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PART ONE APPEARS THIS WEEK

No. 713. Vol. XXVIII. February 1st, 1936.

Popular Wireless & Television Times

EVERY WEDNESDAY 3D

The New KELSEY "ROTALOG"

THE DIAL THAT IS GEARED TO THE WORLD! FREE INSIDE

WIN THE ORIGINAL S.T.700!

BUILT BY JOHN SCOTT-TAGGART HIMSELF, THIS IS THE PRIZE IN THE FIRST OF OUR UNIQUE AND INTERESTING COMPETITIONS

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A PRACTICAL BEGINNERS' COURSE IN RADIO AND ELECTRICITY COMMENCES THIS WEEK

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HOW WOULD YOU LIKE A 50% SHARE IN A NEW TELEVISION INVENTION?

THIS WILL BE THE NOVEL PRIZE IN OUR SECOND COMPETITION—NEXT WEEK.

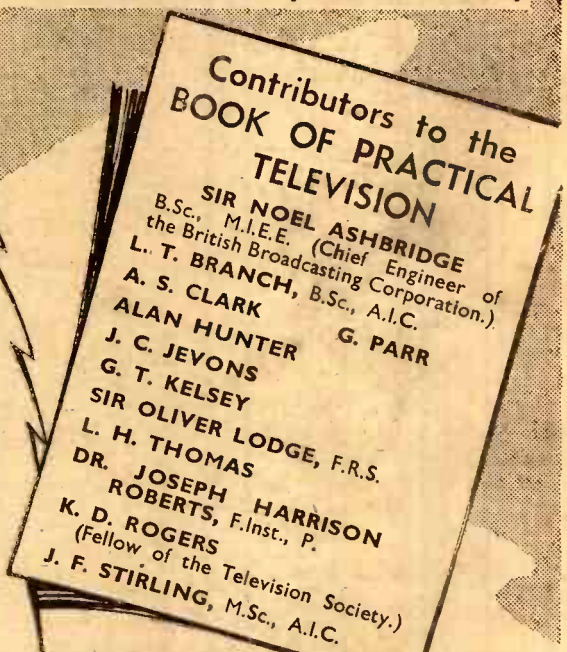
THE FIRST GREAT BOOK DEALING WITH TELEVISION

Written and prepared under the direction of G. V. DOWDING (Associate I.E.E.)

SO many requests have been received from readers who failed to take advantage of our previous offer of The BOOK OF PRACTICAL TELEVISION that we have decided to provide readers with a further opportunity to obtain this volume on bargain terms. If you want to take advantage of this new opportunity you must reserve your copy NOW.

The BOOK OF PRACTICAL TELEVISION will prove of great use to the television engineer and the industry. Its main purpose is to provide enjoyable and informative reading for the listener and potential "looker" and practical and trustworthy guidance for television experimenters and home constructors. It was only possible to produce this splendid book with the aid of a carefully selected team of experts. A great proportion of the material has been derived from first-hand experience, and this has enabled the Editor to obtain a considerable amount of valuable information regarding the practical aspects of the science. The BOOK OF PRACTICAL TELEVISION is a carefully welded amalgamation of the contributions of individual experts and is not a disjointed series of articles.

It contains a vast amount of information which is absolutely original and which has never been disclosed previously in any journal or book. It even includes the full constructional details of a complete outfit suitable for the reception of the forthcoming B.B.C. television programmes and this instrument is the very first home-constructor set of the high definition television in the whole world. In the ordinary way such a volume would not be sold under one guinea, but a large printing order has made it possible to offer this magnificent book to our readers at a price that is little short of a gift.



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Reader's Signature..... **For Office Use.**

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PLEASE WRITE IN CAPITAL LETTERS.

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THIS WEEK: KELSEY'S GREAT "AXIS" SET

MANAGING EDITOR: G. V. DOWDING. ASST. EDITORS: A. J. RANDALL, K. D. ROGERS.

UPLIFT ?
S.S. LENA
RADIO COSTS

RADIO NOTES & NEWS

WELCOME, LISBURN!
ROBOT HICCUPS
SOFIA STATION

Armchair Critics

WE enthusiasts, who know how much skill and savvy can be expended on gaining practical knowledge of wireless, are entitled to rub our eyes at the idea now gaining ground among some of the radio rajahs. These omniscients, while admitting that radio operating in the past required a modicum of sheer gump, now consider that all difficulties have been smoothed away. The development of telewriting and so forth has, in their opinion, reduced the operator's status "to that of a typist"!

Typist, forsooth! The rajahs show deplorable lack of tact in thus slighting all keyboard bangers. And anybody knowledgeable on the subject of long-distance communication knows the fine class of laddie that handled the world's cables. The cream of *that* class took to wireless, and found it a worthy calling. It is no less worthy to-day.

Opportunity for Fortitude

WE must all learn to take the rough with the smooth, must we not? Right, then. Feast your eye on this. "A scheme for the establishment of AN EDUCATIONAL BROADCASTING STATION was disclosed at the Conference of Educational Associations in London recently. The proposed station would provide an all-day service on its own wavelength. It would arouse a new and vital interest in Art and Music, and would, in fact, be a new type of University."

Speaking for myself, there are two bright sides to this picture. Item: my new set is as selective and exclusive as the proverbial gnat's eyebrow. Item: I can switch off so fast that the speaker's next word sounds like an echo from afar.

New Chain for U.S.A.?

CHICAGO, as you know, is a city of reports. But the latest, although only a radio report, is creating a great deal of interest. It is to the effect that Samuel Insull, Senior, at the age of seventy-six, may attempt a come-back as head of a Middle-West chain of wireless stations.

ON OTHER PAGES

The alleged rival to N.B.C. and Columbia is credited with the intention to call itself the "Affiliated Broadcasting Company Inc." A capital of "One Hundred Thousand Dallers" has been mentioned. Mr. Insull when asked to confirm or deny the report did neither.

Your move, Samuel.

Good Work!

MEET young Erwin Schaber, a schoolboy of Poland. Erwin made himself a slick little wireless set and stayed up till ten o'clock one night, tuning in This and That. He was thinking to himself that he really ought to be up-stairing, when he heard an S O S.

Erwin, who knows the Morse code when he hears it, took the message down, and then gazed at it with perturbation. "*S O S*" it said. "*Soviet ship 'Lena' calling. Sinking fast off Sakhalin Island.*"

Erwin couldn't go to bed with a message like that on his conscience, so he telephoned it to the nearest town, Katowice. Katowice called Warsaw, Warsaw called Moscow, and Moscow radioed the message on to Sakhalin.

Thus it was that the crew of the "Lena," giving one last despairing look round before the icy waters got them, saw a lifeboat approaching. . . . All saved. . . . All credit to Erwin Schaber, schoolboy, of Poland.

Last Year's Bills

SAGES and saints are all very well in their way. But if you want me to commend to your notice a really worthy, up-and-doing, outstanding, and wholly admirable character, I shall introduce (or rather reintroduce) my old friend John Listener.

Good chap, John. (Owns the B.B.C. and all other broadcasting concerns, though you'd never think it by the way they treat him.)

John has been looking at his bill for world-wide use of electricity during 1935, and finds he has used 2,420,000,000 units in the twelve months.

Estimated total cost of this little lot is £3,330,000. "Lot of money," murmurs John, abstractedly paying up in sterling,

(*Continued on next page.*)

NEXT WEEK: "P.W.'s" EXCITING TELEVISION INVENTION PRIZE

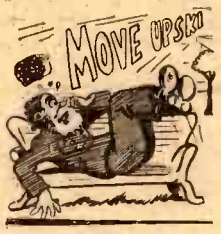
HEAT OF TELEVISION STUDIO RUINS VIOLIN

dollars, doubloons, copecks, lire, centimos, pfennigs, and what-nots.

You bet it's a lot of money. But John is a discerning chap, quite willing to pay for his fancies, and quite able to switch off the "Fancy-thats" who try to uplift him.

The Whisperer

WHAT is claimed to be the World's Loudest Loudspeaker is now being assembled in Leningrad. And proud owners of two-watt instruments will shudder to hear that this Leningrad specimen has a power of *twenty thousand watts!*



It has been designed for crowd-control, and will be installed at a new stadium now being built to seat 100,000 people.

This new stadium, by the way, is in the Leningrad Park of Rest. But I should imagine it will be a Park of Anything But That when the twenty-kilowatter is shouting at the gallant 100,000, on a windy day, when the audience is yelling, too!

Ulster's Blessed Event

FRIDAY, March 20th, will see the opening of yet another B.B.C. Regional broadcasting station, the new Northern Ireland transmitter at Blaris, near Lisburn.

Long and patiently has Ulster waited for the day to be announced, and she may be forgiven for the hint of a swagger with which the news has been accompanied. We are not allowed to forget that this is the first station to have a vertical oscillator in the British Isles. And I think I am voicing a general opinion when I say that most of us are glad that this honour is Ulster's, and has not been calmly confiscated by London or one of the other big bullies with twin wavelengths.

We accord a warm advance welcome to the newcomer, and we shall listen eagerly for his birtheries.

Hot-Stuff Television

WHEN the pals of a certain Parisian violinist heard that their friend had played his instrument at the television studio, for the benefit of those looking-in to Eiffel Tower, they went round to his house to congratulate. And what did they find?

They found a very disgruntled virtuoso. His performance had been highly successful from other people's point of view, but he, poor chap, had apparently had a terrible time. The heat of the great arc-lamps had not only caused him to mop his brow with unaccustomed vigour, but had played the very dickens with the strings of the instrument. And when he got it home again he found that various cracks, fissures and *chasms* had developed!

WHO IS ARIEL?

These "Notes and News" constitute one of the most popular features in radio journalism, and "Ariel" has gathered friends the whole world over.

This is due to the fact that the nom-de-plume "Ariel" cloaks the identity of a gifted journalist; they are not "pars" contributed by a number of persons.

"Ariel" writes every single word himself, and if the unhappy time ever came when, through fortuitous circumstances, he had to delegate his job to another, then that fact would be freely published in "P.W."

Year's Good Causes

THE most successful appeal in the 1935 series of the "Week's Good Cause" was that made on behalf of the People's Dispensary for Sick Animals of the Poor, by Mr. Christopher Stone. It brought in gifts amounting to £11,842, and promises of a further £7,000.

St. Martin's summer appeal by the Rev. W. P. G. McCormick brought in £6,475, which was the next highest figure.

For the first nine months of the year, the appeals on the National and London Regional stations amounted to £45,571. Over the same period other Regional station appeals netted £17,613.

Sincerest Flattery

IMITATION being the sincerest form of flattery, we can consider that France is paying the B.B.C. a subtle compliment in her plans for further radio progress.

For one thing, a high-powered French National station is to be erected on a site near the centre of that country. There is more than a flavour of Droitwich in this.

HEARD ON THE MIKE

"The Phantom Detective":
He let his eyes drop, and felt an uncomfortable feeling in the pit of his stomach.

* * *

Making late calls:
Mrs. X——, it's the anniversary of your husband's death to-day; you're a dear old soul—well, have a happy day, dear.

* * *

Uncle Frank, giving the children a line to find in the Bible:
Here it is, children: "Seek ye first the Kingdom of Heaven"; find it, and send it in to Uncle Frank at 2 G B.

* * *

"Famous Trials," counsel for the defence to jury:
I shall not be able to hear the Crown Prosecutor's address, as my lips will be sealed.

* * *

Motor session:
Some people think the police jaws are made to be broken—er—I meant laws.

* * *

Announcer:
The next bargain I have for you is men's short-sleeved underpants—I mean, men's long-sleeved underpants—no, men's short-sleeved singlets.

("Wireless," *Australia*)

Furthermore, the French Empire station, Radio-Colonial, is to have two short-wave transmitters of 100 kws. each. And this is reminiscent of the recently adopted scheme for higher power at our own Daventry centre of the Empire service.

The Perfect Host

AN ingenious application of photo-electric cell technique has recently been tried out in Philadelphia, at a scientific exhibition in that fair city.

Near the door was a robot, in official uniform, with a loudspeaker concealed in his capacious chest. When a visitor entered, he cut through an invisible ray, and the robot immediately came to life and crisply enunciated a "Welcome, stranger."

Throwing out a pointing arm, the robot then explained that "Right through this door you will find the So-and-So Room. On the right as you enter is the This or That Exhibit," and so forth.

The scheme has given general satisfaction, but there was one *contretemps* on opening day. A small boy discovered that by jumping back and forth through the ray at the door he could give the robot hiccups!

A Hopeless Quest

ONE of the most surprising items in recent radio news is the titbit from Paris concerning a radio saint. The logically minded Parisien has awakened to the fact that in France the road-sweeper, the musician, the airman, the innkeeper, even the very newspaperman, has a patron saint; but so far there is no patron saint for radio.

The newspapers, eager protagonists now that the public attention has been aroused, are putting forth the claims of this great one, or that. The public, intellectually intrigued, advances good reasons why this or that revered personage is unsuited to such radio eminence.

Bulgaria's Latest

IN a country with the geographical peculiarities of Bulgaria, true "culchah" and education are necessarily a little handicapped at times. So there is a proposal afoot to provide the Bulgar with jazz and jollity from a 100-kilowatt station, operated from a studio in Sofia.

The contract has gone to Germany, and one of the conditions is that the station shall be ready for tests by next July or August, ready to radiate uplift in the autumn.

The actual site for the transmitter is at a small place called Vakarel (near Sofia), and the wavelength to be used is still under discussion.

ARIEL.

RECEIVING THE WORLD BY NAME!

FIRST EXCLUSIVE DETAILS OF AN INVENTION THAT MAKES SHORT-WAVE RADIO HISTORY

All about the new Kelsey "Rotalog" Dial—the Dial that heralds a new era in long-distance broadcast entertainment

SHORT waves represent an aspect of broadcast entertainment that has been virtually in the dark for ten years! Here we are in 1936—when ordinary broadcasting is an established and indispensable factor in the home life of the community—still talking about and thinking of short waves in terms of kilocycles and megacycles. Still trying to reconcile the transmission of, for instance, W 8 X K on 11·87 megacycles with a decimal part of just one of those 180 degrees on our short-wave tuning dials!

What a problem! And what a slice of luck when we do manage to mark with a pencil line the identical spot to which we can in future turn for the programmes of W 8 X K, only to find upon returning to that spot—and *what* an anti-climax!—that we hear not W 8 X K, but Moscow, or Pontoise, or Rome, or G S D! The mere thickness of the pencil line has covered the settings of these four stations and several others besides, all of which are crowded into just slightly more than half a metre.

Overcrowded Wavebands.

That, in fact, is the whole crux of the problem with short waves—overcrowding. At least, it is not so much overcrowding as the concentration of the world's short-wave broadcasters into certain particularly suitable but, alas! as far as our tuning dials are concerned, extremely narrow bands. And what happens?

If a station in America chooses practically the same wavelength as a station in eastern Europe, and we, situated between the two, attempt to sort them out—well, it *can* be done, but only with elastic wrists, extremely supple fingers, microscopic vision and perhaps, to some extent, an element of luck. But any attempt to calibrate the positions of those two stations is right out of the question, for no pencil point is fine enough.

And yet the ironical part about it is that, despite the closeness of two such stations on our dials, they may be absolutely free from interference with one another, and, indeed, there may even be room to sandwich another station in between!

Why, then, you may ask, should tuning be so extraordinarily critical? Unfortunately that is an inherent peculiarity of short waves. It is due to the colossal range of frequencies that is covered in a single rotation of the tuning condenser vanes and is probably best appreciated by comparison with the medium-wav ebroadcast band where, if a similar range of frequencies were covered, it would be possible to accommodate ten times as many stations as there are at present. Visualise, if you can, your present broadcast set dial with a maximum of nearly a thousand stations on it instead of a hundred!

It would mean, of course, that with existing tuning schemes it would be quite impossible to sort them out. And that, in a nutshell, is what is wrong with short waves to-day. It is easy enough these days to receive the short-wave stations. It is in calibrating and identifying them that the trouble begins.

Awaiting Solution For Years.

But please don't imagine that the designing world has only just become conscious of this fact. It is a problem that has been on the stocks awaiting solution for years. And that I should now be able to claim to have found that solution must be attributed very largely, I think, to luck. Certainly it is a problem that has intrigued me for more years than I care to remember, but as for how I finally arrived at the answer—well, let us say that it just happened.

Perhaps one night I went to bed and dreamt of a barber's pole. Perhaps the very next morning I even went to have my hair cut in order closely to study the movements of that fascinating rotating spiral. Who knows, perhaps I even mystified the barber by answering "Yes" when the sane reply to his question should have been "No"!

Never mind. The "Rotalog" is here, and after the exciting experiences that I have had with it so far I feel sorely tempted to buy that barber's pole as a memento of the passing of short-wave radio's dark days. For I am convinced that the "Rotalog" will mark the beginning of a new era of short-wave broadcast entertainment.

Leaving myself as a personality out of it altogether—that was just luck—I am happy to think that the solution has been found by somebody connected with "P.W.," for it means that "P.W."—first again—is able to provide its readers with something which cannot be obtained *in any other quarter at any price.*

Seventy-two Inches!

The "Rotalog" does its job, and does it extremely well. It enables any ordinary listener to interest himself in world-wide reception without bothering his head in the slightest degree about kilocycles and megacycles. It means that the fanatics who wrangle interminably about the mysteries and intricacies of these short wavelengths are "debunked" once and for all. Short-wave broadcast reception emerges as a pastime in which all can successfully participate.

Doubtless you will already have examined the free gift dial that is enclosed with this issue. Compare it with any other short-wave dial in the world. You will find that in 99 out of 100 cases with existing dials the travel of the pointer is limited to 180 degrees and that the path it traverses—in other words, the dial—is rarely in excess of 8 or 9 inches.

In the "Rotalog," the pointer makes *four complete revolutions, and in doing so travels over 72 inches of dial!* Seventy-two inches as against nine on which to calibrate stations! Need I dwell any further upon the immense advantages of this new idea? I think not. They are too obvious for words.

But I do ask you to give it a trial, for in constructing the "Axis" receiver with its "Rotalog" dial you will not only possess an instrument that will be miles ahead of anything of its kind in the world, but you will be paving the way to unlimited hours of fascinating entertainment.

"OUR GREATEST TECHNICAL TRIUMPH."

That brilliant young radio engineer, G. T. Kelsey, who revolutionised short-wave technique with his adaptor principle while still in his teens, has now evolved an innovation of probably even greater importance.

As with his earlier great achievement, the "Rotalog" is not merely a variation of known principles, but constitutes an entirely original development.

And it is so astoundingly effective that it makes it possible to transform the short waves into rigidly calibrated programme providers!

It is very difficult indeed to grasp at once the full significance of this quite revolutionary advancement.

Hitherto, short-wave listening has been a kind of lucky-dip business. You search and search and search and then, ultimately—as likely as not—find the wrong station!

But now, with a Kelsey "Axis" set fitted with the so-simple but so-remarkable Kelsey "Rotalog" Dial, the short-wave programmes become domestic amenities.

I feel that in being able to give "P.W." readers the very first opportunity to enjoy short-wave listening on this new basis we have achieved our greatest technical triumph to date.

THE EDITOR.

BUILDING THE "AXIS" CABINET

AN ARTISTIC MODERN DESIGN FOR THE CONSTRUCTOR

THERE is a growing tendency of late on the part of the manufacturers to "popularise" short waves—in fact, so much so that one is tempted to wonder what there is that is so strikingly different between short-wave reception to-day and, say, eighteen months ago, that the time should now be considered ripe for the present wave of industrial activity.

It is my own belief, based upon personal experiences, that there is very little, if any, difference technically, but that the manufacturers in general have become supremely conscious of the necessity for "lifting" short-wave reception out of the experimental stage in which it is apt to be regarded by so many ordinary listeners.

And how have they set about it? Mainly, I think you will find, by making their short-wave sets and their all-wave sets *look* presentable. The tendency in many quarters to regard anything to do with short waves as of interest particularly to those of an experimental turn of mind, and the consequent disregard for cabinet design, has, in my opinion, done more to jeopardise the popularity of short-wave reception than anything else.

I am not saying that short waves open up the way to *perfect* reception on an all-world basis. There is still much to be done before finality can be considered to have been reached. But I do sincerely believe that the stage has now been reached at which ordinary listeners can participate—not with an experimental object in view, but because of the intrinsic value in the programmes available. They are not always quality perfect—that is a matter dependent upon conditions to a very large extent—but does that really matter? Is not the interest in being able to keep in touch with the remote corners of the earth—in becoming acquainted with the customs and habits of practically every nationality in the world?

A Very Important Consideration.

Because I believe that the tremendous advantages of the "Rotalog" will pave the way to successful short-wave reception for a great many people who have never before experienced it—people who have hitherto confined their broadcast interests to medium and long waves—I have paid almost as much regard to the design of the cabinet as to the set itself.

I believe it to be a most important consideration, for who is content in these days of handsome cabinets to put up with an experimental-looking collection of apparatus in anything but the "junk-room"? Why should not the cabinet of a short-wave set look as handsome as the cabinet for any other set?

My idea of an "arty," unobtrusive cabinet is the one that you see illustrated in this issue. It follows very closely on the heels of the modern school in that ornamentation is conspicuous by its absence. Some of you will like it, some of you may not. But at least I think that I may claim that it will not look out of place in whatever type of room it is situated.

My cabinet was carried out in walnut with whitewood beading, and it is unpolished. Personally, I like the "soft," artistic effect that is obtained by leaving the wood unpolished, but of course there is the drawback that it is likely to become finger-marked after a time. But marks can always be removed with a piece of fine sandpaper.

The essential constructional features of the cabinet you will be able to obtain from the very detailed drawings which accompany this article. They give all the necessary dimensions, and it only remains for me to mention that the thickness of the wood that I used was ¾-in. throughout.

I am aware that not all of you will feel inclined to tackle the construction of the cabinet, and there is an alternative to which I have referred on another page. But those of you who are handy with your fingers are not likely to experience any great difficulties if you follow the diagrams.

You will no doubt have your own ideas as to how the cutting of the various sections can best be undertaken, and the only part that is likely to be a wee bit tricky is in getting the lid to "sit down" evenly on the cabinet. Of course—and this, I am afraid, is directly in contradiction to what I have already said about appearance—the lid is not an essential part of the set so far as the "works" are concerned, and—well, if you are *not* concerned with appearance, the short cut to simplicity is obvious. That is up to you; but my view is that the lid "makes" the cabinet. It is just the dignified finishing touch. And as for the initial, which is cut from a single ply stripped from a piece of three-ply wood—well, my wife has already "ordered" a similar cabinet to serve as a work-box!

A Point to Note.

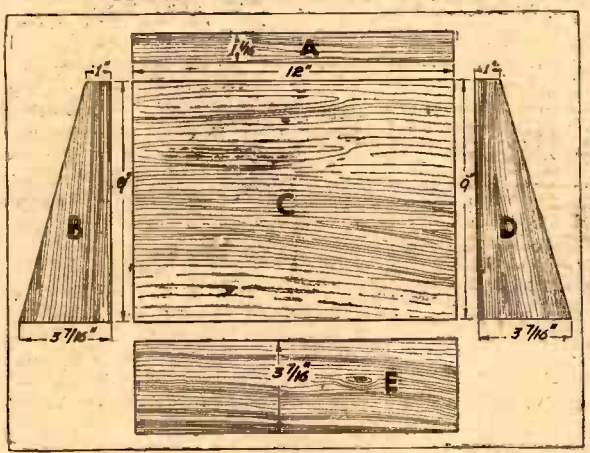
To ensure a good fit, I made the cabinet sides and front as though the cabinet and lid were to be all one, and I cut them through afterwards before I started assembling.

Apart from making it easier, it ensures that the grain in the wood is matched when the lid is closed.

The panel is supported on the ends of the wooden fillets which hold the sides, the front and back of the lower part of the box together, and you must, therefore, see that they stop short sufficiently to allow the panel to be dropped in flush with the edges of the cabinet.

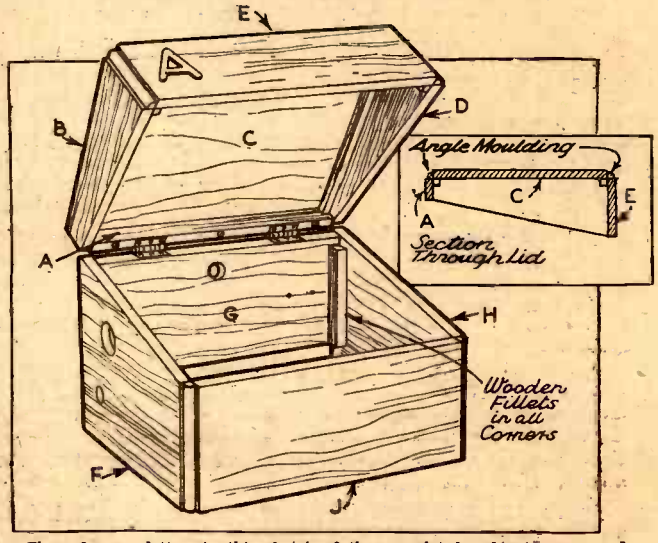
G. T. K.

HOW THE LID IS MADE



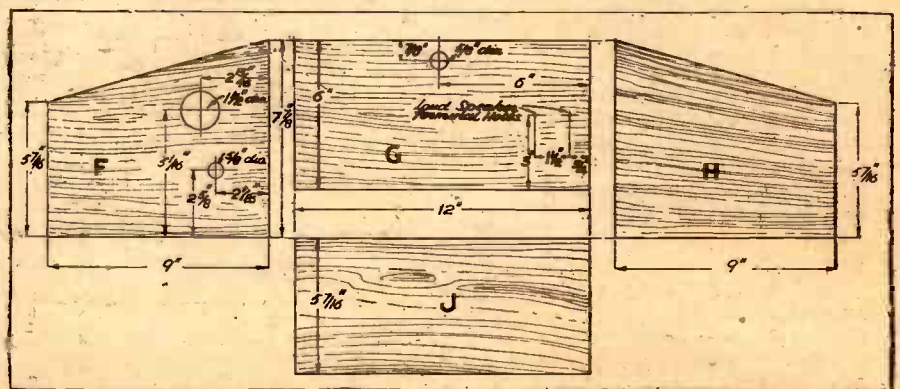
In this diagram all the necessary dimensions are given for the construction of the lid.

GENERAL ASSEMBLY DETAILS



The reference letters in this sketch of the completed cabinet correspond with those in the general constructional diagrams on this page.

THE BASE CONSTRUCTION SIMPLIFIED



In cutting these sections it is of considerable importance to see that the holes are correctly positioned in accordance with the dimensions given here.

"AXIS"

"The Set around which the World Revolves"

IN the design of this, the first set that has ever appeared in any wireless journal in which the world's short-wave broadcasters are actually logged for you, the aim throughout has been simplicity.

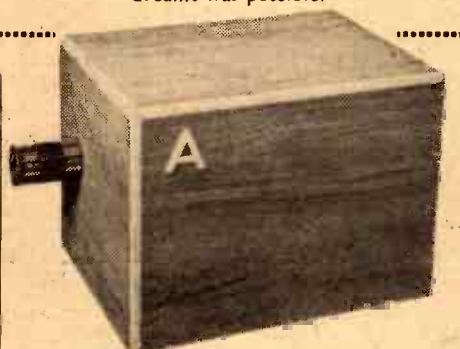
I would ask you particularly to note that fact, for in introducing to you the "Axis" receiver I am seeking to interest not merely the enthusiasts—shall we call them the short-wave diehards?—but everybody who feels the slightest desire to break away from the limitations of Europe and to sample programmes on a world-wide basis. Never mind about inexperience, lack of operating ability and the usual "I-should-like-to-but-would-never-succeed" ideas.

