

LARGEST RADIO CIRCULATION IN THE WORLD

Popular Wireless

Every Thursday
PRICE
3d.

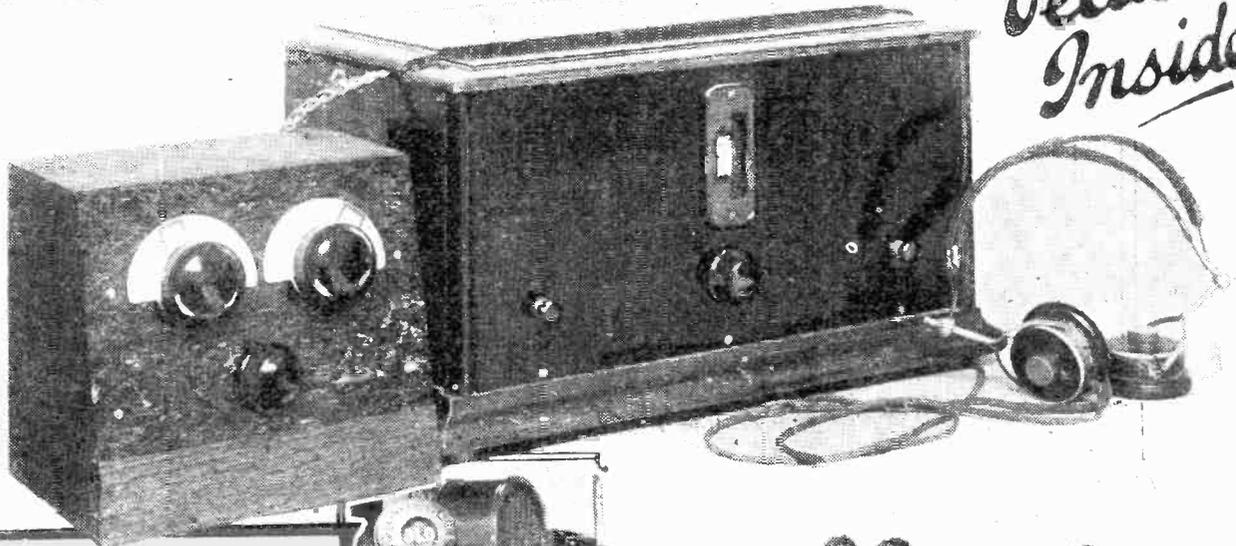
No. 464. Vol. XIX.

INCORPORATING "WIRELESS"

April 25th, 1931.

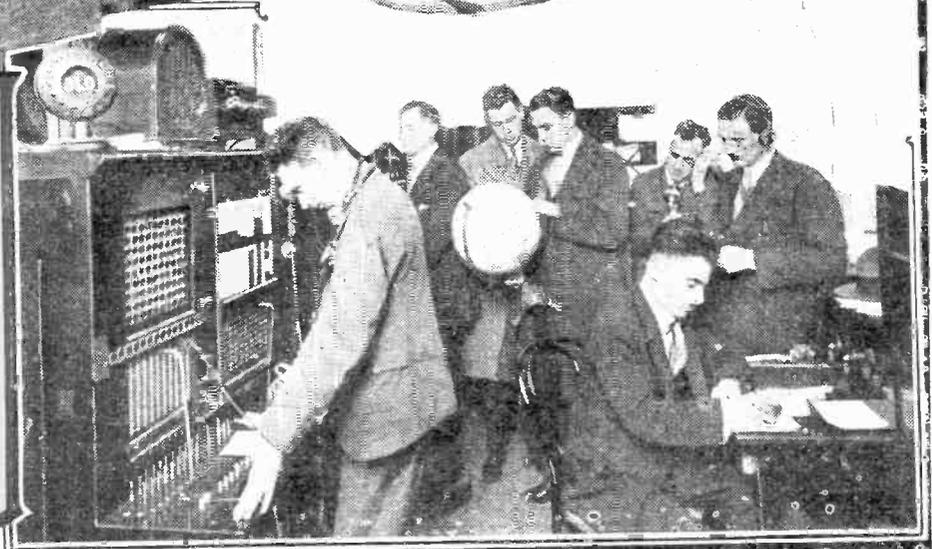
SHORT-WAVES ON YOUR "COMET"

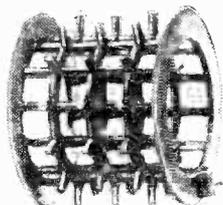
*See
Details
Inside*



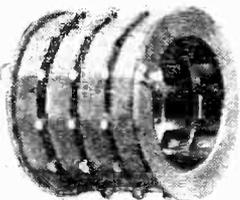
ALSO THIS WEEK

- JACK PAYNE LOOKS AHEAD
- HOW TO FIND THOSE FOREIGNERS
- OPERATING FLEXI-COUPLED RECEIVER
- JOTTINGS FROM MOORSIDE EDGE
- SIMPLIFIED RADIO
- HOW TELEVISION WORKS





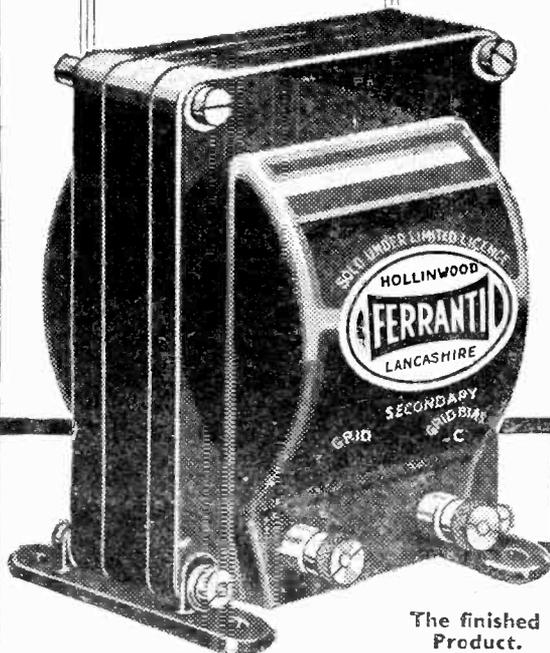
One of the unique moulded skeleton coil formers



The secondary coil, shewing the air-spaced sectionalised low capacity windings



Beautifully made and ready for the case.



The finished Product.

IF TRANSFORMERS WERE SOLD IN GLASS CASES!

A smartly-finished transformer case may cover a multitude of sins, and form a hiding place for scrap metal, poor wire, cardboard, string and pitch. Such transformers sell on outward appearance, Press "boosting" and low price, but how can one expect even a moderately good performance?

If transformers were sold in glass cases! Even to see the internal structure of a Ferranti transformer, with its skeleton formers, its air spaced sectionalised windings, and unmistakable precision workmanship, is to realise that there are many reasons for its world-wide reputation and great superiority.

Meanwhile the curve is the measure of a transformer's performance, and a study of published curves will lead ultimately to the choice of a Ferranti—the transformer with a pedigree and univalled performance.

Ratio	Ratio	Ratio
AF3. 1 to $3\frac{1}{2}$ -25¢	AF4. 1 to $3\frac{1}{2}$ -17'6	AF5. 1 to $3\frac{1}{2}$ -30¢
AF6. 1 to 7-30¢	AF7. 1 to $1\frac{3}{4}$ -30¢	AF8. 1 to $3\frac{1}{2}$ 11'6

FERRANTI LTD.

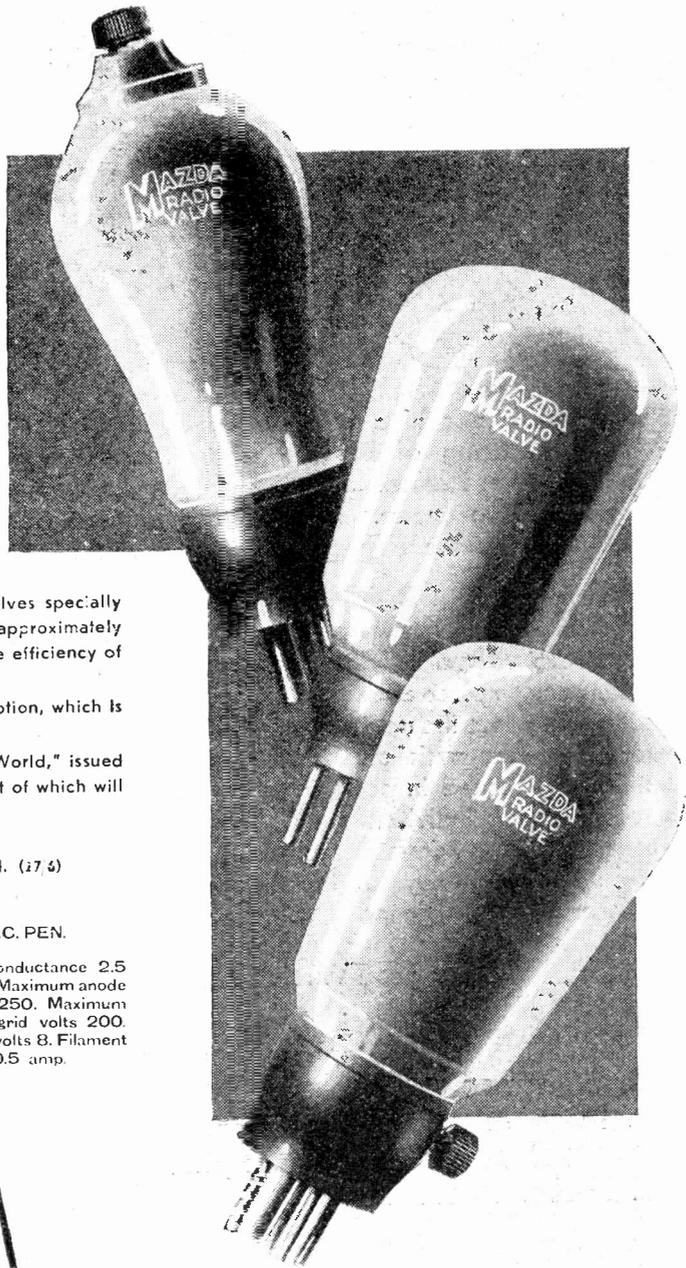
Head Office and Works:
Hollinwood, Lancashire.

London:
Eush House, Alcwyth, W.C.2.

FERRANTI

VALVES FOR D.C. MAINS

THREE NEW AMAZING MAZDA VALVES



Mazda Engineers are again first in the field, this time with Valves specially designed for operation from D.C. Mains. The characteristics are approximately the same as those of the well-known Mazda A.C. Valves, and the efficiency of the Valves is equally good in all other respects.

Economical working is ensured by the very low current consumption, which is only half that of other mains valves.

These valves are fully described in an article in the "Wireless World," issued January 7th, 1931, giving full data and suitable circuits, a reprint of which will be gladly sent on application.

The three types at present available are:—

D.C./S.G. (25/-) D. ./H.L. (15/-) D.C./PEN. (27/-)

and are in stock at all good radio dealers.

D.C./S.G.
A.C. resistance 600,000 ohms. Amplification factor 1,200. Mutual conductance 2mA/volt. Max. anode voltage (E_a) 200. Screen voltage (E_s) 80. Filament volts 6. Filament current 0.5 amp.

D.C./H.L.
A.C. resistance, 12,000 ohms. Amplification factor 3.0. Mutual conductance 2.5 mA/volt. Maximum anode voltage (E_a) 200. Filament volts 6. Filament current 0.5 amp.

D.C. PEN.
Mutual conductance 2.5 mA/volt. Maximum anode potential 250. Maximum auxiliary grid volts 200. Filament volts 8. Filament current 0.5 amp.

MAZDA

THE
BRITISH
VALVES



THE EDISON SWAN ELECTRIC CO. LTD.
*Incorporating the Wiring Supplies, Lighting Engineering
and Radio Business of the British Thomson-Houston Co. Ltd.*
Radio Division
155 Charing Cross Road, London, W.C.2
Showrooms in all the Principal Towns

EDISWAN

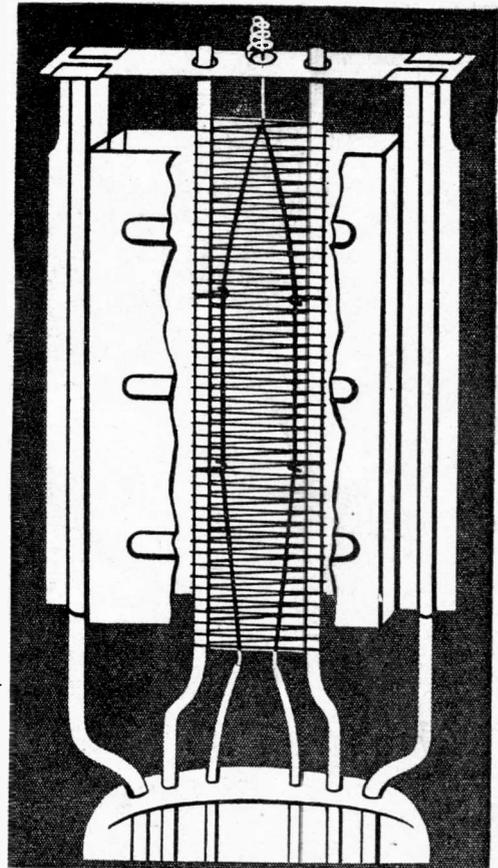
Simple facts for
Valve Users No. 2

Why Cossor Valves never vary in performance

THE performance of a valve is largely determined by the spacing of its grid wires, the distances between the filament and the grid and between the grid and the anode. Any variation in these distances—will alter the characteristics of the valve.

The Cossor Insulated Bridge System of construction entirely eliminates the human element in assembly. These distances are automatically fixed by means of holes in the insulated bridge piece and by the use of precision instruments which space the upright supports with microscopic exactitude. Any variation is utterly impossible. The elements are locked in position in perfect alignment—there can be no individual movement even under the heaviest impact. Remember uniformity in manufacture means uniformity in results. For the finest performance, therefore, under all conditions, you will be wise to select Cossor Valves. There is a full range of types to choose from at every good Wireless Shop.

Over 50 types of Cossor Valves are available from any Wireless Shop to suit all 2, 4, and 6 volt Battery operated and A.C. Mains Receivers.



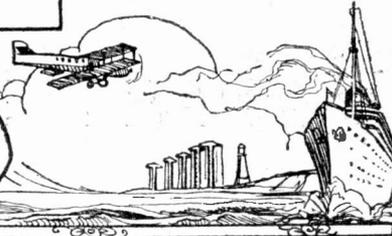
COSSOR

Popular Wireless

LARGEST NET SALES



Scientific Adviser:
 Sir OLIVER LODGE, F.R.S.
 Chief Radio Consultant:
 CAPT. P. P. ECKERSLEY, M.I.E.E.
 Editor: NORMAN EDWARDS.
 Technical Editor: G. V. DOWDING, Associate I.E.E.
 Assistant Technical Editors:
 K. D. ROGERS, P. R. BIRD,
 A. JOHNSON RANDALL.



COMFORT RE STUTTGART
 DO YOU "FLUTTER?"
 RADIO ADVERTISING
 ADVANCE BRITANNIA!

RADIO NOTES & NEWS

CUTTING CABLES
 MICRO-RAYS
 JOY TO COME
 A NEW RECTIFIER

Slaithwaite is Slaithwaite.

AMONGST the most interesting facts which emerged from the talk given earlier this month by Mr. Noel Ashbridge was that he pronounced Slaithwaite "as it is spelt." That is good enough for me. He is the Chief Engineer of the B.B.C. and has to do the right thing. "Slewit" is huff!

By the way, what a contrast his talk presented to that which his predecessor, Captain Eckersley, would have given; the one level in tone, sober and downright in text; the other, good sense and technical knowledge in fancy dress! We have as listeners lost P. P. E., and we mourn the fact. But "The King is dead, long live the King." Mr. Ashbridge will, I believe, win a full measure of popularity by his clear expositions and evident sympathy with the listener.

Comfort re Stuttgart.

IN his remarks about the interference caused by Stuttgart (Mühlacker), Mr. Ashbridge reminded us that the nuisance will automatically lessen with the advent of Summer Time here, because the dark hours of "listening" will become fewer.

