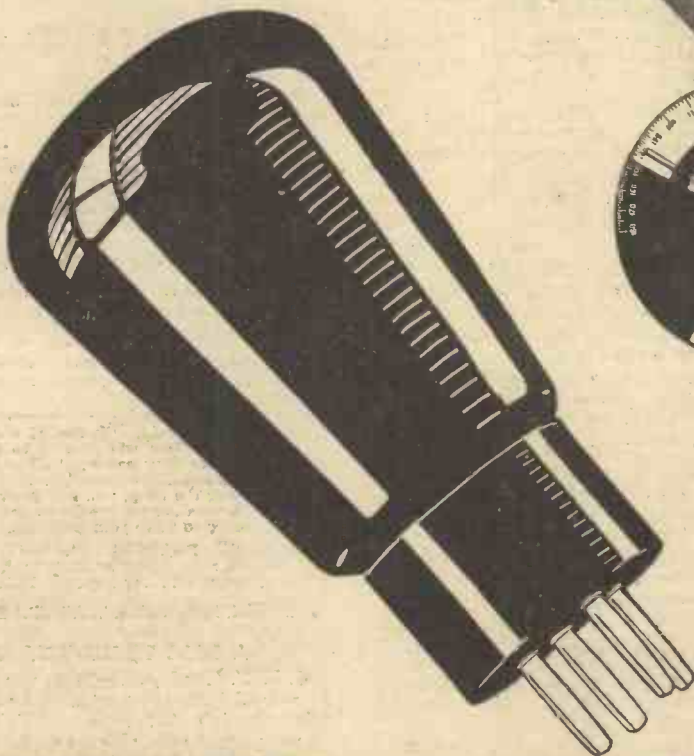


The Pickett Radiola-Gram Cabinet.





# THERE'S STUTTGART — NOW LONDON



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And there are other reasons why TUNGSRAM BARIUM VALVES are better for your set. They are more economical—they make more of your batteries. And they give better performance; long range, volume, perfect tone and long life. Yet remember they cost considerably less than any other valves of similar quality.

L.F., 5/6 ; H.F., 5/6 ; R.C., 5/6 ; Power, 7/3 ; Super-Power, 8/- ; A.C. Indirectly Heated H.F. and L.F., 9/6 each ; A.C. Directly Heated Power, 9/6 each ; A.C. Directly Heated H.F. and L.F., 7/9 ; Rectifying Valves, 10/- each. Tunggram Photo-Electric Cells, Nava E., £2 : 17 : 6 ; Nava R., £3 : 3 : 0.

# TUNGSRAM BARIUM VALVES



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

The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless reception. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialties described may be the subject of Letters Patent, and the amateur and the trader would be well advised to obtain permission of the patentees to use the patents before doing so.

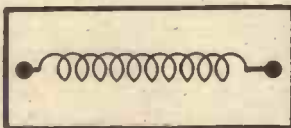
## QUESTIONS AND ANSWERS

### AN AERIAL CIRCUIT VOLUME CONTROL.

D. M. (Brighouse, Yorks).—“Is it possible to fit a 25,000-ohm potentiometer as a volume control in the aerial circuit? I ask because

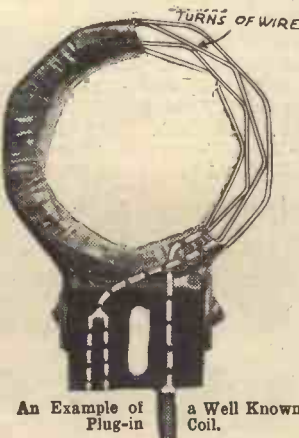
## “INSIDE” INFORMATION.

No. 2.



The theoretical sign for a coil—any single-winding type is a simple spiral, as shown above, with appropriate connecting-points. (In this case, plug and socket.)

Below you see that this is, indeed, the basis of coil-construction, though the efficiency of the finished article largely depends on correct alignment, spacing, and robust mounting.



THE NEW “P.W.” “DIAGRAPHS.”

the particular set in question is a very packed-in job, and the only convenient place to get at for making alterations to the wiring is the side of the box between the aerial and earth terminals.

“It is a three-valve set, and the aerial goes to an aerial coil which is placed up close to the grid coil, the earth terminal being connected to the bottom of both coils, to the tuning condenser, filaments, etc.

“I have tried connecting it in the aerial lead, but it does not seem to make a nice, smooth variation. Is there any other way?”

All you have to do is to connect the slider of the potentiometer to one end of it, and to run a wire from this point to the earth terminal. Then run another wire to the other end of the potentiometer to the aerial terminal, and you will find that variations of the slider will enable you to get a smooth control between full volume and a whisper.

### SILENT-POINT OSCILLATION.

“SUFFERER” (Gt. Grimsby).—“I do not know a lot about wireless, but I do know good music when I hear it; and I used to hear it from our set. But lately it has been very disappointing, with a lot of really unpleasant distortion that seems to come on without the slightest warning and without anything being touched.

“I have been informed I am suffering from ‘silent-point’ oscillation. I do not know what that is, but I do know I am nearly at boiling-point, not silent-point. Anyway, what is silent-point oscillation, and does it cause distortion?”

“If so, why is it called silent?”

From your description, we think it is very likely that you are the victim of the silent-point oscillation type of interference.

We are sure that you will agree it is a particularly unpleasant kind of interference, but it often happens that the person who is causing it has not the slightest idea of what he is doing to his neighbour's reception; so, for the benefit of everyone concerned, we will describe a typical case.

Imagine a man with a new valve set with two dials, one marked “tuning” and the other “reaction.” He first of all turns the tuning, and presently picks up a station broadcasting.

It is not quite loud enough for his liking, so he tries to make it stronger by handling the reaction dial. As he increases reaction, so the station gets louder; but presently he gets a loud whistle as well. He is oscillating, so he turns his tuning dial to try and get rid of the whistle (it is a radio crime to do this, for it sets up a whistle in every set for miles round), and he finds that as he alters his tuning, so the note of the whistle goes up or down, according to whether he is increasing or decreasing the tuning.

Still not understanding a bit what he is doing, he finds that by turning his tuning dial carefully in a certain direction he can bring the howl down in pitch from a very high tone to a lower, then lower still, finally to a growl, and, by careful tuning, he can reach eventually a “silent point.” Beyond this point the growl comes back again, and finally gets

to a shriek as tuning is carried further; but there is just one point where the actual whistle disappears—namely, the silent point.

When a set is operated in the manner described above it completely ruins reception on all neighbouring aeriols. Moreover, it spoils the quality on the set on which it happens, and the tragedy of it is that far better results could be attained by the owner of the set if it were not oscillating.

The reason of it is, of course, too much reaction. The reaction dial should be turned well back, so that alterations of the tuning should not cause whistles or shrieks in the telephones or loud speaker.

The proper way to handle reaction in order to get sensitivity and distant stations is described in detail in “The Key to the Ether,” “P.W.'s” free booklet. Other listeners who are not interested in distance reception will find much helpful information regarding the proper handling of the set in the B.B.C. free book on “Oscillation,” which is obtainable upon application to any broadcasting station or to the B.B.C., Savoy Hill, London, W.C.2.