They just don't count where the "Rotalog" is concerned, for the essence of this new short-wave tuning development is the facility with which it enables any and every ordinary listener to participate successfully in short-wave reception.

Simplicity. Something at last for short waves in which every single reader of "P.W." can interest himself. That is the great idea behind the new "Rotalog" scheme.

SHORT-WAVES "DIAL-TAMED" AT LAST

This easy-to-build receiver gives you something that has hitherto been unobtainable on any instrument, whatever its cost or complexity. No less than the short-wave stations permanently located on the dial. G. T. Kelsey has with his "Axis" advanced the technique of short-wave reception to a greater extent than the most optimistic would have dreamt was possible.



The strikingly attractive appearance of the "Axis" cabinet is exemplified in this illustration.

"Groping in the Dark."

Ask any confirmed short-wave enthusiast what he considers to be the greatest difficulty in short-wave listening from the point of view of, shall we say, the man-in-the-street. He will tell you that it is the bugbear of groping in the dark, of never knowing quite where you are. And it is an obstacle that hitherto could only be overcome by months of patient listening for the purpose of becoming familiar with what we term the short-wave landmarks, and even then there was always an element of luck in it. For those who have had experience of short-wave reception will know of the insuperable difficulty of trying accurately to calibrate stations where dial space is limited.

The "Rotalog" is everyman's short-wave dial because it entirely removes the necessity for groping in the dark. In its 72 inches of dial space—the biggest dial in the world—it provides for the accurate calibration of all the world's most important short-wave broadcasters, and it constitutes a complete and perpetual guide to all that is happening between 12 and 94 metres.

And as for the set on which it is used, it has been my greatest aim—consistent, of course, with the retention of the highest possible degree of efficiency—to bring it within the constructional abilities of everybody. It has no frills, it does not boast of striking originality, *but it works!* It works amazingly well, and you have my word for it that it does justice in every way to the dial with which it is used.

But I must be frank. The novelty and appeal of having a world-calibrated dial is strong; strong, perhaps, because it has never been possible on such a large scale before. And in that, I feel, there is a danger that perhaps some of you will open your copies of "P.W.," will be intrigued by the dial and will forthwith commence to obtain the parts and to build the set without heed of the pitfalls. For my sake I ask you not to. It is I that you will blame if you are disappointed.

May I therefore stress at this early stage the vital importance of following the constructional procedure that I shall outline, and of adhering rigidly to my component specifications. In fairness I must warn you that the whole success of the dial—which means the accuracy of the calibrations on it—is dependent entirely not only upon the use of components absolutely identical with those used in the original set, but upon the wiring and lay-out of your parts. You would be well advised not to build it at all if you want to adapt it to an existing cabinet or if you have some sort of idea of using up your old components.

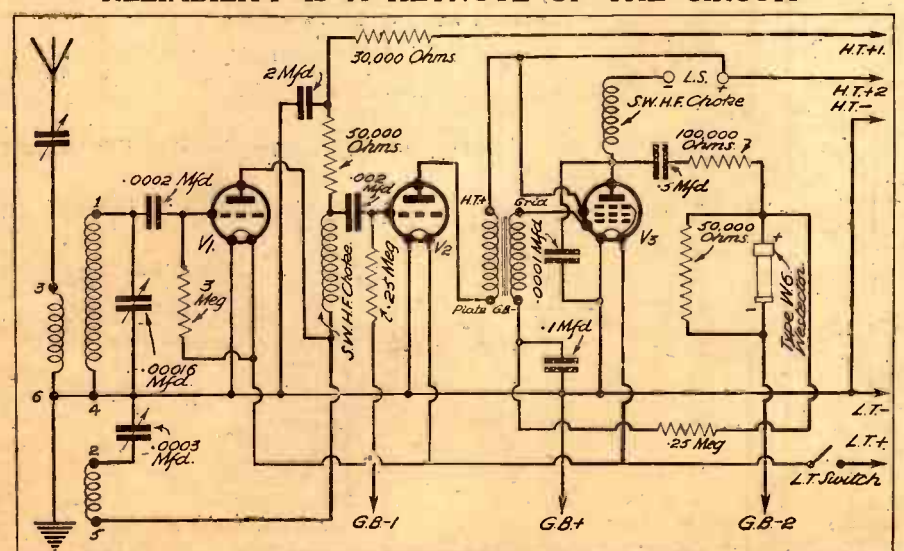
"Your Success is Assured."

The "Rotalog" dial and the "Axis" receiver are the products of weeks of hard work, and if you seek to "improve" upon them I am afraid that I cannot answer for what is likely to happen. But if you follow the recommended constructional procedure as closely as possible, not only will you find the set as easy as A B C to build, but your success is assured.

To refer to the question of operation at this stage is perhaps rather like putting the cart before the horse. But I am not going to say very much, for that is a subject for detailed consideration at a later stage. What I am anxious to point out, however,

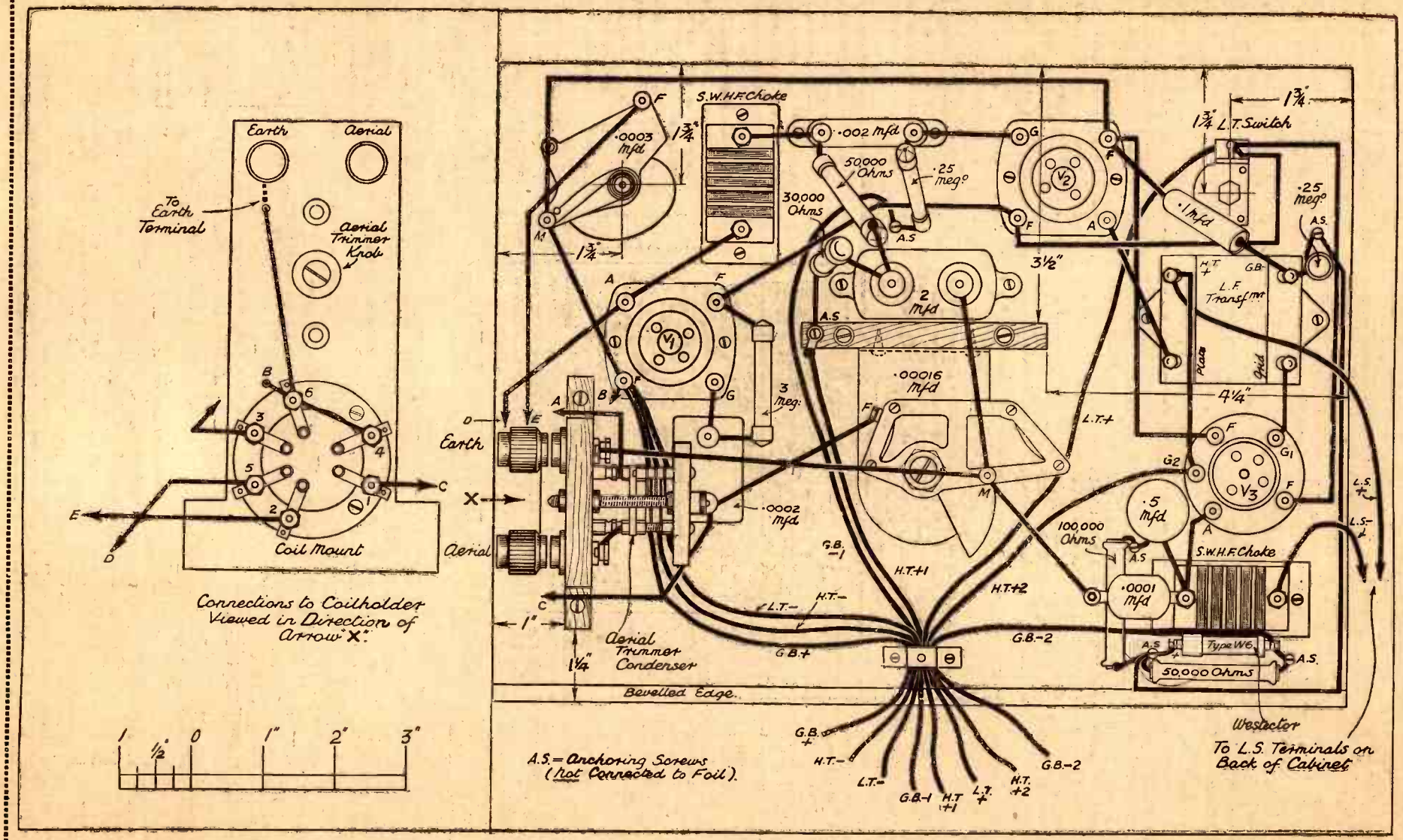
(*Continued on page 599.*)

RELIABILITY IS A KEYNOTE OF THE CIRCUIT



A pentode valve and an economiser output circuit are employed, not only for short waves, but because details are ultimately to be given for using a pick-up with the set.

AN INEXPENSIVE SET FOR WHOLE-WORLD LISTENING ON A NEW BASIS



Here is the complete wiring diagram of the "Axis." It will be seen that certain important dimensions are given. These should be adhered to, otherwise the whole layout will be upset, with detrimental effects on the results.

The ·00016-mfd. tuning condenser is mounted on a special bracket, secured to a wooden block. The method used is clearly shown on another page in this issue.

Another point to note is that the coil holders, aerial trimmer and the aerial and earth terminals are provided with a special mounting of their own, which is fixed in a vertical position on the main baseboard. Thus, when the set is placed in its cabinet the coilholder comes opposite a hole in the cabinet side and the interchangeable coils can then be plugged in easily according to the waveband desired. A second hole is cut in the cabinet side for the adjustment of the aerial trimmer, an operation readily carried out with a screwdriver.

THE "AXIS"

(*Continued from page 597.*)

is that no short-waver could possibly be more simple.

I do not lay claim to having dispensed with the necessity for careful tuning, nor have I succeeded in achieving the impossible by eliminating fading and "dead" nights. Those are inherent shortcomings of short waves which cannot at this stage be overcome with anything but costly and intricate apparatus. But I beseech you not to let these considerations stand in your way.

I have been honest, perhaps even gloomy, in bringing these facts to light. But remember that for every one night that is "dead," and for every one station that fades, there are weeks of enjoyment and dozens of stations that don't.

Its Own Testimonial.

In any case, the most convincing argument in favour of the efficiency of the "Axis" is the one that is the most obvious. Look carefully at the dial that is presented with this issue. Bear in mind that every station that appears on it *had* to be received before the dial could be calibrated and, well, what more need I say? The set carries with it its own testimonial, and that those results can be duplicated by all who construct it I have not the slightest doubt. But I do entreat you to take the short cut to success by heeding my warnings.

The list of components accompanying this article is the only approved list, and in designing the set I have already saved all the "ha'poths of tar" that it is possible to save. There is no justification for further economies, for as it is the cost of the set is extremely moderate. So when you order your parts, insist upon getting what you have ordered, and do not be put off with anything "just as good." It isn't a matter of goodness, it's a matter of calibration. And when you have got the parts, well, the rest is up to you.

With regard to the cabinet, you can, if you like, do as I did and make your own. Complete constructional details you will find elsewhere in this issue. But there is an alternative in the form of a ready-made cabinet which can be obtained inexpensively from Peto-Scott.

As a matter of interest, just before passing on to the general constructional details, it is perhaps opportune to mention that there are alternative ways in practically every instance of overcoming any slight difficulties that may be encountered. The set as it stands, and as I shall describe it, is exceptionally straightforward, and it does not call for any great ability to construct.

But because it is so essentially a set for everyman from the operating point of view, I am anxious also that it should be a set for everyman from the constructional point of view. After all, not all of us are budding carpenters, and I have already explained how the cabinet difficulty can be overcome. May I add that Messrs. Peto-Scott are also in a position to supply the panel ready drilled and faced, and the two pieces of wood cut to shape on which the variable condenser and the coil mount, etc., are fixed.

There is one further point on which I feel that it is perhaps desirable to reassure you. To construct the set exactly in accordance with my original calls for considerable patience in the cutting of the spiral line on the dial, and I must be honest and confess that if you try to hurry it it resolves itself into a finger-aching job. I know, I have had some! If you have the patience and the eye for cutting a 72-in. line on the curve, by all means do it that way.

A Satisfactory Alternative.

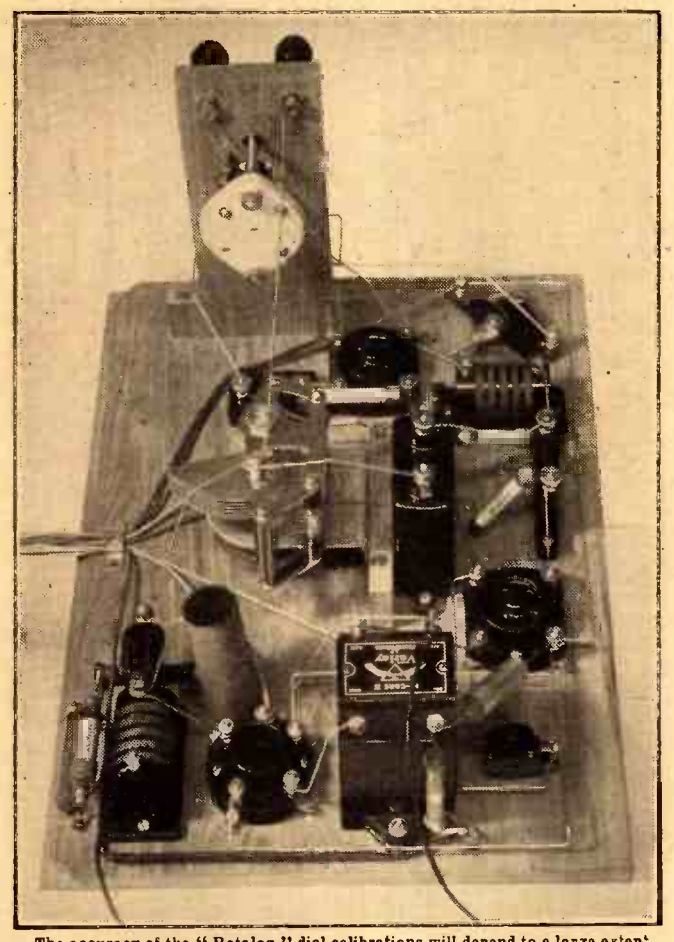
But if you have the slightest doubts about it and don't fancy the task, well, you need not let that worry you particularly. I have evolved a very satisfactory alternative, and you will find preliminary details of a way to use your dial without cutting the spiral in the special dial assembly article elsewhere in this issue.

Bearing these points in mind, I think that I may justly claim that there is not a single reader of "P.W." who could not successfully undertake the construction of the "Axis." With the panel and the brackets all cut and drilled for you there is absolutely nothing in the construction that calls for the slightest skill, and all I ask—and I ask it very fervently—is that you heed the warnings given in an earlier paragraph concerning components and layout.

The panel that is supplied by Peto-Scott is of laminated construction. In other words, the metal facing and the wooden

(*Continued on next page.*)

WATCH YOUR LAYOUT!



The accuracy of the "Rotalog" dial calibrations will depend to a large extent on the care with which you follow the original layout.

THIS IS YOUR SHOPPING GUIDE

COMPONENTS	
1 Six-pin coil base, catalogue number 969	Eddystone or B.T.S.
2 Six-pin short-wave coils, types 6Y and 6R	Eddystone or B.T.S.
NOTE.—Constructors desiring to receive stations below 22 metres will also require an Eddystone type 6LB six-pin coil (see text next week for further details).	["Axis"
1 Special ·00016-mfd. "Rotalog" condenser	J.B.
1 ·0003-mfd. solid dielectric reaction condenser	Polar "Compax"
2 Four-pin valve holders, "Vibrolder" type	Benjamin
1 Five-pin valve holder	Benjamin
2 Short-wave H.F. chokes, type HF3	Bulgin
1 Rotary on-off switch, type S91	Bulgin
1 Aerial coupling condenser, type UTC	B.T.S.
1 ·0002-mfd. fixed condenser, type S	T.C.C.
1 ·002-mfd. fixed condenser, type 34	T.C.C.
1 ·1-mfd. tubular fixed condenser	T.C.C.
1 ·0001-mfd. fixed condenser, type 665	Dubilier
1 ·5-mfd. tubular fixed condenser, type 4517	Dubilier
1 2-mfd. fixed condenser, type BB	Dubilier
1 3-meg. resistance, 1-watt type	Dubilier
1 ·25-meg. resistance, 1-watt type	Dubilier or Polar N.S.F.
1 50,000-ohm resistance, 1-watt type	Dubilier "
1 100,000-ohm resistance, 1-watt type	Erie or Polar N.S.F.
1 50,000-ohm resistance, 1-watt type	Erie "
1 30,000-ohm resistance, 1-watt type	Erie "
1 ·25-meg. resistance, 1-watt type	Erie "
1 "Nicore 2" L.F. transformer	Varley
1 Westector, type W6	Westinghouse
4 Engraved terminals, type B (Aerial, Earth, L.S.+ and L.S.−)	Belling-Lee
6 Wander plugs, engraved "H.T.−", "H.T.+1", "H.T.+2", "G.B.+", "G.B.−1" and "G.B.−2"	Belling-Lee
2 Spade connectors (L.T.+ and L.T.−)	Belling-Lee
Wood for cabinet and panel (if home-made)	
1 Cabinet to specification	Peto-Scott
1 Structakit, comprising 1 Plymax panel ready drilled and with "E" terminal, 1 coil bracket, 1 wooden condenser support, 2 2B.A aerial coupler supports complete with 8 nuts, 1 aerial coupler extension rod, 1 battery cord clip, flex, Maxamp connecting wire and all necessary component wood screws.	Peto-Scott
Screws, 18 gauge tinned copper wire, flex, etc. (not required if Structakit is used)	Peto-Scott

NOTE: The first mentioned makes of components were those solely employed by the designer of the set.

THE "AXIS"

(Continued from previous page.)

panel-cum-baseboard are in one piece. But those of you who propose to prepare your own will have to use a ⅜-in. thick piece of wood and a separate sheet of copper foil. But it is all very simple, and equally satisfactory.

The necessity for a panel-drilling diagram does not arise with this set, for the panel, of course, is also the baseboard, and you can, in consequence, obtain your drilling centres from the wiring diagram. The holes for the reaction condenser and the L.T. switch are actually shown dimensioned on this diagram, but the clearance hole through which the "Rotalog" condenser spindle passes is not shown dimensioned. That is because it comes dead on the point of intersection of the diagonals, and the use of the diagonals is an easier, as well as a more accurate, way of arriving at the drilling centre.

The Metal Covering.

Perhaps I should explain at this stage that the metal side of the baseboard is the top—or, in other words, the dial side, and if you are using separate foil it need not be fixed in position until later on.

When, therefore, you have cut your panel-baseboard piece of wood in accordance with the dimensions which you will obtain from the wiring diagram, and have bevelled the back edge at an angle of approximately 45 degrees, mark the two centres for the reaction condenser and the L.T. switch, and find the point of intersection of the diagonals. The diagonals, by the way, should be to the extreme corners and not to the corners produced by the bevelled edge.

While the drilling is quite straightforward, there are one or two points to which I would call your attention. In the first case, the threaded portion of the reaction condenser spindle is the same length as the thickness of the wood on to which it has to be mounted, and the fixing nut has therefore to be countersunk to the extent of about $\frac{3}{16}$-in. I advise you first to drill the spindle clearance hole and then to use a larger drill to countersink the nut.

With regard to the hole through which the "Rotalog" spindle passes, take my advice and drill a hole of sufficient size to allow ample clearance. An eighth of an inch all round is not too much clearance, and then, if you are slightly out in fixing your condenser, the spindle will not be likely to foul the wood. It is most important that it should not.

When your panel is drilled and ready you can proceed to mount the "Rotalog" condenser, the reaction condenser and the L.T. switch, taking particular care to see that the angle of the reaction condenser and the position of the "Rotalog" condenser are identical with those shown in the wiring diagram.

The piece of wood on which the "Rotalog" condenser is mounted is 1½ inches high above the baseboard, and the condenser should be fixed to it in such a way that there is approximately ⅛ inch clearance between the gear-wheel centre-boss and the baseboard.

With these three components in position you will find it more convenient next to turn your attention to the other wooden bracket. First of all, fix the coil mount in the identical position shown in the general wiring diagram, and then secure the series aerial condenser. For this purpose you will require two 2¼-inch lengths of 2- or 4-B.A. tapped rod and eight nuts. Four nuts are used on each piece—two to secure each rod to the wooden support and two to secure the condenser base to the rod. The distance from the top surface of the condenser base to the wood is not vitally critical, but you must allow yourself just sufficient room to loosen the condenser terminals for ultimate wiring-up.

The Series Aerial Condenser.

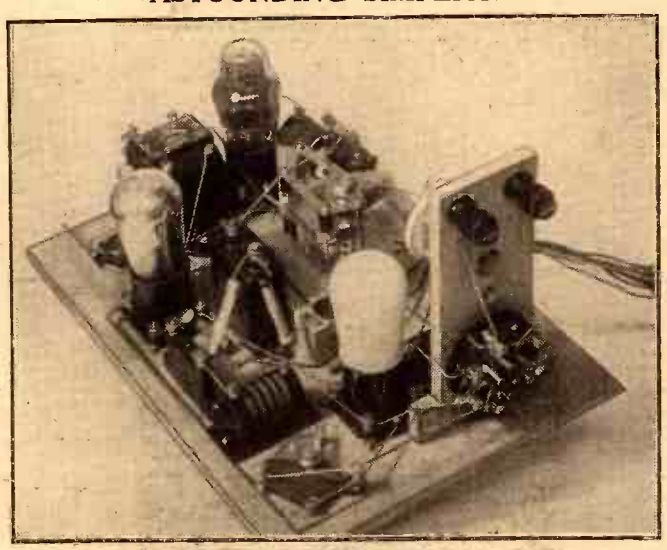
In the photographs and diagrams of my original set, you will notice that the series aerial condenser adjustment knob passes into, but does not protrude through, the clearance hole in the wooden support mid-way between the fixing rods. This knob has a slot in it, and through a corresponding hole drilled in the side of the cabinet it is possible to adjust the rotor vanes by means of a screwdriver. But I have found, in practice, that it is not always easy to locate the slot in the knob, and I have therefore made arrangements with Peto-Scott to supply an extension spindle which just brings the knob out clear of the side of the cabinet. I strongly advise you to use the extension piece, for this series condenser plays a most important part in the successful use of the "Rotalog" dial.

When you have fixed the coil mount, the series condenser and the aerial and earth terminals to the wooden support, the support can be secured to the baseboard.

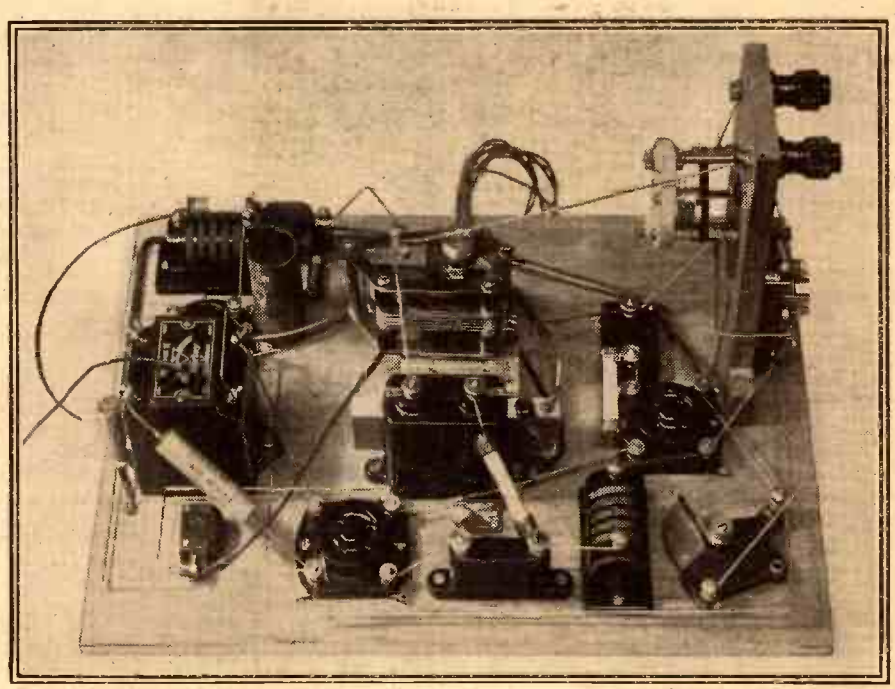
The fixing of the majority of the remainder of the components is very straightforward indeed, and the only point for which you must look out is in the accurate positioning of them. But there is a point of very great importance indeed to which I must call your attention in connection with the screws which serve to hold certain of the resistors in position. All of the screws to which I refer are marked with the letters "A.S." (anchoring screw) in the wiring diagram, and these screws must in no circumstances be long enough to pass through to the other surface of the baseboard. If they do, they will make contact with the copper foil when it is fitted and will cause untold havoc. The same warning applies.

(Continued on page 632.)

ASTOUNDING SIMPLICITY



In view of the extreme importance of careful layout, it will pay you closely to study these pictures of the original set. Used in conjunction with the wiring diagram they will enable you to make an exact duplicate of the original.



FIXING YOUR "ROTALOG" DIAL

TWO METHODS DESCRIBED BY THE DESIGNER

THE "Rotalog" dial which is presented free with this issue is the first dial of its kind that has ever been seen in this country or, for that matter, in the whole world, and because it is so new and different from the usual type of thing, the method of preparing and fixing it calls for detailed explanation.

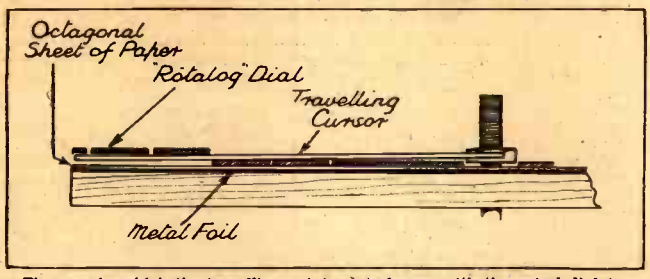
And although I am not going to pretend that there is anything particularly difficult in the procedure involved, I must emphasise the necessity for care when preparing the dial for use.

As you will gather from the directions which are given on the dial sheet, the procedure adopted by me in the construction of the original dial was to make a clean cut all round the heavy spiral line so that the pointer interleaved itself as the main control knob was turned. In other words, with the "Rotalog" condenser at maximum, all of the pointer is visible with the exception of just the tip; but as the centre black knob is turned, the pointer appears to become shorter as it threads its way in towards the centre of the spiral.

Never Any Doubt.

With this scheme, of course, there can never be a moment's doubt as to the section of the dial over which you are tuning. The constant variation in the length of the pointer is the guide, and the last section over which it passes before disappearing from view under the adjacent turn of the spiral is the section on which the dial reading is made.

HOW THE POINTER WORKS



The way in which the travelling pointer interleaves with the spiral dial is clearly shown in this sectional view.

In practice I have found this scheme entirely satisfactory, but it does call for care when preparing and assembling the dial. And because it has occurred to me that some of you may not fancy the task of cutting the spiral line with the possible risk of spoiling the dial if the cutting edge slips, I have evolved another and equally satisfactory scheme which dispenses with the necessity of cutting the dial at all. This second method I shall describe in detail with illustrations next week.

In the meantime, if you decide to use this second method, you can proceed to stick your dial down on to six-sheet Bristol board, to cut it out round the octagonal line, and to fix it to the set in the manner which I shall describe later on.