Meanwhile, every possible means of solving the problem will be attempted.

That close co-operation with the German engineers, and goodwill on both sides, have been obtained is a promising sign and I firmly believe that the trouble will be surmounted, chiefly because it is not so formidable as some of those which have already been encountered.

Do You "Flutter?"

MY contribution to the funds of the Irish Sweep—and incidentally to the much-disputed fortune of Mr. Scala and his friends and relations—having brought me nothing but a thrill which will not pay the water rate, I must forego still longer the luxury of that wave-meter for which I was saving up. I doubt not that many of you had a little flutter on the occasion of the Grand National, and I am wondering whether any of you twigged that Grakle's portrait was published in the advertisement issued by Player & Sons just prior to the race and followed the "tip." I understand that that was not the first occasion on which the winner of a big race has been "tipped" in a Player's announcement.

Spring Cleaning.

TO my dying day I shall never understand why women will permit cobwebs from May till March of the next year, and declare war on 'em in April. Take my case! My home ladies are now scrubbing, scraping and fumigating a room which is used to store the trunks and portmanteaux.

WHAT'S THE TIME?



They can always tell you to the tick, what time it is in Hythe, where this radio-controlled clock runs in connection with the local radio exchange.

whilst in the dining-room there is a cobweb on the chain which supports the inverted bowl of the electric light.

That cobweb has been obvious to me since 1929! My radio set has been covered with a huge d'oyley whereon has been placed a pot of heather. I am told that the "earth" and aerial wires disfigure the *tout ensemble*. Perhaps I can paint them with invisible ink!

They have made a sort of tea-cosy to hide my accumulator, and want to paint the loud speaker to match the *motif* of the wall-

paper. Help! But I might as well yell down a well!

Radio Advertising.

WHILST there is a tendency in Europe to flirt with radio advertising there are signs across the Atlantic, where it has been exploited freely, that it is losing ground. I do not believe that in the States it is generally a source of profit to the advertisers, such are the heavy fees which they have to pay; and in Canada, where of late there has been a reaction in favour of adopting our methods of handling broadcasting, the radio organisations have decided to reduce radio advertising to one-twentieth of the total programme time, and on Sundays to prohibit sales talk over the ether.

Radio Society Item.

THE announcement of a meeting of the Harrow and District Radio Society on April 20th was received here too late for me to give it space in last week's issue. Club secretaries might note that in order to ensure publication they should submit announcements a month in advance. The Harrow people will welcome new members and those interested should write to Mr. E. A. Hillman, Chairman, "Lindhurst," Headstone Drive, Wealdstone, Harrow.

Danish Stations.

FROM a usually well-informed source we are advised that Hjoerring and Odense are purely military stations, and that Sorø is a commercial telephone station giving weather information and other official matter not intended for broadcast listeners. This reminds me that "World-Radio" was not flattered by my note about the Danish "Politikens Radio," which I described as the equivalent of our "World Radio." Bless me, how these editors love each other! Well, wash out "equivalent" and substitute "the Danish attempt to equal 'World Radio.'" Patriotism for ever!

Too Much Chlorine.

A WEEK or so back, whilst referring to Ghandi and his seaside larks, I let NaCl₂ slip by as the chemical formula for common salt, an error about which
 (Continued on next page.)

RADIO NOTES AND NEWS

(Continued from previous page.)

H. S. G. (Streatham) promptly pulled me up. It should have been NaCl. I freely confess that my memory played me false, though that is not very dreadful when it is considered that I wangled my last equation in 1904. That extra atom of chlorine would tie the All-India Congress into knots better than those produced by a King Cobra. Sorry, old thing, and all that! Much more important is the tribute paid by H. S. G. to the "P. W." Dual Coil, the results of which astounded him. Nothing astounds me so much as the astuteness of our readers; they are the NaCl of the earth!

Advance, Britannia!

DESPITE the "economic blizzard" and the moans of the Little Englanders, this country is keeping its head well above water. We may lose a few sporting events, but we collar the speed records, so that British motors, aeroplanes and engines are hall-marked all over the world—and America.

I now learn that no less than six African Administrations have ordered from Marconis wireless stations for use in connection with the Cape-Cairo air route. This doesn't look like decay and disintegration of the Empire, does it?

Cutting Cables.

A MILD sensation in the telegraphic world was created by the news that one of the transatlantic cables was found to have been sawn in two; doubtless the work of some "bucko" mate of a tramp steamer, thinking it was a relic of the war.

I was told, however, that the cable which connected the transatlantic telephony station in Buenos Aires with the box of the announcer of the proceedings of the opening of the British Empire Trade Exhibition was found, just before the ceremony, to have been cut through with a pair of pliers. So you nearly missed hearing the Prince of Wales because of the action of some skunk or skunks unknown.

Further Note for "Seven Fans."

THE seven valued fans wanted elementary instruction. Now, here I have a nice note from F. W. R. (Holborn, W.C.), who says, in effect, that eighteen months ago he knew no more about radio than an ant-eater knows of elephant-steaks. Then a friend suggested that he should follow the light and leading of "P.W." Now he writes to acknowledge his appreciation of all that he has gleaned from our pages. What we can do for one we can do for seven or seventy times seven. Thanks, F. W. R.! "Seven Fans," kindly read, mark, learn, inwardly digest and copy.

Echo Answers—"Probably Not."

A. B. T. (Toro, Uganda) relates how, while he was listening on 15 metres, he heard a station sending fast Morse and what he thought was another station "jamming" it. Further observation led him to believe that he was hearing an "echo," the echo occurring at intervals of from $\frac{1}{2}$ sec. to $1\frac{1}{2}$ secs. I am afraid that he really heard a station sending "words twice," as had there been an echo it would have muddled-up the original signal. Thanks for your

letter, A. B. T. Your query about the station you hear on 45 metres is unanswerable. There are so many languages to choose from besides those you mention. Perhaps Fred Easter will drop you a line if he sees this. (Mr. A. B. Trewin.)

Another Point of View.

SOMEONE writing to a daily newspaper says, "Thanks to Mr. — for his article on Sir John Reith. Now we know what is wrong with the B.B.C." In case this mistaken idea is contagious, I am going to say plainly, that the chief of the B.B.C. must be a sound business man first, foremost and all the time—and that is exactly what Sir John is. I hope the news will comfort all those who fear for the way in which their ten shillings are being administered. If Sir John has his pet ideas about Sundays, etc., you must take him as

SHORT WAVES.

Brown: Hullo Smith! What luck to find you in. Quick! I've booked a table at the "Blitz" where I want you to meet two magnificent girls. I've got four front stalls for "Not So Green," and then we're all going on to "Chez Fifi" for a supper dance. It won't cost you a bean, because I've had a fortune left me!

Smith: I'm awfully sorry, old man. Another time, perhaps. You see, there's rather a decent programme on the wireless to-night.—"Humorist."

TOO MANY.

"Broadcasters take liberties with the ether." It is time listeners used a little!—"Pictorial Weekly."

TRUE TO FORM.

The railway porter who bought a wireless set and couldn't separate the stations—"Sunday Pictorial."

"My receiver seems to work just as well without the earth as with it," writes a correspondent.

And does he get heavenly programmes too, we wonder?

GOOD FOR WHAT AILS YOU.

Would you know the time of day?

Dial in.

Like to hear some music play?

Dial in.

Is it market news you crave,

Or the newest way to shave?

How to make the kids behave?

Dial in.

For historical romance

Dial in.

For fox-trots for your dance,

Dial in.

For health and beauty dope,

For proper use of soap,

For messages of hope—

Dial in.

—"Radio Digest."

he is, that's all; we certainly cannot entrust broadcasting to a man without high principles.

Micro-Rays.

THIS is the name which is being applied to the waves of lengths ranging from 10 centimetres to 1 metre with which the International Telephone and Telegraph Corporation is experimenting, though why "micro" I do not understand. Attempts have been made recently to use these short waves in radio communication, and I understand that the results are encouraging. We could do with some new bands of frequencies, and it is to be hoped that the formidable difficulties which confront engineers who seek to use for telegraphy or telephony such kittle-cattle as ultra-short waves will soon be vanquished.

Joy to Come.

PEACEFUL penetration—a phrase which falls on the ear with a queer pro-war ring—is coming, I fear, across the North Sea in no uncertain manner and in the most peaceful guise. By the end of the month Königswusterhausen is expected to be endowed with an extra 5 kw. Langenberg, with a mere 75 kw., will begin to boom in a few months. A high-power station is to be built for Breslau, and Frankfurt is to be promoted to 25 kw. All of which will give you more value for your half-sovereign, and a bit over.

Down at Chippenham.

THE other day, feeling a trifle stale, I took advantage of an invitation and buzzed down to Chippenham for a day's sight-seeing, the subject being the Westinghouse Brake and Saxby Signal Company's factory. I had a first-class time, wandering about like a boy at a fair—the proper way to see a modern factory in full swing. The machines are wonderful, and do almost anything except train seasons.

A New Rectifier.

GREAT activity was being manifested in the making of the well-known Westinghouse metal rectifier which, as you may know, has a high efficiency, low voltage drop, and does not deteriorate with normal use. A new type has been produced, having an output of 100 m/a. at 200 volts or 60 m/a. at 300 volts. Home constructors should look for these at the next radio show. Well, to jog along, I saw all sorts of most interesting demonstrations connected with railway traffic control and brakes. Everybody was delightfully informative and helpful, and I came away feeling much more optimistic about Britain and her place in the world's trade.

A Good Getaway.

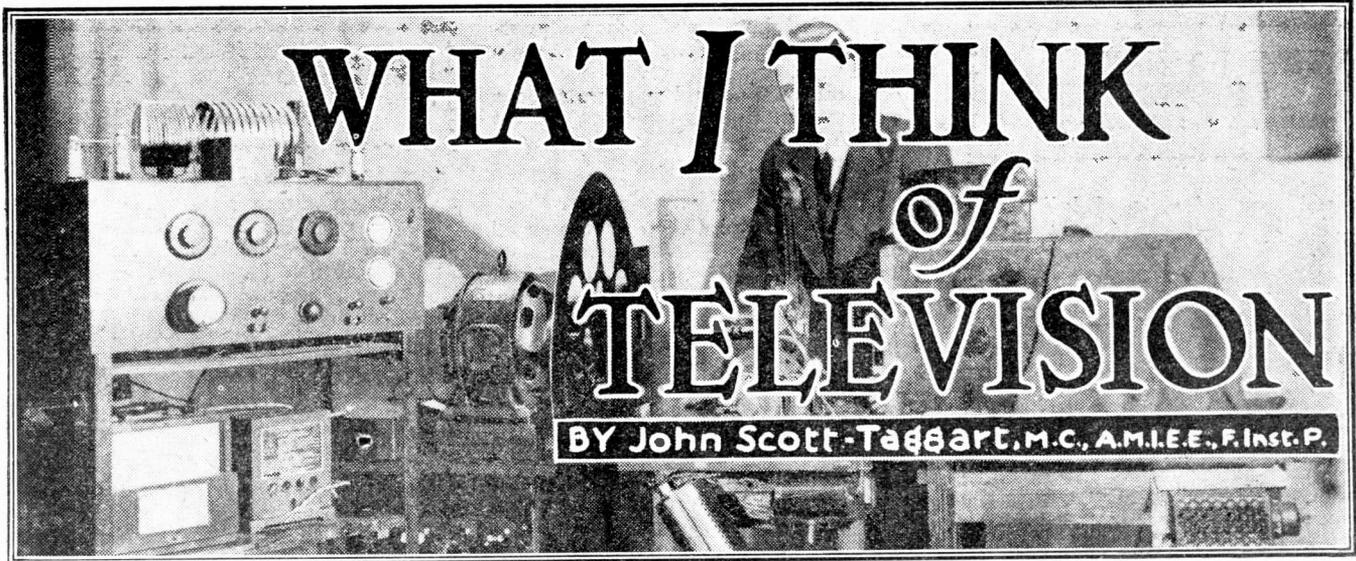
A STRANGE case was reported in the press not long ago, so strange, in fact, that I should like to call further attention. A Tottenham lady was summoned for not having a radio licence. She had been using a three-valver for two years and said that until the inspector called she did not know that a licence was necessary—a statement on which I do not propose to comment.

But the strange thing is that *the case was dismissed*, and, in addition, a P.O. official said that the back fees could not be recovered. The lady ought to have been fined enough to pay all the fees which she ought to have paid from the beginning.

The Dream that Failed.

A. E. G. (Plymouth) begins his letter with, "Ariel, Ariel, wherefore art thou Ariel?" The answer is, "Just my luck! I should have liked to be Drake or Columbus' cabin-boy." He goes on to describe a dream in language reminiscent of Revelation, which dream was mighty complimentary to "P.W." It seems, however, that the sons of the earth bowed down and bumped their nobs on the earth, saying, "Give us a 'Cometised' 'Magic' Four." Now, isn't that just too bad? Because, you see, a "Cometised" "Magic" Four is only a pipe-dream, A. E. G. So sorry! Dream again!

ARIEL.



At first sight the technique of television appears very difficult to understand. It can, however, be very simply explained, and I intend to assume—which is probably entirely wrong—that you know nothing about it.

First of all, don't imagine that television is something very new. Its practical technical development is certainly a matter of a few years, but the basic ideas are as old as the hills; and, curiously enough, the present-day technical progress in most television systems is merely an elaboration in detail of ideas dating from 1880.

Very Little Inventing.

There has been singularly little inventing done of an outstanding character, and most of that has been cribbed from photo-telegraphy. One reason is that television involves so many different applications of physics.

And whenever inventing becomes very troublesome it drifts into the hands of a few keen men like Baird or big corporations like the Bell Telephone Laboratories.

In the case of picture transmission which preceded television, we saw the same sort of thing—voices crying in the wilderness, and then important companies taking it up as a commercial proposition. By that time the early inventors were probably dead.

In earlier days inventors made a point of dying in great poverty, and posterity reaped the harvest. Modern company flotation methods have changed all that. The inventor now makes a fortune before the children of his brain are out of their swaddling clothes. Which is the right time, because so many go straight from their swaddling clothes into their winding sheets.

"Sending" and "Seeing."

In nearly all the text-books on television there is a big distinction drawn between "sending" a photograph of a person along a wire and "seeing" that person along a wire by television.

I am afraid that, in spite of trying very hard, I have failed to appreciate any very great gap between the two operations.

Before giving his final and considered opinions regarding the future prospects of television, Mr. Scott-Taggart is going to explain the essential principles of the subject. And in the following contribution to this exclusive "P.W." series he commences to outline the subject in his usual very lucid and very readable manner.

3. HOW TELEVISION WORKS.

When we see a picture on the television receiver screen we are getting an illusion—the finished product of a complicated chain of electrical, optical and mechanical processes both at the receiver and transmitter.

We are certainly not taking an ordinary photograph of the person and then sending a photo of that person along the wire or by radio. That would take time; but we are really doing the same thing, only almost instantaneously.

Practically the Same.

And if we see the person by television actually move, this is pretty much the same thing as taking a cinematograph picture of the person moving and then sending those pictures by television.

Of course, you may say that in one case we're sending a "dead" picture (or

"canned" picture), and in the other a "live" picture. But this strikes me as essentially a matter of time and attitude of mind. If you weren't told, you wouldn't know that a cinematograph film of a boxing match sent by television a few minutes later was any different from "seeing."

The film would be just a little later than the direct "seeing." If you could speed up the developing of the film enormously, the two systems would become indistinguishable. The various processes in television are not unlike an enormously speeded-up form of telegraphed photography.

The "Time-Lag" Question.

An interesting example of the relative nature of "time-lag" is in ordinary direct vision. When you look at another person it takes a small fraction of a second for the sight of them to reach you.

If you were on a distant star and you were able, by a miraculous telescope, to see a man shooting himself in London, at the moment you saw him raise the revolver to his temple he would actually have been dead perhaps five hundred years!

This, of course, is because it took five hundred years for light to travel the enormous distance between earth and the star. Televisionaries (my suggested name for television enthusiasts who are thinking of running before they can stand steadily) loathe any comparisons between photo-telegraphy and television because they think television ceases to appear quite so wonderful.