### THE FUSE FOR THE OUTPUT CIRCUIT.

B. M. (Clacton-on-Sea).—“I have a choke-coupled output circuit to the loud speaker arranged so that one side of a 4-mfd. condenser is connected to one end of the choke, and to the plate of the valve. The other side of this condenser goes to one loud-speaker terminal, and the remaining loud-speaker terminal to L.T.—

“If the condenser broke down, I should get 200 volts across the loud speaker. Can I put a fuse in to prevent trouble of this kind and, if so, at what value should it blow?”

Yes, you should put a fuse in between the condenser and the loud speaker. Almost any low value fuse as used for radio work will do, as, under normal conditions, there will be practically no current flowing in the circuit. The amount of current that will flow in the event of a breakdown will depend on the resistance of your loud speaker, and Ohm's Law will give you the figures.

With 200 volts on the plate and a 2,000-ohm loud speaker, you will get 100 milliamps. (1 amp.), and many fuses used for radio work will blow long before this figure is reached.

## HOW IS THE SET GOING NOW?

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

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

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

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

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

### A GOOD THREE-VALVER.

G. L. W. (Bradford).—“Can you put me on to a good three-valve set, Det. and two L.F., using plug-in coils? I did not originally want to use plug-in coils because of the trouble of changing, but after making a mess of the last coil unit I tried I decided not to try it again. (I cannot afford to buy one, but I have plenty of coils left over.)

“P.S.—Where has Oslo gone?”

You will by now have received your free gift from “P.W.” of the four blue prints and no doubt have discovered that No. 58 is just the set you are looking for. It employs plug-in coils, but they are so arranged that they remain permanently in position and wave-changing is carried out by a simple switch on the panel. This set should do exactly what you require.

Regarding your P.S., the Oslo station is undergoing alterations at the moment of writing, and will probably be taking up a long wave-length in the near future as a permanency. Look-out for tests from him on about 1,070 metres.

(Continued on page 348.)

# BETTER RADIO WILL COST YOU LESS THIS SEASON



H.T. 2. 94x7

How many high tension batteries will you need this season to give your new big efficient valves the current they should have? One every month or two! And however much you pay, however often you replace them — you can't stop dry batteries running down. Dry batteries lose power — power you've paid for, power you can never recapture — even when the set's switched off! Put in a set of National Dagenite H.T. accumulators now at the start of the season. They're compact, they're clean and except for a shilling or two to re-charge at long intervals the first cost is the last you need ever pay for H.T. Follow the lead of the B.B.C. and the great talkie companies. Get pure music from a background of velvety silence by using the steady unfailing current from H.T. accumulators — Dagenite High Tension accumulators. From National service stations and dealers everywhere.



Re-charge from the house mains at a cost too small to notice, with a National 'Dagenite' trickle charger.  
FOR A.C. MAINS 49/9  
FOR D.C. MAINS 29/9

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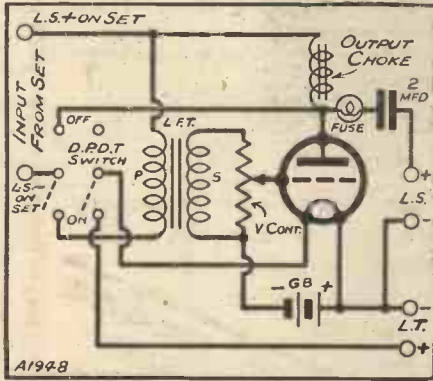
# RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 346.)

## SWITCHING AN L.F. AMPLIFIER.

In connection with Popular "Wirelets" No. 18, September 6th and 13th issues of "P.W.", many readers have been interested in applying the system to a transformer stage instead of to the anode resistance as shown.

## AN EASY CHANGE-OVER.



This is the method used by "Chief Officer," and described on this page.

One reader's letter is of special interest on account of the fact that an output choke is switched into a circuit which did not previously employ it. The letter is reproduced below instead of in the Correspondence Columns,

so that it will catch the eye of those looking for a circuit of this type.

"The Editor, POPULAR WIRELESS.

"Sir,—In POPULAR WIRELESS No. 431 there is Popular 'Wirelets' No. 18 which caught my eye. In consequence, I thought that you may be interested in the one-valve amplifier which I had designed and am using on my set at home.

"Enclosed you will find a rough diagram showing the circuit. I am using this amplifier on a screened-grid three, which has no output circuit (only the direct one). The quality is very much improved even when the amplifier is shut off, as the output-filter-choke circuit is automatically shunted on to the last valve.

Yours truly,

'CHIEF OFFICER.'

"Manchester Wharf, E.1."

## 2 LO'S POWER.

G. R. W. (Tiverton).—"I see that the power of the London Station has been increased, and the Regional is now 45 kw. as against the old 30 kw., whilst the London National on 261 has gone up to 68 kw. But I have not noticed a great change in the strength of reception at this distance when taking into account the improvement that always takes place at this time of the year.

"Is the new power being used yet?"

There have been no increases in the power of the London stations. Although the figures in kw. used to express the power are now bigger than formerly, this is due not to an increase in power, but to an alteration in the method of reckoning the output of the station.

Until recently there have been several ways of calculating the power of a broadcasting station, and some European countries used one way and others used another way. The fact that two stations using identical power might be quoted in widely differing figures, according to the method of reckoning that power, resulted in an agreement between the European countries to all adopt one certain method of reckoning.

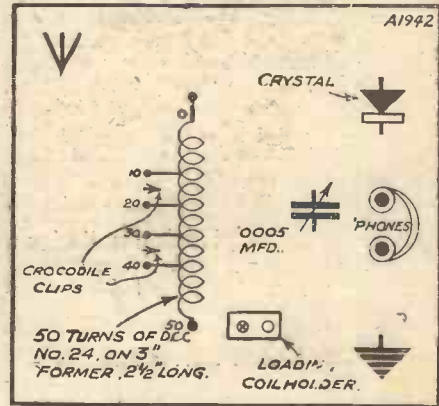
This is now being done, and in order to bring the B.B.C. stations in line with the rest of the Continent, the new method of reckoning power has been applied to them, with the result that the figures are higher than formerly. The actual power has not been increased (and there is no intention of increasing it at the moment), so any improvement you may now have noticed is due to the seasonal change which, as you say, results in better reception during the winter season.

## HILVERSUM AND HUIZEN.

W. M. (Gt. Holland).—"Why it is that sometimes the 1.875-metre station relays Hilversum and at other times Huizen, and the

(Continued on page 350.)

## POPULAR "WIRELETS" No. 22



Here are the "components" for a good crystal set, based on a simple home-made coil, and with separate tapping-points for the crystal and the aerial circuits. Can you "wire-up" this circuit? (Look out for the answering diagram next week.)

# SPECIAL ANNOUNCEMENT TO LONDON LISTENERS!

YOU would doubtless like to enjoy the advantages of High Tension Accumulators—and so be spared the expense and unreliability of Dry Batteries. The problems of initial cost and re-charging need no longer trouble you. Our unique service offers you the famous CAV High Tension Accumulators fully charged and ready for immediate use. They are delivered to your door (anywhere within 12 miles of Charing Cross) at convenient intervals; and at an inclusive charge which represents a vast saving over your present expenditure, and definitely guarantees better reception than partly discharged Dry Batteries.