Those of you, however, who propose to follow my original method should first of all follow the directions that are given on the dial sheet itself. There is not a great deal of help that I can give you in connection with this first part of the procedure, for I am afraid that it is very much a case of patience and common sense.

Making the Cut.

It is, of course, most essential that you should stick your dial on to the six-sheet Bristol board in such a way that wrinkles and creases are avoided (not a difficult task if you carefully follow the instructions), and if, contrary to the warnings given in the directions, you attempt to make the spiral cut before the glue is quite dry, there is a risk that the paper will tear.

For making the cut, which, by the way,

(*Continued on page* 634)

THE WORLD AT YOUR FINGER-TIPS

YOUR "ROTALOG" LISTENING GUIDE

(Note:—All times are given as G.M.T.)

16-METRE BAND:

16·86 m.	G S G, Daventry, England	11 a.m. to 1.45 p.m. and 2 p.m. to 3.45 p.m. daily.
16·87 m.	W 3 X A L, Bound Brook, New Jersey, U.S.A.	2 p.m. to 10 p.m. daily.

19-METRE BAND:

19·56 m.	W 2 X A D, Schenectady, New York, U.S.A.	7 p.m. to 8 p.m. daily. Sun. 3.30 p.m. to 9 p.m.
19·64 m.	W 2 X E, Wayne, New Jersey, U.S.A.	4 p.m. to 11 p.m. daily.
19·68 m.	Pontoise, France	11 a.m. to 3 p.m. daily.
19·71 m.	W 8 X K, Pittsburgh, Pa., U.S.A.	(Relays K D K A) 3 p.m. to midnight daily.
19·74 m.	Zeesen (D J B), Germany	8.45 a.m. to 4.30 p.m. daily.
19·82 m.	G S F, Daventry, England	11 a.m. to 5 p.m. daily
19·94 m.	Moscow (R K I), Russia	—

25-METRE BAND:

25·0 m.	Moscow (R N E), Russia	6 p.m. to 11 p.m. daily. Sun. 11 a.m. to 12 noon and 3 p.m. to 4 p.m.
25·23 m.	Pontoise, France	8 a.m. to 9 a.m., 3 p.m. to 4.15 p.m. and 7 p.m. to 10 p.m.
25·27 m.	W 8 X K, Pittsburgh, Pa, U.S.A.	(Relays K D K A) 10 p.m. to 2 a.m. daily.
25·4 m.	Rome (2 R O), Italy	1.15 p.m. to 3.15 p.m. and 4.45 p.m. to 10.15 p.m.
25·53 m.	G S D, Daventry, England	7.15 a.m. to 9.15 a.m. and 5.15 p.m. to 9 p.m.
28·98 m.	Buenos Aires (L S X, Argentina)	Irregular.
29·04 m.	Brussels (O R K) Belgium	7.30 p.m. to 9 p.m. daily.

31-METRE BAND:

30·40 m.	Madrid (E A Q), Spain	10.15 p.m. to 2.30 a.m. daily. Sat., 6 p.m. to 8 p.m.
31·13 m.	Rome (2 R O), Italy	Mon., Wed., Fri., 11 p.m. to 2.15 a.m.
31·27 m.	H B L (Radio Nations Station, Geneva)	10.30 p.m. to 11.15 p.m. Sat.
31·28 m.	Sydney (V K 2 M E), Australia	Sun., 6 a.m. to 8 a.m., 9.30 a.m. to 1.30 p.m., and 2 p.m. to 4 p.m.
31·30 m.	G S C, Daventry, England	9.15 p.m. to 10.45 p.m., 11 p.m. to 1 a.m., and 3 a.m. to 4 a.m.
31·36 m.	W 1 X K, Boston, Mass., U.S.A.	11 a.m. to 5 a.m.
31·38 m.	Zeesen (D J A), Germany	5.30 a.m. to 7.15 a.m., 1 p.m. to 4.30 p.m., and 10 p.m. to 2.15 a.m.
31·45 m.	Zeesen (D J N), Germany	5.30 a.m. to 7.15 a.m., 8.45 a.m. to 12.15 p.m., 1 p.m. to 4.30 p.m., and 10.5 p.m. to 3.45 a.m. daily.
31·48 m.	W 2 X A F, Schenectady, New York, U.S.A.	9 p.m. to 5 a.m. daily.
31·55 m.	G S B, Daventry, England	7.15 a.m. to 9.15 a.m., and 5.15 p.m. to 1 a.m. daily.
31·56 m.	Rio de Janeiro (P R F 5), Brazil	9.45 p.m. to 10.45 p.m. daily.
31·80 m.	Havana (C O C H), Cuba	3 p.m. to 5 p.m., 9 p.m. to 11.30 p.m., and 1 a.m. to 3 a.m. daily.
32·88 m.	Budapest (H A T 4), Hungary	Sun., 11 p.m. to midnight.

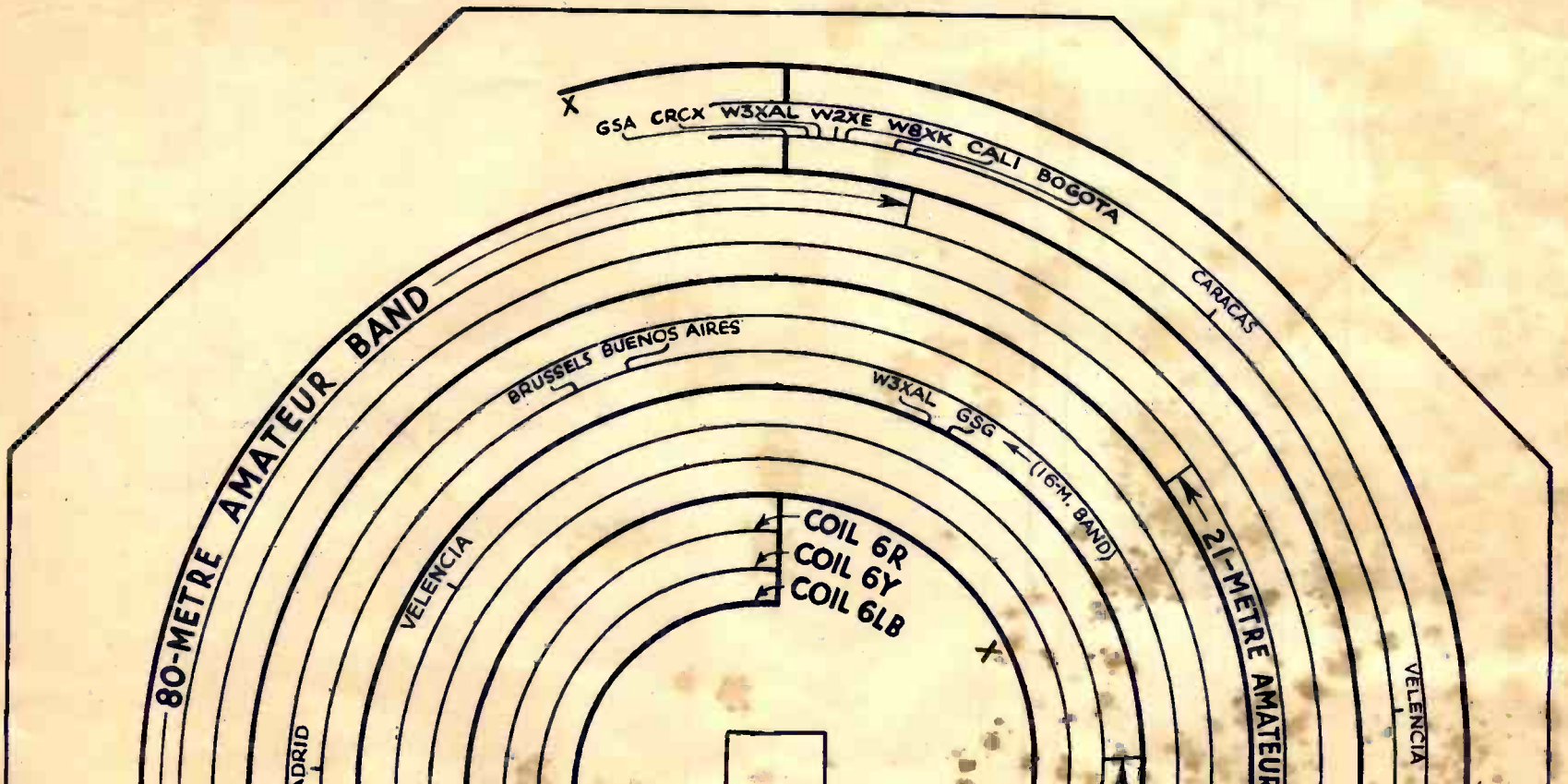
49-METRE BAND:

46·01 m.	Velencia (Y V 6 R V), Venezuela	5 p.m. to 7 p.m., and 11 p.m. to 3 a.m.
47·10 m.	Caracas (Y V 4 R C), Venezuela	9.30 p.m. to 3.30 a.m.
48·62 m.	Bogota (H J 3 A B F), Colombia	Midnight to 4.15 a.m.
48·78 m.	Cali (H J 5 A B C), Colombia	Mon., Wed., Fri., midnight to 3 a.m.
48·86 m.	W 8 X K, Pittsburgh, Pa., U.S.A.	(Relays K D K A), 2 a.m. to 6 a.m.
49·02 m.	W 2 X E, Wayne, New Jersey, U.S.A.	(Relays W A B C), 1 a.m. to 4 a.m.
49·18 m.	W 3 X A L, Bound Brook, New Jersey, U.S.A.	Mon., Wed., Sat., 11 p.m. to 5.45 a.m.
49·22 m.	C R C X, Bowmanville, Canada	10.30 p.m. to 4.30 a.m. daily Sun., 4.45 p.m. to 4.30 a.m
49·59 m.	G S A, Daventry, England	11 p.m. to 1 a.m. daily.
49·83 m.	Zeesen (D J C), Germany	5 p.m. to 9.30 p.m., and 10.5 p.m. to 3.45 a.m.

ALL OF THE ABOVE STATIONS APPEAR BY NAME ON THE "ROTALOG" DIAL.

The KELSEY ROTALOG

PRESENTED FREE WITH "POPULAR WIRELESS & TELEVISION TIMES". 1/2/'36..



DIRECTIONS.—Cut carefully round the octagonal line with a pair of scissors, and lay the dial face downwards on a flat surface. Rub a moistened rag lightly over the gummed surface, taking particular care to see that no part is missed, and then stick the dial down on to what is known as "six-sheet Bristol board." This can be obtained from all art dealers and drawing office suppliers. It is important that the moistened rag should be rubbed only lightly in order not to remove the gum, and when sticking down the dial it is essential that creases and wrinkles should be carefully avoided. The track cutting process must not in any circumstances be undertaken until the glue is absolutely dry, and when the dial has been stuck down, it is advisable to leave it for a few hours before anything further is done to it. For the cutting of the track a very sharp, pointed knife, or, better still, a safety razor blade will be required, and it is of the utmost importance to see that the sides of the knife or razor blade are at right angles to the surface of the dial. The cut begins at the point marked "X" on the outer black line of the spiral, and travels inwards to the point marked "X" on the inner black line of the spiral. To obtain a clean cut, it is recommended that the process should be carried out with a sheet of glass immediately beneath the Bristol board. The small square in the centre of the dial should be cut away. The travelling cursor can be made by sticking the template provided on this sheet on to a piece of the Bristol board and cutting it out, or in the manner described in "Popular Wireless." For general assembly instructions and further details concerning the Rotalog Dial, please refer to the special constructional article in "Popular Wireless."

"P.W." CIRCUIT SPOTLIGHT No. 1

The first of a new series in which K. D. Rogers introduces to you, week by week, the insides of up-to-date receivers.

THE G.E.C. CAR RADIO

I AM starting these "Spotlights" with the circuit of one of the popular car radio receivers. Next week I shall take a very different type of set and dissect the circuit. The G.E.C. set is of the superhet variety, but is a car radio set designed for use from a 12-volt accumulator (car battery) and obtaining its high-tension from a low-tension generator. The set is made by the General Electric Company, and incorporates many interesting features in its circuit. The set costs £19 19s. 0d.

On this page I give the circuit exactly as it was given to me by the makers, from which it can be seen that universal valves are used, their heaters being joined in parallel, while across the L.T. supply from the car battery is also the field winding of the loudspeaker.

Great care is taken that none of the interference created by the generator is fed back into the set via the speaker winding or the valve heaters, and two H.F. chokes are situated in series in the circuit between the generator and the heaters and the loudspeaker field winding.

In the smoothing circuit there is also an H.F. choke to stop trouble in the H.T. feed and also the ordinary smoothing choke for L.F. smoothing. It is also interesting to note that a further H.F. choke is used to stop any interference reaching the anode of V1 or its screen grid, and at the same time decoupling this valve from succeeding stages very successfully.

With the exception of the mixer valve (V2) the screens are not decoupled from the anodes, and they take the same potential in each case. In the case of the mixer, the screen is decoupled by the resistance R13 and the condenser C11, the former making part of the potential divider R13, R12. The H.T. supply to the set is of the order of 240 volts, and the screen voltage of V2 about 80.

The Aerial Arrangement.

Quite a simple aerial feed arrangement is used, the wavechange switch not only shorting out the long-wave portion of the tuned inductance when medium waves are required, but also shorting the end of the primary winding direct to earth. On long waves this winding is fed into the long-wave winding, forming not only a transformer coupling but also an additional auto-transformer coupled arrangement.

The coupling between V1 and V2 is of particular interest, I think, because it employs not only the normal transformer coupling by means of an H.F. transformer, but also a direct tuned anode scheme through the condenser C27.

This condenser is very small, being of ·000007 mfd., and so obviously it does not have much effect on long waves, when its impedance is high, especially as the parallel path through the primary of the transformer is then comparatively of low impedance. But on medium waves, when the impedance of the primary has increased due to the increase of frequency, the impedance of C27 has decreased, with the result that there is something of a constant coupling obtained on all wavelengths. This constancy is very marked on the medium waves, and as the frequency increases more is passed by the condenser and less by the transformer primary, and when the frequency decreases the opposite happens. This is a good scheme and it allows a single winding transformer primary with no need for wavechange switching into the bargain.

Before we go further into the circuit, let us glance at the sensitivity control. This is just an on-off switch which places in or out of circuit a parallel resistance with the bias resistance of V1. With the switch in the "break" position the bias resistance R2 carries all the anode and screen current of V1, and as the resistance is some 55,000 ohms the bias applied to the grid of V1, irrespective of any A.V.C., is pretty high. Thus the valve is in an insensitive condition and the set is set for the reception of local stations.

Now place the sensitivity control switch in the "on" position. The resistance R1 is immediately placed in parallel with R2, and as the resistance of R1 is 1,000 ohms it takes practically all the anode-cathode current. Result: the bias is considerably reduced and the valve is in its most sensitive condition, and the set is ready for the reception of distant stations.

It will already have been noticed that the set has a pre-mixer H.F. stage, so that selectivity is of a high order; while A.V.C. can be applied to three valves, the H.F. V1, the mixer V2, and the intermediate valve V3. This allows very strong control to be effected. As the A.V.C. is of the delayed variety, however, no loss of sensitivity is experienced when listening to distant stations.

How A.V.C. is Applied

Let us see how the A.V.C. is applied. The valve V4 looks after this part of the set as well as after the ordinary rectification and the first stage of L.F. amplification. In the diagram the top diode is used for A.V.C. and the lower one for signal rectification. The output from this diode is fed through the condenser C17 (·05-mfd.) to the volume control R24. Thence the L.F. goes to the condenser C28 and "through" the stopper resistance R23. The resistance R17, it will be recognised, is the grid leak of the triode portion of V4.

Before we tackle the A.V.C. let us look at the resistances R16 and R18. They are in series with the cathode to earth lead of V4, and therefore are bias resistances. The values are R16, 990 ohms, and R18, 9,900 ohms. Thus we see that with the anode current of 1·6 m/a taken by the valve, there is a bias voltage of roughly 16 volts between the top of R16 and the bottom of R18.

Of that voltage the ratio of 990 to 9,900 is taken to the grid of V4—that is, about 1·5 volts.

What of the remaining 14·5 volts? Obviously they will be applied to any portion of V4 that happens to be earthed. That portion is the top diode. Follow the circuit. The diode is fed from the anode of V3 by the condenser C14. The D.C. circuit, which is the one "carrying" the A.V.C. voltage, goes along to the grid of V1, through R3 and R5. But it does not make D.C. contact with earth. To the grid of V2 it goes through R4, but again no D.C. earth is provided. R3 and R4 are just decoupling resistances.

Through R9 the circuit finds a path to the grid circuit of V3, but here we see that there is also a path to earth through R8. Thus the top diode of V4 is earthed at D.C. by means of R8. In other words, it returns to the foot of the cathode resistance scheme of V4 and gets something like 16 volts bias (negative) on the diode.

This bias prevents the diode from becoming operative until the input (signal strength) is 16 volts. Therefore the valves V1, V2, V3 are allowed full play until they have amplified the incoming signal to a strength of 16 volts. Then, and only then, does the A.V.C. start to check things.

Three Watts Output.

By this time, of course, the lower diode, or the signal diode as it is called, has had plenty to rectify, and the output from the set is quite loud (the maximum is three watts undistorted), the degree of L.F. amplification applied being manually controlled if desired by the potentiometer R24.

The signal diode is tapped down the secondary of the I.F. transformer so as to reduce the voltage applied to it to a value that is commensurate with the degree of output strength required.

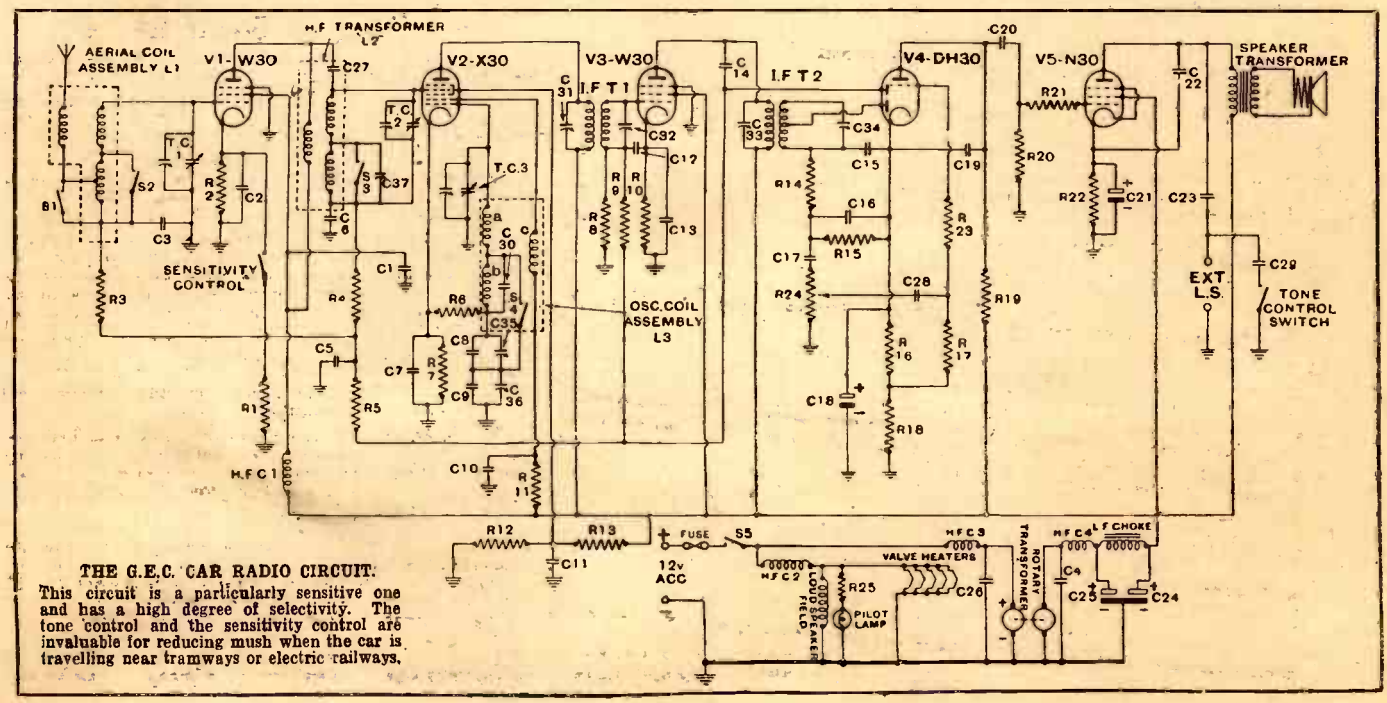
The anode of V4 is taken to a resistance capacity coupling for the grid of V5, in series with which is a stopper resistance R21. R19 is the anode resistance of V4, of course.

There is one selection of condensers that you may like to see elucidated. I refer to the oscillator coil assembly (V2) with the condensers TC3, C30, C35, C8, C36 and C9.

All the condensers in the circuit with the letters TC are tuning condensers, so that TC3 tunes the oscillator coil, which is split in two parts, long wave and medium wave on the grid side and with a single coil for coupling the anode. As is usual the long-wave section is shorted when the medium waves are required.

C30 is merely a loading condenser of ·00005-mfd. capacity. C8 is the padding condenser for the long waves, and C35 is its trimmer. C9 is the padding condenser for the medium waves, and C36 is its trimmer. Thus the circuit is most exactly set to be "in track" all over the wavebands.

One final remark. You may not easily see the H.T. negative line. This is the dark chassis line at the bottom of the diagram, and is common not only to H.T. negative but also to the negative side of the car accumulator and to one side of each heater of the valves. To this line all the valve cathodes return, in each case through one or more bias resistances. And to this line are returned all the earth points that are marked with the familiar symbol of the inverted pyramid of short lines.



THE G.E.C. CAR RADIO CIRCUIT.
This circuit is a particularly sensitive one and has a high degree of selectivity. The tone control and the sensitivity control are invaluable for reducing mush when the car is travelling near tramways or electric railways.

FREE PRIZE SENSATION!

The Original S.T.700

Specially presented by Mr. J. Scott-Taggart to be won in this week's novel FREE competition. HURRY—it

MUST Be Won by a "P.W." Reader!

HOW WOULD *YOU* LIKE THE ORIGINAL S.T.700 SET BUILT BY JOHN SCOTT-TAGGART HIMSELF? Such is the unique offer in the first of the new and entertaining series of competitions which you are to have in "P.W." week by week! This S.T.700 receiver is the identical one from which the blue-print, drawings, and other illustrations were taken for our great Autumn Special Issue of 1935. The very set John Scott-Taggart himself built with his own hands, and which was demonstrated to "P.W." readers!

Besides being a master set designed and built by Britain's master set-designer, a receiver which will give radio reception at its very best, it also has the historical importance of being the first set built by Mr. Scott-Taggart to include his famous Audio-Reaction invention.

Mr. John Scott-Taggart photographed with the famous set, which is soon to go to a "P.W." reader. S.-T.'s professional fee for designing a wireless set, let alone building it, would be hundreds of pounds—what, then, is the value of the original model of his latest and most famous set of all.

And you have the opportunity to secure, at no cost to yourself, this valuable souvenir, which is also a one-hundred-per-cent receiver for giving you and your friends broadcasting entertainment of superlative quality.

With this unique prize you will be the envy of all your friends, and it will become a treasured possession, the value of which must ever rise.

Answer these Questions and Win It Yourself!

"P.W." FREE Entry Coupon

1. Do you build your own radio sets?
   YES. NO. Because .....
   .....
2. Do you like chamber music?.....
   YES. NO. Because .....
   .....
3. Do you find the fat stock prices useful?.....
   YES. NO. Because .....
   .....
4. Do you listen-in as often as you can?.....
   YES. NO. Because .....
   .....
5. Do you think there should be women announcers?
   YES. NO. Because .....
   .....

I agree to abide by all the rules of this competition and to accept the Editor's decision as final and binding.

Signed.....

Address .....
.....

★ How to Send In ★

All You Have To Do to try for it is to answer the questionnaire on this page and adhere to the following simple rules :—

1. Cross out either "Yes" or "No" against each question, then in the dotted lines write *not more than ten words*, giving the reason for your answer in each case.

2. Write plainly *in ink*, please, and remember to be brief. (For example—when we asked a technical assistant how *he* would answer the first question, he said, "Because it is the most varied and interesting hobby ever.")

3. The unique prize will be awarded to that reader whose entry contains, in the Editor's opinion, the best and most effectively stated reasons. Make your answers as pithy as you can, and put them with humour if you want to. Remember what they may win you, if they are good!

4. Enclose your entry in an envelope addressed to: "P.W." Questionnaire, 1, Tallis House, John Carpenter Street, London, E.C.4 (Comp.). The Closing Date is February 8th, 1936, and any entry arriving thereafter will not be passed for adjudication.

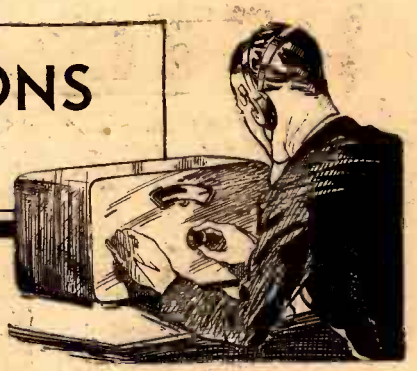
5. The Editor's decision must be regarded as final and legally binding, and entries will only be accepted on that understanding. No employees, or relations of employees, of the proprietors of POPULAR WIRELESS are entitled to enter.

Have a go at it! Your prospect of winning the unique Scott-Taggart prize is as good as that of anybody else. It will cost you nothing to try (except the 1½d. stamp for the letter), but may bring the great Scott-Taggart Prize, carriage paid, to your own home.

BE QUICK—Closing date, Feb. 8th!

RANDOM RADIO REFLECTIONS

By VICTOR KING



This week Victor King covers a wide diversity of subjects from ghosts to television, and gives another of his fascinating Professor Varrinace problems

GHOSTS BY WIRELESS.

SO the B.B.C. is going to broadcast direct from a haunted house—if they can find one. And at midnight the ghost will come on the air—if there is one. Somehow I don't think I shall listen to that. I shouldn't know whether to laugh or shiver if clanks and groans and horrid moans came through.

A few months ago I attended a materialisation séance—the only one available in London, I believe; admission by introduction; frivolous sensation-seekers not entertained.

There we sat in such intense darkness that it pressed you down. A dozen of us holding hands in a closed circle. Vague figures build up, dimly lit by phosphorescent illumination. They utter strangled noises. I see the pale face of a young woman floating in the blackness; she speaks to her mother. I suddenly feel I can't stand it any longer; I yearn for the bright lights, the hurrying, worldly crowds in the Strand and Piccadilly. But my hands are in the grip of those of my neighbours; I must stick it out to the end.

Later, cynicism comes to the rescue. I wonder "how they fake it." Then doubt steals over me. An under-done materialisation of a child mouths at his father. Is it all one big fraud? Or am I in the presence of something of transcendental wonder?

I leave in an extremely thoughtful frame of mind and conclude that this spiritualism business at least deserves to be investigated with the earnestness and by the brains which are devoted to, say, the perfection of poison gases or to researches into Chinese Art of a Ming dynasty.

ANOTHER PROFESSORIAL "BRICK."

CONTINUING our investigation into the work of that respected agricultural expert, Professor Varrinace, here is a further extract from his "All You Should Know About Radio":

"The pentode is a special form of thermionic valve which has been developed for both high- and low-frequency amplifying purposes. Its name is derived from 'pentagon,' and from that it follows that it possesses six electrodes. In addition to the control grid there is a grid similarly disposed to the extra grid which is to be found in the screen-grid valve. But there is a further grid in addition which is joined to the cathode."