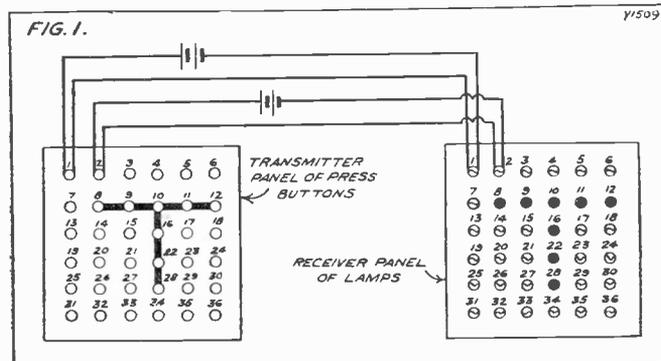
As a keen proponent of television (but not one who is blind to present defects and future difficulties) I find such comparisons helpful in many ways.

Interesting Experiment.

Let us consider the sending, first of all, of a letter such as T along a wire or wires so that it will be visible as a T at the other end. Let us pretend we have never heard of any method of doing this before. A way which seems obvious is as follows:

We arrange a square board which consists entirely of
(Continued on next page)

A VERY SIMPLE SYSTEM



With this elementary apparatus, which the author describes in detail in the accompanying article, very crude pictures can be transmitted from one point to another.

WHAT I THINK OF TELEVISION

(Continued from previous page.)

rows and rows of sorts of bell pushes (see Fig. 1) which are simply electric switches. We now have a second board, which may be in the next room or a hundred miles away.

That is the receiving apparatus, and it consists of lots of little electric lamps similar to those used in flash-lamps. There are thirty-six lamps just as there are thirty-six press-button switches at the sending end.

Sending Letters.

Each press-button switch in the transmitter has two wires connecting it to the corresponding lamp in the receiver, a battery being inserted in each circuit. If button No. 1 is pressed, lamp No. 1 will light up. If press-button No. 2 is pressed down, lamp No. 2 will light up, and so on.

Now, if the letter T is to be transmitted, the man at the transmitter board will select any convenient set of press-buttons

a face like that, but if you had enough press-buttons and lamps you could transmit quite good pictures.

Now, there are several ways we can use this apparatus for sending pictures, and the principles have been used in different modern television systems.

Building Up the Picture.

We can get a human operator to press all the buttons at once. This, of course, is not automatic. It needs the human brain of the operator. An alternative is to make a stencil of the letter or picture to be transmitted.

For example, we could cut out the letter T in wood and press it on the transmitting board. The press-buttons under the T would be pressed down and a letter T would appear in lights at the receiving end.

Another way of using the apparatus is as follows. Instead of the press-buttons being like bell-pushes which only work while pressed down, we could substitute press-buttons which, once depressed, stay down, with the result that the corresponding lamps at the receiver remain lighted. Now we may send the letter T in stages. We press down 8 first, then 9, then 10, and so on.

At the receiver the letter T is built up gradually as lamp 8 lights up, then lamp 9, then 10, and so on. This gradual process may be called "integrating" the picture, i.e. building it up. The person at the receiver does not know what is coming till the letter is finished or nearly finished.

Persistence of Vision.

But if the process were very rapidly carried out the completed letter T would be there before the person at the receiver could think about it.

The third method of sending the letter T, which is most like modern television technique, is to use the ordinary bell-push type press-buttons, and to press the buttons 8, 9, 10, etc., in very rapid succession.

Each lamp only stops on while its corresponding press-button is pressed, but the letter T is flashed momentarily to the receiver because the human eye "remembers" all the individual flashes and, if they follow rapidly, builds up a letter T, which then disappears.

THE NEW VALVES

By K. D. ROGERS

A FEW weeks ago two completely new ranges of valves made their appearance on the British market. The Electrical Trades Association, Ltd., of Aldwych House, have brought out the Eta valves, seventeen different types of which are so far available.

With keen appreciation of the requirements of the average set owner and home constructor, a very useful method of classification has been adopted. It is a more or less obvious system, and one which was put forward by the writer some time ago.

The method is simplicity itself, and merely consists in giving the valve a letter group denoting whatever the makers like, and then figures following to provide at a glance the two main characteristics amplification factor and impedance.

Logical Classification.

The latter, being in thousands of ohms, can be denoted to the nearest thousand by two figures, while the former does not exceed two figures except in the case of screened-grid valves. Therefore all valves except the S.G.'s can be designated in the following manner:

A valve having an amplification of 20 and an impedance of 10,000 ohms becomes a 2010, and in the battery class (which consists solely of 2-volters) the Eta valve having these characteristics goes under the classification of B.Y. (battery?) 2010. The L.F. power valve is B.W.1304 (amplification factor 13 and impedance 4,000 ohms). Simple, isn't it?

The range of valves covers a screened-grid and two H.F.'s, detector, L.F., and power and super-power types in the 2-volt class. In addition, there are indirectly-heated valves for A.C. work, and a few directly-heated A.C. valves. Finally, we have a 350-volt full-wave rectifier.

On test all these valves acquitted themselves very well, and we can recommend them with confidence to the notice of our readers. The screened-grid valve is a particularly outstanding member of the 2-volt family, as also is the B.Y.1304, which, as you see from the figures, has a mutual conductance of over 3.

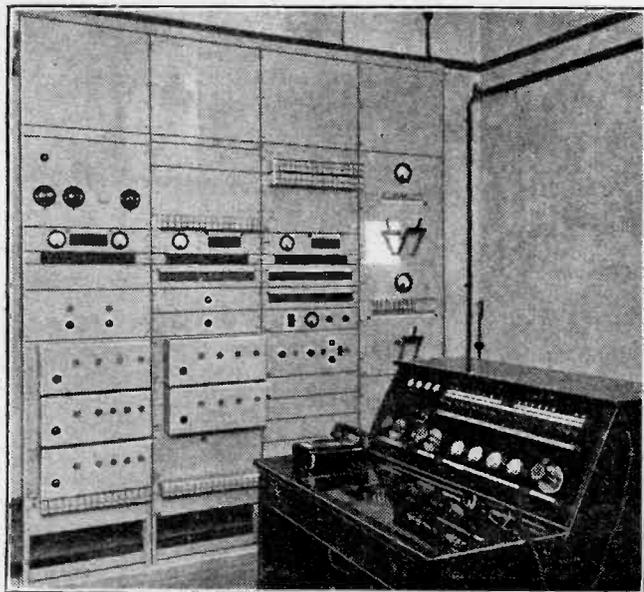
All the 2-volters take 150 volts maximum anode voltage, and the filament current varies between .12 and .32, according to the type of valve.

The A.C. Valves.

The A.C. valves have rather peculiar filament currents in the cases of the directly-heated type. Two of these are quite suitable for operation off 4-volt accumulators, for they consume 0.15 and 0.23 ampere respectively. The remaining "direct" valve takes 1.05 ampere, however.

No pentodes are yet available, and so far there is no sign of 4- or 6-volters, though we must say that these two latter voltages would be unnecessary. The modern 2-volter is so efficient that it is difficult to see why the 4- and 6-volt valves are still retained. Let us hope that Eta will lead the way in the valve world in this respect, and limit themselves to the most valuable types—2-volters and A.C.

CONTROLS FOR THE NORTH



A corner of one of the two control rooms at Slaitwhaite, showing the apparatus rack and the control desk.

which form a T. For example, 8, 9, 10, 11, 12, 16, 22, 28. These buttons have been joined by a black line to make them stand out. If these were all pressed down at the same time by the man using the fingers of both hands, the corresponding lamps 8, 9, 10, 11, 12, 16, 22, 28 in the receiver would light up at once and show the letter T.

We have, therefore, transmitted the letter T. We could send a recognisable S by pressing buttons 11, 4, 9, 15, 22, 28, 33, 26. The letter E could be sent by 9, 10, 11, 12, 15, 21, 22, 23, 27, 33, 34, 35, 36. And so on.

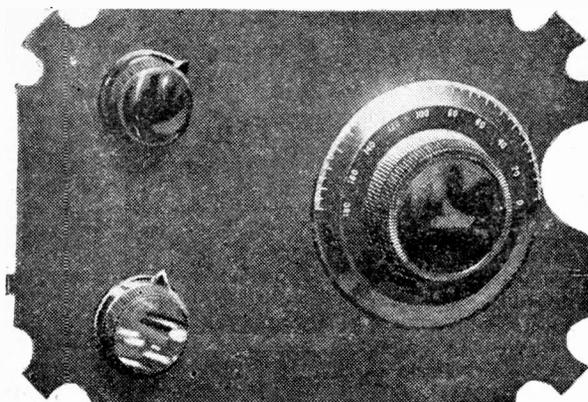
A "Face" Transmitted.

But we could go further and send very simple pictures. For example, a very simple face could be sent by 3, 4, 5, 12, 18, 24, 28, 34, 27, 26, 32, 19, 13, 7, 9, 11, 16, 20, 21, 22, 23. I should not care to have

NEXT WEEK.

The £3 Three.

ECONOMICAL
AND EFFICIENT.



SIMPLIFIED RADIO

More about the entirely new tuning method that is going to have a very striking effect on the future of radio-set design.

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

THIS week I am going to tell you something about the practical applications of the "Extenser." It can, of course, be used in any set, from the simplest crystal receiver to the most intricate multi-valver. And, by its very nature, it is obvious that the bigger the set the more advantageously can the Extenser be used.

One Extenser replaces one ordinary variable condenser and the wave-change switch figuring in the circuit in which it is used. Extensers can be ganged just as easily as variable condensers.

The simplification in set construction is most marked. There is only the one component to fix on the panel and to wire up instead of two.

Immensely Important!

Increased efficiency is likely to follow because the wave-changer is situated on the end of the Extenser and just where, for economy and efficiency in wiring, it requires to be. Leads do not have to be run from the dual-range coil or coils over to some point on the panel where a wave-change switch is located.

Valuable though this is where simple single-tuned circuit outfits are concerned, it is an immensely important point in the case of sets using one or more H.F. stages with their associated H.F. circuits. Using Extensers such complications as a team of wave-change switches dotted along the set's panel, or intricate mechanical switch-ganging devices, are entirely unnecessary.

In regard to the operation of a set using an Extenser (or Extensers) we find quite a gold mine of virtues. First of all, a panel control is wiped right out. Instead of having, say, an on-off switch and a wave-change-switch, you have only the former and there is no confusion between two similar items.

You can't accidentally change the wave-range instead of operating the on-off, and so leave the set with its batteries running down for long periods, as has quite often happened!

Exit Two Phases!

Admitted, there are sets having combined on-off wave-change switches, but I do not think the idea is a particularly good one. There is still the danger of doing what I have referred to in the above paragraph. Anyway, I fancy the ideal is "one thing, one job" on a set's panel. To combine two jobs in one knob is surely to create difficulties for the inexperienced listener.

Perhaps you think that the Extenser is a good example of one thing that does two jobs. But it isn't really, you know. The

task of the Extenser is merely that of station selection. You don't have to think of its automatic wave-changing.

If you were handing over an Extenser set to a new listener you would not need to mention wave-changing at all. You'd point out that merely by rotating the Extenser dial he tunes in the stations he wants to listen to.

You might casually mention that unlike a variable condenser the Extenser embraces both medium and long waves. In the future, when all sets are fitted with Extensers the term "medium and long waves" as indicative of two separate groupings of broadcasting stations will cease to have any real meaning to the ordinary listener.

He will be told that his set covers, say, 200 to 2,000 metres, and that all stations coming within that range are available by rotating the one station-selecting dial.

And with the Extenser there aren't two sets of wave-lengths applicable to the one set of dial readings, 30 standing, for instance, for both London National and Motala. No, the Extenser dial carries two progressive sets of markings running from zero to 99 in the one direction and zero to 200 in the other.

These dial readings assume a vital significance, too, if you want to look closer at them than you usually do at our present illogical condenser dials, for the two-figure numbers (0-99) stand for the medium-wave stations which are all three-figured (261, 525, etc.), and the three-figure numbers (0-200) indicate that you are sweeping through the long waves (which are all four-figured, 1885, 1551, etc.). Thus, as your dial readings glide from tens to hundreds, so do you jump from hundreds to thousands in wave-lengths. I do not claim that this is one of the Extenser's greatest advantages, but it is well worth mentioning as being indicative of the mass of incidental virtues it seems to have.

All Very Simple!

In operating an Extenser you turn the dial from zero in a clock-wise direction to tune up the medium waves, and thus follow the usual plan. But to tune in the long-wave stations, you turn from zero in an anti-clockwise direction and this again seems a logical sort of process.

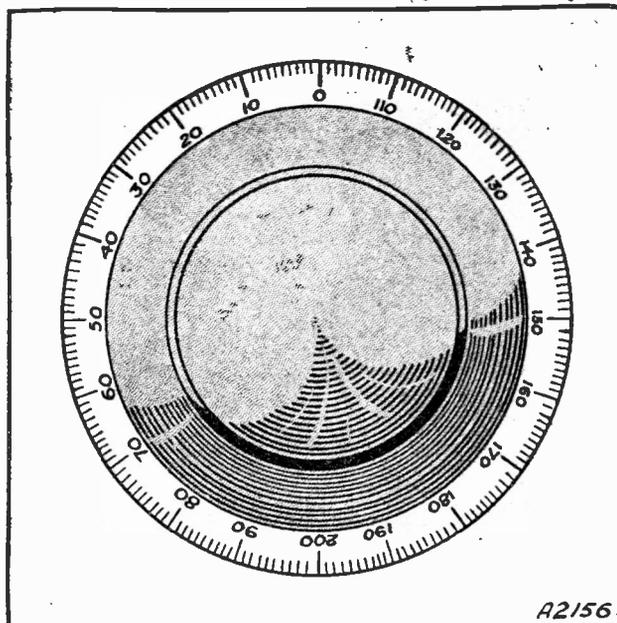
With a drum-drive, all the above applies except that you must imagine that the dial has been turned edgewise—which, actually, is what really happens.

The calibration of an Extenser set is of fundamental simplicity. The one curve showing dial readings running from 0-200 plotted against the one set of wave-lengths 200-2,000 metres is all that is required. There cannot possibly be any confusion. Whatever the station the listener wants to tune in, whether it is a medium- or long-waver, there is only the one number on the Extenser dial that applies to it.

Now imagine the simplicity of the directions necessary for a maiden aunt about her new set!

Although "I says it as shouldn't," I fancy the Extenser is going to have a mighty big effect on all aspects of the technique of radio set design in the future.

REALLY READABLE READINGS



This is how "Extenser" dials will be engraved, and, as explained in the accompanying article, the figures will convey a definite meaning and not be purely arbitrary.

RADIO FACTS AND FIGURES.

Some interesting comparisons.
By THE EDITOR.

FIGURES supplied by the G.P.O. throw interesting light on the distribution of broadcasting licences, and the "Wireless Trader" has prepared a valuable analysis which serves to illustrate some interesting facts.

For example, it is shown that in the London area the largest number of licences, 116,706, were issued in the South-Eastern postal district. The Eastern district follows with 109,049 and the Northern district next with 100,816.

London Leads ?

Then comes Paddington 68,047, Battersea 66,979, North-Western district 65,352, South-Western district 50,700, Western 6,989, West Central 5,896, and East Central 4,973.

The figures for towns and cities other than London can best be noted from the following table:

Birmingham	99,221
Manchester	94,517
Liverpool	82,672
Glasgow	60,904
Sheffield	46,199
Leeds	44,693
Newcastle	43,860
Bristol	43,535
Nottingham	42,454
Leicester	37,574
Edinburgh	33,987
Bradford	32,981
Hull	30,430
Cardiff	28,119

Towns where more than 20,000 licences are in force include: Stoke-on-Trent, 25,034; Portsmouth, 23,015; Brighton,

22,601; Belfast, 22,329; Plymouth, 22,298; Southend, 20,641; and Coventry, 20,356.