Over 10,000 London listeners testify to the excellence of this unique High and Low Tension Accumulator Service.

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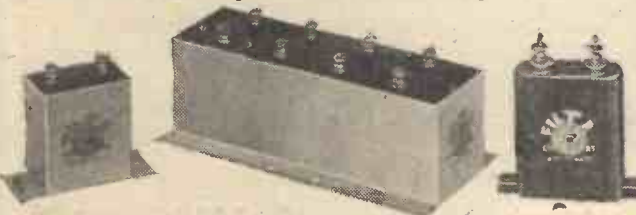
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2	Bakelite	3/3

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MODEL  
N° 219



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*Ever Ready batteries are made for all wireless sets. If you own a portable you can obtain an Ever Ready of the right size and shape to fit it. Write for free list, which gives full particulars, including exact dimensions in inches.*

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## RADIOTORIAL QUESTIONS AND ANSWERS.

(Continued from page 348.)

same uncertainty appears to exist with the 1,071-metre station? Which is which?"

We do not wonder that you have been unable to disentangle the positions as it is certainly a puzzle—in fact "double Dutch."

Actually the stations concerned are Huizen (Holland) 1,875 metres; Hilversum (Holland) wave-length 1,071 metres. In addition there is a short-wave Hilversum station, on which broadcasts are sent out during the time that the powerful maritime wireless telegraphy station at Scheveningenhaven is working to Dutch shipping.

So that without any further complication, the "Hilversum" situation would be rather difficult, as sometimes the programme is going out on the long-wave station, 1,071 metres, and sometimes (generally until 5:40 p.m.) on the 298.8 metres station. This in itself would be rather confusing, especially as the times of working and change-over at week-ends are different from those during the week.

But in addition to this, there is an arrangement by which the Hilversum programmes are sometimes sent out from the Huizen aerial, and vice versa. For instance, during July, August and September, "Hilversum" was going out from Huizen, and "Huizen" from Hilversum. They change four times a year, so for the next three months it is probable that each station will be sending its own programme, though this cannot be said for certainty.

### KEEPING THE OUTPUT IMPEDANCE CONSTANT.

R. P. P. (Cheltenham).—"I use a high-resistance potentiometer across my loud speaker for volume control, the slider being connected to the set and altering the volume according to whether more or less of the resistance is in circuit.

"I am told that the disadvantage to this method is the fact that the output impedance should be kept constant, which is not the case when the total resistance in circuit is varied, and that another variable resistance could be connected so that no matter what the position

of the slider the total impedance in the plate circuit would not be altered.

"What are the connections for this?"

It is possible to maintain a more uniform impedance and thus a more even response when wide variations of volume are dealt with in this way, but there is no easy way of adding an extra resistance to the existing potentiometer for the purpose, so far as we are aware.

What is needed is a potentiometer with a dual arm arranged so that any movement which cuts out one of the resistances automatically brings in the other, and vice versa. Double potentiometers of this type have attained considerable popularity in the U.S.A., and are obtainable in this country also, but you require a double potentiometer, and not an alteration to the existing one.

### THE SPARKING CONDENSER.

"SPARKING" (Cleekheaton).—"Quite by accident I have discovered that the large condenser (4 mfd.) I use in my choke output system will give a very large spark even some hours after the set has been switched off.

"I always take the H.T. negative plug out when attending to wiring, etc., or checking over my leads, etc., and feeling quite safe on this account I accidentally put a screwdriver across and discharged this condenser, and got a really large spark. Quite startling!

"It was such a tremendous crackle that I became curious when I discovered that the H.T.—plug was out, so preparing myself for the shock I tried a screwdriver again. Nothing happened.

"I have found since that it only happens once when the set has been on, but even hours after it has been switched off I can get one fat spark by touching the terminals. Is it O.K.?"

Perfectly O.K., and an indication that this condenser and the rest of your insulation are in good condition.

As you are using a really big condenser it will hold quite a large charge which is sufficient to produce a surprisingly large spark—some hours after the charging current (in your case that of the anode circuit) has been removed, providing that the insulation of the condenser and its associated apparatus is good.

Your spark, instead of pointing to something wrong actually proves that the insulation is thoroughly satisfactory.

## THE "P.W." DISTRIBUTOR.

(Continued from page 331.)

To the pair of terminals marked "L.S.1" connect your local loud speaker, that is, the one which will be used along with the set. Connect your two pairs of extension lines to the terminals marked "L.S.2" and "L.S.3."

This is how you use the distributor. Start off with the two plugs removed from the sockets. To bring the local loud speaker into action, insert one of the plugs, it does not matter which, in socket No. 1. To transfer the output of the set to one or other of the extension lines, transfer this plug to the appropriate socket, No. 2 or No. 3.

To bring the local loud speaker into action again, take the remaining plug and insert it in the No. 1 socket. Similarly, you can bring both the extension line loud speakers into action by placing the plugs in the No. 2 and No. 3 sockets. The blank socket upon the panel is for whichever of the plugs happens to be out of use.

### The "On and Off" Control.

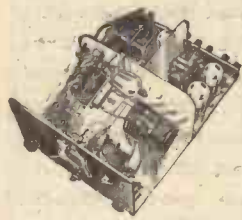
We thought that since this distribution board will function at times as the main control, it would be handy to have upon it an "on and off" switch.

You need not use it if you do not want to, but to bring it into action, proceed as follows. Connect your L.T. battery to the terminals marked L.T.— and L.T.+ Battery, upon the unit. Wire up the L.T.— and L.T.+ terminals which are marked "set" upon the unit to the appropriate terminals upon your set. Keep the set on-off switch permanently turned on and control with the unit L.T. switch.

## MAKE UP THIS FINE ALL-ELECTRIC RECEIVER

### "SENSITITE"

A.C.—SCREENED GRID. DETECTOR. PENTODE  
Everything Supplied. Nothing Else to Buy.  
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One-knob control—Illuminated dial—Gramophone pick-up—Automatic grid bias—Simple selectivity adjustment. No soldering—A screwdriver and pliers is all you require—Panels and screens drilled. Full size blue print. **£9-10-0**

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It is not only selective enough to entirely separate the twin stations when these are but 5 miles away, but will bring in, at moying coil strength all the principal European stations.