At least one little brick there; a nasty little brick. See if you can spot it before turning to page 629.

STRANGE BUT TRUE.

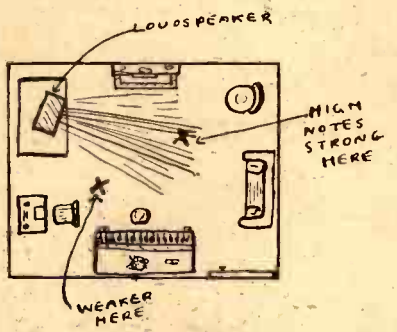
ONE of the strangest things in radio to me, despite the fact that it is very easy to understand, is that a loudspeaker can affect the selectivity of a set. Stranger still, that the better the loudspeaker the more it reduces selectivity, and the worse it is the better the selectivity.

But, of course, that is only within limits. And the reason lies in the fact that a broadcasting station occupies a strip in the wavelength scale the width of which is represented by the frequencies of speech and music it transmits. A very good loudspeaker takes in the whole width and all the interference which might lie on the outer fringes. A poor loudspeaker that can't reproduce the higher frequencies cuts these fringes off. Exit interference!

If your speaker happens to be a good one and you are pestered by one of those high-pitched heterodyne whistles it is worth while ringing the changes on the position of the speaker relative to your ears.

The high notes come off the diaphragm in a more or less sharply defined beam and, said he, going all technical, the projection angle is governed by the angle of the diaphragm.

This is how you might have your speaker arranged—



But note that in a room having rather bare walls reflection effects may tend to confuse the issue.

How do you like my homely little illustrations? I have the idea that cutting out the "middleman" (the draughtsman) sort of brings us, you and me, a bit closer together. Tell me if I'm wrong. No, not you, B. T. G. of Liverpool. It seems to me that so far as you are concerned I am *never* right in anything I say or do!

TELEVISION BY JUNE?

AS the weeks pass and the months gather, television always seems to move on before us like a carrot permanently tied a little way ahead of a donkey's nose. First it was to be somewhere about September of last year. Then a bit before Christmas, then February. And when February was on top of us it was first May and now it is June!

But *maybe* it really will be June. Certainly there are increasing signs of the imminence of the completion of the plans for this London television transmitting service. Advertisements for female announcers who haven't got red hair (what a stimulant for the hair-dyeing profession!), lots of talk about programme plans, chunks being knocked off and knobs nailed on to the Alexandra Palace, and so on. All these make up the smoke-screen behind which I suppose there must be some small fire secreted somewhere.

It amused me to read the other day that the B.B.C. is supposed to have had something of a boycott raised against it by the film industry, and that it will have to fall back on "crude home-made films." (You must realise that films of some kind or other will have to form a large if not the whole part of the television programmes.)

This amused me because of the smug assumption that if the B.B.C. turned its hand at making its own films they would necessarily be "crude." Now I happen to be a student of the technical aspects of film-making. I have "shot" miles of film of both interior and exterior scenes.

The first essential of good film-making is for the cameras to be handled by expert camera-men. The B.B.C. will meet with no difficulties there. As soon as the word goes round that the B.B.C television director is requiring the services of camera-men, they'll be flooded with applications, and among them will be the names of some of the star lens-wipers of the cinema world. In hardly any time at all there will be first-class directors, continuity-men, and other film experts tapping at the front door of Broadcasting House.

I can't see Mr. Gerald Cock, the Television Mogul, finding it an insuperable task to produce high-grade film "shorts" of topical items, etc., for his programmes. The only snag is money. But my bet is that in due course there will be plenty of cash diverted to the television service.

THERE—AND BACK AGAIN.

Apparently the Beam Wireless people have quite a bit of trouble with signals which simply won't stop buzzing round the world once they have been started off.

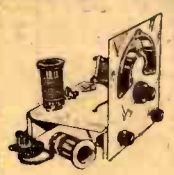
What should be a nice, sharp, short, clean-cut dot of the Morse code, is apt to smudge because it is joined by a second dot that is really the first one after it has had a dash right round the globe.

It may do that twice—giving a "Pip-pip" to the receiver each time it dashes past it—at 186,000 miles per second?

PETO-SCOTT PILOT AUTHOR KIT
EXACT TO SPECIFICATION

Since 1919, PILOT AUTHOR KITS have given satisfaction to Home Constructors everywhere. Always exact to the Author's specification, they "Fit the Author's Blueprint exactly and remove all doubt."

S.T.700 SHORT-WAVE ADAPTOR
AMERICA DIRECT *on your* **S.T.700!**



Make your S.T.700 an all-wave set, bringing you programmes from every corner of the world, with this wonderfully efficient, inexpensive unit, the latest up-to-the-minute design of the foremost short-wave experts. Simply plugs into either A.C. or battery version of the S.T.700 . . . there's nothing more to do! Incorporates 100:1 ratio aerial tuning and slow-motion reaction.

Ready assembled on aluminium chassis complete with aluminium panel (as illustrated) and 2 coils, covering 13-26 and 24-52 metres. **Cash or C.O.D. Carriage Paid** **37/6**

5/- DOWN

Or 5/- down and 7 monthly payments of 5/-.

Complete in walnut finished cabinet with Paxolin overlay panel. Cash or C.O.D. Carr. Paid, £2/12/6, or 5/- down and 11 monthly payments of 5/-. Extra plug-in coils, 46-96 and 90-190 metres, 4/6 each.

S.T.700 KIT "A" £3:19:6
Immediate Delivery **CASH OR C.O.D.**

Peto-Scott 1936 UNIVERSAL SHORT-WAVE ADAPTOR-CONVERTER

Send for free blueprint.

Covers 13-80 Metres

Converts your existing battery or A.C. Receiver for operation on short-waves, *with no alterations*, bringing you **America direct**, programmes from all over the world. **Two hours to build** . . . a lifetime of world-wide radio entertainment!

2/6 DOWN

KIT "A" CASH or C.O.D. *Carriage Paid.* **£1:19:6**

Or 2/6 down and 10 monthly payments of 4/3.

Comprises all parts for building with full-size blueprint, assembly and operating instructions, less cabinet.

WITH CABINET. Cash or C.O.D. Carriage Paid, £2/10/0, or 12 monthly payments of 4/6.

Peto-Scott 1936 ELIMINATORS 1936

MODEL A.C.12 (illustrated). A.C. Mains, 200/250 volts, 50/100 cycles. Output: 120 volts at 12 m.a. 4 tappings. Cash or C.O.D. Carr. Paid, 30/-, or 2/6 down and 10 monthly payments of 3/-.

MODEL A.C.25. 3 H.T. tappings. Output: 25 m.a. at 150-v. A.C. Mains 200/250-v. 50/100 cycles. Westinghouse rectifier. Cash or C.O.D. Carriage Paid, £2/9/6, or 5/- down and 10 monthly payments of 5/-.

2/6 DOWN

MODEL M.A. 10/30. With ½-amp. Trickle Charger for 2-v. Accumulator. A.C. mains 200/250-v. 50/100 cycles. Westinghouse rectifier. 4 H.T. tappings. Output 30 m.a. at 150-v. Cash or C.O.D. Carriage Paid £2/19/6, or 5/- down and 11 monthly payments of 5/6.

W.B. STENTORIAN JUNIOR
AS FIRST SPECIFIED FOR THE AXIS

MODEL 36J. Cash or C.O.D. Carriage Paid. £1/12/6. Or yours for 2/6 down, balance in 11 monthly payments of 3/-.

W.B. Stentorian Senior Model 36S. Cash or C.O.D. Carr. Paid, £2/2/0, or 2/6 down and 11 monthly payments of 4/-.

2/6 DOWN

W.B. Stentorian Baby Model 36B. Cash or C.O.D. Carr. Paid, £1/3/6, or 2/6 down and 10 monthly payments of 2/6.

IMMEDIATE DELIVERY—CASH—C.O.D. or H.P.

BUILD THE AXIS

These are the Parts specified by the Author and contained in **PILOT AUTHOR KIT "A."** Any item supplied separately. Orders over 10/- sent carriage and post free.

		£	s.	d.
1	Peto-Scott drilled and polished Plymax panel, 12 x 8½ ins. with earthing terminal		5	0
1	Peto-Scott wood Coil Bracket and 1 wood condenser support			9
1	Peto-Scott Extension Spindle for B.T.S. Aerial Coupling Condenser			6
2	Peto-Scott 2B.A. Aerial Coupling Condenser Supports with 8 2B.A. nuts			9
10	ft. Maxamp. connecting wire, wood screws, flex and Battery Cord clip		2	0
1	Eddystone or B.T.S. 6-pin Coil Base		2	3
2	Eddystone or B.T.S. 6-pin Short-Wave Coils 22-47 and 41-94 metres		8	0
1	J.B. special .00016 mfd. "Rotalog" Condenser with pointer		10	6
1	Polar "Compax" Reaction Condenser ..		2	6
3	Benjamin Valveholders		2	6
2	Bulgin Short-wave Chokes, Type HF3 ..		4	0
1	Bulgin rotary On-Off Switch, Type S91 ..		1	9
1	B.T.S. Aerial Coupling Condenser, Type UTC		2	9
3	T.C.C. Fixed Condensers		4	1
3	Dubilier Fixed Condensers		6	0
3	Dubilier 1-watt Resistances		3	0
4	Erie 1-watt Resistances		4	0
1	Varley "Nicore" 2 L.F. Transformer ..		11	6
1	Westinghouse Westector, Type W.6		7	6
4	Belling-Lee engraved Terminals, Type B..		2	0
6	Belling-Lee engraved Wander Plugs		1	0
2	Belling-Lee Spade Connectors			4
	KIT "A" CASH OR C.O.D. Carriage Paid ..	**£4**	**2**	**6**

Extra coils to cover 12-26 metres 4/- each.

KIT "A" £4:2:6
CASH or C.O.D. Carriage Paid

Author's Kit of first specified parts, including Peto-Scott Structakit, as detailed below, less valves, cabinet, headphones and speaker. **Yours For 7/6**

Balance in 11 monthly payments of 7/6.

KIT "B." As for Kit "A," but including set of 3 first specified valves, less cabinet, headphones and speaker. **Cash or C.O.D. Carr. Paid, £5/7/0, or 12 monthly payments of 9/9.**

KIT "C." As for Kit "A," but including valves and Peto-Scott special "AXIS" cabinet, less headphones and speaker. **Cash or C.O.D. Carr. Paid, £5/19/6, or 12 monthly payments of 11/-.**

Any item supplied separately. Orders over 10/- sent C.O.D.—carriage and post free.

PETO-SCOTT AXIS CABINET

As first specified and used by the designer. Neatly constructed of well-seasoned wood with lift-up lid, and hand french polished by experts. **Walnut finish. Cash or C.O.D., 12/6.** *Postage 1/6 extra.*

CASH OR C.O.D. 12/6

AXIS STRUCTAKIT

Comprises Peto-Scott drilled and polished Plymax panel, 12" x 8½", with earthing terminal; Peto-Scott wood coil bracket; Peto-Scott wood condenser support; Peto-Scott extension spindle for B.T.S. aerial coupling condenser; 2 Peto-Scott 2 B.A. aerial coupling condenser supports with 8 2 B.A. nuts; 10 ft. "Maxamp" connecting wire, wood screws, flex and battery cord clip.

Exactly as first specified and used by the designer. Total value, 9/-. Cash or C.O.D., 8/6.

8/6 *Carriage 9d. extra.*

Ericsson's HEADPHONES

As First Specified for the AXIS

The most famous headphones on the market. Receivers and headbands are of aluminium. Extremely light and comfortable in use. Wound to 4,000 ohms resistance.

Per Pair 12/6

Carriage Paid.

AXIS FINISHED INSTRUMENT

The "AXIS" ready assembled with the components listed in centre column by Peto-Scott's experienced short-wave engineers. Complete in specified cabinet with valves and 2 coils, 22-47 and 41-94 metres, less headphones, speaker and batteries.

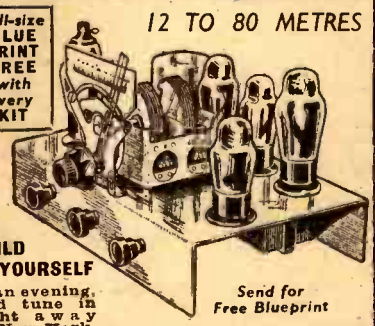
Cash or C.O.D. Carriage Paid, Aerial tested on actual broadcasting. **£7:0:0**

Or 12 monthly payments of 12/9.

Peto-Scott 5-VALVE *Battery* SHORT-WAVE SUPERHET KIT

12 TO 80 METRES

Full-size BLUE PRINT FREE with every KIT



BUILD IT YOURSELF in an evening, and tune in right away to New York, Schenectady, Rio de Janeiro, Moscow, Rome, Johannesburg, Sydney . . . to stations all over the World!

Send for Free Blueprint

KIT 'A' £4:10:0

Cash or C.O.D. Carr. Pd. Or 7/6 deposit and 11 monthly payments of 8/3. **All parts for building, less valves and cabinet.**

KIT "B." As for Kit "A," but with valves. Cash or C.O.D. Carriage Paid, £7/1/6, or 12 monthly payments of 13/-.

KIT "C." As for Kit "A," but with valves and walnut finished cabinet. Cash or C.O.D. Carriage Paid, £7/16/6, or 12 monthly payments of 14/3.

VITAL FEATURES

- NO COIL CHANGING
- TRIPLE WAVE-LENGTH COILS
- PENTODE OUTPUT
- SPECIAL NOISE-FREE OSCILLATOR MIXING CIRCUIT
- STAMPED METAL CHASSIS
- 5 B.V.A. VALVES

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The Memoirs of a Radio Journalist

By Sam Heppner

Personal sidelights on prominent British Radio Stars by one who has spent years in close association with the entertainment world.

"Ginger" Croom-Johnson, who is leaving us to become a naturalised American.

"SELF-EXPRESSION" is the excuse generally applied to the peculiar form of insanity that causes people to write. The motive which has prompted this spasm of journalistic frivolity, however, is "self-protection." Throughout my career as radio journalist I have, for a number of years past, lunched, laughed and languished a pleasant afternoon in the company of an incalculable number of wireless folk—singers, entertainers, hot rhythm pianists, band leaders, composers.

A Clever Young Composer.

Consequently, everyone I meet says (in an almost girlish hysteria): "Fancy knowing all the radio stars. You *must* have an interesting life. *Do* tell me all about them!" Hitherto I had obliged. In future, however, I shall merely indicate these memoirs—which they can either take or leave.

George Posford is a prophet; professionally he is a song-writer—he is the extremely amiable and clever young man who composed the music for "Good-Night, Vienna" and "Invitation to the Waltz," the two radio plays which were subsequently turned into films—but a recent scrap of wireless news recalls George's remarkable prophetic vision.

JACK PAYNE, who has for many years been one of the most popular of dance-band leaders. It was due to his special British song programmes some time ago that George Posford had his first big success—"Lazy Day."

A couple of years ago, when "Soft Lights and Sweet Music" was comparatively new to listeners, I remember discussing this very popular feature with George up at his flat—one of those cramped, Bohemian dwellings under the stars, approached by a dim and perilous stairway.

"Yes," agreed George, "'Soft Lights and Sweet Music' was certainly a brain-

RAY NOBLE was for some time an arranger for Jack Payne. Later he joined the Gramophone Company in charge of light music. He is now in America, getting £300 per broadcast and leading a band in Radio City, New York

wave. It's made Ginger, although he's such a resourceful and enterprising bloke; he would have hit on something equally attractive if it hadn't been that." ("Ginger" is what everyone calls Austen Croom-Johnson: why, I shall never know. If it's his hair they have in mind, "Sandy" would be a much more appropriate nickname.) "But," continued George, "he's wasting his time in this country; 'Soft Lights' is just the sort of feature that would be a riot as a 'sustaining item' in the N.B.C. sponsored programmes in New York. Of course, he's new to listeners here and it may take a year or two, but I rather fancy that Radio City will snap him up."

Returning to America.

Well, as I suppose you already know, George was not far wrong. Ginger went to New York after an N.B.C. representative heard some of his records in London, got married, delighted American radio fans, and returned to England at the end of last November. On the expiry of his contract with the B.B.C. he will be off again to the States where, as a naturalised American, he is to remain. That will be some time in March.

I'm glad that he's got a break because, apart from the fact that he certainly deserves it, Austen Croom-Johnson is a fellow I have known "man and boy," as the old ladies say.

He Was Hard-Up Then.

I first met him several years ago when someone brought him along to my house one Saturday night. He was then about twenty and, of course, quite uncelebrated; I didn't know who or what he was, but we had a chat, and I learned that he was in a rather sad financial state through getting rid of his best-sellers, literally "for a song."

That was the position in Charing Cross Road in those days and, so far as I know, still is among some publishers. You see, a composer writes a tune and, if he is hard-up, will be glad to sell all the rights for a fixed sum instead of disposing of it on a proper royalty basis; this arrangement is quite legitimate, inasmuch as the publisher's

GEORGE POSFORD is one of the most noted B.B.C. light music writers. He was responsible for the world-famous music for the successful "Good-Night, Vienna" and the almost equally noted "Invitation to the Waltz," two radio plays that were subsequently filmed.

investment is purely speculative. But, as a rule, astute publishers who are quick to

(*Continued on page* 631)

LISTENING TO AMERICA

With a few words about aerial efficiency

By K. D. ROGERS

WE all of us get tired of the B.B.C. programmes at some time or another. It is too much to expect that we shall find just what we want in the English programmes every time we go to switch on our radio sets. So what do we do? What do you do?

Many of us turn to the Continent for entertainment, to find that most of the items we cannot understand because they are given in a language unknown to us. The music may be enjoyable, but how often we wish we could understand the words and the announcements!

So the Continent is not really a satisfactory alternative to the English programmes. Yet there *is* an alternative, and a good one, too—America!

And it is not so difficult to get those American stations as you may think if you have not tried. The short-wave American broadcasting stations are available to listeners in this country from about 1 p.m. to well after midnight, and they can be heard, with the aid of a superhet converter, on any set that has a good H.F. stage.

I have just been listening to Bound Brook on 16·8 metres broadcasting its breakfast programme, while last night I heard a long programme from Schenectady on 31·4 metres. All with the aid of a converter attached to my ordinary broadcast receiver. The strength of reception in each case was sufficient to make me turn the volume down a little, and the programme value of the stations, though rapidly varying in the way the Americans do, with ten minutes of this and a quarter of an hour of that, was sufficient to keep me on the wavelength for a considerable time.

Calibrated in Wavelengths.

The converter I had in use was the B.T.S. "Adaband," a self-contained one-valve superhet converter that fits below the broadcast receiver in a very neat manner if the set is of the consolette type, or which can be tucked away quite conveniently if the set is a console or radiogram.

The converter is wavelength calibrated, a most valuable fact, for it greatly assists in the finding of any particular station. And I may here say that the Americans are not the only interesting broadcasts that one can hear on the short waves, and in English, too. There are Zeesen (especially on Sunday mornings), Madrid, Moscow, Huizen, our Empire station with its special programmes, and Nairobi, all within the range of this converter.

I used a mains type for my listening, though I have also tested the battery version costing 5 guineas, which is just as good.

What I particularly like about the converter is the fact that you can take practically the whole control of the outfit, converter plus radio set, over to the converter. The main on-off switch of the set has to be operated in the usual way, but there is a change-over switch on the converter that allows you to go over to short waves and back to medium or long by just turning the left-hand knob. This also controls the two short wavebands, from 13 to 28 metres, and from 28 to 75 metres. The right-hand knob is for tuning, there being both fast and slow-motion control. Volume is controlled on the ordinary set, of course, and so is reaction should you decide to use it in order to boost up the strength of any weak station.

TRY IT ON YOUR SET

This is the neat unit that enables you to hear the American and other short-wave stations on your ordinary receiver.

Finally, a very strong point, I think. The "Adabands" I tested were completely non-microphonic. No small thing when dealing with short-wave stations below 20 metres. And I tried hitting the instrument and placing it right up against the front of the loud-speaker in an endeavour to make it howl! It just refused.

The price of the instrument is £6 12s. 6d.; and the mains model is for universal use, on D.C. or A.C. The makers are British Television Supplies, Ltd., Faraday House, 8–10, Charing Cross Road, London, W.C.2.

STOP THAT LEAKAGE.

AERIAL insulation is as important to-day as it was ten years ago, the only difference being that while in those early broadcasting days any loss in the aerial was at once noticed by reduced signal strength, to-day any leakage can usually be made up by turning the volume control a little, or may not be noticed on any but the most distant stations.

The fact that present-day receivers are so sensitive that they will work with any sort of aerial, and in some cases without an aerial at all, is no excuse for having an inefficient, badly erected contraption as the collector of radio energy for your set.

You have only to keep your eyes open while travelling in the usual suburban train to realise the diversity of horror that is too often hung precariously on a pole and called an aerial.

Bulgin have removed all excuse for such atrocities, for they have brought out for a few pence a series of insulators, brackets, lightning arresters, and what not, for aerial erection that leave no excuse whatever for the Heath Robinson efforts that even in these enlightened days "decorate" our neighbours' houses. You will note I put the blame on the neighbours, for I should never suggest that you are guilty of a badly erected aerial. In fact, to be polite, I must assume that Bulgin will never sell any more of their new insulators to "P.W." readers. You will all have got them the moment they came out. Yet, on second thoughts, perhaps you haven't. You alone can answer that, but should *you*, looking at this copy of "P.W.", be guilty of letting down the fraternity by having a "wonky" outdoor aerial system, let me most seriously suggest that you do something about it.

Something to Suit Everybody.

Mr. Bulgin and his men have determined that no matter what sort of aerial you have, or want to have, you can get an insulator that will exactly do the job. If you want a stand-off insulator, they have one. If you want an insulator to which to attach the bottom of your lead-in, just to keep it taut, they have one, with a lightning arrester incorporated. Wall brackets and screw brackets with insulators on them are among the list, to say nothing of a new type of insulator with a fuse in it, as well as a lightning arrester, so that the lead to the set is disassociated from the main aerial except through the fuse.

The prices? Well within your pocket. So if, though I hate to suggest it, you *are* guilty of one of those unbusiness-like aerials, drop a line to A. F. Bulgin and Co. Ltd., Abbey Road, Barking, Essex, and ask for full details of those new insulators. They will enable you to straighten up your aerial, and to make it not only *appear* efficient but actually to be above reproach from the electrical point of view.

COULD YOU FILL THIS SPACE?

A CHANCE FOR AMATEUR WRITERS!

ONLY 250 words are required to fill the space shown. Do you think you could do so with approximately 250 words (about any radio topic) which others would enjoy reading?

If you do, send the Editor your effort so that it reaches him by February 14th.

The reader whose contribution is considered by the Editor to be the best will be invited to contribute a weekly article of about 250 words for a period of three months, and each article will be paid for at the rate of £3 per thousand words.

Usually only "star" journalists are able to have signed articles running regularly for such periods, and they achieve that only after years of experience. But POPULAR WIRELESS offers this invaluable stepping-stone to journalistic triumph to a "P.W." reader who has never yet obtained the status of a professional writer.

But note these points:

1. When sending your 250 words (about any radio or broadcasting subject) you must state in a signed covering letter that you have never previously received payment for writing stories or articles and that the contribution is written by yourself and entirely original.
2. Address your effort to The Editor, POPULAR WIRELESS, Tallis House, Tallis Street, E.C.4, and write "WRITER" in the top left-hand corner of the envelope.
3. The Editor reserves the right to use any of the attempts in "P.W.", but those used will be paid for at our usual rates. Unsuccessful attempts will not be returned, and no correspondence will be entered into regarding them.
4. And quite naturally the Editor's decision must be regarded as final.
5. The Editor reserves the right to re-write or ask the winner to re-write any of the weekly articles he submits or to employ themes which he, the Editor, may from time to time suggest. Also, of course, alterations and amendments might need to be carried out, all of which will provide invaluable journalistic training for the fortunate winner.
6. Should no entry reach the standard required for "P.W." articles, the offer is automatically withdrawn.

LEARNING FRENCH THROUGH YOUR RADIO

A NEW METHOD EXCLUSIVE TO "POPULAR WIRELESS"

PART 1

THE beginner should know immediately that there are thousands of English words which are either exactly or nearly French words as well. Usually the beginner takes a long time to realise this, with the result that acquiring a vocabulary produces an unnecessary strain.

If I ask such a beginner to translate into French: "Their relations with the Continent were very frequent," or phrases like "The defence of the Convention," "An irreparable rupture," "A profound irritation," "An indestructible routine," he is completely lost for words.

On the other hand, if I ask him to translate into English: "Leurs relations avec le Continent étaient très fréquentes," or the phrases, "La défense de la Convention," "Une rupture irréparable," "Une irritation profonde," "Une routine indestructible," he will do it easily at sight.

You will probably gather from this the principle underlying the French instruction I am going to give you on this page every week. I am going to use very largely a vocabulary of what I call English-French words. Wireless language, technical and programme, is very rich in this type of vocabulary.

As a preliminary I give at random a selection of English-French words frequently heard on the air:

un artiste
un air pour baryton et piano
les Ballades favorites
un cabaret-concert
un concert par la quintette de la station
une chanson de music-hall
un concert de musique de chambre
un concert de musique sérieuse
un concert de musique contemporaine
le directeur de la station
les Informations
les Informations de presse
les Informations régionales
l'ouverture de l'Opéra
l'Opéra en trois actes de R. Wagner

I could give you hundreds more of such phrases, all of which in a very short time, if not immediately, you should translate at sight.

Let us begin to collect a few English-French nouns. Write down in a note-book as many English nouns as you can think of that end in -ATION. Examples: NATION, STATION, POPULATION, VARIATION, ANIMATION, RESIGNATION, FRUSTRATION, RELATION, etc., etc.

There are hundreds of these words. Look for them in an English dictionary. THE POINT TO REMEMBER IS THAT THEY ARE ALL FRENCH WORDS AS WELL, EITHER EXACTLY AS THEY STAND, OR WITH THE ADDITION OF AN ACCENT.

The Frenchman would write them as follows: LA NATION, LA STATION, LA POPULATION, LA VARIATION, L'ANIMATION, LA RÉSIGNATION, LA FRUSTRATION, LA RELATION.

The Frenchman rarely speaks or writes a noun WITHOUT its ARTICLE. Whereas we say "I like Radio drama," the Frenchman will say "I like THE Radio drama."

This brings me to the first bit of French grammar.

THE DEFINITE ARTICLE

There are TWO genders in French: Masculine and Feminine. DON'T CONFUSE GENDER WITH SEX. WORDS ONLY HAVE GENDER. A WORD IS EITHER MASCULINE OR FEMININE.

Le is the Masculine Singular Definite Article meaning "The."

La is the Feminine Singular Definite Article meaning "The."

Les is the Masculine and Feminine Plural Definite Article meaning "The."

EXAMPLES:

le concert (the concert)
les concerts (the concerts)
la station (the station)
les stations (the stations)

All the nouns ending in -ATION (pronounced *ah-se-on(g)*) above are Feminine. Hence the Definite Article LA.

L'animation, you notice, is written l'. This is because the noun animation begins with a vowel. This applies to Masculines as well.

LEARN THE DEFINITE ARTICLES LE, LA, LES, and listen for them on the wireless.

Imitated pronunciation:
le(r) (without sounding the *r*), *lah*, *leh*.

If now I wish to say OF the concert, OF the station, etc. (which we call the Genitive Case of the noun), I must use the little word DE (called a preposition).