Analysis also shows the comparative figures between the number of homes in certain districts and the number of licences issued. Comparison between the two sets of figures results as follows:

	Homes	Licences
London	1,410,000	595,507
Middlesex	278,000	57,853
Lancashire	1,094,000	357,314
Yorkshire	930,000	295,514
Durham	328,000	41,087
Essex	326,000	102,591
Warwickshire	308,000	145,323
Staffordshire	300,000	76,682
Glamorgan	277,000	68,982
Kent	254,000	117,846
Cheshire	228,000	52,705
Surrey	206,000	121,114
Hampshire	202,000	86,606

The above figures show how great is the difference in the degree of popularity in different districts; incidentally the radio trade should find them very valuable, for the figures help to show where intensive radio propaganda and selling campaigns are obviously needed.

Where are those Pirates ?

Radio is certainly a "boomer!" Nothing seems to affect its onward progress—not even "hard times." And the Radio Industry in particular has done extremely well, and will obviously do even better in the future. Consider this:

In December, 1922, there were only 35,774 wireless licences in force, but to-day

the number is very nearly 3,600,000. From 1923 to 1926 the increase was at the rate of more than half a million per annum.

During the next three years the increase fell to about half that rate; but last year the increase over 1929 was 445,127, and as during January and February of the present year 178,000 additional licences were issued it is generally considered that the total for 1931 will be well over 4,000,000.

The "Wireless Trader" estimates the value of the Radio trade to-day at about £20,000,000. We should be inclined to put the figure even higher. Recently published figures also show that there are now nearly three million homes in this country which have an electrical supply, and the number is steadily increasing. The number of mains-operated sets now in use is approximately 1,500,000, and an increase of at least 250,000 of this type of receiver is estimated for the current year—perhaps a great deal more if electrical power developments are speeded up.

"Portables" very popular.

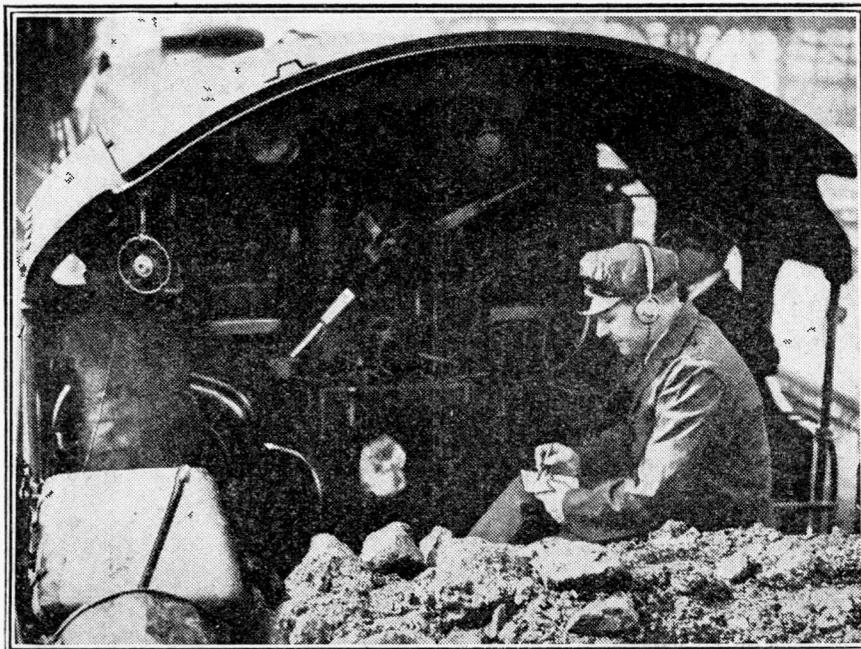
The total production of complete sets during 1930 is calculated at a little under 650,000. This total embraces 61,200 four-valve portables and 102,500 five-valve portables. Electrically-operated sets include 65,000 of two valves, 99,600 of three valves and 34,400 of four valves.

Coming to battery-operated sets, exclusive of portables, the "Wireless Trader" analysis shows 89,700 of two valves, 140,200 of three valves and 47,500 of four valves. A liberal addition to the gross total must be made for battery sets employing five or more valves and also for radio-gramophones.

And, finally, compare the prices of sets of a few years ago with the prices of to-day. The average price of a three-valve set in 1923 was £20. By 1930 this had fallen to £4 10s. A mains-driven set which in 1927 cost £30 can now be bought for £20.

Truly, no one can say that Radio is any longer an expensive hobby.

FOORT TRAVELS ON THE "FOOTPLATE"



Reginald Foort, whose performances on the Regal Cinema Organ are frequently broadcast, looks for "local colour." He recently travelled on the footplate of an express to the West of England making notes of the noises heard via the "mike" and phones you can see in the photo. When next he plays "Chou Chou" during one of his broadcasts you will no doubt hear some very realistic effects!

DO YOU KNOW ?

Here are some very interesting facts, showing the importance of Radio at sea.

Automatic alarm apparatus to ring a bell when S.O.S. is received, is now fitted on about 1,200 ships.

Many ships lifeboats carry wireless apparatus for emergencies, and it is estimated that the number of such radio-equipped lifeboats is now about 500.

An agreement that all passenger vessels of 5,000 tons or over must be fitted with direction-finding wireless was signed recently by eighteen nations, and is to be enforced on July 1st, 1931.

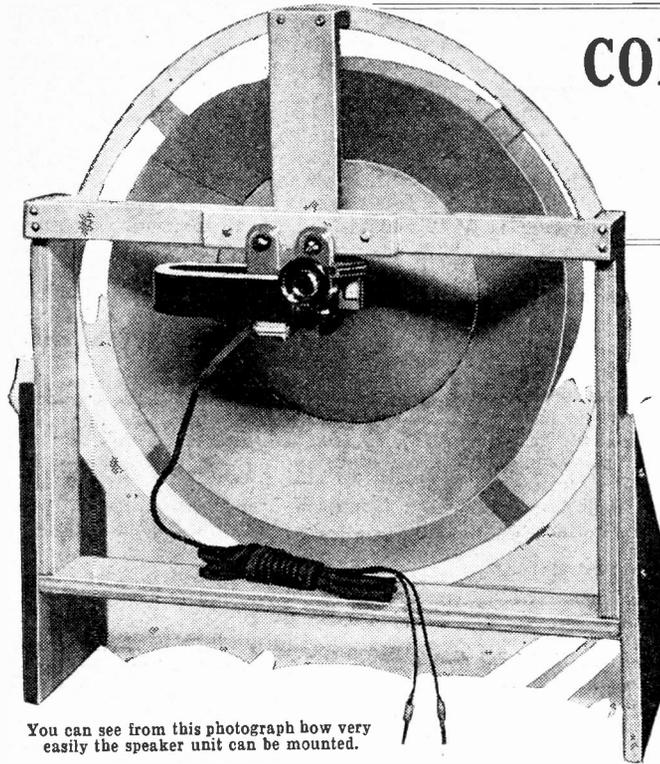
There are at present more than 3,000 vessels equipped with wireless direction-finders, this being about over one-fifth of the vessels carrying radio apparatus.

The wireless beacons, or "wireless lighthouse" stations, work on wave-lengths between 950 and 1,050 metres.

There are to be 20 automatic wireless beacons, round the coast of Great Britain and Ireland, and most of these are now in action.

COMPLETING THE CABINET "CLEAR-CUT"

Here are the final diagrams and instructions for the cabinet model of the "P.W." "Clear-Cut" speaker described last week.



You can see from this photograph how very easily the speaker unit can be mounted.

LAST week we constructed the cones for this Cabinet speaker and left them drying. They ought to be thoroughly dry by now, didn't they? So we will continue the construction, very little of which remains to be done.

With the two cones stuck together we can now tackle the mounting.

This is simple. You make the hole through the main cone and fix the unit on in the usual manner, being careful that the nuts are tightly done up, special conical washers being in position on each side of the cone.

Fix the Cone on Tightly.

This is essential if you are to be free from rattle and other disturbances that may be generated by careless fixing of the cone on the reed. The position of the cone on the reed can, of course, be adjusted, and this is necessary in order that the back edge of the secondary cone comes directly in line with the cardboard ring.

Remember that the whole success of this loud-speaker depends upon the rigidity of the mounting of the unit and the firmness of the chassis, and at the same time upon the freedom of suspension of the edge of the cone.

This suspension is carried out by means of paper strips fixed at intervals round the edge of the back cone and attached to a cardboard ring supported on the framework of the speaker. This ring is somewhat flexible and so provides a strong but flexible support for the edge of the cone.

Arranging the Suspension Strips.

The cardboard ring should be about half an inch wide, and to it are stuck strips of Kraft paper of the same width. These are then left for fixing to the back cone round the outer edge of the latter. You will probably have taken the unit off the frame for mounting the cone; it can now be replaced and the position of the cone on the unit spindle adjusted so that the paper

strips on the ring come dead in line with the edge of the back cone.

Now carefully stick the two top strips so that the cone is hanging by these in such a position that there is no tension either up or down on the spindle going through the middle of the cone. The two bottom pieces can be stuck, and then the diaphragm should be found to be perfectly central without any strain occurring on the apex of the cone due to the pulling of any paper strip, or the weight of the dia-

phragm on the spindle of the speaker unit,

Any strain on the spindle of the unit might easily result in most unsatisfactory results, especially if the pull is badly to one side.

Modern speaker units do not have very much gap between the armature and the pole pieces, and such a strain might easily cause the armature to touch one or other of the pole pieces on fairly loud passages.

Adjustment of the loud-speaker unit (where an adjustable unit is employed) is carried out in the usual way by means of the screw at the back of the unit, and before placing the speaker in its cabinet it is advisable to place it on test, so that in the event of your having got something wrong with the construction, this can be remedied while the speaker is still get-at-able.

Final Adjustments.

There should be no reason why any trouble should be experienced, but you may want to adjust things if you have not got it quite right.

For instance, it is not unknown to find a piece of enamel in the armature gap of the speaker unit, and if this were the case you would find the loud-speaker would not adjust properly, but would continually chatter. This is not a likely thing to happen, but we have had cases brought to our knowledge and it is just as well to be prepared, isn't it?

This completes the construction, and the only thing now is to mount the cone in the cabinet after all the "slack" parts are perfectly hard and set. The cabinet is one supplied by Camco, and suits this loud-speaker admirably.

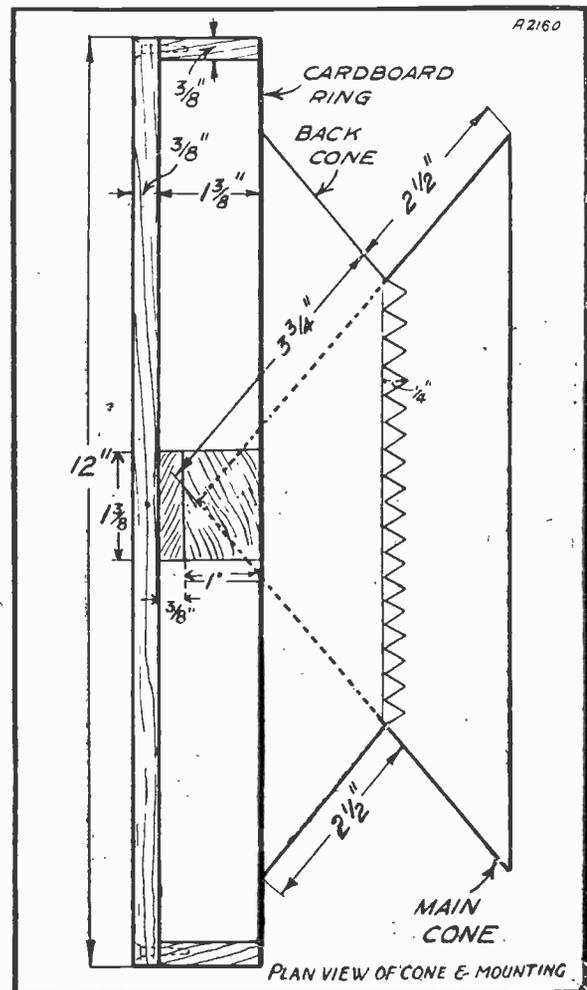
The Cabinet Acts as Baffle.

The loud-speaker unit and chassis are pushed forward into the cabinet, care being taken that the cone is close up to the board behind the loud-speaker fret, the diameter of which is roughly the same as that of the diaphragm of the loud-speaker. Then the rest of the face of the cabinet is used as a baffle. After screwing the chassis to the cabinet so that it is perfectly rigid, there is nothing else to be done but to use the loud-speaker, obtaining considerable benefit from your labours.

But perhaps we ought to say one or two things about the "Clear-Cut" Cone in

(Continued on next page.)

SUPPORTING THE RING



The position of the cardboard ring on the chassis is shown in this diagram.

REMOTE TUNING

Details of an elaborate scheme whereby a set can be adjusted to different stations by "button pressing."

A NEW system of remote control has been brought out in the United States. By this, the receiver may be completely controlled from a remote point by means of ten differently marked buttons mounted on a small metal box, which is attached to the receiver by means of a flat ribbon cable of twelve small wires. The functions of these push buttons are as follows:

Black, with white dots: Momentary depression turns the receiver on.

Black: Momentary depression turns the receiver off.

Red, with white dot: Depression increases volume until the button is released.

Red: Depression decreases volume until released.

Brown buttons: Each of these buttons corresponds to one of six predetermined stations, any one of which may be tuned in by depressing the corresponding button.

When the receiver is turned on, a green "jewel" in the remote control box is illuminated. When one of the six brown buttons is depressed, this jewel dims in brilliancy, indicating that the receiver is being tuned in. In a few seconds the brilliancy of the jewel becomes normal, indicating that the receiver is now in tune.

Any Setting Possible.

It is possible to secure stations other than the six pre-determined ones by manipulating two of the buttons, a high wave-length and a low wave-length button, and tuning the receiver by ear. The high wave-length button, of course, will tend to turn the tuning knob of the receiver in one direction, and the low-wave length button in the other.

By properly manipulating these two buttons, it is possible to tune the receiver to any wave-length situated between the two wave-lengths represented by these two buttons.

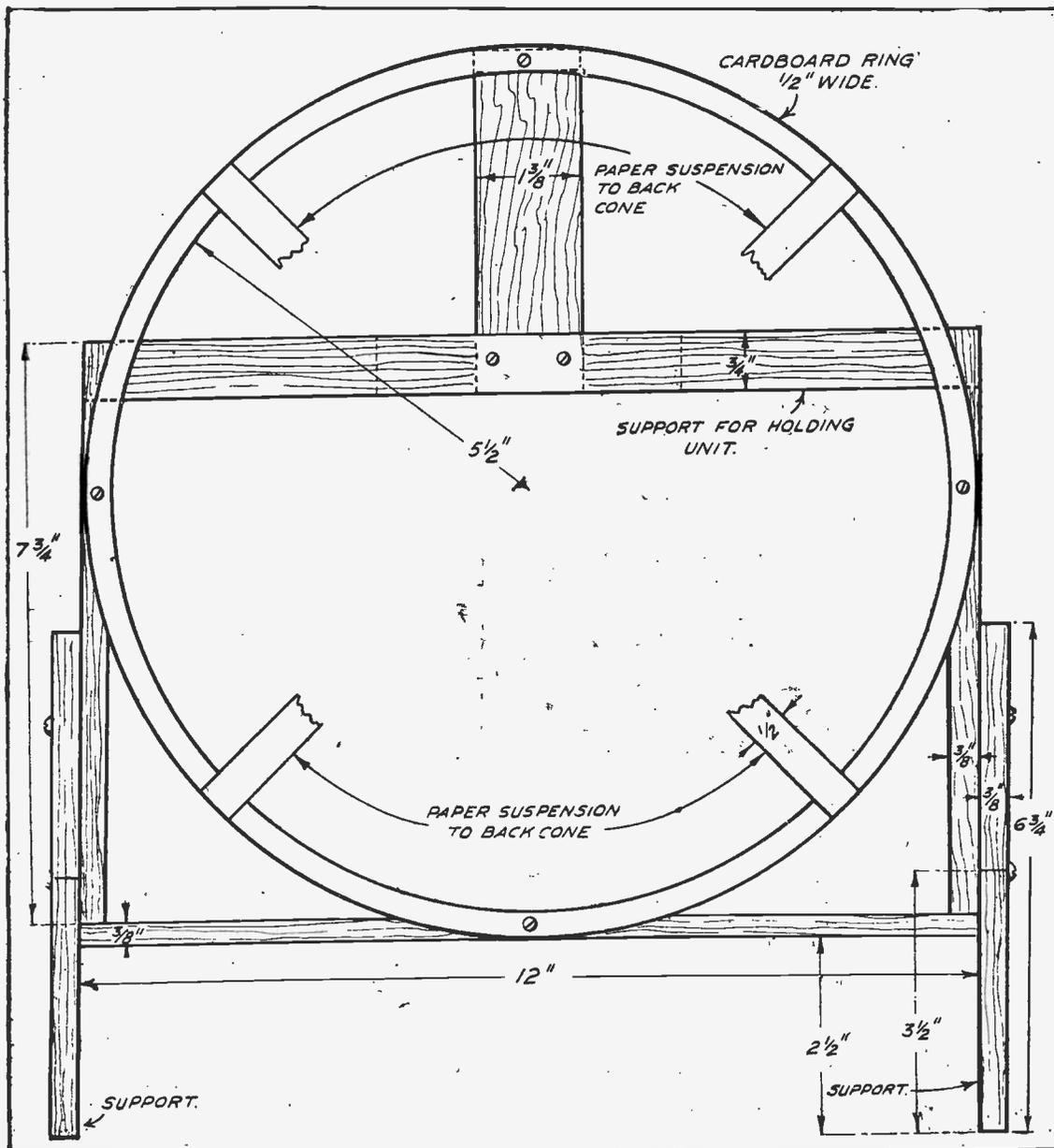
At the receiver, a duplicate set of buttons is provided, which may be used in the same manner as described for the remote buttons. In addition, six metal buttons are provided just below the six tuning buttons.