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MILLIAMPS  
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The All-in-One Radiometer gives you a definite answer to every question you put to it. It will tell you, at once, whether a valve is "good" or "dud." If your batteries are failing it will show you just where you stand, giving you

the exact output in volts and milliamps. Mains Units, too, can be tested. When you build your new set you can test every component, every inch of wiring—before you switch on. You will never burn out a valve if you check over first with the All-in-One. It is calibrated to give an accurate reading, is as simple to understand as an alarm clock and is built to last. Let it solve your problems—let it save you money. Ask for our booklet or write direct to Pifco Ltd., Pifco House, High St., Manchester

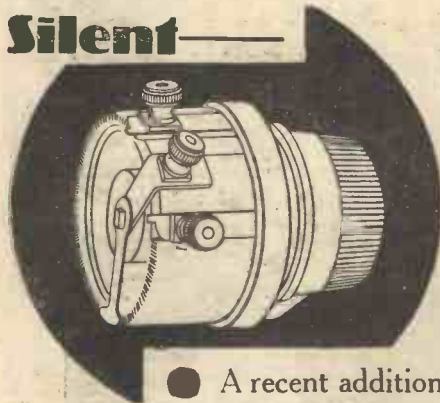
**12/6**

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## PIFCO **A4 IN ONE** RADIOMETER

P. 4.

# Smooth and Silent



● A recent addition to Colvern productions—the Variable Colverstat—has many applications. It is necessary that it be silent, constant and smooth in adjustment, consequently all Variable Colverstats are wire wound and are designed to operate silently. The ideal volume control, price 5/6.

The Colvern Booklet gives a list of resistances and values available and also contains much other matter of interest to the constructor. It includes Coil measurements, Circuits, fixed Resistances, Switches and illustrates suitable tuning coils for ganging screen grid valves for multi stage receivers.

The Colvern Booklet sent free on request.

## COLVERN : RADIO :

Advt. of Colvern Ltd., Mawneys Road, Romford

# PARASITES OF THE ETHER.

(Continued from page 325.)

it makes a strong impression even when very far distant on a sensitive radio receiver.

The static content of the earth's atmosphere is largely influenced by the sun. It is calculated that the amount of solar radiation reaching the earth each day is equivalent to twenty thousand billion horsepower. This energy is chiefly composed of electromagnetic waves, visible light, ultra-violet rays, and streams of electrons and ions. In addition the earth receives a liberal daily allowance of a very penetrating type of radiation (Millikin rays) coming to us from inter-stellar space.

### "In a Sea of Static."

All this has a very definite effect in ionising the atmosphere and charging it with static. For instance, streams of ions and electrons projected from the sun, particularly during a period of sunspot activity, swirl around the earth's magnetic field and create space currents. These in turn induce corresponding "ground" currents in the interior of the earth, and so give rise to magnetic disturbances which react upon the electrical equilibrium of the atmosphere.

Regarding the earth as immersed in a sea of static, the passage of deliberately transmitted wireless signals can be compared with a comparatively small but regular succession of wavelets.

Superimposed on these one must imagine a constant fret of atmospheric "disturbances" comprising irregular movements and surgings, such as are caused in the ocean by wind, tide, and other natural influences. Such disturbances may vary in size from infinitesimal ripples to full-sized waves, and even an occasional tidal flood.

## FOR THE LISTENER

(Continued from page 332.)

An irascible friend of mine, finding the number engaged at the third time of asking, dialled O.D.A.M. The O called up the operator, and the other three letters turned her into a Miss Pink.

Italy.

The conversation between Mr. Wickham Steed and Dr. Kermania on Italy, in the series, "The World and Ourselves," was a model of what such a talk should be. Compliments did not fly.

Wickham Steed was against Fascism, and Dr. Kermania is Mussolini's man in London. So they were at polite loggerheads all the time. Thrust and parry, and no quarter.

Dr. Kermania, who spoke English charmingly, was quite able to hold his own, and made out a good case for Fascism. Fascism, he held, was the best form of government for Italy at the moment.

Wickham Steed argued against it on general principles, and rather as if he was imagining that we in England were threatened with it. His arguments were sound enough from our point of view, but hardly, as it seemed to me, from the Italian point of view.

I have been in Italy both before and since the war, and the improvement since

(Continued on page 354.)

# BROWNIE

Not just a 'box of tricks'—but a really superb all-electric 3-valve receiver in a handsome, richly polished, solid walnut cabinet—that's the wonderful new Brownie DOMINION MAINS S.G.3. It's the modern set for the modern home... no batteries, no accumulators... no bother, no expensel! Just switch it on—and then sit back and enjoy at last—the perfect broadcast!



## MAINS S.G.3

Price, including royalty and valves £18/10 OR

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Sold everywhere from 1/-  
DX COILS LTD., LONDON, E.8





## Your Battery Set as TROUBLE FREE as an "all mains" yet smoother-steadier and safer

Though mains supply for your set may not be available in your district, you can enjoy trouble-free H.T. supply for 12 months or more with the added benefit of the smooth, unfluctuating flow of power from a Standard Cartridge type Wet H.T. Battery. Millions of Standard Cells are in daily use with thousands of users who were determined to stop wasting money on costly dry batteries. Why continue to suffer the inconvenience of wasteful dry batteries. Install the Standard for 7/6 down and get wonderfully improved reception—without trouble.

From Radio dealers, Curry's & Halfords.

# WATES STANDARD PERMANENT H.T. BATTERY

This large capacity Battery for 7/6 down.



**FREE BOOK**

**SPECIAL OFFER FOR TWO-VALVE SETS**  
 To STANDARD BATTERY CO. (Dept. P.W.),  
 124/128 Shaftesbury Avenue, London, W.C.2.  
 I enclose Locker and details of 2-tray  
 Battery (as ill.) No. 90V. for  
**7/6 DOWN** and 5 monthly pay-  
 ments of 7/6. 2 cells, 14V.  
 Spare No. 2 cells, 14V.  
 5/6 per doz. Batteries  
 of any voltage  
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PRESCIENCE  
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 EXQUISITE CRAFTSMANSHIP

PRECISION  
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 Easy reading. Smooth action. No crackle.  
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**500 LINE CONDENSER**  
 The lightest, lowest loss & most efficient Condenser extant.  
 Capacities:  
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 A great little variable compression type condenser.

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 Bakelite and Mica.  
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**DRUM DIAL CONDENSER.**  
 A truly phenomenal illuminated drum dial with trimmer control.

**BRITISH LEADERSHIP**  
 Drum dial, 8/6 with one Condenser, 13/- with two, 17/6

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**SUPPLIERS TO THE LEADING SET MAKERS OF THE COUNTRY**

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7 of our 35 Lines



**CORRESPONDENCE.**

**THE "NEUTYPE" FOUR**

**A MAINS UNIT PROBLEM.  
"DOUBLE DUTY LOUD SPEAKERS."**

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

**THE "NEUTYPE" FOUR.**

A Cornish reader's very satisfactory experiences. The Editor, POPULAR WIRELESS.

Dear Sir,—May I just add a few words of praise in favour of the "Neutype" Four, which I have just constructed? It is a very fine set, and does a lot more than you claim for it. On the long waves Daventry simply roars in with no reaction, whilst Radio Paris, Motala, and Hilversum come in almost as well. Hulzen, Zeesen and others come in at full loud speaker strength with a small amount of reaction. Selectivity is very good. I can tune in Zeesen while Daventry and Radio Paris are both working without a trace of either in the background. On the short waves (200 metres to 500) a station seems to come in on every degree of the dial. A piece of wire 15 ft. long stretched across the room will bring in the London and Midland Regionals at good L.S. strength, without any reaction, whilst with a little careful tuning I can bring in about a dozen foreign stations at quite good strength. When working with an outside aerial I have to use a volume control on quite a number of stations. In conclusion, I consider this an excellent circuit. If any amateur is in doubt of what to build, I advise him to try this one, and I think he will be well rewarded. As a reader of "P.W." for six years I have found no other wireless book to equal it. Wishing it the best of luck.