That is:

OF THE = DE LE, which always contracts to DU
DE LA, which never contracts
DE LES, which always contracts to DES

EXAMPLES:

du concert (of the concert)
des concerts (of the concerts)
de la station (of the station)
des stations (of the stations)
de l'artiste (of the artiste)
des artistes (of the artistes)

Imitated pronunciation:
dü kon(g)-sair *deh kon(g)-sair*
de(r) lah stah-se-on(g) *deh stah-se-on(g)*
de(r) larteest *deh zarteest*

It is necessary to say a word about the pronunciation of the word DU. We have nothing in English like the French vowel *u*. Consequently, it is impossible to give an exact imitated pronunciation of it. The French *u*, however, can be perfectly pronounced by an Englishman if he attempts an English *ee* sound WITH ROUNDED LIPS. That is, for DU say *dee* WITH ROUNDED LIPS.

To write *dee* for DU in an imitated pronunciation is misleading. I shall always employ in my imitated pronunciation for the French *u* a *u* with two dots on it. Thus, *ü*. But remember how to pronounce it. EE WITH ROUNDED LIPS.

And, again, if I wish to say TO the concert, TO the station, etc. (which we call the Dative Case of the noun), I must use the little word À (also called a preposition).

That is:

TO THE = À LE which always contracts to AU.
À LA, which never contracts.
À LES, which always contracts to AUX.

EXAMPLES:

au concert (to the concert)
aux concerts (to the concerts)
à la station (to the station)
aux stations (to the stations)
à l'artiste (to the artiste)
aux artistes (to the artistes)

Imitated pronunciation:
oh kon(g)-sair *oh kon(g)-sair*
ah lah stah-se-on(g) *oh stah-se-on(g)*
ah larteest *oh zarteest*

In regard to pronunciation, you will notice that the *t* of concert is not pronounced. IN FRENCH NO FINAL CONSONANT IS PRONOUNCED UNLESS IT IS FOLLOWED BY AN *E*, OR UNLESS THE WORD WHICH FOLLOWS BEGINS WITH A VOWEL OR A SILENT *H*.

Practise these imitated pronunciations, and particularly the two words—
le sport (*le spor*) la faute (*lah foht*)

(*Continued on page* 633)

ABOUT THESE PROGRAMMES

By HIGHAM BURLAC

Higham Burlac, who contributes this feature, was writing for "P.W." way back in the dark ages of radio before broadcasting had begun. But his weekly programme causerie is new. It has been running for only a month or two and has already proved one of our most popular items.

IT is astounding to see the readiness of some people to shed tears, in the peace of their studies, over the shifts which have to be resorted to by practical men who try to do useful things in a world of rocky facts and awkward conditions.

I refer in particular to the wails which have recently been emitted because the B.B.C. abridged a Shakespeare play; as though, forsooth, that were an act of vandalism rather than of wisdom. Anyone who has read as much of Shakespeare as has a schoolchild of fifteen, knows that dozens of the poet's lines can be cut with advantage, and *must* be cut for broadcasting under present conditions. No cuts ever spoilt for me the sense of continuity—and I listen to Shakespeare broadcasts with the play in front of me. And so far as I remember, the B.B.C. never cut even a single line from a purple patch—only from some of the long-winded and not very intelligible speeches and jocund passages of cross-talk.

Those Welsh Items.

Now, some nice cuts from the programmes in Welsh would not be amiss. The language of the realm here is English. Earmarking radio time for Welsh is simply a surrender to narrow-minded diehardism over a language which nobody outside parts of Wales has any use for.

But to come back to plays: I hope to see within a few years the establishment of the Radio Theatre. A play a night, with all the "stars" working for it. This, plus a good standard of television, will transform the radio of Britain. We are marking time, heedless of the colossal possibilities which radio holds. These evening programmes, like trays of *hors d'œuvre*—a bit of this and a snack of that—cannot continue for very much longer, because their compilation will drive the B.B.C. men insane. The entire output will have to be reorganised on bolder lines.

The revenue will be available, and vast economics can, doubtless, be effected. For instance, the B.B.C. boasted that Greta Keller came all the way from America in order to play in "Three for a Song." Quite an unnecessary expense. The lady is a very charming crooner—but not a Melba or Tetrazzini.

My Alternatives.

Developing this vision, which I hold to be practicable, especially so in such a small territory as ours, I hope to be able to listen, on any given evening, to (*a*) a good "variety" show, or (*b*) an orchestral concert of Queen's Hall standard, or (*c*) a full-length play, possibly with a "curtain-raiser," or (*d*) a selection of lighter music by Geraldo, or the Kentucky's, and so on.

I do hate having my enjoyment spoiled with time pips, motor smash cases, stale news, serious hospital S O S calls, and commentaries on politics. Cannot all this chit-chat have a wavelength to itself? "Public services programme" would be a good name for this collection of all the depressions and other oddments of this whirling globe. Let us have the opportunity to escape from other folks' troubles for a few hours. Goodness knows that our own lie just round the corner! Cochran never interrupted a revue in order to harrow his public with the everyday business of other folk.

I feel better now, chaps. Nothing like letting off a little steam once in a while. But a horrid thought strikes me, and so let me ask you not to believe me to be unsympathetic to the troubles of others. I am, in effect, discussing the organisation of a public utility corporation, not my private likes and dislikes.

Jan Stewer is a "find"; in fact, a Find. Writer and player too! May he be encouraged to produce more West Country plays like "Barnet's Folly," at such intervals as shall not be too brief to spoil his hand, nor too long to deprive us of his work. It is early to compare him with Eden Phillpotts, who is a famous novelist of great power and profundity; but Jan Stewer has much more than the knack of stringing words together, and I hope that he will bring his George Growsells and Hannah Mudges to life on the printed page. He has the gifts—and the accent!

Pamela wants to know whether the "Effects" Section (or is it a Dept. ?) will buy her cuckoo clock in case the nightingale turns on the B.B.C. this year. And young Bill inquires whether Henry Hall put the hall-mark on his new wrist-watch.

The Poetry Readings.

I suppose that you do not, as a rule, listen to poetry readings? I don't, because I have had so many bad quarter-hours of it in my time, including the years before broadcasting was thought of. John Drinkwater, Ion Swinley, Forbes-Robertson, Henry Ainley and a poor clerk named Shukes (who died years ago, unknown to the public) are the only men whom I could ever listen to in comfort during poetry recitations. I have never heard a woman reciter who did not make me shudder.

Here is a field for exploration by the B.B.C., if they desire to bring the beauties of poetry home to the "average listener." But not a very fruitful field. Poetry is best read or whispered by one's self from the book—or declaimed aloud whilst one is walking in the wind on the high hills.

That Broadcast Drama.

It would not be reasonable to expect me not to be interested in the sparring between Mr. Garry Allighan and Mr. Val Gielgud about Radio Drama. I am, in fact, feeling like the Irishman who said, "Is this a private scrap, or can anybody join in?" Much as I should love it, I must not mix in, though Garry and I would have a gorgeous roll together in the dust, and I could also tread on Val Gielgud's coat-tails handsomely.

I cannot, however, resist the temptation to ask them to call "Time!"; while I say that in my view Radio Drama is fundamentally closely allied with the drama of the stage, which is a matter concerned with much weightier things than scenery, costume, lighting, and elocution. Further, I think that the B.B.C. is right in falling back upon stage successes, because the corresponding radio successes are thus pretty well guaranteed in advance.

But I wish that Mr. Gielgud would explain his phrase "synthetic writing." It sounds fine, but means nothing except to the mind of its inventor.

THE SILENT MICROPHONE

DURING the reign of King George the Fifth broadcasting was born; through the medium of the ether wave he made intimate personal contact with his subjects; by radio he stepped down from his throne and mingled with the people as a monarch who was their friend.

Over the air came his voice to the crofter's cottage and the lonely farmhouse; to ships ploughing their ways through tropical and ice-girt seas; to those far-distant homes of Britons in other lands, knitting the firmer the intangible but immensely strong bonds of Empire.

For five successive Christmases he quietly radiated his personal message to an audience of inestimable dimensions. With no tricks of rhetoric, with no distant tone of formal authority, but with simplicity, kindliness and sincerity.

And though his Golden Microphone shall never more be switched to the homes of the Motherland and the Empire Overseas to carry his words of sympathy and affection to our hearts, his kindly voice will for ever echo in the memories of the millions who were privileged to hear it through the modern miracle of wireless.

THE EDITOR.

TALKIES TO BE BROADCAST

Plans in Progress between the B.B.C. and Film Industry.

WHAT WE SHALL SEE WHEN TELEVISION COMMENCES.

L. Marsland Gander, Special Television Correspondent of "The Daily Telegraph," discusses the latest news of developments for the coming B.B.C. television service.

HALF the programmes from the Alexandra Palace will consist of films. The other half will comprise direct pick-up television from the studio or the Palace grounds. In March the first tests of the apparatus on closed circuits will begin, and after two months of public tests, at stated times, regular programmes may be expected to begin in June.

These were the most important points which emerged during a recent discussion of television prospects which I had with Sir Noel Ashbridge, Chief Engineer of the B.B.C., and Mr. Gerald Cock, the Television Director.

The daily hours of transmission will be 3 to 4, 6.15 to 7.15, and 9.30 to 10.30 p.m. Mr. Cock realises that his big task is to show television to the world. He hopes that there will be twenty or thirty public televiewing rooms set up in London by the big stores, radio manufacturers, newspapers, and other business concerns.

Between 3 and 4 he wants to catch the women shoppers; between 6.15 and 7.15 the City workers leaving their offices; and the last period is for home televiewing.

In handing over the responsibility for demonstrating television to private enterprise, the B.B.C. is doing the only thing which starvation finance of the new service allows. I am afraid there may be grave disappointments in this policy, and it is a matter for surprise that London cannot do as well as Paris and Berlin in the provision of official televiewing rooms. The B.B.C. is providing only one.

A Question of Cost.

The mystery of the B.B.C. film policy is: Where are the films to be obtained? The industry has virtually agreed to ban the televising of films until three months after the last date of exhibition in cinemas. Stale films of various kinds, interest "shorts" of the type made by the G.P.O. film unit and the Empire Marketing Board will surely not be strong enough.

Mr. Cock was somewhat evasive on this point, but it is evident that he still hopes for agreement with the film industry. He said that the B.B.C. retains the right to make its own films, but as the making of a regular news reel alone would cost £120,000 a year, it would create a nice hole in the total £180,000 allocated to the service.

On one point, however, Mr. Cock is very clear. The B.B.C. will not attempt to transmit long feature films by television. There will be two types of film broadcast. Excerpts from current successes, with comments, may be given once a week. The other type will be short films lasting about ten minutes each. These may be made available as a return for the advertising of the big films.

The Main Principles.

Some of Mr. Cock's guiding principles in programme compilation will be:

No regular features at fixed times at first, but each hour to be representative of what television can do.

An hour's vaudeville a day divided into two parts.

Less obvious and more informative entertainment.

The maximum of topicality and news value throughout the programmes, but no regular news bulletin in the early stages.

Risking a "flop" to try out good ideas.

Mr. Cock instanced as one example of the kind of programme he had in mind, a talk on his experiences by a veteran journalist, illustrated by still photographs of shipwrecks, disasters, earthquake havoc, etc.

* * *

As no talk with Mr. Cock is complete without allusion to the woman announcer, I raised the matter. Listeners will remember the formidable list of qualifications which applicants had to have. Nevertheless he has been inundated with applications from "It" girls. They waylay him and attack by letter and 'phone. "If we don't get a charming maiden it will be our fault. I didn't know there were so many," he said resignedly.

* * *

Sir Noel revealed the interesting fact that a new system of modulation will be used on the speech transmitter which will be common to both vision systems. Beyond that he would not go. The peak power of the station will be 16 or 17 kilowatts.

Widespread Reconstruction.

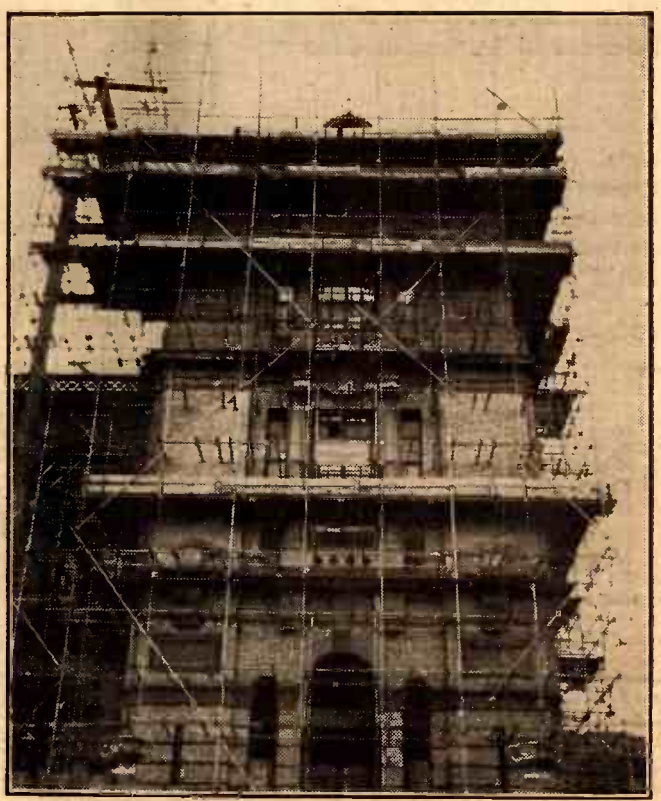
When I visited the Alexandra Palace a few days ago I was surprised at the transformation and at the extent of the rebuilding work. The old 80-foot tower which is to carry the aerial mast seemed to have been completely "degutted," and two wide sections of the outer wall had been removed from top to bottom. I seriously wondered whether it would not have been more practical to build afresh instead of converting on this scale. However, to outward appearances, the main part of the section taken over by the B.B.C. has required less adaptation. The transmitting halls on the ground floor appeared to be nearly ready.

Television is certainly not all beer and skittles. Serious problems arose in the Paris studios because of the brilliant illumination required. At one time it appeared as if the artists would be roasted alive. They have to be almost encased in lights and the total energy represented is 48 kilowatts. The heat would have been insufferable, but a refrigerating plant has been installed in the cellars.

This suggests that the performers will suffer from sunstroke and frozen feet at the same time.

(*Continued on page* 633.)

WHERE THE MAST WILL BE



In preparation for the erection of the 300-foot mast for the London Television Station at the Alexandra Palace the B.B.C. has practically demolished one of the old 80-foot towers. Here is a view of it showing the maze of scaffolding that has been erected.

PRACTICAL RADIO & ELECTRICITY

This week we present the first two articles of our new instructional series, conducted by Mr. A. Johnson Randall. This series, which will run perfectly smoothly, week by week, throughout the year, will aim at giving the reader a thoroughly sound insight into the elements of electricity and radio. Above all, it will be interestingly readable and essentially practical. As the course progresses, Mr. Randall will include practical descriptions and installation details of lighting and bell circuits and of domestic apparatus generally. Car-lighting equipment will also be dealt with. The theoretical side will be treated in the simplest possible manner, so that no reader can have the slightest difficulty in following the various explanations. "Practical Radio and Electricity" should prove invaluable to everyone interested in the whys and wherefores of these fascinating subjects. Especially will it prove itself useful to service men and young men who contemplate entering this and other branches of the radio and electrical industries, and to constructors who desire to understand and appreciate the intriguing processes underlying the operation of their sets.

ELECTRICITY is one of the marvels of the age. Harnessed by man's skill, this great discovery is being used daily a thousand and one different ways to make this world a better place to live in.

Just imagine what it would be like if the clock were put back and we found ourselves living in the days before electricity had become the force which it is now.

Just Imagene.

Think what it would be like if there were no telephones, no electric lighting or electrical machinery of any kind, no cinemas or motor-cars, and last, but by no means least, no radio. Consider for a moment the ordinary domestic uses of electricity. Apart from light and heating, we have vacuum cleaners, refrigerators, electric bells, irons, cookers, and dozens of other devices to assist in lightening work and adding comfort to the home.

And those whose business it is to conduct research into the many possible applications of electrical science have not forgotten medicine. Several of our hospitals are equipped with the very latest apparatus for bloodless surgery. There are devices for assisting in the cure of rheumatism and other diseases, as well as those amazing lamps which give out light whose health-giving properties are second only to the rays of the sun itself.

There is nobody who has not benefited by the discovery of electricity. And it is a force that is progressing so rapidly that it is impossible to foresee what new uses will have been brought to light within the next few years.

Although such a vital factor in our everyday life, electricity is unique in one respect—it is invisible. While its effects can be seen, and felt, you cannot see the hidden force which is responsible for them.

Another rather amazing thing is that all electricity is fundamentally the same, no matter whether the amount of energy is sufficient to drive hundreds of electric trains or only just enough to light a small bulb in a pocket torch. It is simply and solely a question of power. And this power can be derived in many different ways.

When it is a question of driving the motors of electric trains, or of supplying houses with light and heat, big generators are necessary. If, on the other hand, you only wish to ring an electric bell or to light a bulb of a small hand lamp, then you will only need a battery such as you can buy for a shilling or so in a shop.

Simple To Handle.

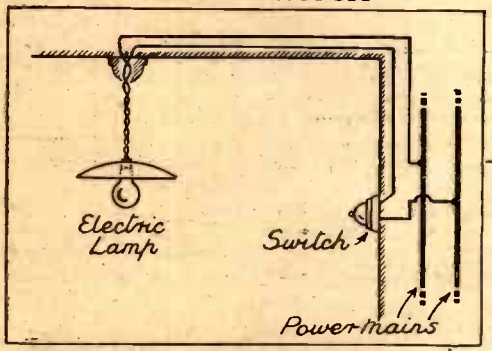
Another surprising fact is the ease with which electricity can be controlled. The engineer at the big generating station can instantly release energy amounting to many thousands of horse-power by the simple movement of a switch. It is no more difficult for him to do this than it is for you to press the switch which supplies energy to your valves or to press a button which causes your electric bell to start ringing.

No Difference.

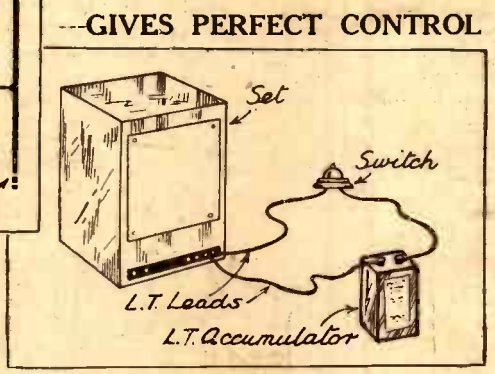
Yet, although there is no comparison between the amount of power in each case, what you have to remember is that there is no real difference between the energy controlled by the engineer and that given out by the batteries.

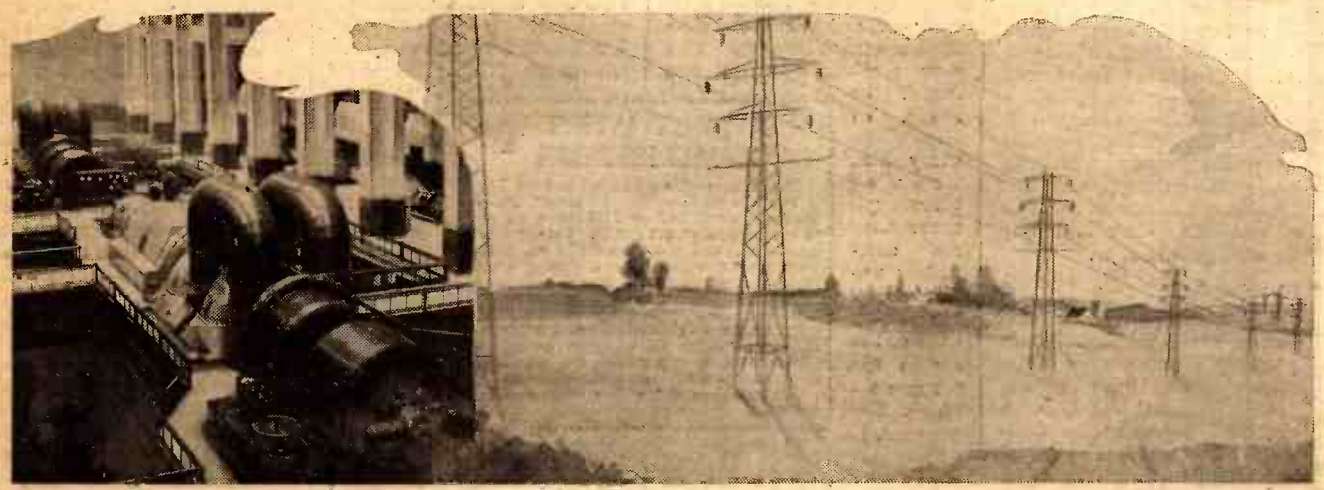
You will have noticed that in order to take electricity from one point to another it is necessary to use wires, or

(*Continued on page* 624.)



One of the amazing things about electricity is the ease with which it can be controlled. No matter whether you wish to control a lamp or motor connected to the power mains or a wireless set run from a small battery, the simple movement of a switch is all that is needed.





THE MYSTERY OF WIRELESS WAVES

What is it that carries the voice of the Announcer and the Sounds of an Orchestra Playing in a Studio to Your Receiver? What is that Mysterious Link which Makes Broadcasting Possible? How many Listeners have asked themselves this very Question?

Here is the Answer, Given in a Readable and Easy-to-Understand Fashion that everybody will be able to follow.

I DARE SAY you have often wondered how the broadcast programmes reach your receiver. You adjust the tuning control on your set to a given point and a voice or music comes to you out of space, as often as not travelling hundreds of miles before it finally emerges from your loudspeaker.

What Happens?

A point worth remembering is that you are not the only one receiving this particular programme. Thousands of other listeners are also getting it at the same time and with the same satisfaction as you. How do these sounds get to your set and theirs?

In the centre of this page you will see a pictorial sketch that I have drawn for purposes of explanation. First of all we have the announcer at the broadcasting station—or rather, in actual practice, in a small studio—speaking into a microphone suspended just in front of him. When he speaks he produces tiny vibrations inside the microphone which are changed into small impulses of electricity—how and why we shall go into later.

Electrical Copy.

These small electrical impulses, which incidentally are a faithful representation of the sounds issuing from the announcer's mouth—that is, an electrical representation—are then passed on to a chain of amplifiers, or, to use the alternative word, magnifiers. This apparatus is used to make the electrical impulses stronger. Passing through these amplifiers the impulses are then applied to the transmitter at the broadcast station. And then, finally, they arrive at the transmitting aerial whence they go out into space.

Now at this stage there is one point I want to impress upon you, and it is this. When these electrical impulses which your receiver converts into speech or music, as the case may be, travel through space they are completely unaffected by the existence of the air in the atmosphere. For instance, it would not matter in the least if there were no air at all between your receiver and the broadcasting station. Your reception would still be as good as ever. Broadcasting does not rely upon the existence of air.

I mention this mainly because so many people seem to have formed the impression that air is a necessary adjunct to broadcasting reception. Actually they are getting confused with the direct transmission of sound. It is true that if a gun is fired and you hear the sound of it some miles away, that sound is only audible because it is carried to you by the air which exists all around you.

On the other hand, if you could put the whole area between your receiver and the broadcasting station into an enormous container and then pump the air out so that there was a vacuum, you would still receive your programme just as loudly as ever.

The Ether Link.

This is because there is "something" which exists everywhere and which carries in addition to broadcasting, light and heat. This "something" has been given the name of "ether." We cannot feel the ether, neither can we see it, and yet it permeates all matter. It carries the heat from the sun's rays to you in the same way as it permits light and heat from the luminous filament in a vacuum lamp to pass through the vacuum between the filament and the glass bulb.

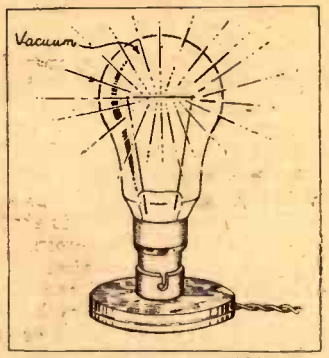
It has been proved that these wireless impulses travel through space with the same speed as light—i.e. approximately **186,000 miles per second.** In text-books you will often find this figure given as 300,000,000 metres per second. And in many ways this is the better method of stating it, because it simplifies certain calculations which are necessary in the study of radio.

Quite Unlike Sound.

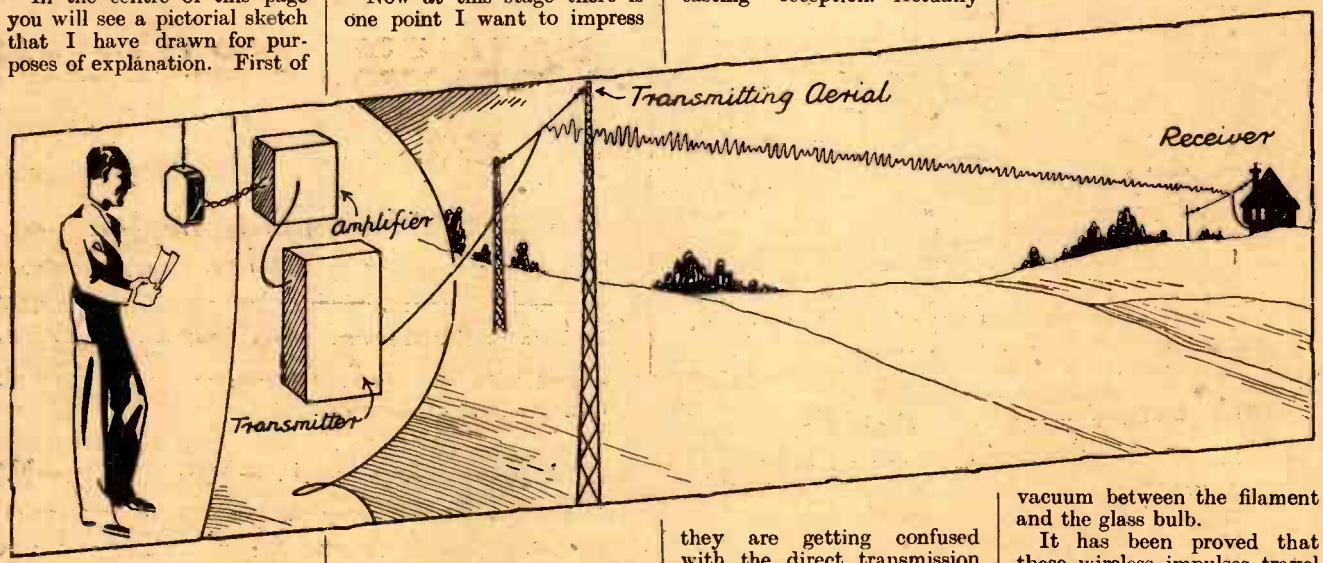
Contrast this with the speed of a sound, such as that of thunder or the firing of a gun, through the air. Sound travels at approximately 1,100 feet per second, so you see that

(*Continued on page* 624.)

A SIMPLE EXAMPLE



Although no air exists within the bulb of an ordinary vacuum lamp, light and heat pass from the filament through the glass with ease.