These metal buttons are employed only when determining which six stations are to be available by means of the remote control. For instance, in any given area the stations which would most likely be chosen for the automatic tuning device would be the most consistent or desirable ones.

COMPLETING THE CABINET "CLEAR-CUT"

(Continued from previous page.)

RIGID, BUT REMARKABLY SIMPLE



The chassis is a simple affair, and the four paper suspension strips should be placed as shown above.

action. The first concerns the adjustment of the unit.

This should be carefully carried out, as hurried screwing up of the adjusting knob might quite easily result in slight displacement of the armature, and consequent chatter on loud notes. Also be sure to connect the speaker the right way round (+ to L.S. + on the set) if you have no output filter.

The second point concerns chatter on loud notes. This may be due to the wrong adjustment of the gap between the armature and the pole pieces, but it is just as likely to be due to valve overloading in the set.

A Sensitive Speaker.

The "Clear-Cut" Cone is so sensitive that even the slightest overloading is enough to spoil the reproduction — a state of affairs not found on many of the less efficient types of cone speakers.

So don't blame the speaker if you get a little "blasting" on strong high notes, it is more likely to be the set at fault than the loud speaker. That is the one "disadvantage" about changing on to a better speaker, it does show up the faults in the set.

CAPT. ECKERSLEY'S QUERY CORNER



Some questions and answers of general radio interest that will aid you in your radio reception.

INSTABILITY ON LONG WAVES—
CONTROLLING THE VOLUME—TWO
VALVES IN PARALLEL—SOME COLD
FACTS.

Under the above title, week by week, our Chief Radio Consultant comments upon radio queries submitted by "P.W." readers. Don't address your questions to Captain Eckersley, however, a selection of those received by the Query Department in the ordinary way will be answered by him.

Instability on Long Waves.

G. H. (Manchester).—"I have just built a set with an S.G. stage, with a screen between the aerial and H.F. coupling coils. The receiver is quite stable on the medium wave-band, but directly I switch over to the long waves, it oscillates and is quite uncontrollable.

"I have been very careful with the wiring and the spacing of all the parts, and I am wondering whether the fact that larger coil windings are used on the long waves is likely to have anything to do with the oscillation trouble. Ought I to use more screening, or would it suffice if I cut down the size of the long-wave coils?"

It is very difficult to say. There is only one royal road to stability and sensitivity in a screened-grid stage and that is complete screening.

A partial screen may make matters worse than no screening at all. If the tuning coils are inefficient (i.e. small) the instability is reduced, but sensitivity must suffer in a like manner—why not make good big coils of thick wire and use a complete screen?

You might also try screening the coils complete in a metal cylinder decently far away from the windings. Or remove the partial screen altogether just to try (success not guaranteed), or make the long-wave coils smaller and less efficient?

But these latter ideas are merely to cut down sensitivity, to produce stability there is only one real way—complete screening.

Controlling the Volume.

B. R. S. (Leicester).—"I should like to fit a volume control to my H.F., detector and L.F. receiver, and I find that I have the choice of three methods.

"The first is controlling the voltage to the screening grid of the S.G. valve with the aid of a variable resistance in series. The second is the use of a variable resistance across the primary of the L.F. transformer; and the third, a high resistance potentiometer across the secondary of the L.F. transformer.

"Do you consider that there is anything to choose between these schemes, and if so, which do you think is the best?"

I doubt if you have exhausted all the methods and I think that the methods you cite are not ideal. In the first place, you must realise that to control volume alone is easy, but to control it while keeping the

system undisturbed as regards its response performance is difficult.

Thus while you can control the volume of the sound from your loud speaker by controlling pre-detector volume, it is not always advisable to do so. Ideally, whatever the strength of your signal, you should be able to keep the volts of high frequency applied to the detector the same, and then control the volume of the emitted sound in the low frequency circuits.

Pre-detector volume control should, therefore, be separate from post-detector volume control.

You can obtain a pre-detector volume control by varying screen-grid volts, but

you upset the conditions terribly by so doing. A potentiometer is better.

The best volume control is a constant impedance potentiometer arrangement in the loud-speaker lead. This arrangement is the subject of a patent. It has the great advantage of being controllable from one's armchair.

Two Valves in Parallel.

S. J. (Coventry).—"I recently purchased a new loud-speaker, and find that the output from my set is not adequate. Will I get a very much greater output by using two valves in parallel in the output stage?"

No. The apparent increase of output from two valves in parallel as compared with one by itself is just too disappointing a quantity to be adequately described.

You see if you were lighting a lamp from a battery and it seemed a bit weak, another battery in parallel wouldn't help much if the regulation of the first battery were all right. I should say you are most probably suffering from a lack of volts rather than a lack of power.

Now, two valves in push-pull is a much better scheme and has the other advantages of push-pull itself. Of course, if you are using much too small a valve and are suffering from lack of power then the parallel valve will help. But get another valve and try as parallel and as push-pull.

Some Cold Facts.

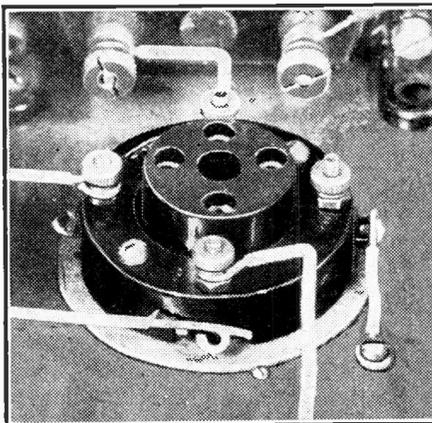
J. P. (Exeter).—"I take it that any accumulation of ice on the aerial insulators of a transmitting station would prevent the station from functioning. I should imagine that, in severe winter weather, it is quite feasible for the aerials to become frozen, and would like to know if any precautions against such eventuality are taken in the design of modern transmitters?"

Certainly the formation of ice on insulators is bad. The formation of ice on the aerials is also bad because the weight to support becomes even a hundred times greater, and the whole of the aerial comes tumbling down if precautions are not taken.

The solution of the problem is to pump kilowatts of low-frequency energy, which does not interfere with, and can be blocked off from, the high frequency, into the aerial, and thus heat it and prevent the formation of ice anywhere.

(Provision has been made for this at the B.B.C.'s new North Regional station.)

ONLY A VALVE HOLDER, BUT—



You want to watch how you wire it, if trouble is to be avoided. If to be mounted on metal, slip an insulator under it, as shown. And make sure that all its nuts are screwed down tightly, and its soldering tags firmly fixed.

it is better to leave the valve conditions alone, otherwise varying its amplifying properties may vary its linearity of response. I think a potentiometer (50-100 thousand ohms) across the tuned circuit is about the best way of controlling the input to the H.F. valve, and hence the input to the detector.

You can judge to some extent how far you are loading the detector by a detector-feed meter. The feed should reduce by about 10 per cent for good conditions.

For low-frequency volume control a potentiometer, arranged as you have suggested, will do. Do not in any case just shunt a transformer by a variable load,

LATEST BROADCASTING NEWS.

THE NEW FOOTBALL
"WAR."

SIR JOHN REITH IN AMERICA
—TOWN-PLANNING 700 YEARS
AGO—"BAGDAD ON THE SUB-
WAY"—"IDLE THOUGHTS"
—EMPIRE DAY, Etc.

THE attack by the B.B.C. on the League Management is a very serious and determined affair. Following so close on the altercation with the Canadian Pacific Railway, it seems to reveal a new attitude of confidence at Savoy Hill. Obviously the idea is to make it very difficult, if not impossible, for the League Management to get a hostile policy endorsed at a May meeting.

Meanwhile relations between the B.B.C. and the Football Association are most cordial. If the campaign against the other body succeeds, it may encourage the B.B.C. to the adoption of more aggressive tactics generally.

Sir John Reith in America.

A tremendous reception is being prepared for Sir John Reith when he reaches New York on the "Aquitania" in the third week of May. One of his official hosts will be Mr. Owen D. Young. Others will include members of the Federal Administration, and he is almost certain to visit the White House.

American journalism is smacking its lips at the prospect of such an exceptional subject for varied publicity. Sir John's commanding stature, his vivid personality, and his remarkable career, all find favour in the United States, where his friends and admirers are as numerous as on this side of the Atlantic.

Town-Planning 700 Years Ago.

On Tuesday, May 5th, at 9.40 p.m., National listeners will hear speeches by the Lord Mayor of Hull and Mr. John Drinkwater on the occasion of a banquet celebrating the 600th anniversary of the granting of a charter to Hull by King Edward III.

It seems that Hull had a charter even before its present one, which it received in 1229 from King Edward I, who changed the name of the port from Ravenspur, as it then was, to Kingston-upon-Hull, and gave it the distinction, which it shares with Winchelsea, of being the only places in England which were definitely built on town-planning lines in the Middle Ages.

"Bagdad on the Sub-Way."

John Watt's radio version of New York, entitled "Bagdad on the Sub-Way," which has already been broadcast from London after a successful first performance in Belfast, will be repeated for National and London Regional listeners on Tuesday and Wednesday, May 5th and 6th respectively. The cast will be composed mainly of Americans.

"Idle Thoughts."

A new series of talks entitled "Idle Thoughts"—a continuation of Mr. Harold Nicolson's recent commentaries on "People and Things"—starts on Saturday, May 1st,

when Mr. Denis Mackail is the speaker. Lord Ponsonby, Mr. Compton Mackenzie, Mr. Harold Nicolson, and Captain Robert Hartman will also contribute to the series.

Empire Day.

The broadcast celebration of Empire Day will be given this year on Saturday afternoon and evening, May 23rd. Arrangements are not yet complete but it is definite that the Prime Minister will participate. There is likely to be a relay of a big patriotic demonstration in Hyde Park during the afternoon.

Command Performance Broadcast.

Listeners throughout the country will learn with a good deal of pleasure that the Variety Artists' Benevolent Fund Command Performance, which takes place at the Palladium on Monday evening, May 11th, is to be broadcast from all stations taking the National programme. The various artistes have, of course, not yet been selected, but the relay will be given in two sections, the first between 8.15 and 9 p.m. and the second between 9.40 and 10.40 p.m.

Mid-Week Religious Broadcast.

A religious broadcast will be heard on Wednesday, May 13th, when the Centenary Celebration Service of the Congregational Union of England and Wales is relayed from the City Temple, London, as part of the National programme. The service, which begins at 11 a.m. and lasts until noon, will contain addresses by the Rev. Albert Peel and the Rev. J. D. Jones, others taking part being the Rev. Charter Piggott and the Rev. S. M. Berry. Chairman and Secretary, respectively, of the Congregational Union of England and Wales. When a religious service is thus introduced into a week-day National programme there is usually a good deal of reaction among the mass of "lay" listeners.

The Grand Opera Season.

Among the notable artistes taking part in the forthcoming season at Covent Garden is Noel Eadie, who will be Queen of Light in Mozart's "Die Zauberflote," and Gilda in Verdi's "Rigoletto," while the list also includes Josephine Wray, Gladys Palmer, Heddie Nash, Gladys Cole, and Mabel Richie,

NEXT WEEK:

Full details for making

THE "£3" THREE

ECONOMICAL : EFFICIENT : EASY-TO-BUILD

ALSO

THE "EXTENSER"

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

COMING SHORTLY:

ANOTHER
"CLEAR-CUT"
CONE.

FOR THE LISTENER

By "PHILEMON."

Other people's views are not always very interesting, but our popular contributor certainly knocks the nail on the head more often than most critics of the broadcast programmes.

"The Jockey."

I SEE that "The Jockey" is to be brought from Berlin to Savoy Hill. This is not a play, or a successor to Steve Donoghue. It is a German "Night-Place"—a sort of cabaret.

We have had so-called cabaret shows in our programmes before now; but they have been fake. The word has been used as a kind of spice to cover up a re-hash of old songs and old jokes, and old turns by some of our old friends in vaudeville.

The official programme has sometimes added the allure of a poster displaying scantily-clad and high-kicking damsels. Anything more unlike the actual performance could scarcely be imagined! One does not look to the B.B.C. for spicy numbers.

But there is, I suppose, for the untravelled Englishman a certain whiff of "naughtiness" about the word "cabaret"; so he feels he is getting something special under the name, "under the rose," whereas all he gets is an old dish in a new guise: sometimes, indeed the relics of previous dishes warmed up—and not always very warm at that!

All Very Informal.

"Cabaret" is a French word. I rather think that the entertainment which goes by that name is a French institution; but I am not sure. Certainly the first cabaret I ever visited, more years ago now than I care to remember, was in Paris.

The word means "a place where one drinks"; and, being a diminutive, should

(Continued on page 224.)



—How To Find— THOSE FOREIGNERS

Some really practical hints on picking up those distant programmes.

By R. W. HALLOWS.

THERE is a great deal more in the art of finding foreign wireless stations with the receiving set than the mere twiddling of knobs. One of the most instructive ways of spending a wireless half-hour is to put first a beginner and then an old hand to work on the same receiving set, allowing each fifteen minutes and seeing just what number of stations each will bring in at good volume. One needs to be no prophet to foretell that the old hand's score will be certainly double and probably three times that of his rival.

Taking One's Bearings.

Can we find the secret of the old hand's success? I think we can, particularly if we have an opportunity of watching him work. When he takes on a new set for the first time you will find that the first thing he does is to find his bearings. This is how he does it.

He knows that with most sets the London Regional will come in somewhere about the middle of the dials, usually rather below the 50 mark on a 0-100 dial.

He spins the right-hand dial (we will presume that there are two) to 35 and turns the left-hand one to a slightly lower reading. Keeping the right-hand one still, he moves the other a few divisions up and down.

Then he advances a couple of degrees with the former and repeats his performances with the latter. In a matter of a few seconds he has tuned in the London Regional and he makes a mental note of the dial readings. We will say that these are left 45 and right 50.

The Next Two Stations.

His next step is to find whichever of the shorter-wave home stations is within range. This will be the London National, Belfast, one of the relays, Aberdeen or possibly Cardiff, according to locality.

Experience has shown him about where these are usually to be found. If, for example, the London National is being sought, he will look for it between 15 and 25.

He goes to work just as before and in a miraculously short time he has found the station. The readings we will say are left 20, and right 25. Next he moves up towards the top end of the scale in search of the North Regional. This he finds at say 70 left and 75 right.