I remain,  
Boscastle. S. BURNARD.

**A MAINS UNIT PROBLEM.**

The Editor, POPULAR WIRELESS.  
Dear Sir,—I would like to reply to Mr. G. S. Mathieson's letter in a recent issue of "P.W." regarding H.T. eliminators.

Mr. Mathieson's last paragraph: "Notice voltage your valves are meant to take, and see that you give

**NEXT WEEK**

Full details of

**The "Contradyne" Three  
The Last Word in Modern Receivers**

**Don't Miss Next Week's "P.W."**

them that amount." But can he say how, without guessing, when the majority of up-to-date manufactured H.T. units have two fixed (one negative and one power)appings, and two variable, with no high resistance voltmeter?

Without the H.R. voltmeter how can one tell the amount one is giving the S.G. valve, since that valve especially is supposed to be very critical as regards voltage? Yet how many manufacturers include them? I know the price would rise, but it would probably save one's valves.

Again most units cover 200 to 240 volts, a gap of 40 volts which again means guessing. The power tapping gives, say, 180 volts, but on what voltage, 200 or 240?

Perhaps one of the well-known manufacturers of H.T. units could enlighten us regarding this point, as I know it would be of great interest to a number of your readers.

Yours faithfully,  
East Sheen, S.W.14. A. LEFEVER.

**"DOUBLE DUTY LOUD SPEAKERS."**

The Editor, POPULAR WIRELESS.  
Dear Sir,—I read with interest in a recent "P.W." Mr. Mec's account of the signals he gets from the primary of a transformer, the secondary of which is used as an L.F. choke. I would like to assure Mr. Mec that the energy developed in the primary is by no means supplying him with extra signal strength; it is energy developed in the wrong place, due to the fact that there are passing through the secondary variations of current strength, i.e. signals. Now this

(Continued on next page.)

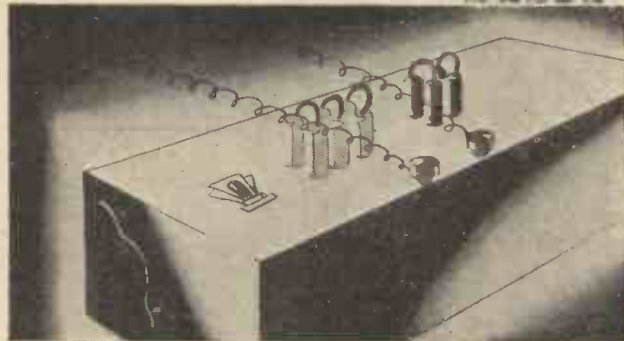
**Radio is becoming  
All-Electric**

You can make your battery set All-Mains quite simply. No need even to alter it. Think of the added power—constant, unlimited, unailing; the added range, selectivity. Think of being able to use the Six-Sixty Mains Valves!

Convert your set with the Six-Sixty A.C. All-Mains Conversion Equipment—the great success this season! Price, Complete from £8:5:0 Mains Unit only (H.T., L.T., & G.B.) £6:6:0.

Dimensions do not exceed those of the batteries it replaces. No internal wiring alterations. Made to suit any A.C. supply. Specially selected Six-Sixty A.C. valves and Six-Sixty 4/5 pin valve holder adaptors.

Write for FREE Booklet giving full and interesting information on how to make your set up-to-date.



**AND  
ALL  
SAY**

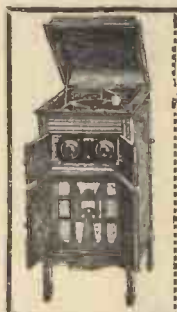
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(B.V.A. RADIO VALVES AND EQUIPMENT)

**SIX-SIXTY RADIO CO., LTD.,**

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**A RADIO-GRAM  
THAT YOU  
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Here at last is offered an efficient Radio-Gramophone (Broadcast or Records at the touch of a switch) built into a really handsome matt-finished oak cabinet, at the astounding price of only £18:18:0, complete (3 Valves.) A fully illustrated catalogue of this, and many other fine models, will be sent on request.

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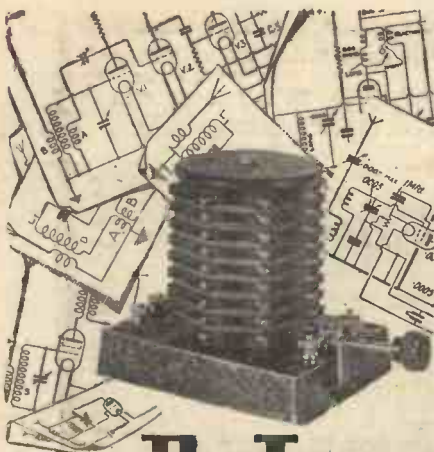
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# The Tuner for ALL circuits

This tuner is practically indispensable for all circuits now that the new broadcasting arrangements are being developed.

The Watmel Tuner selects—it gives absolute separation. It is efficient—volume and tone do not suffer. Its special winding and loose aperiodic coupling make it a Universal Dual-Range Tuner and a wave-trap as well.

It is specified for many successful circuits, including the SUNDAY PICTORIAL "FAMILY TWO."

It is beautifully finished in Walnut-Bakelite, and robust positive push-pull switch is concealed in the base.

Price complete  
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## THE WATMEL BINOCULAR H.F. CHOKE

gives maximum efficiency, very low self-capacity and an extremely restricted field.



**TYPE DX3**  
Inductance - 200,000 mh.  
Self Capacity - 1'6 m.mfd.  
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Price 6/-

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Inductance - 40,000 mh.  
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WATMEL WIRELESS CO., LTD.,  
Imperial Works, High St., Edgware.  
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M.C.14

## CORRESPONDENCE

(Continued from previous page.)

shows that the secondary is not acting efficiently as a choke. The signals, instead of being completely choked back, are passing partly through the 4-mfd. condenser and partly through the secondary which has, apparently, an impedance not much higher than the condenser.

A sad state of affairs! If Mr. Mee substitutes for the transformer a good high impedance choke, practically all signals will choose the lower impedance path offered by the mfd. condenser and L.S., and there will be an improvement in signal strength at the proper place—the output terminals, instead of half the signals dutifully entering the L.S. and the other half wandering through the "choke."

Yours faithfully,  
C. LEHANE.

## YOU MUST NOT MISS The "CONTRADYNE" THREE

This remarkable receiver will be fully described in

POPULAR WIRELESS  
NEXT WEEK  
On Sale Next Thursday

### WHERE ARE THE MILLIAMMETERS?

The Editor, POPULAR WIRELESS.

Dear Sir.—In the words of that once popular song, "I May Be Wrong, but—" it seems to me that in connection with the modern "Quality Rush," too much attention is paid to getting super high notes and to going right down in the depths, and not enough emphasis is paid to avoiding overloading of power valves.