A FACT WORTH REMEMBERING

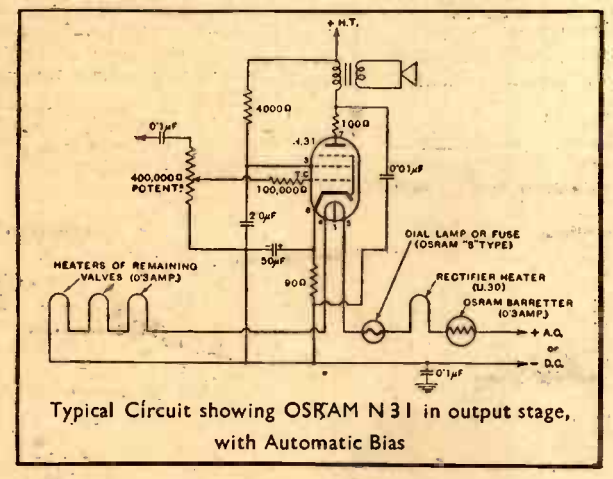
The distance from London to New York is roughly 3,000 miles. It would take a wireless wave ·016 or 1/62 of a second to cover this distance direct. On the other hand the sound of a gunshot (if one could hear it over such a great distance) would require four hours to travel the same number of miles.

So you see a radio programme reaches your receiver, to all intents and purposes instantaneously, in contrast to sound, which takes an appreciable time to travel through the air.

Try working out a few examples for yourself. It's quite interesting.

OF TECHNICAL IMPORTANCE

AN EFFICIENT OUTPUT VALVE FOR D.C. OR D.C.-A.C. 'UNIVERSAL' RECEIVERS AND AMPLIFIERS



Typical Circuit showing OSRAM N31 in output stage, with Automatic Bias

CHARACTERISTICS **TYPE N31**

Heater Current	0.3 amp. or 0.6 amp.
Heater Volts	26.0 or 13.0
Anode Volts	200 max.
Screen Volts	180
Mutual Conductance	10.0 ma/volt
Anode Current average	40 mA.
Screen Current average	10.6 mA.
Anode Dissipation	8 watts.
Normal Grid Bias	-4.4 volts
Automatic Bias Resistance (each valve)	87 ohms.
Optimum Load (single valve)	5,500 ohms
Optimum Load (anode-to-anode) Low Loading Push-Pull	7,000 ohms.

Price each: 18/6

WRITE FOR OSRAM VALVE GUIDE

Osram valves

MADE IN ENGLAND

Sold by All Radio Dealers

POWER PENTODE TYPE N31

The OSRAM N31 affords the designer of a D.C. Mains or 'Universal' amplifier or receiver, the means to obtain a large power output even with the comparatively restricted H.T. voltages available for this class of work.

Of exceedingly high sensitivity, the N31 (with Automatic Bias) may conveniently be fed from a diode, type D41, in a Radio receiver, or alternatively be operated in conjunction with the special 'low hum' triode, type H30, in a Gramophone or Speech Amplifier.

Suitable also for use in 'Low Impedance Loading' push-pull circuits (with fixed grid bias) where still greater output is required from a small signal voltage input.

OSRAM VALVES—DESIGNED TO ASSIST THE DESIGNER

THE MAN WITH THE MICROPHONE MIND

Alan Hunter interviews Rex Haworth, one of the most enthusiastic balance and control men

WHENEVER I am allowed to wander into the Control Room of St. George's Hall I find Rex Haworth absorbed in his elaborate fade unit. At one time he would have been dubbed "Balance and Control"—but such is the passion for titular glory rampant at the "Big House" these days, that Rex is ceremoniously known as a Studio Assistant.

In his case it is far from true to add that the more a thing changes the more it remains the same. The essence of his technique, as I hope to show, is evolution towards an ever-elusive standard of perfection. Which, in itself, is no mean thing.

Rex is a modest fellow. When people butt into the somewhat cramped little box looking down on the stage of St. George's Hall he carries on quietly and efficiently with his job. One afternoon he was able to mute his monitor loudspeaker to tell me about his work.

Although still a young man, Rex can claim to be a B.B.C. veteran. Way back in 1923, it was, when he first came into contact with the broadcasting system—if one could call it a system then. Bournemouth was in those pioneer days quite a broadcasting centre—and Rex went there as an engineer. Only a year later he came to Town to settle down to what may well prove to be his life's motif. The study of the microphone was his particular bent even then as it is now.

Solving the Many Problems

Rex has rather a musical soul. He was fascinated with the business of balancing microphone outputs to achieve a really good aesthetic effect. So impressed was Rex with the importance of good microphonic balance that he obtained permission from the powers that were to devote his whole energies to solving the many problems involved.

That was right back in the days when L. Stanton ("Uncle Jeff") Jefferies was Musical Director of the B.B.C. He and Rex between them started the Balance and Control Section that held sway for many years as a potent factor in broadcasting technique.

Came a break in his work for the Corporation. In 1928 Rex left the B.B.C. to see what he might do in film work—talking films having come upon the scene. He linked up with British Acoustic first, where luckily for his future career he had a recording van at his disposal.

While there he suddenly decided to "shoot" the Cenotaph ceremony. Unfortunately other film companies had thought of the same idea. He found all the key points booked. A long-focus camera perched on a distant building eventually solved the picture problem. He was still not "okay for sound," as the film men say. In fact, he thought he was "sunk"—to use his own graphic word.

Rex, remembering his B.B.C. days, decided to tap the broadcast commentary for his sound effects. The recorder was taken to a suitable radio installation to "bottle" the necessary comments. Then the trouble was to make the sound fit the picture. But finally the upshot was that, by this ingenious combination of film and radio, he was able to beat all his rivals' showings by a fortnight. And that is how the first British news film was born.

Recording Engineer of "High Treason."

Later, keen film fans might have seen his name flashed on the screen among the acknowledgments as the recording engineer of "High Treason," which, as a matter of history, was the first big talkie to be made in England. Rex tells of the hectic times he had when trying to record in the old Gaumont studios at Shepherd's Bush, where the construction was mainly of glass.

"Takes" had to be done with one eye on the railway time-table, for the line ran all too close to the studios. Two men were also posted in the street outside to hold up the traffic during sound shots.

Four years, he had. No holiday at all. Just hard, grinding work, building up an entirely new sound technique. No wonder Rex had a nervous breakdown at the end of that time. When he was better he rejoined the Corporation, with the firm resolve that he would apply the so hardly-learned technique of his film days to the allied job of broadcasting.

It is not too much to say that Rex has brought about a fundamental change in the theory of applied studio acoustics—applied, that is, to microphone balance. When Rex returned he found that it was the practice to achieve clarity of microphone pick-up by the absorption of all unwanted reverberation—mostly by the aid of screens and thick pile carpets. He decided that instead of eliminating all the echo, thereby rendering the effect unnatural, he would "tame" this phenomenon to the advantage of the final loudspeaker effect.

Fortunately, he had St. George's Hall to play with. Here he found ample scope for unfettered experiments. He began a scientific exploration of the whole hall, with the idea of discovering every nook and cranny that might be influencing the sound effect as picked up by the "mikes" and heard through the loudspeaker.

Getting the Correct Balance.

For the past year the broadcasts of the Theatre Orchestra have given Rex an ideal yard-stick upon which to measure his balancing ideas. Stanford Robinson must be given first credit for the way he has brought on this orchestra, with the able assistance of Mark Lubbock. To Rex Haworth we owe the success of the balancing of the orchestra's constituent groups of players.

His theory is that, so far as the artists are concerned, there should be no such thing as a microphone technique. Let them play as well as they know how to play, without being artistically under the thumb of the engineers. Then, says Rex, let the balance man do his job of translating their musical perfection into an equally flawless microphonic counterpart.

Rex is international in his technique. He got from Germany the idea of varying the studio acoustics to suit different types of musical performances. He got from

(*Continued on page* 633.)

HE HAS TO DEAL WITH UP TO SEVEN MIKES

A scene in the Control Room at St. George's Hall. Rex Haworth is second from the left, adjusting the controls on his mixer panel.

ON THE SHORT WAVES

TRYING OUT NEW CIRCUITS

Our popular contributor, W. L. S., discusses some new ideas for short-wave receivers.

THIS page must be taken as a collective answer to a number of readers who have written to me during the past few weeks. Perhaps if I quote from one particular letter, the circumstances will be clear. This gentleman says: "You often advise us to try out the So-and-So circuit and see whether it improves our particular troubles. Perhaps you don't realise that we can't afford to be continually building up new sets and buying expensive parts on the off-chance of results being improved.

"Doubtless your own cupboard is full of short-wave condensers and coils, so that you can build up anything you like at a moment's notice without feeling the draught (or the overdraft!). But some of us are not so fortunate." And so on.

No Need for New Parts.

Well, I thought I had acquired the habit of making myself clear, but apparently I haven't. So read on. When you see my reply to "X. Y. Z. of Penny-cum-Quick," advising him to try a Split Colpitt's circuit, or something of the kind, I am *not* advising him to rush out and buy a metal panel, two short-wave condensers, a set of coils, new valves, and all the rest.

He can easily try it out with the junk in his "odds-and-ends box," if he has just a little ingenuity. Time and time again I have described simple home-made short-wave

RAPID CONSTRUCTION

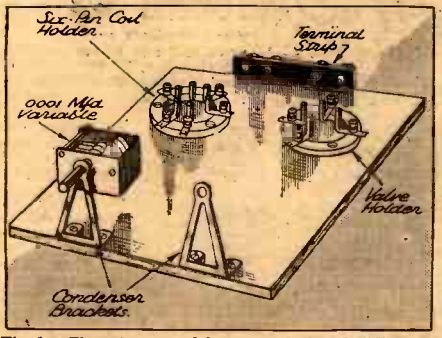


Fig. 1. There is no need for a panel when building up a test set. Try mounting the condensers as shown.

coils, wound perhaps on the bases of dear departed valves. At least twice last year I described the method of making a nice little short-wave condenser from one of the old-fashioned ·0005's that everyone must have lying about.

As far as panels and baseboards are concerned—forget it! Look at the sketch in Fig. 1. A suitable-sized piece of plain wood as a baseboard, equipped with a terminal strip at the back and two brackets for variable condensers at the front, will furnish the means of trying out any number of circuits you like.

I have always stressed the need for building "try-outs" *carefully;* but that doesn't necessarily mean complete with metallised panel and baseboard and new parts throughout. You should see some of *mine!* I tried out a circuit with a Class B valve only a few days ago, and built the whole rig in half an hour, talking the while with a very frivolous friend who was trying hard to get my mind off radio on to other subjects.

I'll have it photographed before I pull it to bits, just to show you what I mean. It looks like the wreck of the "Hesperus," but it works. (And there aren't any dirty connections or dry joints in it.)

If you double-space a couple of old ·0005 condensers (if you haven't got them, you can pick them up for 6d. a time) and wind a set of four-pin coils on anything from shaving-soap cartons to valve bases, you can try out *any* circuit without feeling a pain in the bank balance.

An "All-Junk" Set.

Why, I know a man who built a biggish short-wave superhet entirely from junk! It took him a long time to do, but he said he wouldn't have missed the fun for anything. Admittedly it looked like the work of an elderly spider with a bent for electrical engineering, but gosh, how it worked!

These "try-outs" are more than half the fun of short-wave work, to my mind. I don't like to think that most of my regular readers are people who build a set that works reasonably well and then spend their life just *listening* on it because they're scared stiff of not being able to duplicate the results if they try something else.

The short-wave man ought to be a bit of an experimenter, even if he has no particular qualifications in the technical line. Otherwise we shall all settle down with all-wave sets and I shall have to go out of business and start that poultry-farm I've mentioned before.

Just to give you a lead, Fig. 2 shows a circuit that is well worth trying if you have a Class B valve. I've already dealt with one that uses the two halves of a Class B valve as detector and L.F. stage. This one uses the valve as a push-pull detector.

Unfortunately it requires a ·0001 split-stator ("series-gap") condenser, since both ends of the grid circuit are live. But even a split-stator condenser can be made quite easily out of one of the old-fashioned variety. You can strip it right down and reassemble it so that you have two independent sets of fixed plates with a gap of an inch or so in between them.

In case your ingenuity won't run to that, I'll show you how to do it next week, together with some other hints on using up old components.

Now Readers, You Try.

The push-pull detector circuit operates extremely well, as a rule, and has definite advantages over the "single-ended" variety. The circuit I have shown is not the conventional one, but I have found it work very well. You will have to wind special coils with the reaction winding split into equal halves, one on either side of the grid winding.

I should very much like to offer a prize for the best "junk-box receiver" constructed by a reader. I'll supply plenty of

QUITE A NOVELTY

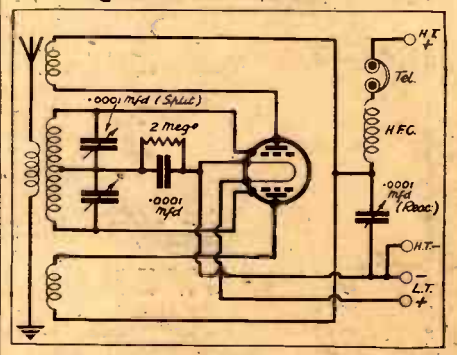


Fig. 2. If you have a Class B valve try this circuit. It is capable of surprising results.

circuits during the next few weeks, and I should be interested to hear what sort of results the more enterprising enthusiasts succeed in getting with them.

If an appropriate prize would be a box of still more junk, then I'll actually make the offer—but I don't particularly want to be inundated with hundreds of weird affairs that I've got to try out and then return, so I'll rely on letters first, if you don't mind!

The initials W. L. S. mask the name of one of Britain's most prominent short-wave experts and amateur transmitters. He is a man who has had many years of practical experience, and is ever in the forefront of any development on the short wavelengths.

Every week W. L. S. contributes to the pages of "Popular Wireless" authoritative and most readable information concerning happenings below 100 metres, and gives valuable practical tips for those interested in the reception of short-wave stations.

IT PAYS TO BUY THE BEST

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No. 1007. **Price 1/6.**

EXTENSION CONTROL OUTFIT.
Ample length adjustment is obtainable with the 4" non-warp precision-drawn insulating tube and 3" brass rod provided in this outfit. Complete with panel-bush and nut.
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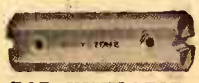

BAR INSULATOR.
An ultra-high frequency insulator for strain or spacer purposes, made from Frequentite. Slotted ends for feeders with 2" spacing.
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ULTRA SHORT-WAVE H.F. CHOKES.
These chokes are single layer space wound on DL-9 formers, and have an exceedingly low self-capacity.
No. 1011. D.C. Resistance 1.3 ohms. **Price 1/3.**
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INSULATING PILLARS
Invaluable for mounting components in ultra short-wave receivers. White DL-10 insulations 7/16" diameter. Long 6BA adjustable screw shank at top. N.P. Metal foot.
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EDDYSTONE SIX-PIN COILS

Type 6 LB,	12–26 metres	4/-
„ 6 Y,	22–27 „	4/-
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for your
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COMPLETE TRIPLE EXTRACTOR UNIT as specified by Mr. John Scott-Taggart . . 24/-

MODERNIZE YOUR SET with this "UNIGEN" UNIVERSAL COIL.
Will bring your set up-to-date whatever the present circuit. Equally suitable for H.F. Aerial or Band Pass Tuning. Range 200-550 and 800-2,100 metres. **5/-**

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.....

P.W. 1/2/36

ON THE SHORT WAVES—*Page 2.*

Points from the POST-BAG

W. L. S. REPLIES IN BRIEF TO A FEW OF HIS MANY CORRESPONDENTS.

J. P. S. (Northwood) wants me to recommend a good short-wave set that will go down to 10 metres and up to about 90. It will be his first short-waver, so it must be simple. I suggest that practically any good design with four- or six-pin coils will fit the bill, except that one usually has to make one's own coil for wavelengths down below about 13 metres. Just duplicate the smallest coil of the set you have, leaving one turn off each winding, and all is well.

W. R. (Mile End) reports Georgetown, V P 3 M R, and also a station on about 44 metres announcing himself as "Philips Iberica" (?). He wants more of the "Standard Layouts" with which I used to disport myself a year or so ago. I think I shall have to revive them.

F. G. S. (Stamford Hill), commenting on the reader who had built up two of them and couldn't get a sound, sends a photograph of his own version of one of them, which satisfies him very well. I hope to publish the photograph next week. He has also logged V P 3 M R.

W. R. (Accrington) encloses a "veri" from W 2 X A D concerning the famous Stratosphere transmission.

W. P. C. (Smethwick) almost makes me blush. He says that if I can't solve a problem, I say so—unlike ninety-nine per cent of other writers! But perhaps all the others *can* solve them and don't have to admit defeat? Or can they?

He has built a set on the lines of the "B.C.L." Two, but finds that he gets far more volume with 80 volts on the last stage than with 120. All I can suggest is a dud valve.

Identifying Stations.

C. H. (Merstham) has just started short waves, and wants to know how to identify short-wave stations, and how to get hold of a reliable list of them. Since he probably doesn't need the Amateur Call-Book, which is a very bulky affair and costs about 6s. nowadays, I suggest that he approaches Mr. Bear, of the International Short-Wave Club, at 10, St. Mary's Place, S.E.16. The I.S.W.C.'s monthly publication contains a complete list of short-wave broadcast and experimental stations.

He, also, has spotted V P 3 M R, which surely must be about the most popular station of 1936, so far!

H. B. (Barnsley) accepts my recent invitation to readers to air their "grouses." He accuses me of starting him off on short-wave work some years back. Since then he has read all about my big set, and has been waiting impatiently. Says he: "Man! I could have built Broadcasting House while you've been playing with that set!"

Now that it has finally emerged from its incubator he finds it's an all-mains affair, and he wants a big *battery* superhet! Too bad, H. B.! But what most of the readers were clamouring for was a mains job, and they've got it! I shall have to tackle a battery affair separately. Of course, if you could afford 5 amps. of L.T. at 4 volts—— I have purposely brought out all connections to terminals so that one can use H.T. batteries if necessary, but the L.T., I admit, is a bit thick.

(This set, by the way, for the benefit of those who don't know, is described in the February number of our sister journal, WIRELESS.)

G. B. (Bromley) says that he is fed-up with conventional-looking layouts, even if they do work. He wants to try out some unconventional ones, even if they *don't* work! As luck will have it, I can show him this week an unusual one that *does* work. Fig. 3, on this page, shows it.

The Scheme Used.

I haven't been able to show much detail in the sketch, but you will see the general idea. The tuning condensers and the detector V_2 are enclosed in a kind of shell, on the outside of which are mounted most of the other parts. Actually the set uses an untuned triode between the detector and the aerial—this is shown as V_1, on the left. V_3 is the L.F. stage, on the right, and the original set was an all-mains affair with the rectifier just "out of the picture" on the right-hand side.

The layout may look queer to our conservative eyes, but the actual set, made by an American friend of mine from English components, was uncannily good. I haven't quite found out what little magic touch made it so, but I can vouch for the results.

H. L. C. J. (Christchurch) wants to know where he can obtain a switch of the two-way multi-pole type for switching an H.T. unit over from one set to another. I am using one of the Wearite rotary type for a similar job myself, and I think there are others available.

A reader who writes from Bath without any initials wants particulars of a coil to tune from about 25 to 52 metres with a ·0001. If he winds a 12-turn grid coil and a 7-turn reaction coil on a standard four-pin former he won't be far out.

UNCONVENTIONAL BUT GOOD

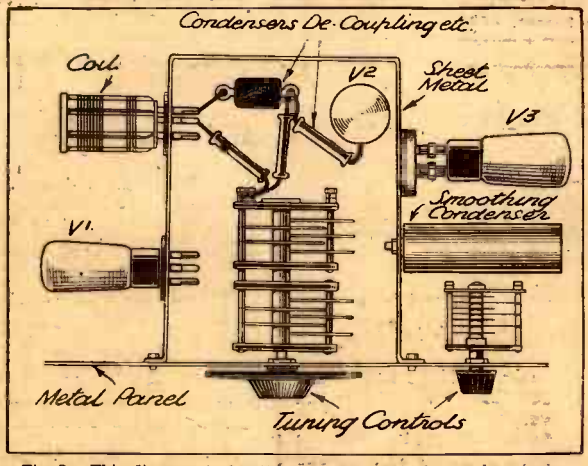


Fig. 3. This diagram is for the special benefit of G. B. (Bromley), who wants an unconventional layout. This one works excellently, and can be thoroughly recommended.

SHORT-WAVE NEWS

HERE ARE THE LATEST TITBITS ABOUT HAPPENINGS BELOW 100 METRES.

THE B.B.C. is making a real effort to meet the wishes of Empire listeners in regard to the type of programme supplied to them. Mr. J. B. Clark, the Director of Empire Service, recently made a strong appeal over the air for close and continued co-operation between the overseas listener and the B.B.C. Executive.

Interesting points in his talk included the following: Singing of large choirs and performances by big orchestras suffer more from the vagaries of short waves than do items on a smaller scale. It is also desirable to use a slower rate of speech for talks and announcements on account of fading and possible interference.

An Early Transmission.

Transmission 1 is radiated from London in the early hours of the morning. Mr. Clark reminded listeners that it is not so easy for a comedian to be funny at 5 a.m. as at 5 p.m.

Both parts of Transmission 4 take place in the evening, and although there are fixed times for news bulletins, it is sometimes desirable to change the time of the News in this transmission.

Daventry is now radiating a programme for sixteen hours out of every twenty-four. This will probably surprise many home listeners who don't happen to hear it, but the overseas watcher knows all about it!

There are now quite a number of new stations regularly on the air and being reported by readers. Nazaki, Japan (J V H), has been coming in for a fair share of comment. He works on 20·55 metres between 7 and 8 p.m. on Tuesdays and Fridays, and is usually received at extremely good strength.

Addis Ababa (E T A), on 16·42 metres and 25·1 metres, has also been heard by quite a number of listeners. Another Japanese station broadcasting at the same time as J V H is Tokio (J V M) on 27·93 metres. Several others are to be heard, but these two appear to be the most regular.

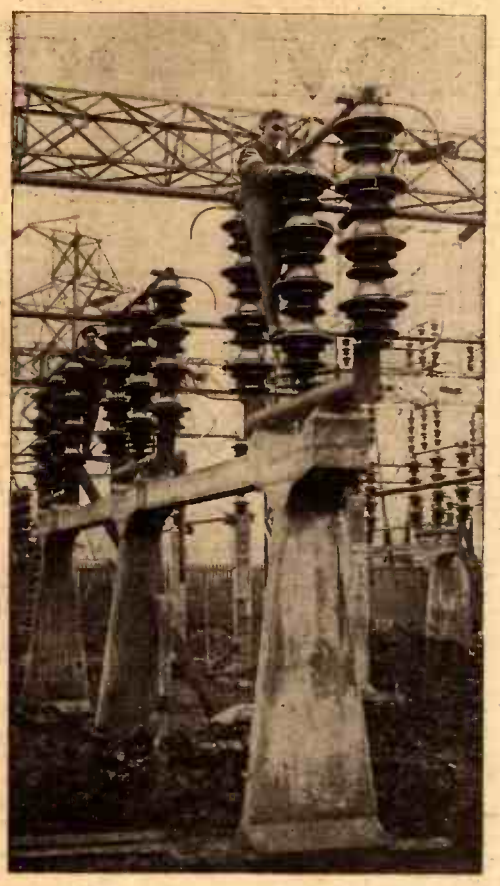
The Paris Conference.

By the end of this month the Paris Conference will be under way. It is hoped to arrive at some international agreement about the allocation of wavelengths to short-wave broadcast stations, with a view to alleviating some of the congestion that is now apparent on certain wavebands. It is quite possible that by this time next year the short-wave "broadcast bands," as we now know them, will not be in existence.

Nothing "official" can be decided, as it is not a Government affair, but some very useful recommendations will probably be passed on.

W. L. S.

THE MOST SUCCESSFUL ELECTRICAL WORK OF THE YEAR



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- Neon Tube and Neon Lighting
- Power Factor and its Correction
- Quantum Theory of Energy
- Radio - Gramophone Electrical Equipment
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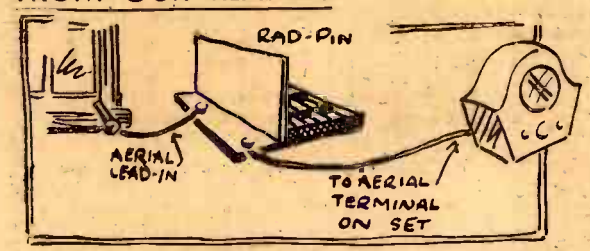
FROM OUR READERS



Mr. Roberson recommends that the Rad-Pin "Nest" should be connected like this instead of in one of the loudspeaker leads.

A "RAD-PIN" IMPROVEMENT

A READER'S SUGGESTION CONCERNING VICTOR KING'S FASCINATING RADIO GAME (DESCRIBED IN "POPULAR WIRELESS" OF JANUARY 11TH) WHICH ENABLES THE MOST INACCESSIBLE RECEIVER TO BE USED WITH COMPLETE SIMPLICITY.

The Editor, POPULAR WIRELESS.

Dear Sir,—I have a suggestion regarding joining your "Rad-Pin" to the wireless set.

Instead of connecting the Rad-Pin in the loudspeaker circuit of the set, connect it in the aerial lead. This, you will agree, eliminates all possible damage to valves and speaker (in the result of continual making and breaking of circuit). What is more, the result of contact by the pin and foils "contacts" would be more definite. This method would appeal to users of self-contained mains sets making for safety and simplicity.

Yours truly,
H. ROBERSON.

63, Dore Avenue, Manor Park, E.12.

[*This letter is awarded the weekly prize of one guinea for what, in the opinion of the Editor, is the best letter. See announcement on this page for further details.*]

CROONERS NOT WANTED.

The Editor, POPULAR WIRELESS.

Dear Sir,—I am fourteen years old and, like most schoolboys, enjoy listening to dance music. I prefer it, however, without the interruptions of a crooner.

I enjoy modern rhythm best when it is played on a cinema organ, and the tunes I like best are waltzes or tangos.

These types of dance music are also very enjoyable when played on piano accordions, but I am sorry to say are usually unbearable when played by energetic dance bands and sung by sleepy crooners.

I cannot say I absolutely abhor dance bands, for some are not so "hot" as others, but give me someone like Don Carlos in the place of the crooners. I like to hear someone sing, not a dreamy "boo-boo-boo" like the murmuring of a half-witted infant.

Finally, may I point out to crooners the benefits gained from the well-advertised night-caps which may renew their vitality.

Your faithfully,
R. F. MASON.

162, New England, Peterborough.

MORE TECHNICALITIES WANTED.

The Editor, POPULAR WIRELESS.

Dear Sir,—Though I am only fourteen my radio activities date back three years, when I pushed off with a simple little one-valver. About a year ago I started on short waves with a 1-valver and what a sight it was! A stripped ·0005 and an old neutralising condenser in the aerial, a general-purpose valve—in fact, the best thing in it was a good commercial triple-range coil.

The moment came when I switched on, and the first station I heard was Radio Caracas, YV2RC, Venezuela, on 49·08 metres, and since then I have been a short-wave "fan."

The most interesting thing I find in S.W. is listening to "hams" and the informal nature of their conversations. My own set I use now is an S.G.-I.L.F. with band-spreading and gets good DX. I should very much like to hear from other young S.W. fans and promise to reply to them all.

Though I think POPULAR WIRELESS is the best of its kind, I think it could be even more improved by fewer articles about things which are so non-technical, such as the "Truth about Frankie Wilson," etc., and I am sure other "fans" will agree with me.

Another thing I spend time on is listening to the conversations between what appear to be fishermen on trawlers on 1,150 kilocycles, on a 5-valve commercial superhet. I should like to hear from other readers on this point.

Wishing POPULAR WIRELESS the best 73's.

Yours faithfully,
C. PEGG.

68, Patrick Road, Plaistow, E.13.