All of this takes much less time to carry out than to describe in writing. A skilled hand would pick up these three stations and note their readings even on an unknown

set in thirty seconds or less. Now just think what can be learnt from those three sets of readings which we may tabulate in this way:

	Left Condenser	Right Condenser
London National ..	20	25
London Regional ..	45	50
North Regional ..	70	75

In the first place we have three key wavelengths of 261.3 metres for the London National, 356.3 metres for the London Regional, and 479.2 metres for the North Regional. Secondly, we know that the left-hand condenser lags about five scale divisions behind the right in its readings.

Now we come to a third very important point. The expert realises that he is not dealing with straight-line wave-length condensers. Subtracting 261 from 356 he finds that the twenty-five divisions between 25 and 50 represent on the average rather less than 4 metres per division.

On the other hand, the subtraction of 356 from 479 shows that over the upper

metres below the London Regional, so he will try with a setting about 15 degrees less than that needed for the British station. Next he will probably go for Strasbourg on 345 metres, which he is sure to find about three divisions below the London Regional, since the wave-length difference is 11.

Between the London and North Regionals he will use stations such as Hamburg, Toulouse and Rome as stepping stones: whilst above the North Regional, Milan and possibly Budapest will tell him nearly all that he wants to know.

Filling in the Gaps.

So far as we have got, the search will have taken the expert, perhaps, five or six minutes out of his allotted quarter of an hour. He now proceeds to fill in, and the stations that he finds it worth trying for will depend naturally a good deal upon the selectivity of the set and the locality in which he is situated.

Heilsberg immediately gives him Bratislava, since the two are on neighbouring wave-lengths. Just below Turin he will look for and almost certainly find Kosice, whilst just above is Hilversum. He will probably take Breslau as a kind of secondary stepping stone in the space between Hilversum and Strasbourg, and once having found the necessary settings he will have no difficulty in filling in Bordeaux Lafayette, Gothenburg, Brussels No. 2 and Brno. With a selective set or at some distance from London he will also find Barcelona and Graz.

The Key to Success.

Still working on the same lines he brings in Stuttgart if he is far enough away from London and then, with

Hamburg as a stepping stone, Lwow. And so he goes on right up to the top of the scale.

In the nine or ten minutes of his quarter of an hour that remained after his preliminary exploration, the expert would find the great majority of the stations covered provided that they were within the range of the apparatus. It is more than likely that he would have a minute or two to spare which he would devote to trying for the weaker transmissions.

Stepping stones, then, are the key to successful searching. Find your strong stations, for they are easy, and make a note of the settings that each needs. If you have these stepping stones you divide the whole broadcast band into parts, and therefore narrow down your field of search.

THE BAND OF BANDOENG



A group of native musicians that are often on the air from Bandoeng, on the short waves.

half each represents almost 5 metres.

The beginner will probably make a perfectly general search over the wave-band, starting at the lowest condenser scale reading, and working up to 100. The expert gets his three key stations first of all, makes deductions from the readings, and then proceeds to fill in the gaps by using these stations as what we may call stepping stones.

Further Stepping Stones.

First of all he goes for strong stations always well received, which will act as further stepping stones. Heilsberg is about 15 metres above the London National (15.2 to be exact), so he knows that it will come in about four condenser divisions higher.

His next stepping stone will probably be Turin on 296 metres. This is just over 60

FROM THE TECHNICAL EDITOR'S NOTE BOOK.

Tested and Found-?



KONDUCTITE METALLIC PAPER.

GRAMO RADIO AMPLIFIERS, LTD., are selling a most useful material. It is Konductite, a metallic paper for screening in radio sets. It can easily be applied to a baseboard or to behind a panel, or even to pieces of wood shaped for interstage screening. The retail price of a piece measuring 30 in. by 20 in. is 2s. On test we found it excellently conductive even after being folded tightly and subsequently straightened out.

EXPRESSION OF CONFIDENCE.

Messrs S. G. Heayberd & Co. are in future issuing two-year guarantees with every Heayberd kit or unit that is sold.

SPA SAFETY AERIAL FUSE.

The Spa safety aerial fuse appears to me to provide a quite adequate protection against lightning. Besides the series aerial fuse there is also an automatic switch, which comes into operation the moment the fuse "blows," and this directly connects the aerial to the earth.

THE NEW UNDY LOUD SPEAKER.

You will perhaps remember my report concerning the Undy loud-speaker unit. Well, I have now been sent one of the latest types of these, the Super Dynamic 8. A special feature of this new production is that it incorporates an auto transformer with three tappings so that it can be rendered suitable for working with any normal output valve from one of low impedance to one of high impedance.

There is also a switch which can be brought into action when large power is being dealt with, and this enables the loud speaker to stand a high constant anode current and a high anode voltage without receiving injury.

It is certainly an attractive proposition, and the results it gives are distinctly impressive. One is given a striking example of the necessity of matching the output impedance to that of the valve if the greatest undistorted output is to be obtained.

But I would like to suggest that the makers of the Undy unit would be doing the user of the speaker a service if they would indicate roughly what they consider to be (1) valves of low impedance; (2) valves of medium impedance; and (3) valves of high impedance.

The constructor ought to be able to find out the impedance of his output valve, but he could not be blamed for not being able

to categorise it as above. If he is left to experiment with the three tappings, he is going to have an unhappy time, for broadcasts are of an unhappily fluctuating character, and the ear is a very blunt "meter." But perhaps the Undy people do supply the information when

they send their products out on to the market. In which case I have wasted the space occupied by the preceding couple of paragraphs!

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

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

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

DRYDEX H.T. BATTERIES.

I hear that Exide are reaping a full reward from that courageous enterprise, their entry into the dry battery market. There may be depression, economically and otherwise in this country, but authoritative reports indicate that this is no immediate concern of Drydex.

NEW TANNOY MAINS UNIT.

Grid bias has hitherto been a nasty little snag where mains apparatus is concerned. To say that an H.T. unit having a trickle-charger incorporated in it makes a set "all electric" is, perhaps, legitimate. But the fact remains G.B. demands a replaceable battery if mains supply is not used for it.

That a G.B. battery is small and lasts long is all the more trying from the designer's point of view; because G.B. from the mains is usually a fairly

complicated business, as Dr. Roberts recently pointed out in his Technical Notes.

But Tannoy have patented a method enabling G.B. from the mains to be obtained efficiently and without necessitating costly gear. Moreover, it operates independently of the H.T. in the same unit—a very important advantage this.

The new and ingenious scheme is to be found in the Tannoy G.B.1 Unit, which costs only £4 15s., and replaces both H.T. and G.B. batteries and provides L.T. trickle charging.

I will quote the makers for the detailed description of this excellent unit:

"High tension, low tension, and grid bias are all drawn from the mains at negligible cost, and with a constant efficiency completely absent when using batteries with their attendant troubles and recurring expenditure.

"By an ingenious and prov. patented scheme, the Grid Bias (which hitherto has only been available on much more expensive mains units) is incorporated in this model, quite independent of the H.T. supply. The voltage is constant, there being little likelihood of variations with fluctuations in anode current, as in the case with other forms of grid biasing.

"The L.T. is provided by incorporating in the switching an efficient trickle charging arrangement, whereby a small accumulator (2, 4, or 6 volts) is still retained, but this never requires to be removed from the set, since when the set is switched off the battery is automatically trickle charged at a rate which is never likely to be harmful even if left on indefinitely for long periods.

"The size of the instrument is 8½ in. long, 5¼ in. wide, and 3¼ in. high.

"The Mains consumption is approx. 3.5 watts or over 300 hours per unit. It is supplied for A.C. mains 200/250 v. at 40/50 cycles, and its outputs are:

"High Tension.—1. Max. 150 v. at 15 m/amps., or 120 v. at 20 m/amps. 2. Tapping at 80/90 v. Tapping at 60/70 v.

"Grid Bias.—G.B.1, 1½ v. G.B.2, 4½ v. G.B.3, 12 v.

"Low Tension.—Trickle Charger, 2 v., 4 v., or 6 v.

"NOTE.—Special intermediate voltage tappings for H.T. and G.B. can be made at 1/- extra per tapping."

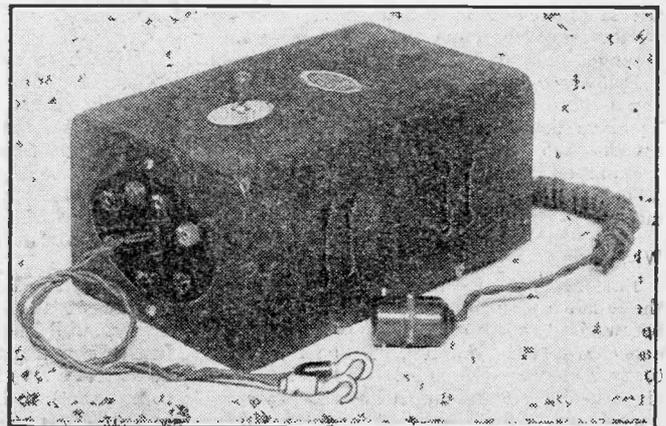
It is a neat little unit and it gives fine results, the outputs being up to the specification and the smoothing excellent. I can thoroughly recommend it to the attention of all "P.W." readers having A.C. mains.

USEFUL SCREENING DEVICE.

For the type of screen that is generally used in "P.W." sets the Magnascreen, made by Burne-Jones, is excellent. It is of the vertical partition kind, and, being fashioned from heavy gauge aluminium, is wonderfully rigid.

Earthing terminals and fixing screws are provided, and there are slots to facilitate the wiring.

Magnascreens are available in three sizes, 10 in. × 6 in., with three terminals at 2s.; 9 in. × 6 in., with three terminals at 1s. 9d.; and 7 in. × 6 in., with two terminals, at 1s. 6d.



This new Tannoy unit makes use of one Westinghouse Rectifier for H.T., and, by an ingenious patented method, another for L.T. trickle charging and grid bias.

THOUGHTS WHILE LISTENING

A collection of questions raised in the mind of F. G. Lidstone after a goodly experience of listening to his local station.

Where "Perris," the French city often mentioned by B.B.C. announcers, is situated.

How many radio sets in use really give good reproduction.

Why an item is announced to follow "in a few moments' time."

Why there is no musical transmission on Sunday morning.

How old such compositions have to be before they are deemed "respectable."

Why six pips for the time signal.

How many unsightly aerial masts could not be dispensed with.

"Little Numbers."

Why Jack Payne calls all his items "little numbers."

If his statement, oft repeated, that "Several of these numbers are played by request" is really an apology.

And if not, why tell us?

Why Schubert's Serenade was recently given four times in three days.

How many wireless sets are worked with insufficient H.T.

Popular Wireless, April 25th, 1931.

Why there are so few pianoforte recitals.
Why Christopher Stone is not allowed more Gramophone Time.

How many listeners really wanted to know "When a Blackbird Lays Eggs."

What will happen when there are no Bach Cantatas left.

Whether a recent talks title "What do we learn from all this?" was not the worst yet.

Who is the announcer at Savoy Hill who talks in a low mumble?

Longer Intervals.

Why the intervals between items are increasing in length.

Why the Epilogue must be broadcast exactly at the half hour.

If it is necessary to have sometimes a five-minutes pause in the programme before the time signal.

Why it is not possible to superimpose this signal on the programme in such instances, if items are likely to run past their allotted time.

If the cinema organ could not be utilised as a supplier of broadcast entertainment far more than is the case at present.

MIKE, "MUTES," AND A NOTED COMPOSER



John Ireland (right) consults Jack Payne regarding the use of "mutes" to tone down trumpets, and trombones, while members of the B.B.C. Dance Orchestra provide a practical demonstration of the effects obtainable.

If there exists a restaurant orchestra leader who does not like playing on the last half-inch of the E string.

Why the only historic drama given by the B.B.C. is of the poetic kind, in which everyone speaks in a continuous tremolo like a cinema organ.

How many listeners would be disappointed if eighty per cent of soprano singers were banned from the ether.

And what number would be glad.

Old and New.

Why a Sunday orchestral programme can include an old-time waltz but not a new one.

And why the same applies to musical comedy selections.

And if the owners realise the difference in reproduction a good supply makes.

What the military bands would do without Gilbert and Sullivan.

And who on earth persuaded one of them recently to blare its way through an arrangement of a Brandenburg Concerto.

If James Agate really speaks as distinctly as my set makes him.

When the "Foundations of Music" will be regarded as strong enough to build on?

If Harold Nicolson and A. J. Alan are not the two best microphone personalities outside vaudeville.

Why repetition on National and Regional is allowed to kill the alternative programme.

JACK PAYNE LOOKS AHEAD

(Continued from previous page.)

but they will probably not increase to the same proportion as the strings. The demand will be for softer, less extravagant tunes, with, of course, a dance rhythm.

"There will be greater scope, however, in the future broadcast dance orchestra for novelty effects. The microphone of twenty years' time will not be the comparatively insensitive instrument we have now; it will probably be capable of accepting and reproducing more fantastic effects than at the present time. And novelty effects will always be required of the broadcast dance orchestra unless—"

"Unless what?"

"Unless the public loses its sense of humour, which is not in the least likely.

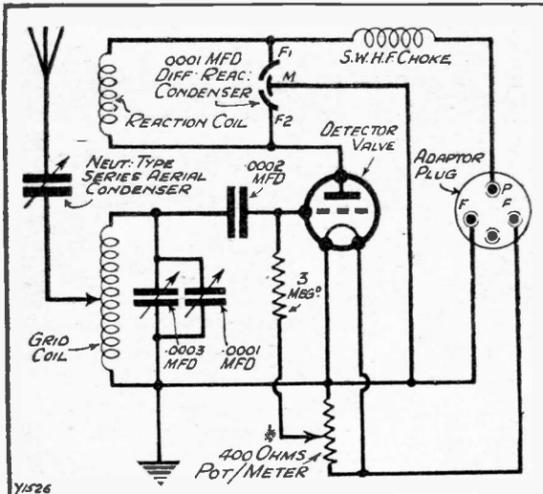
Weird Instruments.

"Again, I believe there will be a greater number of nationalised instruments in the years to come, so that the dance orchestra will be capable of producing Russian, Italian, Hungarian, African—in fact, any type of national music quite as well as any orchestra of one of those countries. That will be a most important consideration, for broadcasting is gradually assuming an international rather than a national aspect."

"Of course, there may be weird and as yet unheard of instruments in the broadcast dance orchestra of future years. Who can say? Nobody can predict anything with certainty—"

So perhaps, after all, it is best to follow the advice of the famous politician, and—
Wait and See!

IT USES YOUR OWN DETECTOR



Don't be frightened at seeing a valve in the circuit—it's not an extra one, but your own detector promoted to short-wave work!

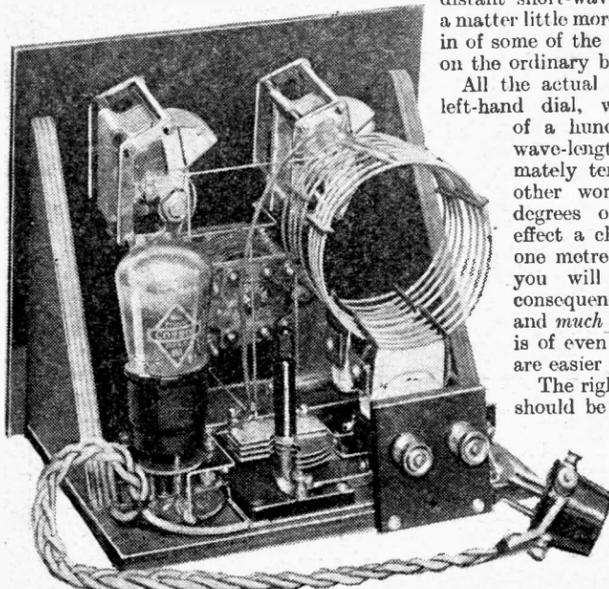
How would you like to hear your "Comet" receiver "turving out" the Yanks on the short waves in much the same way as it now puts over pretty well everything that there is worth hearing in Europe on the medium and long waves?

You like the idea?

America is a "Cert."