How many sets does one find without a milliammeter, and in which the output valve is being given more than it can deal with? I think I should be correct in saying nearly every one—surely a thoroughly undesirable state of affairs!

Yours faithfully,  
"Logic."

## ADVERTISEMENTS

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

### "KLEER-KUT" COILS FOR "P.W." BLUE PRINT SETS.

#### SPECIAL OFFERS.

"Sharp-Tune Two," 8/- (6 coils); "Three-Coil Three," 13/- (6 coils); "Easy Change Three," 5/3 (6 coils); "Maxipower Four," 8/8 (6 coils).

See last week's advt. for full prices. Mounted on British Plugs. All post free.

L. BRUCE, 47a, Stanley Gardens, N.W.3  
7 Years of Coil Manufacturing.

## A Small deposit Secures

Any Popular Make of Wireless Set, Eliminator, Loudspeaker, Components, etc. A few examples of our wonderful Terms.

### COSSOR MELODY MAKER

1931 Empire 3 Valve Kit. Complete including valves and cabinet. Cash £6.17.6 or 11/9 with order only and 12 monthly payments of 11/9.

1931 Cossor 4 Valve Kit. Including valves and cabinet. Cash £9.17.6 or 16/9 with order only and 12 monthly payments of 16/9.

### OSRAM MUSIC MAGNET

1931 Osram 4 Valve Kit. Complete with valve and handsome cabinet. Cash £11.15.0 or 19/9 with order only and 12 monthly payments of 19/9.

The above kits also supplied complete with Batteries and Loudspeaker at slight extra cost.

### COSSOR "ALL MAINS" SET

Cossor 2 Valve All-Electric Receiver. Complete, ready for use. Cash £10.10.0 or 17/9 with order only and 12 monthly payments of 17/9.

Also on similar terms: H.T. Units, Batteries, Loudspeakers, Components, Etc.

Remember NO Formalities or Fuss for Fosters Finance Themselves.

Send for list stating requirements to:



Head Office:  
74, Highbury Park, Highbury Barn,  
London, N.5. and Branches.

Phone: North 4430. (Private Branch Exchange.)  
Buses 4, 19 and 263 pass the door.

## REPAIRS

Any make of L.F. Transformer, Loudspeaker or Headphones repaired and despatched within 48 HOURS—TWELVE MONTHS' GUARANTEE with each pair. 4/- post free.

Terms to Trade.

### TRANSFORMER REPAIR CO.,

"Repairs" Dept.,

953, GARRATT LANE, TOOTING, S.W.17.

**KONE DOPE DRESSING** for Linen Diaphragm Speakers 6d. & 1/- per bottle. 3d. postage. Special Doped Linen, 5/- per yd., any size cut. Write for Price List of our new Single Linen Diaphragm Speaker. Marvellous Reproduction. The Actual Manufacturers.

KONE DOPE CO., 54, Idmiston Rd., Stratford, E.15

## IN YOUR SPARE TIME!

### Demonstrate and sell "ELECTROCETS."

ALL Electric 2 and 3 valve receivers, Radio Gramophones, Eliminators. (For A.C. Mains.)

Also 2 valve battery or mains operated receivers.

Demonstration receivers may be purchased on Deferred Payment terms, and are sent on 7 days' trial. Excellent commission.

Send to-day a 1d. stamp for our brochure P.W. 2, which includes our illustrated catalogue and details of how you may obtain the sole agency for your district.

THE ELECTROCET RADIO CO.,  
SOLIHULL, BIRMINGHAM.

## EXACT TUNERS

250 to 2,000 metres. Thousands of these tuners are in use, and we can strongly recommend them. No further coils are required. Send P.O. for particulars and circuits—FREE.

THE EXACT MANUFACTURING CO.,  
Croft Works, Priory Street, Coventry.

PLEASE be sure to mention "Popular Wireless" when communicating with Advertisers. Thanks!

# TECHNICAL NOTES.

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

## Ebonite Drilling.

WHEN drilling ebonite panels for the mounting of components, it sometimes becomes necessary to make rather large holes, larger than the average size of drill used by the amateur.

It is occasionally recommended that a smaller hole should be drilled first and that this should then be enlarged by means of a file or some similar tool.

This is quite a practicable way of enlarging a hole in ebonite, but there are one or two little precautions which you should bear in mind. In the first place it is obviously necessary that the cutting be done *gradually*, not too much at a time, otherwise you may crack the ebonite panel.

In the second place, I do not know whether you have noticed it, but if you attempt to enlarge a circular hole by means of a *flat* tool there is a curious tendency for the hole when enlarged to be more or less *three-cornered* or *triangular*.

## A Curious Effect.

If you try to enlarge a circular hole by means of a *triangular* file the hole tends to come out with *four* corners or roughly square. This effect is more pronounced when enlarging a hole in thin metal sheet such as tinfoil, but it also occurs with ebonite.

The best way to avoid it is to do the cutting *very gradually* and not to exert too much force. At the same time the ebonite panel may be gradually shifted around into different positions. In this way and with a little care it is quite possible to enlarge the hole, keeping it circular and at the same time concentric with the original position.

Incidentally, the taper of the tool should not be too slight, otherwise there will be a tendency for the tool to jam in the hole, whilst on the other hand, if the taper is too pronounced you will make a tapered hole instead of a parallel one. This latter effect can to some extent be overcome by using the tool alternately on opposite sides of the panel.

## Pentodes.

I have been several times asked whether it is possible to use a pentode valve taking its low-tension supply direct from the A.C. mains.

Hitherto, there has been some difficulty in producing a valve of this kind, but quite recently the first example of the indirectly heated type has been put on the market, type A.C.-Pen.

This has the usual 4-volt filament, taking about one ampere, and has a very high amplification factor; the magnification factor is in the region of 100. The maximum high-tension voltage for this valve is about 250 volts with a screen voltage of 200 and a grid bias of about 10.

There are some special precautions advised in connection with the use of the valve; for one thing the output should be suitably by-passed in cases where the reproducing unit is deficient in the lower frequencies.

(Continued on next page)

# K. RAYMOND

27 & 28a, LISLE ST., LONDON, W.C.2  
Come to LEICESTER SQUARE TUBE.

This address is at the back of Dally's Theatre. Phone: Gerrard 2821.

**C.O.D.** Orders despatched same day as received where possible. Send ORDER with instructions and pay Postman. C.O.D. APPLIES TO UNITED KINGDOM ONLY.

All C.O.D. orders must be over 5/-

## "SHARP-TUNE" TWO VALVER

EXCEPTIONAL SET. RAZOR-SHARP TUNING. IF YOU HAVE TROUBLE WITH YOUR LOCAL STATION BUILD THIS SET. KIT AS FOLLOWS: 12 by 7 Panel, 2/6. Ormond -0005, 4/- Ormond S.M. Dial, 3/6. Ormond Switch, 1/3. Ormond -0001 Differential, 4/- Ormond -0005 Solid Dielectric Condenser, 3/6. 2 Telsen Valveholders, 2/- 3 Lotus Coil Plugs, 2/- Telsen H.F. Choke, 2/6. Telsen Ace Transformer, 8/6. -0003 Fixed Condenser, 1/- Lissen 2-meg. Leak and Holder, 1/6. 12 by 2 Strip, 1/- 9 Terminals, 9d. COMPLETE AS ABOVE.