[*An interesting "opposite" to this letter is the following P.S. to a letter from Rev. Thos. D. Lawton, of Brown Edge Vicarage, Stoke-on-Trent. He writes, "I must thank you for the news about Mr. F. Wilson. I mentioned it in the pulpit last Sunday eve."*]

AN OLD-TIMER

This photograph, sent in by Mr. M. Hirst, of Bootle, Liverpool, shows one of his first valve receivers. He is a satisfied constructor of many "P.W." designs.

THE ATOM IS A SOLAR SYSTEM.

The Editor, "Popular Wireless."

Dear Sir,—I note in a recent issue of "P.W." that a reader states the opinion that the atom is unlike the solar system.

This I must flatly contradict. The atom is the same as the solar system, only on a smaller scale. Whether we call a thing large or small depends on its relation to other things. The atom has its constituent parts as widely separated as the parts of the solar system. Therefore the inhabitant of an electron, if such exists, would look out over a vast expanse of space to the neighbouring electron, or to the central "sun." He would also be aware of other atoms, as these would be luminous like our stars.

Similarly we can, if we feel inclined, regard our solar system as an atom, whirling about amongst countless other atoms. We ordinarily think of our solar system as being large, and the atom as being exceedingly small. But what if our solar system is, after all, only an atom in some other complex world material?

This opens up an awe-inspiring prospect. Is there nothing large or small in the universe, except by comparison? We know the earth is made up of atoms. May not the electron be also made up of "atoms"? And may not our solar system, together with all the others about us (stars), be part of such another "electron"? May not this go on indefinitely? The mind reels with the shock of it.

Yours truly,
WM. NIMMONS.

7, Hazelfield Street, Belfast.

WIN A GUINEA

Every week we pay one guinea for the best letter from a reader on any radio topic. There's no reason why you should not win one. So why not have a shot?

Radio experiences, faults you have found and remedied, programme opinions; these are all permissible topics. If you enjoy reading what others have to say, why shouldn't they find interest in some words of yours?

Anyway, give us the opportunity to decide whether or not that letter you have in mind merits printing. It may even earn a guinea!

USEFUL AS A START.

[*The following extract on the same subject as Mr. Nimmons' letter above, is from a letter sent by Mr. G. H. F. Seiflow, of Brook House, The Avenue, Hatch End, Middlesex.*]

"With all deference to the views of Mr. Lancefield, I submit that his objections to the comparison between the structures of the atom and of the solar system are rather beside the point. His chief objection appears to be that whereas the solar system is bound together by gravitational attraction, the atom is bound by electrostatic attraction. But these two forms of attraction are very similar in their attributes. They both fall off inversely as the square of the distance, and neither requires any intervening medium for its action. True, there is no such thing as gravitational repulsion, but in the atom we deal mostly with attraction between opposite charges.

"Let me add, that on a first approach to the theory of atomic structure a solar system comparison is very useful, but I agree with Mr. Lancefield that on understanding the fundamental principles the simile should be dropped."

DOES THE ETHER EXIST?

The Editor, "Popular Wireless."

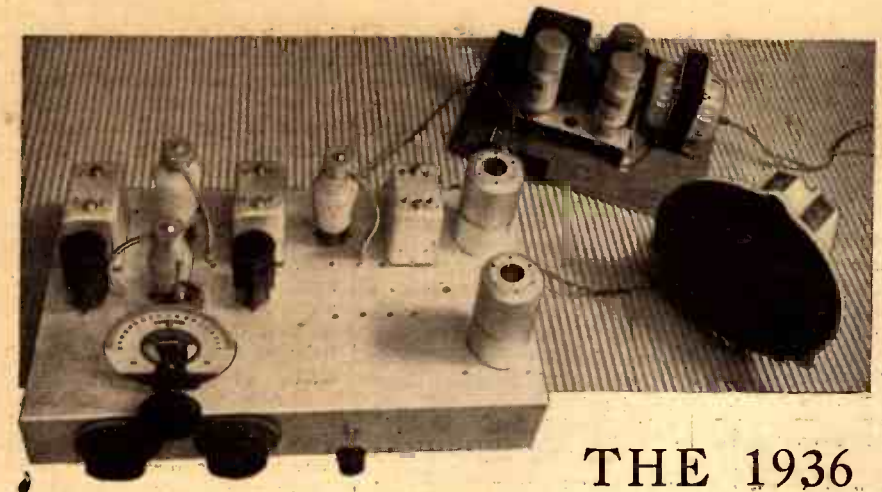
Dear Sir,—I was very interested in Mr. A. Thomson's letter in "Popular Wireless" dated January 11th, 1936, re the non-existence of the ether, but I beg to disagree with several of the points which he raises.

Now, the corpuscles which he presumes to be emitted by a luminous body must give up their kinetic energy in order to cause waves in a magnetic field. Yet when the moon is nearly in line with the earth and a star, it is possible to see the star from here although its light is obviously passing through the moon's magnetic field. If this corpuscular theory were correct, the energy of the corpuscles would be transformed into waves in the moon's magnetic field, which could never reach the earth. Everyone knows that such a star is visible until it is eclipsed by the moon.

Again, how could men see in the old-type submarines; being made entirely of a magnetic material, screened everything inside from the earth's magnetic field, which Mr. Thomson says is necessary for the production of the waves?

The second effect mentioned by Mr. Thomson is easily explained: When moving bodies or particles meet the air, friction occurs which results in these becoming charged with electricity. This causes an electric field, which, as it is moving, induces currents in wireless aerials.

(*Continued on page* 631.)



Here It Is!

Just the set for which so many—especially Overseas listeners—have been waiting. A sensitive, easy-to-operate, all-mains short-wave receiver which gives excellent loudspeaker reception of S.W. broadcasting.

THE 1936 EMPIRE SUPER

It is fully described by W. L. S. in the

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Television To-day.
What is Happening in Radio.
A Word on Soldering.
Television NOT to Compete With Cinemas!
Berthe Grossbard of the Rome Station.

PRACTICAL RADIO & ELECTRICITY

(*Continued from page* 613.)

Conductors as they are called. Large conductors reach out from the power station, and from these are taken the various subsidiaries which carry the electricity into those places where it is required for running motors, lighting, and so on. These large conductors, which are able to supply any amount of electrical energy required, are called "the mains."

If the amount of power needed is very small, as in the case of an electric bell, heavy conductors are not necessary. There are various factors which determine the actual size of the wire to be used, and also the nature of its covering. These we shall deal with shortly in this series; but the chief thing to bear in mind at this juncture is that there is virtually only one kind of electricity from the practical standpoint, no matter whether it is derived from a giant generator or from a midget battery.

But the amount of energy which is available in each case is a very different matter, as we shall see later.

In electricity—as in almost everything else—there are certain rules, or "laws" as the highbrows like to call them, that must be carefully followed. There is a right and a wrong way of doing things. And in this series I am going to explain these various rules in a simple and essentially practical manner.

Electricity need not be an unsolved mystery, and very shortly I know that you will all agree with me.

THE MYSTERY OF WIRELESS WAVES

(*Continued from page* 614.)

the wireless impulses reach you practically instantaneously, whereas sound takes an appreciable time to travel.

You can easily prove this for yourselves during a thunderstorm by noting the time taken between a flash of lightning and its accompanying peal of thunder. You see the flash immediately, but some seconds elapse before you hear the thunder. As a matter of interest, if you are so disposed, you can work out the distance of that flash from you by noting the time which elapses before you hear the thunder. Five seconds per mile will give you a good approximation.

These electrical impulses which we have been talking about are called "waves." And it is the waves travelling through the ether which carry the broadcast programmes to you. A series of waves is usually depicted as a zigzag kind of line something after the fashion of that which joins the transmitting and the receiving aerials in the sketch.

Actually wireless waves are rather complicated things. At this stage we cannot go into them fully, although, of course, we shall do that later on. But I can say without going into any theory that the waves sent out by a broadcasting station have two forms; the first comes into being directly the station switches its electrical power into the transmitting aerial and before the announcer comes to the microphone to open the programme. This wave is being sent out the whole time the transmitter is working and is called the "carrier" wave. (You can hear it on your set as a breathing sound).

It is so called because it has to carry the actual speech and music to you and to other listeners. When the announcer speaks, and all the while the programme is in progress, the electrical impulses transmitted by the microphone in the studio are applied to this "carrier" wave, which then undergoes all sorts of variations and becomes what is termed "**modulated.**" This, of course, sounds rather involved, but all it means is that the carrier wave is constantly undergoing changes in accordance with the sounds picked up by the microphone in the studio, and it is really these changes that affect your receiver and produce a faithful representation of the broadcast programme.

But, remember, the carrier wave must be there to carry these impulses or, to use another term, modulations.

At this point I will leave you, and next week I shall tell you why your programmes sometimes fade, and how it is possible for a station many thousands of miles away to be picked up clearly on a small aerial.

A. J. R.

TECHNICAL JOTTINGS

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

These notes are contributed every week by a scientist who has earned the reputation of being the leading technical "columnist" in this country. He has the gift of being able to write about technical topics in such a way that all can understand and appreciate his notes, from the ordinary listener to the radio engineer. It is extremely seldom that a scientist possesses such a depth of learning, such university, laboratory and really practical experience as Dr. Roberts; it is very rare indeed when these qualities are combined with the power to wield a smooth and expressive pen as in his case.

Using Headphones.

I SAID something the other day about using headphones in special conditions, either instead of or in addition to the loudspeaker. As you know, headphones only require a fraction of the output that is needed to operate a loudspeaker satisfactorily. It is not that they are more sensitive, as some people think—actually they are as a rule considerably less sensitive than an efficient modern type of loudspeaker unit—but, being clamped in close contact with the ears, they gain an enormous advantage over the loudspeaker, which has to project its sound over a very much larger area. You can use headphones with an extremely small output volume from the set, even, as is well known, with the small output from a crystal set.

Plug and Jack Switching

If you are using a valve set, it may well be that the output from the last stage is too powerful for the 'phones, and if the set has, say, two low-frequency stages of amplification, it is better to introduce the headphones after the *first* low-frequency stage or even sometimes after the detector. A convenient way to do this is by means of a plug and jack. If you are connecting the headphones in after the first low-frequency amplifier, you can connect one end to the common negative and the other to the coupling condenser, whilst the centre terminal goes to the grid terminal of the last valve. In this way you can plug in the 'phones and automatically cut out the last valve at the same time.

Short-Wave Working.

In these days of long-distance reception and high selectivity, it is almost essential to have a vernier or slow-motion tuning dial, and most modern sets are fitted with such a dial, some sets having, in fact, very elaborate ones. If this slow-motion tuning is necessary for broadcast wavelengths, it is still more necessary when you go in for short-wave tuning. In tuning-in a short-wave receiver you want to work just on the point of oscillation and search for stations with extra special care. Some people who go over to short-wave reception, after having been accustomed to broadcast reception, find the delicacy of the operation a bit irksome. That is why the special Kelsey "Rotalog" scale has been devised. With this it is easy to commence operating a short-wave receiver and you soon fall a victim to the fascination of short-wave working,

(*Continued on next page.*)

TECHNICAL JOTTINGS

(Continued from previous page.)

owing to the number of stations which can be picked up and the enormous distances on which reception can be made with quite simple tuning.

Programme Recording.

I dare say you know that the B.B.C. has for a long time made use of a system of recording on a magnetised steel tape. I I believe this idea was first invented by a German, Dr. Stille, and was more recently associated with Mr. Blattner, who was a prominent figure in the British film industry. Some of the best recordings which the B.B.C. has reproduced over the microphone were made on this system. It has many advantages, one of them being that, as there is no mechanical contact between the recording or reproducing arrangements and the tape or wire, "surface noise" is practically eliminated and a very perfect reproduction is obtained.

There is no "processing" after the record has been made, and the tape can be instantly passed through the necessary machine and the items reproduced. I have myself made records on this instrument and was astonished at the perfection of the reproduction—or rather, I should say, my friends who were present were astonished at the reproduction, because it is a well-known fact that you are no judge of the reproduction of your own voice.

The Marconi Company's Work.

I mention all this because I learn that the Marconi Company have lately taken up this matter of recording on the steel-tape instrument and have been devoting a good deal of research to it.

A new recorder, known as the Marconi-Stille, is now available, and is claimed to give even more faithful reproduction than the instruments which the B.B.C. have been using for some two or three ye ars past.

I understand that a number of these machines are on order with the Marconi Company for use by broadcast concerns in different parts of the world. I expect a lot of you will write and ask me whether this is available in smaller form for home use. I cannot tell you whether it is being made in small form, but I should imagine that it would be in a much higher price category than the ordinary disc gramophone.

Television and High Voltages.

Several readers have asked me whether there is likely to be any danger with the high voltages which have to be used in connection with television sets. I suppose this is because one or two accidents have happened in the past with the voltages used in ordinary all-mains radio receivers, and since there are certain voltages used in a television set which are very much higher, naturally people think that the danger is correspondingly greater.

In the first place, I should say that there is no excuse whatsoever for *any* accident happening with an ordinary radio set, and I think it is true to say that in the one or two cases where something of the kind *has* happened it has been because the person concerned was monkeying about with something that should have been left alone.

The Insulation of a Receiver.

Any respectable all-mains receiver is so designed and insulated that it is for all practical purposes quite impossible for anybody to give themselves an electric shock unless, as I say, they go deliberately interfering with something which does not need to be interfered with at all. You can't *prevent* a person getting into trouble if they have made up their minds beforehand to do so.

As regards the television receiver itself, it is true that the voltages used in connection with the cathode-ray tubes are relatively high, but at the same time the resistances used are high also, or should be. The total wattage consumed by a cathode-ray tube is exceedingly small, so small that it is very doubtful if the same amount of *energy* passed into the human body would do any serious harm.

The Voltage "Regulation."

A properly designed transformer for giving the necessary high voltages can be so arranged as regards its "regulation," that its output voltage drops enormously when the current taken from it exceeds a very small pre-determined value. Perhaps I can best explain what I mean by comparing this with one of those old electrostatic machines which used to be such a characteristic feature of science laboratories in our schooldays.

You remember the sort of things, with a couple of large glass dises all heavily coated with shellac varnish. The best-known type of machine of this kind was the Wimshurst.

These plates were spun round by means of a belt and pulley, and the slight amount of electrostatic charge on them soon built up until a very high voltage was generated, sufficient to cause a spark perhaps half-an-inch in length. The total amount of energy or *wattage* was nevertheless exceedingly small.

The high-voltage electrical arrangements in a television set are not quite so innocuous as this, but at the same time they can be so arranged as to be relatively harmless.

If any of you have any sort of doubts on this matter, I think I can set your minds at rest because, altogether apart from whether the circuit is capable of doing any harm, you may be quite certain that the commercially built television sets will be gone over with even greater care, from this point of view, than manufacturers already exercise in regard to the relatively low voltages of present-day radio receivers.

THE BOOK OF PRACTICAL TELEVISION

Some appreciative comments on the fine book which forms the subject of a special offer to "P.W." readers as detailed in other pages in this issue.

"OF GREAT VALUE."

"The book will be found of great value to all who wish to understand both the principles and the present position of television, and the least technical reader will seldom find it 'above his head.'"

The Broadcaster and Wireless Retailer.

"A WEALTH OF INFORMATION."

"This book contains a wealth of valuable information concerning advancement made in television. . . . Readers without scientific knowledge or training will certainly be able to enjoy reading this book, on account of the manner in which it has been compiled." *Mexborough Times.*

"SO PRACTICAL."

Sir,—I received my "Television Book" by return of post. I wish to thank you for producing so practical a book at such a light cost. I find it very easy to understand, and have grasped the principles of television already.—Yours sincerely,
CLIFFORD HARMER.
Belaugh, Wroxham, Norfolk.

"BY FAR THE BEST."

Sir,—I am in receipt of your book "Practical Television." It is indeed a fine publication, and is by far the best book on this subject I have seen.—Yours,
J. S. SHELLY.
61, *Premier Street, Brooks Bar, Old Trafford, Manchester.*

"A FINE PRODUCTION."

Sir,—It is a book which should be in the hands of all those interested in television. It is written for everybody to understand, from novice to expert. Congratulations on a fine production.—Yours faithfully,
WM. E. ROBERTS.
58, *Woodbridge Rd., Guildford, Surrey.*

"A GREAT PUBLICATION."

Sir,—Just a few lines to say I received my "Book of Practical Television" and I am very pleased to have had the opportunity of obtaining such a fine book.

It is a complete and comprehensive survey of the art of television, and I am sure thousands of enthusiasts will welcome it as a great publication, bringing a knowledge of television within the reach of all, and preparing them for the time when, like radio, it comes to the home of the man in the street.—Yours faithfully,
THOS. P. COTTERILL.
1, *Crescent Road, Congleton, Cheshire.*

"SPLENDID VALUE FOR MONEY."

Sir,—I wish to thank you for my copy of "The Book of Practical Television." It certainly is splendid value for money.

I should imagine that this work is the most complete guide to television now available, and my congratulations go to the Editor and to all the distinguished contributors for compiling a book which should be read by all those interested in radio and television. Wishing your paper every success.—Yours faithfully,
R. A. LOVELAND,
Handcross, Haywards Heath, Sussex.

RADIOTORIAL

The Editor will be pleased to consider articles and photographs dealing with all radio subjects, but cannot accept responsibility for manuscripts or photos. Every care will be taken to return MSS. not accepted for publication. A stamped, addressed envelope must be sent with every article.

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

All inquiries concerning advertising rates, etc., to be addressed to the Advertisement Offices, John Carpenter House, John Carpenter Street, 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 subjects of Letters Patent, and the amateur and the trader would be well advised to obtain permission of the patentees to use the patents before doing so.

QUESTIONS AND ANSWERS

A selection of readers' queries, the answers to which are of general interest. Although our query editor endeavours to present his material in the most entertaining manner possible, and even introduces a spot of humour now and then, the purpose of this important feature is to convey authentic advice and information regarding the various aspects of home radio and to present solutions of those tricky problems which you all encounter from time to time.

PROGRAMME DISAPPEARS WHEN THE DETECTOR IS TOUCHED.

P. M. (Nr. Hungerford, Berks.).—"One thing I do not understand is that if I put my finger on the first detector valve, which is a metallised valve, standing all by itself, the programmes disappear.

"I say 'standing all by itself' because on thinking it over when first noticed I came to the conclusion that it might be some stray capacity effect, due to putting my hand too near some sensitive part of the set. But this does not appear to be the explanation.

"Can it be that the bias is altered by touching the screening on the valve? There is the usual by-pass condenser across the bias resistance in the cathode circuit, but I have not attempted to experiment with the connections to this as this part of the wiring is inaccessible owing to the oscillator coil leads.

Difficult to say without seeing the set, P. M. But there is one possible explanation which occurs to us on noting that you refer to oscillator coil leads close to the bias resistance.

If the set employs a cathode-injector circuit, with a coil inserted between the cathode and earthing point, the touching of the detector valve might have the effect of short-circuiting the oscillator's output. In effect there would be an H.F. earth on both sides of the input to cathode, so naturally the oscillator would not then function properly.

MAIN FUSE BLOWN BY D.C. SET'S "A." AND "E." TERMINALS' REVERSAL.

V. M. B. (Liverpool).—"What is the explanation of the following? Three-valve set, run from mains (D.C.) and had been working perfectly. Two loudspeakers used, one old cone and one moving-coil permanent magnet.

"Switched off one night as usual. Switched on next evening, and immediately blew the main electric light fuse.

"While waiting for this to be put right set was examined (with a torch), and the only fault with it was that it had been shifted during the day, and by mistake when replacing, the aerial and the earth wires had been changed over.

"These were put right before the fuse was attended to. When the fuse had been fixed the set was switched on again, started up perfectly, and has continued to go O.K."

If the set was being run from D.C. mains which happened to be earthed on the positive main—instead of on the negative, which is more usual—the blow-out described might easily occur as the result of the shorting of the protective condenser which is incorporated in the earth lead.

This condenser is placed in the earth lead to prevent the set's negatives from contact with earth; and it is an essential component because if the set's positive H.T. is already connected to earth (by the supply company) the earth connection forms a direct short circuit across the set unless some precaution is taken to make the lead non-conductive to D.C.

The aerial, being insulated from earth, had evidently been "alive" without ill effect; but as soon as the earth lead was connected to the aerial coil the mischief was done because there was no barrier between the earth and the "live" main.

The possibility of a recurrence of this incident could be eliminated by an observance of the I.E.E. recommendations on the subject of mains sets' aerial and earth connections.

It is recommended that the aerial-earth connections should be completely separated from the rest of the wiring.

The use of an aerial coil which is not metallically connected to the rest of the set is one way of ensuring freedom from such trouble. And the provision of a good-quality condenser of, say, ·001-mfd. capacity in the aerial-terminal lead, and another in the earth-terminal lead (inside the set), is another method of guaranteeing that D.C. will not flow through this part of the circuit.

To be absolutely safe the set may have both a separate coil-winding which is coupled to the grid circuit only by induction, and also condensers (mica type) isolating the aerial and the earth terminals from the rest of the set's wiring.

There is no difficulty from the point of view of electrical characteristics of the set, which remain unaltered. A qualified service-man would quite easily be able to modify a set of old design which does not now comply with the recommendations.

WILL SMOOTHING CHOKES BE NECESSARY?

E. R. H. (Nr. Hoddesdon, Herts.).—"The high-tension will be derived from mains, but not the ordinary kind of mains, as it is a country house with its own private lighting plant.

"This is run during the day so that an engine is charging the batteries. At night the engine is switched off and the supply mains deliver the current from the large batteries. So the 'mains' H.T. will really come from batteries. Will it be necessary to put in smoothing chokes in these circumstances?"

Smoothing chokes are only for the purpose of eliminating any ripples in the supply; and if batteries are the sole motive power there will be no ripples, and hence no need for smoothing-chokes.

We should make certain, however, that the charging apparatus is always to be switched off when the plant is delivering current. Such installations sometimes use the batteries as "floaters," and undertake a certain amount of lighting while charging is in progress. Obviously if the wireless set were connected to a supply of this kind it would not be practicable to attempt reception at such times.

IMPORTANCE OF SUPERHET'S AERIAL.

S. P. (Norwich).—"I had always supposed that with a sensitive superhet, A.V.C. and all that, a short aerial was just as good as a long one. But I have improved my reception

(*Continued on next page.*)

RADIOTORIAL QUESTIONS & ANSWERS

(Continued from previous page.)

about twenty-five per cent by scrapping the old under-the-roof aerial and using an ordinary out-of-doors type.

"Reception is not better in the sense of more stations, but it is cleaner—much less hiss on all stations. Is this usual?"

Up to a point, yes. A good aerial input means that there need be comparatively little amplification, which in turn means less valve hiss. Even superhet circuits thus benefit from a good aerial.

USING TWO ELIMINATORS ON ONE SET.

M. S. (Tamworth, Staffs).—"My first attempt to get H.T. from the mains was a flop, because I looked out for voltages and neglected the current. It was a 20-milliamp eliminator, and my set takes between 35 and 40 milliamps. (Don't laugh!)

"Now, having learnt better, I have been wondering if I could use another eliminator, similar to the first, and make them supply

THE PROFESSOR'S MISTAKES

See page 604.

"Pentagon" is a five-sided figure, and a pentode has five electrodes, not six as stated. They are anode, cathode, and three grids.

half each. Will it be possible to join them up in parallel, like batteries?

"If this can be done, and the pair of eliminators joined together will supply 40 milliamps, I would rather do it than have to get a 40-milliamp eliminator and have the other on my hands."

The general experience is that it is better to get one mains unit capable of supplying the whole of the set's demands than to attempt to use a pair of smaller mains units for the purpose.

Theoretically a pair of smaller units should be able to do the work; but instead of coupling them together, like batteries, to make a larger single unit, the reverse process is adopted. That is to say, the set is divided, so far as H.T. supply goes, into two sections. Each of these is fed from a separate mains unit, but there is a common H.T. negative.

For example, one unit would be connected to supply the H.T. for the output valve, and the other for all the remaining valves. But this supposes that the one unit is not overloaded by the output valve's requirements.

CELLULOID DIALS FOR S.T.700

WHITE celluloid dials for the S.T.700 are now available from the sole official suppliers: Celluloid Printers Ltd., of Kingston By-pass Road, Surbiton, Surrey.

These dials are generally similar to the light card variety given away with the S.T.700 issue of POPULAR WIRELESS, but the station names and dot lines are printed on a matt-surface white celluloid, which permits the junction lines to be drawn with pen or pencil with great ease. Any line wrongly drawn may always be washed off and re-drawn.

This journal and Mr. John Scott-Taggart himself thoroughly recommend all readers who have built the S.T.700 with the Colvern coil unit and special long pointer J.B. condenser—as used in the original set—to send direct for one of these handsome permanent dials to Celluloid Printers Ltd., Kingston By-pass Road, Surbiton, Surrey. The cost is 3s. 0d., post free.

BARRY KENT CALLING!

Our exclusive broadcasting news feature. Barry Kent secures "scoops" almost every week, for he has an uncanny knack of being able to "get there first." Watch his paragraphs in "P.W." and note how long it is after they appear that many of his news items find their way into the newspapers!

Sir John Reith Pleased.

I HEAR that at a recent meeting of the Programme Board of the B.B.C. (a committee of all heads of departments) a special message from Sir John Reith was read by the chairman, Captain Cecil Graves. In this message Sir John conveyed the warmest congratulations to all ranks of the Programme Division for achieving a steadily improving standard of programmes throughout the service. This, I understand, is the first occasion of the kind.

* * *

Henry Hall for the "Queen Mary."

The latest recruit for Roger Eckersley's B.B.C. squad on the "Queen Mary's" maiden voyage is Mr. Henry Hall, who has accepted an invitation from the Cunard-White Star Line to be the guest dance band conductor for the return voyage. This is a signal honour. Both Mr. Hall and the B.B.C. can be congratulated on the invitation. Incidentally, it puts Henry Hall in the very front rank of international dance-band celebrities, such as Paul Whiteman.

* * *

Features from the Continent.

Ever since Val Gielgud and Eric Maschwitz did their famous feature programme from Budapest, other Continental centres have been anxious to be similarly treated. The French are the most persistent. They have offered to do the whole thing themselves. The B.B.C. has now decided to accept the French suggestion, and a representative will visit Paris in February.

* * *

Gilbert and Sullivan.

The B.B.C. programme authorities are making a strenuous endeavour to secure full freedom to deal with all Gilbert and Sullivan music as and when they like. At present there are severe restrictions, including a ban on the production of any of the complete operas. The Broadcasting House people are prepared to spend generously to get this ban lifted.

* * *

Restaurant Noises.

Apparently there has been a revival of complaints from listeners who dislike the background noises that sometimes accompany relays of restaurant music. The sound of crockery and silver being moved or thrown about seems to be the most disturbing. The B.B.C. is investigating.

* * *

Film Carnival Ball.

It is an interesting sign of the growing cordiality of the relations between the B.B.C. and the film industry that the latter has offered for broadcasting half an hour from the Film Carnival Ball at the Albert Hall on March 20th.

John Watt has been engaged by the organisers as compère of the whole party. The relay will take place during the late dance music period. It will include the presentation at the microphone by Mr. Watt of a number of world-famous screen personalities.

* * *

A Problem of "Taxis."

The Variety Department of the B.B.C. has hitherto depended on gramophone records for representing the noises of taxi-cabs. This has not been altogether satisfactory, so now Eric Maschwitz is arranging for a special recording of a real taxi-cab.

* * *

A Toscanini Season.