Perhaps yours is only a "Comet" Two? It matters not the slightest whether you are using the "Comet" two-, three-, or four-valver (with or without refinements), or even the single-valve version. You can tune in programmes with your "Comet" set from America—and in the case of the three, the four, and possibly the two—from Australia, or Africa! In fact, from every part of the world, and all for an additional expenditure of forty shillings, or even less!

READY TO ROPE THEM IN



Two short-wave coils and your own detector valve go into the adaptor, and its plug then goes into the vacant valve holder. Very easy!

This all sounds very fine, you may think, but what most concerns you no doubt is exactly how it is done. Well, all you have to do is to build the "Comet" Short-Wave Adaptor, the parts for which will cost at the most two pounds.

When you have finished it, you simply take the detector valve out of your present set and place it in the adaptor. You then fix the plug from the adaptor into the detector valve socket of your set, and when you have joined the aerial and earth leads to the adaptor terminals—well, the range of your set has been increased from one to ten thousand or more miles! And all for forty "bob," or at almost twenty miles a penny!

You make absolutely no alteration to your existing set in order to hear these distant programmes, and to put the adaptor in or out of use is the work of a few moments. There are no extra battery connections to make, all the necessary "juice" for the adaptor being obtained through the plug which connects it to your set.

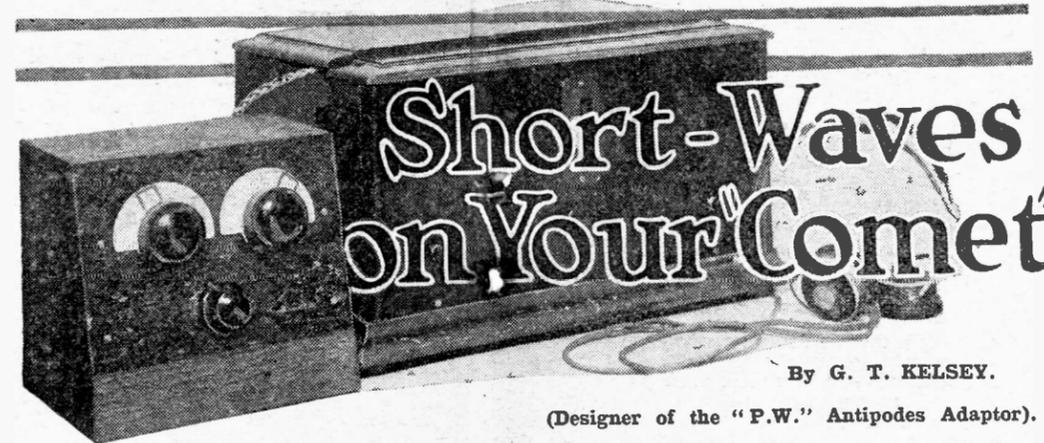
Perhaps your mind turns to the difficulties which are normally associated with the operation of a set on the short waves—or, shall we say, more correctly—to the difficulties by comparison with the operation of a set on the ordinary broadcast waves? Let me hasten to assure you that you can forget the word difficulty in so far as the "Comet" Short-Wave Adaptor is concerned.

Extremely Simple Tuning.

You see, this little unit incorporates the very latest idea in short-wave receiver design, the scheme of using two variable condensers in parallel across the tuning coil, and in consequence the finding of distant short-wave transmissions becomes a matter little more difficult than the tuning-in of some of the more elusive continentals on the ordinary broadcast waves.

All the actual tuning is done with the left-hand dial, which for a movement of a hundred degrees only alters wave-length to the extent of approximately ten to fifteen metres! In other words, a movement of ten degrees of this knob may only effect a change of little more than one metre in wave-length, and, as you will appreciate, stations in consequence become "spread out" and much more easy to find. What is of even greater importance, they are easier to tune in.

The right-hand condenser control should be regarded solely as a wave-length adjuster, and—if you desire to, take full advantage of the simpler tuning scheme



By G. T. KELSEY.

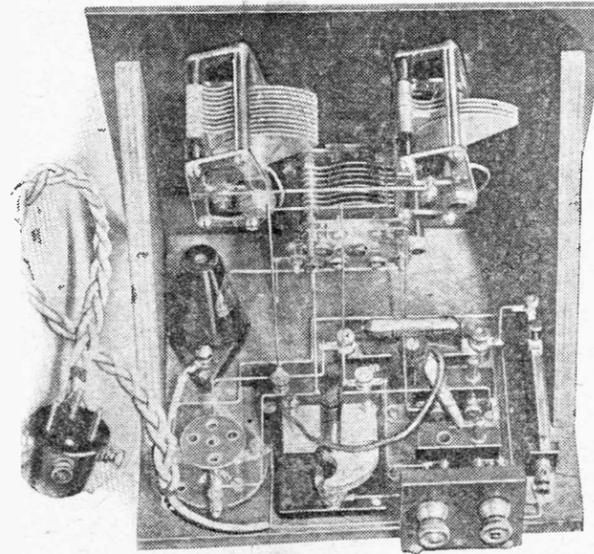
(Designer of the "P.W." Antipodes Adaptor).

Had America on your "Comet" yet?—or Nairobi?—or Buenos Aires? You can get all these and hundreds more with the aid of this remarkable adaptor. It costs less than two pounds—and gives you all the earth! Read everything about it below.

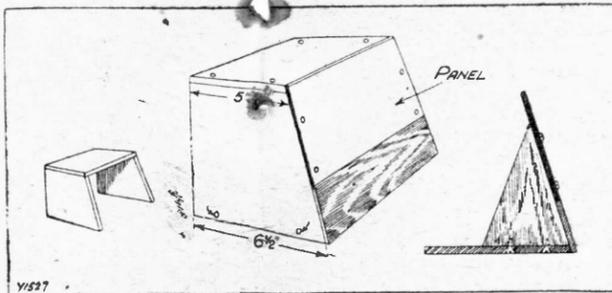
—it should never be used for actual tuning purposes. You simply advance it ten or twenty degrees at a time, and then for every movement of this dial you rotate the tuning dial (the left-hand one) throughout its range of 100 degrees.

Let me make it a little more clear.

PROGRAMMES OVER THOUSANDS OF MILES!



That's what this adaptor can bring in—stations thousands of miles away—and all for less than £2. Below are the details for making the cabinet.



Inexpensive.

These figures are, of course, only approximate, and will depend upon the coil sizes in use, but at least they will show the general principle—not

to mention the tremendous advantages—of the two-condenser-tuning idea.

In short, the "Comet" Short-Wave Adaptor is one of the final sparkles in the tail of the remarkable "Comet" series. It is inexpensive, easy to build, and perhaps above all remarkably simple to operate.

But the proof of the pudding is not in talking about it!

You know what it will do, and how it will do it, so now study the component list, get together the necessary parts, and then set about building one for yourself.

On Any Set.

Just before telling you how to proceed with the constructional work, let me add that if there are any readers who have not tackled one of the "Comet" sets, but who are interested in this adaptor, there is no reason why you, too, should not build one, for although it was primarily designed for "Comet" constructors, it can be used quite successfully in conjunction with any straight two-, three-, or four-valve receiver.

Before you can proceed very far it will be necessary for you to tackle the wood-work part of the business, so we may as well start

off straight away with this part of the construction. All the wood, with the exception of the small strip at the front, is cut from 3/4-in. material, and the dimensions for some of the pieces required can be obtained from the diagram in which the cabinet is shown.

The angle of the two wooden brackets by which the ebonite panel is secured to the baseboard can be obtained from the side pieces of the actual wooden cover. These side pieces are 7 in. high, and slope away on one side from 6 1/2 in. at the bottom to 5 in. at the top.

Panel Drilling.

The small wooden strip along the front below the panel is cut from three-ply wood, but as it is only there for the sake of appearance, you can, if you like, leave it out altogether providing you increase the depth of the panel accordingly.

When the cabinet and panel assembly is finished, remove the panel, mark out the three holes for the condensers and then drill it in the usual manner. You can then proceed to fix the condensers to the panel, but do not refix the panel to the baseboard supports until all the baseboard components have been fixed and—with the exception of the wires to the tuning and reaction condensers—wired up. This procedure is necessary as otherwise you will have the greatest difficulty in getting at the components which come close to the condensers.

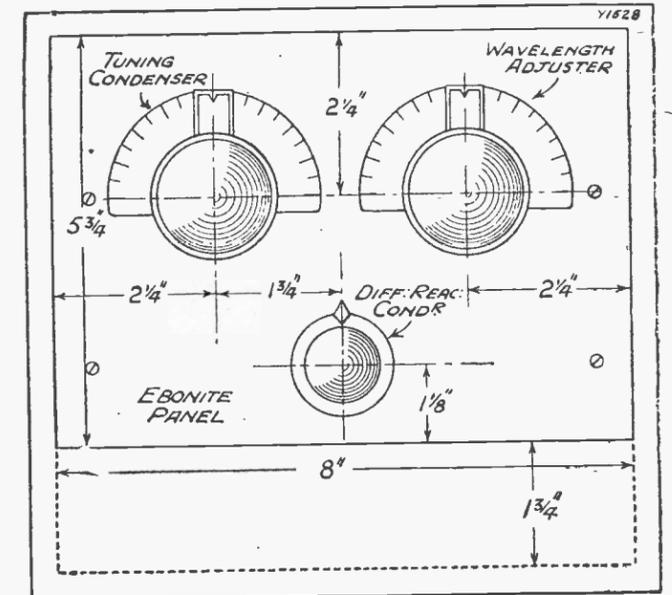
The flexible leads from the adaptor to the plug (which, by the way, can be obtained commercially if you ask for a four-pin valve adaptor, or alternatively can be made from the base of a defunct valve) are made from ordinary flex wire, and should be just sufficiently long to reach comfortably inside the set when the adaptor is standing next to it.

Testing Out.

There is really nothing else to tell you about the construction. It is all quite straightforward, and if you work from the diagrams you will not be likely to go very far wrong. So now let us pass on to the more interesting task of trying out the unit.

First of all remove the detector valve

IT COVERS THE WHOLE WORLD



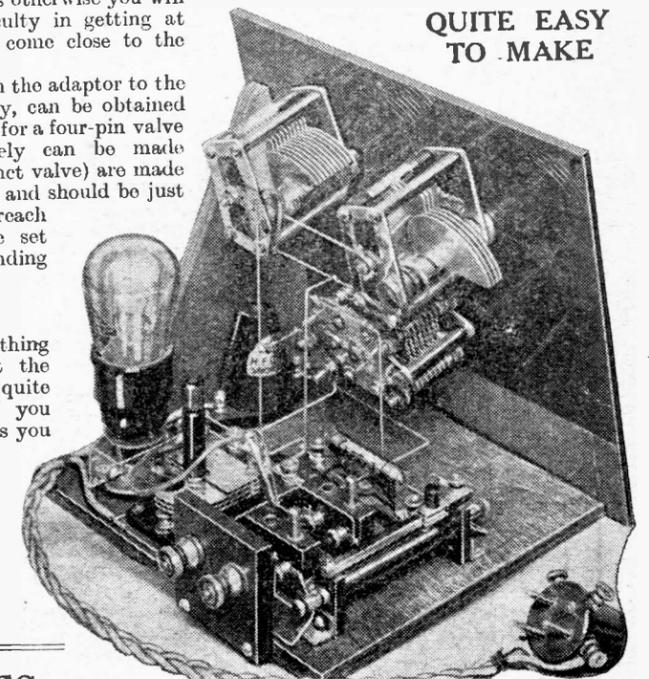
All the short-wave tuning is done on the new controls, and you don't have to bother with your ordinary tuning and reaction dials.

from your set, and place it in the adaptor. If, by the way, your set is the "Comet" Four or any other set in which an H.F. stage is included, the H.F. valve or valves preceding the detector should also be removed.

The Coils To Use.

Next insert the adaptor plug into the detector valve holder of your existing set, transfer the aerial and earth leads from the set to the unit, and substitute for the loud speaker a pair of 'phones. Place a five-turn short-wave plug-in coil in the socket (Continued on next page.)

QUITE EASY TO MAKE



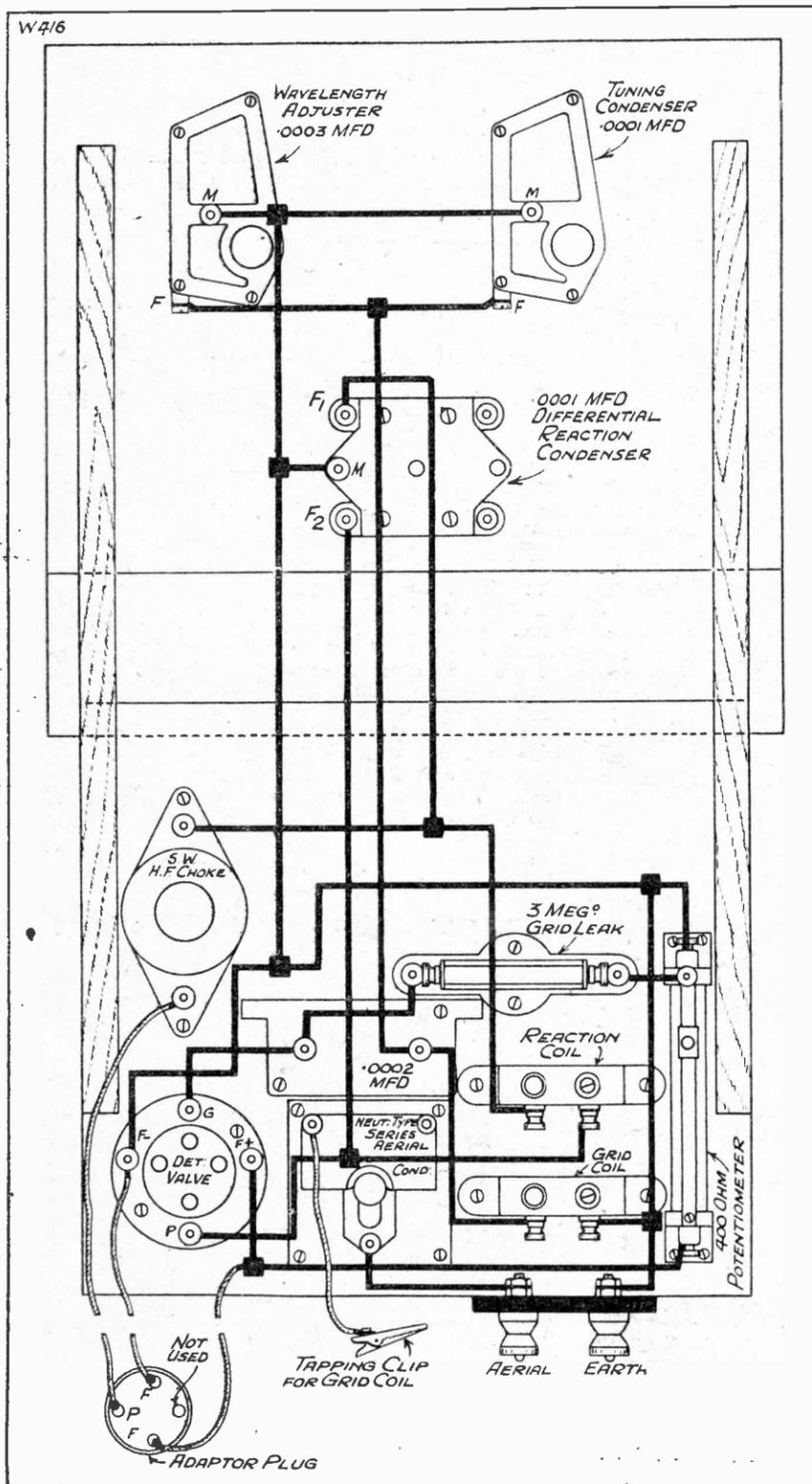
The wiring is simple, the components are few—but the extra range is really staggering.

DON'T BE TIED TO EUROPE — GET ALL THE OTHER CONTINENTS

SHORT WAVES ON YOUR "COMET."

(Continued from previous page.)

HOW THE PARTS ARE PLACED AND WIRED



Note how the three long "flexes" go to the adaptor plug.

nearest the back of the unit, and a four- or five-turn coil in the other coil holder.

Join the clip at the end of the flex lead from the series aerial condenser to a point about midway on the grid coil (the one nearest the back), and all is then ready.