**£1-18-0** PLUS CARR. AND PACKING, 3/-

GIVEN AWAY FREE WITH ABOVE  
Wiring-up Wire, brackets, set of leads, G.B. clips, and baseboard.

OAK CABINET TO SUIT 6/11  
Plus 1/6 for carriage.

COMPLETE SET OF COILS  
35, 50, 60, 100, 150, 250; to cover short and long wave-lengths can be bought with the KIT OF PARTS. FOR ONLY 8/6 EXTRA.

## THE "THREE-COIL" THREE SET

FULLY DESCRIBED IN THIS ISSUE. A WONDERFUL CIRCUIT. KIT AS FOLLOWS. 18 by 7 Panel, 4/- 2 -0005 Ormond Log Condenser, 8/- 2 Vernier Dials, Ormond, 7/- -0001 Differential, Ormond, 4/- L.T. Switch, 1/3. Ormond Rheostat, 2/- 3 Telsen Valve Holders, 3/- 3 Lotus Coil Mounts, 2/- -0001 Sovereign Condenser, 1/9 -01 Lissen, 1/9 -001 Lissen, 1/- -0003 Lissen, 1/- 2-meg. Grid Leak, 1/6 2 Telsen H.F. Chokes, 5/- Telsen Ace Transformer, 8/6. H.T. Fuse, Raymond's, 9d. Screen, 1/6 10 Terminals and Strip, 1/10. COMPLETE AS ABOVE.

**£2-15-6** PLUS CARR. AND PACKING, 3/6

Oak Cabinet to Suit 9/11 extra.  
COMPLETE SET OF COILS

2 60x and 50. 2 250x and 100. Can be purchased with Kit for an additional 14/-  
GIVEN AWAY FREE WITH KIT  
Wire, Screws, Panel Brackets, G.B. Clips, Set of Battery Leads, and Baseboard.

## RAYMOND'S "SCREENED-GRID" 3

Marvellous Value in Kit of Parts for SCREENED-GRID 3 RECEIVER  
Kit as follows: 14 by 7 in. Panel; -0005 S.L.F. Var. Condenser; Micro Condenser; Push-pull Switch; 3-point Switch; 10 by 6 in. Screen; Titan Coil; 3 Valve Holders; L.F. Transformer; H.F. Choke; -0002 Fixed; 2 -0003 Fixed; 2 1-mid. Condensers; 2 H.T. Fuses; 2-meg. Leak and Holder; 12 by 2 in. Strip; 11 Terminals; Connecting Wire; Brackets; Wiring Diagram; and 14 by 7 in. Oak Cabinet.

**£2-12-6**

Packing and Postage 2/6 extra.

Complete Kit as above with 3 Valves (1 Screened-grid), 100-volt Guaranteed H.T. Battery, 2-volt 40-amp. Accumulator, 9-volt Grid Bias, £3 10s. Clitophonous Loud-speaker. Aerial Equipment.

**£5-0-0**

Packing and Postage 6/- extra. UNBEATABLE FOR REAL VALUE.

## 100 SPECIAL BARGAINS NOT TO BE MISSED

Best Quality Goods at Cheapest Prices  
Can be Supplied C.O.D.

NOW IS YOUR OPPORTUNITY TO SAVE MONEY.

Oak Loud Speaker Cabinets, 13" x 13"	4/11
Oak Loud Speaker, to fit Blue Spot, R. or P.	10/6
Chassis, to fit Blue Spot, R. or P.	6/11
Dual Range Coils, panel mounting	4/11
Dual Range Coils, baseboard mounting	4/11
Differential Condensers, 00015	2/6
Reaction Condensers, 0001	1/11
Baseboard Neutralising	1/11
S.L.F. Variable Condensers, 0005	2/6
S.L.F. Variable Condensers, 0003	2/6
Valve Holders, with terminals, each	5d.
Baseboard Rheostats, 6 ohm. or 30 ohm. each	6d.
Marconi 6-1 Unboxed Transformers	8/11
Eye 110 h. Chokes	4/11
100 H.T. Batteries, fully guaranteed	6/11
60 H.T. Batteries, fully guaranteed	3/11
4.5 Packets Batteries, per doz.	3/6
Special Juventa H.T. Battery, to fit portable sets	1/11
6-Pin Bases	10d.
Earth Tubes	1/6
1 mid. fully guaranteed Condensers	1/6
2 mid. fully guaranteed Condensers	2/-
4 mid. fully guaranteed Condensers	3/6
Triotron Cone Units, latest model	3/6
Triotron T.D., 2 valves	4/6
Triotron Z.D., 2 valves	5/6
Fuller 2-v. 60 Accumulators	6/11
12" Cone Chassis, take any unit	1/11
15" Cone Chassis, take any unit	2/11
12" x 7" Oak Cabinet, polished panel	8/11
14" x 7" Oak Cabinet, polished panel	9/11
18" x 7" Oak Cabinet, polished panel	10/11
Dr. Nesper Trickle Chargers, 2- or 4-v. Accumulators	25/-
Dual Range 6-Pin Coils	4/6
200-700 metres 6-Pin Coils	3/6
Sovereign Dual Range Coils, panel mounting	6/11
Titan Coils, Dual Range	9/11
New Ormond Geared Dial	2/6
New Ormond Log Condenser	6/-
New Ormond Log Condenser, with double dial	6/-
Hegra Dynamic 8-Pole Speaker	39/11
Hegra Trickle Charger	23/11
Undy 8-Pole Units	16/6
Undy 8-Pole Units and Chassis	32/6
Pifco "All in One" Voltmeter	12/6
Dead-Beat Voltmeters	4/6
Accurate Hydrometers, float or ball reading	2/6
Nevev S.M. Condensers and Dial, complete	3/11
100 ft. Enamel Aerial 7/22	2/9
100 ft. Aerial, 7/22 Copper	1/9
Gramophone Pick-Ups, guaranteed	7/6
Panel Brackets, per pair	6d.
H.F. Chokes, reliable	1/6
Telsen L.F. Choke	2/6
Telsen H.F. Choke	7/6
Panel Rheostats, 6 ohm. or 30 ohm., complete with knob, each	6d.
.00015 Brookmans Condensers, complete with knob	1/10
Miniature .0005 Condensers, complete with knob, suitable for portable sets	1/11
3 m.m. Rubber Flex, per yard	1d.
14 x 369 Red and Black Flex, per yard	1d.
S.P.D.T. Porcelain	6d.
D.P.D.T. Porcelain	10d.
Fuse Bulb Holders, each	9d.
"Undy" Volume Controls, 0-3 meg.	2/11
Clitophonous 3 gus. Speaker, cabinet model	16/11
Connecting Wire, insulated all colours, per 10 ft. coil	3d.
Fully Guaranteed 5-1 or 3-1 Transformers	4/9
Set of S.W. Coils, Nos. 2, 4, 6, 9, per set	6/6
Plug-In Coils, Nos. 25, 35, 50, 60, 75, each	1/3
Plug-In Coils, Nos. 100, 150, 200, 250, each	2/3
60 C.T. Coils, 1/9 each; 60 C.T., each	1/4
250x Coils, 3/6 each; 250 C.T., each	2/9
Wall Plugs and Jacks, complete	8d.
Linen Double Chassis, solid oak frame. Lumen fixed and stretched, complete with dope and brush, etc.	5/11
10" x 6" Aluminium, with 1/2" bond	1/3
18" x 7" Aluminium, plain panels, each	1/9
Single Coil Plugs, with terminals, each	6d.
400 ohms. B.B. Potentiometers, each	1/4
Spring Incon. Aerials, with insulators, each	6d.
Ebonite Grid Leak Holders, each	3d.
Sultane Portable Cabinets, Rexine finish	19/6
Pair of 5xx Coils, suitable for 1930 Cosmor	9/11
Pair of B.B.C. Coils for 1930 Cosmor	5/11
"Daily Mail" (Sovereign) Wavetrans	2/11
Aeonic 2-Valve All Mains Set, complete with Speaker, one only	8 gns.
9-v. Grid Bias Batteries, each	11d.
5-Way Battery Leads, complete with Plugs and Spades; excellent quality, per set	1/6
7-Way Leads, per set	1/11
Harley Wavetrans, each	10/6
Walnet Dual Range Coils, Type 31	15/11
Excellent Tone Cabinet Cone Speakers	10/11
Red Diamond Permanent Detectors	2/-
Brownie Permanent Detectors	2/6
Utility Double S.M. Dials; each	6/3
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**TECHNICAL NOTES.**