The B.B.C. has concluded arrangements for Toscanini to conduct six of the concerts of the May Music Festival this year. I understand that the fee for the distinguished guest conductor is the biggest so far paid. It works out at between 300 and 400 guineas a concert. This will not be begrudged by anyone. Indeed, the acquisition of Toscanini for the special season is a real feather in the cap of the B.B.C.

* * *

B.B.C. Salaries.

Rumours of better salaries for B.B.C. officials persist. The movement no doubt will be helped by the circumstances of the appointment of a new assistant to Sir Stephen Tallents. There was, so I am told, terrific competition between the B.B.C. and the present employers of this gentleman, and before the B.B.C. won they had to offer a figure which threatens to disturb the whole equilibrium of salaries, to the advantage of the staff. This is highly satisfactory.

* * *

Sir Henry Wood Again.

Sir Henry Wood has been engaged by the B.B.C. for his forty-second season of Promenade Concerts at the Queen's Hall. It is possible that there will be some adjustment of the timing of these programmes this year. There has been a feeling that the first period might be longer, and the second shorter.

* * *

Programme Plans Held Up.

Some of the more ambitious programme plans, notably the scheme to strengthen the day-time programmes generally, have been held up for the time being. The trouble is lack of money. In the ordinary way the expenditure on programmes is a steadily mounting figure. Then there is the further complication of television which is going to impose a strain on the B.B.C. whatever happens as a result of the Report on Finance of the Ullswater Committee.

* * *

Summer Arrangements.

The curtailment of transmissions during the summer months, and the elimination of alternatives in the early evenings, as introduced last summer, will be applied again this year. The B.B.C. is not convinced that there is not a considerable falling off in the summer listening audience, particularly during daylight.

* * *

Felix Greene Popular.

Mr. Felix Greene, who was recently appointed to represent the B.B.C. in New York, is already extremely popular with Americans. He is much sought after socially and is constantly lecturing and broadcasting on many subjects. There is a rumour that one of the big American chains may try to capture him from the B.B.C.

FROM OUR READERS

(*Continued from page* 622.)

The heating of the disc at Kew can be explained by the presence of the earth's magnetic field, but I suggest that the worthy gentlemen who performed the experiment were well aware of this, and took precautions to screen the apparatus.

However, I partly agree with the theory that the earth's field may assist in the propagation of long radio waves, as these do not fade, which proves that the reflecting or refracting agent is constant. Shorter waves do fade and vary considerably from hour to hour, this showing, I think, that they are affected by different agencies.

Mr. Thomson is incorrect when, in reference to the bending of light rays by the earth's magnetic field, he says: "Refraction does not enter into the matter. This must be obvious." Refraction means bending, whether by optical or other means.

Perhaps, however, it is a purely optical phenomenon, for near the surface of the sea the air is colder and denser than that above.

I have never experienced an aeroplane flight, but I know for a fact that photographs have been taken by infra-red light which clearly show the earth's curvature. In any case, if the rays were bent, surely this would give the impression that the machine was flying over a bump in the ground rather than in a hollow?

Yours faithfully,
G. W. GREEN.

17, Jefferies Road, Ipswich, Suffolk.

THE MEMOIRS OF A RADIO JOURNALIST

(*Continued from page* 607.)

recognise a good "commercial" number, profit handsomely by this sort of transaction. Indeed, a best-seller of Ginger's that all the radio dance bands were playing regularly at the time made £1,500 for the publisher. Ginger, in a state of financial embarrassment, had accepted £60 outright for it.

Maddening, eh? Well, that's just a cameo showing merely one aspect of the life of a struggling song-writer.

That first visit of his to my house was almost prophetic. A rose-shaded standard lamp by the piano shed a "soft light"; losing no time, Ginger was at the keyboard providing the "sweet music." I can well remember his darting, humorous eyes and the lank, fair hair that side-slipped occasionally over his youthful face abundant with freckles. A troublesome motor-car had left his clever, tapering fingers grimy and black. Untiringly those hands extorted sad, wistful melodies from the piano; I didn't like Ginger's popular tunes, the best-sellers, so well as his less successful efforts. The latter are too good, I fear, to make money. Too sophisticated. But there's genius in that music; the rudimentary genius of Noel Coward, George Gershwin and Cole Porter all mixed up.

Better in the Drawing-Room.

The great pity about Ginger's broadcasts was that he remained so unobtrusive throughout them. Listeners were treated to an occasional piano-solo by him in the "Soft Lights" features; but he always insisted on remaining in the background; he had a complex about "killing the goose."

That is why he is so much better in a drawing-room than on the air. Most performers are, of course; there's the personal, intimate touch. But in Ginger's case the difference is more noticeable. I firmly believe that if Ginger behaved at the microphone as he behaves in the drawing-rooms of the Mayfair hostesses—that is, if he sang (which is a thing he seldom does on the air) and gave listeners some of his amusing "scat" choruses and hot rhythm solos—he would be even more popular with listeners than he already is.

After his entertaining recital we drank quantities of beer and then feasted royally on fish and chips acquired from the local shop.

And now, save for a possible relay in "Five Hours Back" or a triumphant experiment with the short waves, listeners will hear Ginger no more after March. Lots of our best musicians seem to be establishing themselves in the United States. They are paying Ray Noble £300 a broadcast over there, and Al Bowlly is doing considerably better in America than he was here.

And here's a secret: George Posford will be crossing over some time this year. When John W. Green, composer of "Body and Soul" and "I Cover the Waterfront," was over here about eighteen months ago, the B.B.C. gave a broadcast of his "Night Club" and George's "Broadcasting House," two clever jazz-symphonic impressions. Now that he is back in America, Johnny has been writing to George, asking for permission to perform the work in New York. And that's the reason for George's visit; he wants to supervise the production personally.

Jack Payne and "Lazy Day."

Incidentally, it is no light trifle. It has already been performed in Germany by the Berlin Philharmonic Orchestra—comprising roughly a hundred musicians — under Schroeder. There's a triumph for a twenty-eight-years-old composer of dance tunes whose first big success, "Lazy Day," might never have seen the light of publication had not Jack Payne given it an airing from Savoy Hill during his British song campaigning days!

(*To be continued.*)

THE "AXIS"

(Continued from page 600.)

of course, in the case of the Peto-Scott laminated baseboard.

Incidentally, it is rather important, from the point of view of appearance, that none of the component fixing screws should protrude through the other side of the baseboard, for if they do the points will have to be filed off to allow the foil to lie flat.

If you are not using a laminated type of baseboard, the fixing of the foil can be the next job. Before, however, you fix it to the wood it is necessary to cut certain holes in it. These consist of a hole for the "Rotalog" condenser spindle, a hole for the L.T. switch spindle and a hole for the reaction condenser spindle.

Earthing the Copper Foil.

All of these holes should be large enough to provide ample clearances for all of the spindles *and* the fixing nuts where concerned. The foil has, of course, to be earthed, and there are one or two ways in which this can be done. When cutting the hole for the reaction condenser spindle and nut, you can leave a little tab common to the body of the foil which can afterwards be soldered to the reaction condenser fixing nut (which is an earthed point); or, if you wish to avoid soldering, a bolt—with a washer to ensure that it makes contact with the foil—can be passed through the wooden panel-baseboard, and a wire can be taken from nuts on the other side to the L.T.-wiring.

Possibly the best way to fix the foil is by means of a strip of narrow wooden beading on either side, but not at the back and front, or it will foul the dial.

ACCESSORIES.

VALVES.—V1, Cossor type 210 H.F.; V2, Cossor type 210 L.F.; V3, Cossor type 220 P.T.
BATTERIES.—H.T., 120-volt Drydex, type H 1006. L.T., 2-volt Exide, type D.M.G.-C. G.B., 15-volt Drydex, type H 1037.
LOUDSPEAKER.—W.B. Stentorian, type 36J.
HEADPHONES.—Ericsson.
AERIAL EQUIPMENT.—B.T.S.
NOTE: If you intend to use your "Axis" as a radiogram in accordance with details to be given later, you will also require a Graham Farish Pick-up.

The wiring is particularly straightforward, and can be carried out without soldering, except in the case of the L.T. switch, which is not made with terminal connections. Certain of the resistances and fixed condensers are held in position by the wires with which they are provided, and the "Westector" is also supported by the wires which connect it in circuit. May I again remind you of the importance of following the wiring as closely as possible.

There is hardly any need for me to say anything concerning the flexible battery connections, for they are all clearly shown in the wiring diagram. There are, however, two flex leads, one from the H.F. choke nearest the output valve and the other from the L.F. transformer terminal marked "H.T. +," which call for explanation. For convenience, the L.S. terminals of the "Axis" are mounted on the back of the cabinet, and it is to these terminals that these flex leads are connected when the set is finally placed in the cabinet.

(To be continued next week.)

Please be sure to mention "POPULAR WIRELESS" when communicating with Advertisers. Thanks!

LEARNING FRENCH THROUGH YOUR RADIO

(*Continued from page* 609.)

For an exercise here is a number of wireless nouns. Their genders are indicated by the M or F in brackets. Prefix the correct Definite Article, and also write down their Genitive and Dative Cases:

musique (F), ouverture (F), émission (F), mariage (M), disque (M), radio (M), presse (F), orchestre (M), prélude (F), drame (M), comédie (F), théâtre (M).

Imitated pronunciation:

mü-zeek, oo-vair-tür, eh-me-se-on(g), mah-re-ahge, deesk, rah-d'yoh, press, or-kestr, preh-lüd, drahm, kom-eh-de, teh-ahtr.

NOTE.—In the French termination -age the *g* is not voiced or hard as in the English word *large*, but unvoiced or soft, as in the word *garage*.

THE MAN WITH THE MICROPHONE MIND

(*Continued from page* 616.)

Italy the idea of what are termed resonant rostrums. Looking down on the Theatre Orchestra at work it is easy enough to see what this means. Each group of instrumentalists sits on a small raised platform or rostrum. The height of these platforms is most important. Rex tells me that the raising by only one foot of the wood-wind section made all the difference between it coming over and not being heard at all. "Each instrument," he asserts, "must be able to 'see' the microphone."

It is probably true to say the Theatre Orchestra is more conscious of the subtleties of balance than any other combination. They have seen so many improvements. The stage of St. George's Hall has been minutely explored to find best positions for each section. Rex went tapping round the stage to locate the best spot for the brass. When he had found it the brass players were fixed—and told not to move. The same applies with every other section.

Ribbon "Mikes" Have Helped.

Ribbon "mikes" have helped balance. They pick up over an angle of 45 degrees on each side of their axes, cutting off all response outside the "action angle." These mikes can be focused, as it were, to pick up only what is intended. Two screens in one of the stage boxes help to reflect unwanted sounds outside the pick-up angle of the mikes.

As many as seven mikes may be used—as in "Waltz Dream." Only two or three are used at any given moment. Rex fades in and out his mikes as he follows the sequence of the script always in front of him as he sits at the controls.

Nine knobs on this panel, meaning two sets of four and a Group Mixer between. Last time I was up there he had them arranged this way: On the left, "Gram," "Studio," "Distant Orch." and "Stage Band." On the right, "Main," "Chorus," "Near Orch." and "Echo."

With the Group Mixer it becomes easy to prearrange either the left or right-hand set of knobs, swinging over at the critical moment. This seemingly simple action entails a lot of art, for Rex has to contrive to maintain the right aural perspective as he goes over from one mike to another.

His echo is produced by a mike placed in an adjoining stone corridor. Its pick-up is full of reverberation, which can be suitably blended with the output of the mike suspended high above the orchestra.

"Waltz Dream" was a triumph for the balance business. Rex was rightly given credit for helping in the production. While the producer himself is down among the artists getting the last ounce of performance from them, Rex sits aloft—producing the show in terms of well-balanced broadcasting.

TALKIES TO BE BROADCAST

(*Continued from page* 612.)

However, this is not so. The refrigerating apparatus consists of a machine which cools circulating water and of a pump which produces a current of cold air in the studio. The air current is cooled by a fine spray of water.

The air is then pumped through a series of ventilators surrounding the two stages at a height of about five feet. Regulation of the velocity of the air currents prevents the impression of a draught. My belief is that fierce lighting of this kind will not be necessary at the Alexandra Palace.

* * *

I note that Mr. Andrew W. Cruse, chief of the Electrical Division of the U.S. Bureau of Foreign and Domestic Commerce, who came to see me when in Europe on an investigation of television, has made his report. He says he is convinced that the U.S. is not being left behind, but adds that television on a commercial scale will not materialise for five years. Both of which statements tend to show that I did not, as I fondly imagined at the time, convince him. Well, we shall see. Approximately twenty-seven experimental transmitters have been licensed in the U.S., so at least America has numbers on its side.

And, by the way, Mr. Cruse agrees with Mr. Cock. He says that television is not going to keep people away from cinemas, but will make the movie industry "bigger and better than it has ever in its wildest dreams hoped to be."

FIXING YOUR "ROTALOG" DIAL

(Continued from page 601.)

is 72 inches long, I think you will probably find as I did that a razor blade of the Ever-Ready type is about the best instrument. But even with a razor blade it is too much of a finger-aching job to attempt to make the whole cut in one operation. Do a bit, have a rest, and then do another bit. That is the best way to tackle it, and you will probably find it an advantage to have several blades in readiness, for if you cut the dial on a sheet of glass as suggested in the instructions (by far the best way of getting a clean cut), you will find that the blade rapidly becomes dull.

May I once again remind you of the importance of keeping the cut absolutely at right-angles to the surface of the dial. If the cut is a slanting one, the sections will not fall back into place after having been raised by the pointer, and there is a tendency for the pointer to stick slightly.

Attaching the Dial.

When the whole 72-inch length of spiral line has been cut (from the point marked "X" on the outside to the spot correspondingly marked on the inside), do not attempt to pick your dial up without a ruler or a piece of card underneath to support the sections. If you do, the centre of the spiral will sag and drop, and will take the rest of the spiral with it. It cannot do a great deal of harm, but it is much more likely to become damaged in this condition.

In fixing the dial to your "Axis" panel, the procedure is quite straightforward, but there are one or two points to watch out for. First of all cut out an octagonal sheet of paper exactly the same size as the dial. This goes between the dial and the copper foil, and is for the purpose of insulating the pointer from the foil in order to obviate noise in operation.

Next place your dial roughly in the position it is to occupy, but do not fix it.

A Special Wire Pointer.

Now about the pointer. You will notice on your dial sheet that a pointer is printed at the foot of the dial, but thanks to the enterprise of Jackson Brothers, who have been responsible for the production of the special "Rotalog" tuning condenser, this pointer need not now be used. A neat metal pointer, in the design of which I have collaborated with J.B., is being included in every "Rotalog" condenser box, and it is complete with brass collar and grub-screw. This makes a far better job of it, and it is not likely to become damaged in use.

It is this pointer that you will next require. Place the brass collar over the spindle of the condenser and pass the tip of the pointer through the cut in the spiral at the outer end—just about where the calibrations of W3XAL and W2XE occur at the outer extremity of the dial. Next cut some small cardboard washers, roughly about ¼-inch diameter and from material that is approximately the same thickness as the wire from which the pointer is made. You will want ten of them in all, and one is used at each point of the octagon and two in the centre, to raise the card just that thickness away from the panel.

For fixing the dial, I recommend the use of pins cut off about ¼-inch from the head. I will just tell you how to fix one corner of the octagon, and then you can proceed to fix the other seven corners in the same way.

See first of all that the dial is in the correct position, which is with the outer "X" to the edge of the panel farthest away from you, and with that side of the octagon parallel with the edge of the panel. The condenser spindle should also be central in the square in the centre of the spiral.

Next use the point of a pair of compasses, or a similar instrument, and pierce a hole through one corner of the octagon (about ¼-inch from the edge, through the cardboard washer that should be underneath it, through the paper insulating strip, through the foil, and into the wood. Hold the dial, etc., carefully in position while the compass point is removed, and then, with a pair of pliers, push home one of the cut-off pins (the ¼-inch piece with the head on it).

The points at which the dial is held in the centre should be treated in exactly the same way, and although the actual positions

(Continued at foot of next page.)

AN AMAZING OFFER!

YOUR OPPORTUNITY TO ACQUIRE, FREE OF ALL COST OR LEGAL AND OTHER RESPONSIBILITIES, A FIFTY PER CENT SHARE IN A NEW TELEVISION INVENTION!

This is the extraordinary prize offered in connection with a simple television competition in the February 8th issue of "Popular Wireless."

The invention is due to Mr. G. V. Dowding, Associate I.E.E., Editor of "Popular Wireless," who is one of the most successful inventors of modern times.

During the past two years he has sold patents to Marconi's Wireless Telegraph Co. for the use of the British Licensing Pool (one only a month or two ago), and that is, perhaps, the peak of achievement in radio invention. Many other noted firms have either purchased his patents outright or operated them on a royalty basis.

His new television invention is a definitely practical proposition, and concerns a novel receiving apparatus which can be employed in connection with any system of transmission.

The plans have been revealed to only one firm, one of the largest in the world, and this firm has advised that the patent should go forward to its final stages.

This great firm will then be prepared to give it a final consideration. And they may make a cash offer for it!

The Editor's Patent Agents, who also handle the patent work of leading radio companies and are right in the forefront of their profession, are busily preparing the complete British specification.

As soon as the name of the winner of the competition is known, it will be incorporated in the documents, and in a fifty-per-cent interest agreement. And that name might be yours!

How much is the invention worth?

No one can say at this stage, but the Editor considers it has as good a chance, if not a better one, than any of its predecessors. It is a practical invention, it is topical. Of the last four of the Editor's patents to go through to the "complete" stage, two were sold outright to Marconi's and one was operated successfully on a royalty basis by Messrs. Radio Instruments Ltd.

Anyway, here is a sporting offer for you, a chance to take a golden chance. A chance to let the Editor try and make a lot of money for you.

Will *your* name be on the complete specification?

Will *your* name figure in the negotiations concerning this new television invention?

You can at least make sure that *your name* goes forward as a competitor in this simple competition for this unique prize. There will be no entrance fee.

FULL DETAILS WILL APPEAR IN THE FEBRUARY 8th ISSUE OF POPULAR WIRELESS.

THE RADIO BULLETIN

A complete guide to all the current activities of the radio industry which are of direct interest to the listener. In this Bulletin you will find recorded each week news of every new set, component and accessory produced, or about to be produced, by the radio industry, together with price alterations and so on. It is the only guide of this nature available to the public and provides further proof of our desire to make "P.W." the complete radio journal for listener, constructor and experimenter.

NEW FERRANTI ALL-WAVE RECEIVERS.

DETAILS of the four new Ferranti All-wave designs, referred to in our Bulletin of January 18th, are now to hand. The largest receiver is a seven-stage superhet for A.C. mains and incorporates a double-diode pentode output. It is available in a two-tone consolette cabinet of walnut bakelite with ivory inlay, and the price is £13 18s.

The other receivers are "Straight Threes," and are also intended for use on A.C. mains. The circuit used, which is the same in each case, is—as the name implies—of straightforward type, and embodies a rectifier, H.F. pentode, pentode detector, and a 2½-watt pentode in the output stage.

The least expensive model of these three is the consolette, priced at 9½ guineas. There is also a console at 13 guineas and a radiogram at 17 guineas.

Each of these four new receivers is fitted with a special illuminated all-wave dial, provided with slow-motion drive and calibrated in wavelengths, and also in station names on the medium and long waves. The wave-ranges covered by the sets are 19–51, 200–550 and 900–2,000 metres.

* * *

MARCONIPHONE PRODUCE AN ALL-WAVE DESIGN.

The Marconiphone Company has entered the all-wave field with a new set known as the Model "345." Costing 17½ guineas, this new design has a wave-range of 16·5 to 2,200 metres in four steps. On the short waves there are two switching positions, one covering the 16·5 to 50-metre band and the other 47 to 140-metre band. Five valves and a rectifier are employed, the circuit being a superhet of advanced type.

* * *

G.E.C. LAPEL MICROPHONE.

The General Electric Company has recently introduced a lapel microphone in connection with their sound reproduction equipment.

This microphone, which is of the carbon type, is of extremely small dimensions, and is intended for use by speakers at banquets and other functions.

A clip permits the microphone to be attached either to a buttonhole or to a safety-pin in the speaker's clothing, and the connecting cord terminates in a plug and socket so that a number of the microphones may be distributed among the various speakers, each being connected in turn to the main amplifier input lead.

Actually the instrument weighs only one ounce, and its compact dimensions can be gathered from the fact that these are only 1¾ in. × 1½ in. × ¾ in. The price is £4 5s.

* * *

A NEW LISSEN MODEL.

A new receiver, listed as the Model 8119, now appears in the Lissen range. It is a three-valve battery receiver design of similar specification to the existing model 8112.

In the case of the new model, however, the cabinet is of bakelite. The price is the same as that of the Model 8112, namely, £5 10s., complete with batteries.

(*Continued on next page.*)

FIXING YOUR "ROTALOG" DIAL

(*Continued from previous page.*)

for these centre fixing points is not critical, I should not be inclined to have them more than ¼-inch away from the cut-away square.

The actual wire of the pointer should be as near as you can get it to the surface of the dial before you tighten up the grub-screw.

You can next proceed to fix the knobs to the reaction condenser to the L.T. switch and to the main condenser spindle, although with regard to this last mentioned knob, do not bother to secure it too tightly, for it may be necessary to remove it for adjustment purposes when I describe the adjustment and operation of the set next week. In the meantime, here is just a point of interest to those readers who propose to utilise the dial method which does not involve the 72-inch spiral cut. When fixing your dials to the panel, you need not worry about the piece of paper between the dial and the metal foil, and the cardboard washers are unnecessary. In other words, the dial can be fixed direct to the foil.

THE RADIO BULLETIN

(Continued from previous page.)

MURPHY 1936 PLANS.

Early in May, Murphy Radio are to produce a new battery set, costing about £6 17s. 6d., exclusive of batteries. Three valves will be used, but no other details are yet available.

With regard to other sets in the Murphy range, the existing models will be continued with minor modifications, the prices being the same as at present. The current models were, of course, reduced in price on January 1st.

* * *

LATEST ALBA RELEASES.

Two battery sets and an all-wave superhet for A.C. mains are the latest Alba releases.

The battery receivers comprise a Band-pass Three incorporating two H.F. pentodes and pentode output with automatic grid-bias. This set retails at 8 guineas (including batteries).

The other receiver is a five-valve superhet with A.V.C. The price is 10½ guineas (including batteries).

The all-wave model embodies an eight-stage superhet circuit; dual-speed slow-motion drive, having ratios of 17 : 1 and 100 : 1, facilitates tuning, and the tuning dial, which is of the popular clock-face type, is provided with station names on medium and long waves. The undistorted output from this set is 3½ watts, and the price is 14 guineas.

* * *

COSSOR PRICE REDUCTION.

Messrs. A. C. Cossor, Ltd., announce that the price of their A.C. Super-Ferrodyne Model "368" receiver has been reduced to £8 8s.

WHY NOT USE A PICK-UP?

I SUPPOSE there is hardly a set on the market to-day that is not fitted with terminals or sockets for the attachment of a gramophone pick-up. Many sets, of course, have the motor and the pick-up already incorporated, and are radio-gramophones. But the majority of sets have not such full provision, though their makers have seen fit to make the sets so that a pick-up can be connected with the minimum of trouble.

Very Easy to Fit.

A wise move, for modern radio receivers are capable of such excellent quality that it is a shame not to use them to the full, and to reproduce gramophone records through their amplifying stages.

The pick-up is an easy-to-fit gadget, and nowadays there is no need to pay any fabulous price for it. I have just been testing the Graham Farish pick-up, an instrument that is available at the remarkably low figure of 14s. 6d. without incorporated volume control, or for 18s. 6d. with that refinement.

If you have a set with a volume control that works the L.F. side you probably can get away with your pick-up for 14s. 6d., but if no volume control on "gramophone" is available in your set you will need to pay the 18s. 6d. and have the pick-up that has the control incorporated. No great hardship that 18s. 6d. either, is it?

A Sensitive Instrument.

And as for the instrument, I can vouch for the excellence that that provides. It is sensitive, more sensitive than many other makes at double the price, and the quality that it will provide is surprisingly good. I am not going to talk about curves in this short article, but can say that the curve of the reproduction that the Graham Farish Pick-up gives is not to be sneezed at. It has a valuable lift in the bass end to compensate for the inherent falling off of low notes in the records, while the high note end cuts off sharply just before 4,000 cycles. Thus a lot of the surface noise that one hears with pick-ups that go on up into the 6,000 and 8,000 cycles is absent with the G.F. model.

Excellent Value For Money.

Not that needle scratch is solely a matter of the curve of the pick-up. It may occur at lower than 4,000 cycles, dependent on the resonance point of the needle and armature used in the component. But the G.F. pick-up is pleasingly free from pronounced scratch, so that prospective purchasers need not worry about that.

Altogether the instrument is very fine value. I know of no other pick-up at the price, and the low price is not an indication of low performance. The performance is high, very much higher than one would expect, and it is with the utmost confidence that I recommend it to the attention of readers who are thinking of buying a pick-up. Make a point of hearing one in action the next time you go to your radio dealer.

K. D. R.

RADIO MYSTERY CYPHERS

Next week we are commencing an intriguing cypher series contributed by Louis C. S. Mansfield whose weekly broadcasts are proving so tremendously popular. Mr. Mansfield has devised a special radio series for Popular Wireless, and in connection with this we shall be offering prizes for solutions of the code messages he will describe. We believe you will find this new feature a most attractive and stimulating way of filling up those odd half hours. Don't forget—the first mystery cypher appears next week in "Popular Wireless."

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S.S.

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VAUXHALL. T.C.C., 200-mfd., 10-volt, 3/-; Continental valve holders for Universal valves, with terminals, 9d.
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The following unused Set Manufacturers' Surplus. All goods guaranteed perfect; immediate delivery.
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CONVERSION Units for converting D.C. Receivers to A.C. Mains operation up to 80 watts, £2 each.
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WE can supply complete Kits of specified components for the A.C. S.T.600 at a competitive price.
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BANKRUPT BARGAINS. List Free. I will allow minimum £5 on your old set against a new Mullard MU35 12 gn. A.C./D.C. Superhet, or £3 10s. against a new Mullard MB3A battery set at 8 gns. Amplion latest 5 v. superhets, A.C., £7 10s. Burgoyne 11 gn. table model A.C. radiogram, £7 10s. A.C./D.C. radiogram, listed 15 gns., Burgoyne, 10 gns. Electric irons, 3/9d. Soldering irons, 1/4d. Large stock valves of all types. All new goods. Butlin, 6, Stanford Avenue, Brighton. Preston 4030.

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TELSEN. W.68. L.F. Chokes, 1/6; ACE Transformers, 1/11; Binocular H.F. Chokes, 1/6; Air-dielectric ·0005 Condensers, 1/6; G.S.4. Super L.F. Transformers, 3/11.
Send 6d. postage with all orders.
BOYES RADIO LTD., Mail Order Dept., 49a, Shudehill, Manchester, 4.

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500 GLADIOLI first size 4–5 inch circ. in 10 named vars. 100 Anemones, 100 Ranunculus, 25 Double Begonias and 5 Lilium Regale for only 10/-. Double lot 19/-, carriage and duty paid to destination. (C.O.D. 6d. extra.)
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WANTED for Private Company, wireless mechanic, fully experienced in upkeep of Standard make amplifiers and all Receivers, also line testing and faults. State where previously employed (in confidence), age, and wages asked. Steady job for good man. Write Box No. 1236, POPULAR WIRELESS, John Carpenter House, John Carpenter Street, E.C.4.

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To: E. K. COLE Ltd (Dept. A.3), Ekco Works, Southend-on-Sea.
Please send me full details of Ekco Radio Power Units.

Name .....

Address .....

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