(Continued from previous page.)

**Permanent or Electro-Magnet.**

The comparative simplicity and convenience of permanent-magnet speakers commended this type very much to listeners during the past year or two, but there is still, in my opinion, a good deal to be said for the electro-magnetic moving coil type, notwithstanding its extra weight and bulk and the need for a separate field-exciting current.

Personally, I have always preferred this type of speaker for its robustness of volume and quality of tone and in view of the great improvements which have been made in the design of speakers of this kind quite recently I think it still more than holds its own with the permanent magnet type.

As quite a number of the letters which I receive from readers deal with some aspect or other of the loud-speaker question, it may perhaps be interesting to say something on the general question of loud-speaker characteristics and those of the moving-coil type in particular.

**Diaphragm Mounting.**

As you know, one of the main objects is to obtain equal response, or at any rate as uniform response as possible, over the ordinary range of audio-frequencies and this is largely a matter of the design both of the moving coil and of the diaphragm.

One point, the importance of which is not always fully appreciated, is the question of the escape of the vibrations around the edge of the diaphragm. This effect, which is specially liable to occur with large-amplitude diaphragms such as those in powerful moving-coil loud speakers, is minimised by the suitable mounting of the diaphragm at its edge and partly by the use of a suitable baffle in which to mount the whole reproducing unit.

As you know, one of the peculiar characteristics of moving-coil speakers is the booming effect so often found in the lower ranges, but this in more recent types has been overcome to a surprising extent without restricting the movement of the diaphragm appreciably.

**Value of the Bass.**

This is very important if the full value is to be given to the reproduced bass notes. In this connection I may say that

(Continued on next page.)

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## TECHNICAL NOTES

(Continued from previous page.)

sonally, I think the importance of the bass notes, or perhaps I should say the difficulty of securing the proper and proportionate reproduction of the bass notes, is apt to be exaggerated.

Personally, I prefer not to have the bass too prominent, in fact, to have it somewhat suppressed and a little extra prominence given to the upper frequencies.

When considering the higher frequencies, it is very important to be sure that there is no tendency to squeakiness, and the aim of the designer should be to strike a happy mean between an over-predominant bass giving rise to boominess and a high-pitched thin or squeaky reproduction.

### Design of Magnetic Circuit.

Another point in the design of a moving-coil loud speaker, or a permanent magnet speaker, for that matter, is the concentration of the magnetic field upon the region occupied by the moving coil. A well-designed magnetic circuit may make a considerable percentage difference to the amount of field current necessary to excite the speaker.

When designing the magnetic circuit, however, mechanical considerations have to be considered as well as the magnetic features of the circuit. We have to remember that the moving coil has to move within the magnet gap and in doing so it acts as a piston and pushes the air to and fro.

If the unit is so designed that there is considerable resistance occasioned by this movement of the coil, it will mean that there will be a damping or cushioning effect upon the armature and this will lead to a reduction in sensitivity and most probably also to distortion or at any rate to a non-uniform reproduction over the audio range, since the effect will differ with different frequencies.

### Choosing a Good Unit.

I mention these points not because the majority of my readers will actually be concerned with the construction of the loud-speaker unit, but because only by appreciating the features necessary for efficient reproduction are you in a position to distinguish between a unit which is well designed and one which is not.

As a matter of fact, notwithstanding that extravagant claims are often made for loud speakers such as the claim to an absolutely uniform response over the whole audio-frequency range, there is still ample room for improvement and often quite a small change in the design or construction of the loud-speaker unit will make a surprising difference to the performance.

### A Matter for Experiment.

It is reasonably correct to say that with the majority, if not, indeed, with all magnetic circuits, it is a matter of some difficulty to predict from theoretical considerations precisely how the circuit will function, inasmuch as the factors which govern it cannot as a rule all be accurately known. Therefore, it becomes largely a matter of experiment and practical test, and this brings it within the range of the home experimenter.

(Continued on next page.)

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## TECHNICAL NOTES.

(Continued from previous page.)

Furthermore, the type of quality of reproduction which will suit one listener will not necessarily suit another, so that it is impossible to draw any hard-and-fast rule as to what may be considered the standard or perfect type of reproduction, and this again still further enlarges the field for development.

### Test Your Voltages.

A letter from a reader in this journal a short time ago emphasises a point which I have previously mentioned in these Notes. In the case in question a mains unit had been installed instead of the high-tension battery previously used, the set having a screen-grid H.F. amplifying stage.

It was found that whereas the set had operated perfectly well on the battery, it went into violent oscillation with the mains unit. On testing, it was found that both the

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No. 32.

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If you are installing a mains unit, pay particular attention to the instructions about its earth connection. Often in such cases a . . . . . must be inserted between the set and earth, by means of appropriate terminals on the unit.

#### LOOK OUT FOR THE MISSING WORDS NEXT WEEK.

Last week's missing words (in order) were: Direct. Alternating. Smoothed. Voltage. Voltage. Rectifier. Transformer.

screen grid and the other valves were receiving a voltage far in excess of their rated value.

### The H.T. Voltag: is Important.

Notwithstanding the advice so frequently given, to apply a high-resistance voltmeter, I am afraid that quite a large percentage of experimenters never know with any sort of accuracy what voltage they are applying (I am speaking more particularly of mains-unit operation) to their different valves. Bearing in mind the great developments of valve design and the fact that the efficient operation of modern valves in many cases depends critically upon the application of the correct voltages, it is surprising that so little attention is paid to this point by amateurs.

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