First of all increase the reaction condenser to make quite certain that the set will oscillate quite satisfactorily. (This, by the way, should be done at every ten degrees or so of the wave-length adjuster to make certain that the set will oscillate over the whole range.)

Bringing in the Stations.

You may find small bands of four or five degrees here and there over which the set will not oscillate, but these "dead

INSIDE THE ADAPTOR.

- 1 0003-mfd. variable condenser, slow-motion type, or with vernier dial (Jackson "Tiny," or similar small type—not solid dielectric).
 - 1 0001-mfd. variable condenser, as above.
 - 1 0001-, or any capacity up to 0002-mfd. differential reaction condenser (Cylton, or Lotus, Igranic, Ready Radio, J.B., Dubilier, Parex, Ormond, etc.).
 - 2 Single coil holders (Lotus, or Igranic, Bulgin, Wearite, Magnum, Lissen, etc.).
 - 1 400-ohm potentiometer (Ready Radio, or Igranic, Lissen, Wearite, etc., round type).
 - 1 3-megohm grid leak and holder (Graham Farish, or Lissen, Ferranti, Dubilier, Igranic, Ediswan, Mullard).
 - 1 0002-mfd. fixed condenser (Lissen, or Formo, T.C.C., Telsen, Ferranti, Ediswan, Dubilier, Igranic, Ready Radio, Mullard, Watmel, etc.).
 - 1 Neut.-type series aerial condenser (Bulgin, or Magnum, J.B., etc.).
 - 1 Four-pin valve holder (Clix, or Benjamin, Igranic, Lotus, Lissen, Bulgin, W.B., Junit, Formo, etc.).
 - 1 Short-wave H.F. choke (Magnum, or Igranic, Wearite, etc.).
- Flex, valve adaptor plug, terminals, wire, wood for cabinet, screws, etc.

spots" are caused by the aerial, and unfortunately seem unavoidable. It is usually possible to shift them, however, by altering the series aerial condenser.

The potentiometer is for the purpose of obtaining smooth reaction control, and the slider should be adjusted until the set changes into the oscillating condition without the slightest trace of "ploppiness." It should, however, be used as near to the positive end as is consistent with smooth reaction control.

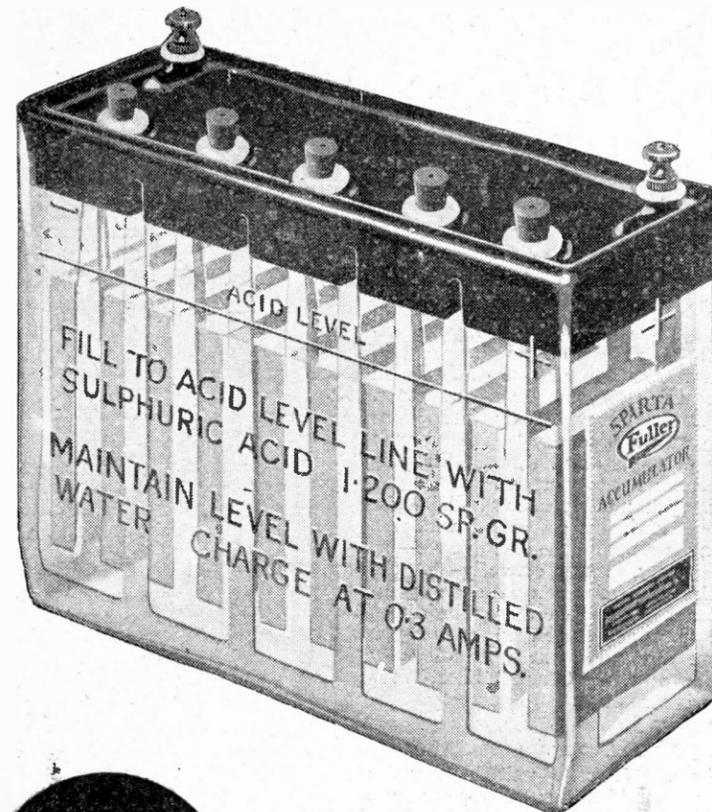
When searching for stations, the reaction condenser should be adjusted so that the set is just—but only just—in the oscillating condition. The tuning condenser (don't forget, it's the left-hand dial) should then be slowly rotated until a carrier wave, or in other words a whistle, is heard. Providing it is a telephony station, decreasing the reaction until the set just stops oscillating and slightly retuning enables you to hear the programme.

For a Slightly Higher Band.

The coils mentioned above will cover from approximately 20 to 55 or 60 metres. The range of the set can be extended from 50 to about 100 metres by replacing these coils with a ten-turn grid coil and an eight-turn reaction coil.

Here again the clip on the flex from the series aerial condenser should go to a turn about midway on the grid coil, the best position being found by trial.

For the wireless enthusiast H-T WET ACCUMULATORS



For multi-valve sets especially, Fuller H.T. Wet Accumulators give an even, constant, reliable power output which never falters right to the end of the charge. They are unequalled for increasing the general efficiency and tone-purity of the set. They run for months without recharging and then the renewal cost is very small. The micro-porous pasted plates (exclusive to Fuller) have a texture not merely finer and smoother than that of ordinary plates, but much more durable in wear. They do not crumble or break down. Then there are patent grease-cup terminals, effectively preventing corrosion and bad contacts. Fuller H.T. Wet Accumulators are contained in moulded glass boxes and are supplied dry charged.

- Type MHG 10 v. 3,000 M.H. 5/-
- Type DMHG 10 v. 6,500 M.H. 6/9
- Type QMHG 10 v. 10,000 M.H. 11/6

FULLER SUPER BATTERIES



MOTOR CAR BATTERIES

Patent double grease-cup terminals eliminate risk of acid creep. Strong, durable ebontite containers. Micro-porous paste. There is a type for every car—ask for lists 104 and 105a.



"NON-SPILL"

L.T. ACCUMULATORS JELLY ACID TYPE

For Portable Receivers. Micro-porous pasted plates. Indestructible separators; large non-spill vents. Standard on many well-known Portable Sets. Can be used in any position. JAP 11, 22 a.h. 13/6. JUA9 18a.h. 13/- Ask for list 269.



DRY H.T. BATTERIES

For Portables the Fuller W.O.P.100 is supreme. It gives them the power they need—guaranteeing up to 20 milliamps, 100 (reads 108) volts, 10"x5"x3", 15/- Complete range of standard, super power and grid bias batteries available



L.T. ACCUMULATORS

Dry charged Mammoth plates for Modern Valves; micro-porous paste; patent double grease-cup terminals; L.D.G. 2 v. 60 a.h. 9/6. Also M.S.G. 2 v. 22 a.h. 4/6. Ask for list 270a.

Obtainable through FULLER service agents or any reputable dealer. Full list of sizes and types post free. FULLER ACCUMULATOR CO. (1926) LTD., CHADWELL HEATH, ESSEX.

BUY ALL YOUR RADIO FROM READY RADIO

Build your "COMET" with the CHOSEN COMPONENTS

THE "COMET" THREE (Foundation Circuit)

- KIT A - £4 5 0 Or 12 monthly payments of 7/9
(Complete Kit of Components, as specified.)
KIT B - £5 12 6 Or 12 monthly payments of 10/4
(As Kit A, with set of Mullard valves.)
KIT C - £7 2 6 Or 12 monthly payments of 13/-.
(As Kit B, with attractive oak cabinet.)

Additional Components for L.F. CONTROL
£1.10.10 (If ordered with any of the Kits, add 2/9 per month to the monthly payments.)

FLEXI-COUPLED "COMET" THREE

- KIT A - £5 3 3 Or 12 monthly payments of 9/5
(Complete Kit of Components, as specified.)
KIT B - £6 10 9 Or 12 monthly payments of 12/-
(As Kit A, with set of Mullard valves.)
KIT C - £8 0 9 Or 12 monthly payments of 14/8
(As Kit B, with attractive oak cabinet.)

Completely Assembled FLEXI-COUPLED "COMET" THREE
Ready for use aerial tested, valves, cabinet and royalties included. £9.5.9, or
12 monthly payments of 17/-.

Additional Components for "COMET" RADIO-GRAMOPHONE

13/6. If ordered with any of the Kits, add 1/3 per month to the monthly payments.

"MAGIC" THREE CONVERSION KIT £1-8-9

THE "COMET" TWO

- KIT A - £3 2 6 Or 12 monthly payments of 5/8
(Complete Kit of Components, as specified.)
KIT B - £4 1 6 Or 12 monthly payments of 7/6
(As Kit A, with set of Mullard valves.)
KIT C - £5 1 6 Or 12 monthly payments of 9/3
(As Kit B, with attractive oak cabinet.)

Components for completing the "COMET" TWO

16/-. If ordered with the "Comet" Two Kit, add 1/6 per month to the monthly payments.

THE "COMET" FOUR

- KIT A - £6 10 0 Or 12 monthly payments of 12/-
(Complete Kit of Components, as specified.)
KIT B - £8 17 6 Or 12 monthly payments of 16/3
(As Kit A, with set of Mullard valves.)
KIT C - £10 10 0 Or 12 monthly payments of 19/3
(As Kit B, with attractive oak cabinet.)

Components for completing the "COMET" FOUR.

£2 7 0. If ordered with the "Comet" Four Kit, add 4/3 per month to the monthly payments

"COMET" H.F. UNIT

- KIT A - £3 8 6 Or 12 monthly payments of 6/3
(Complete Kit of Components, as specified.)
KIT B - £4 8 6 Or 12 monthly payments of 8/-
(As Kit A, with specified valve.)
KIT C - £5 3 6 Or 12 monthly payments of 9/6
(As Kit B, with attractive oak cabinet.)

THE "COMET" ONE

- KIT A (less valve and cabinet) £2 19 6 or twelve equal monthly instalments of 5/6
KIT B (with valve less cabinet) £3 8 0 or twelve equal monthly instalments of 6/3
KIT C (with valve and cabinet) £4 3 0 or twelve equal monthly instalments of 7/7

THE "COMET" A.C. SAFE-POWER UNIT

Complete Kit of Components £5 3 0

Or 12 monthly payments of 9/6

Any part may be purchased separately.

TO INLAND CUSTOMERS
Your goods are despatched post free or carriage paid.

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

Avoid delay and disappointment and the offer of unsatisfactory substitutes by ordering a complete kit of specified components from Ready Radio.

If it is not convenient for you to send cash with order you can order immediately and pay on delivery or we will despatch your goods immediately and you can pay by easy monthly instalments.

THE "COMET" SHORT WAVE ADAPTOR

	s.	d.
1 Ebonite Panel 8" x 7½" x ¾" drilled to specification	2	6
1 Cabinet to specification	7	6
1 Jackson Bros. '0003 mfd Tiny variable condenser	9	6
1 Jackson Bros. '0001 mfd Tiny variable condenser	8	6
1 ReadiRad '00015 mfd differential reaction condenser	5	0
2 ReadiRad Single Coil Holders	1	8
1 ReadiRad 400 ohm baseboard mounting potentiometer	2	9
1 ReadiRad 3 megohm Grid Leak and Holder	1	4
1 ReadiRad '0001 mfd fixed condenser	10	
1 Bulgin N.Y. Neutralizing Condenser	4	9
1 Telsen sprung valve holder	1	0
1 Igranic Short Wave H.F. Choke	2	0
1 pkt. ReadiRad "Jiffilix" for wiring	2	6
1 ReadiRad Terminal Block with terminals	9	
2 Atlas Short Wave Coils 4 and 6	5	3
Flex, plug adaptor, tapping clip, etc.	1	11
	£2	17 9

or 12 monthly payments of 5/2.

IMMEDIATE DISPATCH

ORDER FORM

To: READY RADIO (R.R. Ltd.) 159, Borough High Street, London Bridge, S.E.1.

CASH ORDER FORM. Please despatch to me at once the goods specified for which I enclose payment in full of £.....

C.O.D. ORDER FORM. Please despatch to me at once the goods specified for which I will pay in full the sum of £.....

HIRE PURCHASE ORDER FORM. Please despatch my Hire Purchase order for the goods specified for which I enclose first deposit of £.....

Name

Address

Kit Required

Ready Radio

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

Telephone: Hop 5555 (Private Exchange)

Telegrams: READIRAD, SEDIST.

STATIONS WORTH HEARING

Some practical distant-programme notes compiled by a special contributor who nightly searches the ether in order to obtain really up-to-the-minute information for "P.W." readers.

By R. W. H.

IT is a great pity that some of the countries whose official representatives signed the agreement upon which the Prague Plan is based are not carrying out to the letter the undertakings that they gave.

It was distinctly agreed by almost every country in Europe, with the exception of Russia, that stations should work upon the wave-lengths allotted to them, and should not cause interference by wandering about all over the band.

Bad Interference.

Certain countries are very much to blame for the way in which they are allowing their stations to cause widespread interference. By far the worst offender at the present time is France, some of whose stations seem to be doing exactly as they like.

The best behaved stations are Radio-Paris, Lyons Doua, Paris P.T.T., Toulouse Midi, Strasbourg and Bordeaux Lafayette. Of the others Radio Maroc, by butting in, is interfering with both Witzleben and Dublin. Radio L.L. ruins Hamburg; Radio Algiers heterodynes both Bergen and Mühlacker; the Poste Parisien causes a good deal of

trouble: Radio Vitus interferes with Genoa; Radio Lyons seems to be working on any wave-length he likes and interferes with numerous stations between 280 and 290 metres.

Juan-les-Pins has grabbed a wave-length and is making a nuisance of himself; Beziers is doing the same. Bordeaux Sud Ouest has not had the same wave-length on two consecutive nights in recent weeks; Radio Binche heterodynes Lodz by working off his wave-length; Fécamp interferes with Cork, and Toulouse P.T.T., though provided like most other French stations with a U.I.R. wave-meter, has never been recently within a kilocycle of his proper carrier-frequency.

Other Offenders.

Other offending countries are Italy with her Bolzano station, Norway, whose relays are distinctly troublesome, and Sweden—Falun often completely spoils Bordeaux Lafayette and the Swedish relays are rarely on their correct wave-lengths.

At present the slogan amongst European broadcasting authorities appears to be: shout your neighbour down and if you

can't, grab another wave-length, no matter whose transmissions you may spoil.

What a pity it is that we have not in Europe some body with real authority like the Federal Radio Board in the United States, which jumps with both feet on any station which deviates even for a brief period more than a few hundred cycles from its assigned frequency.

Despite these wails (both mine and those caused by heterodynes) the number of stations receivable at fine strength and with good quality is remarkably large. The owner of a receiving set of reasonable selectivity and containing at least one efficient stage of H.F. amplification should have, at any time, a choice of a dozen or more programmes really worth listening to.

Some First-Rate Stations.

As the summer draws on the number of first-rate stations naturally decreases, and to save time and trouble it is as well to keep a list of the stations which in your locality and with your own set are best worth trying for when conditions are none too favourable.

As a basis for such a list I suggest the following stations. Long waves: Huizen, Radio-Paris, Königswusterhausen, Warsaw, Motala, Kalundborg, Oslo. Medium waves: Budapest, Vienna, Brussels No 1, Milan, Langenberg, Rome, Stockholm, Witzleben, Katowice, Sottens, Frankfurt, Toulouse, Strasbourg, Bruen, Brussels No. 2, Breslau, Gothenburg, Hilversum, Heilsberg and Nuremberg.

From this you should be able to pick from ten to a score which are really outstanding. Note down their condenser settings and you will be able to have a chance of alternative programmes instantly all through the summer.

THIS week I propose to clear up such letters as are of sufficient "general interest." Please note that this excludes the "W 2 X A D Department"!

First, we have a report from "D. P." of Chesterfield of the reception of W 1 X A D on about 50 metres. Has anyone else heard him? "D. P." reports general conditions very good, and has also received some Americans on the broadcast band.

Next S. F. C. (N.W.10) wants confirmation of the existence of W 3 X A L, Bound Brook, working on about 21.76 metres. So far as I know, there should be no broadcast on that wave, but can anyone help with further reports? S. F. C., incidentally, does not agree with all these different short-wavers being published.

"And There You Are."

He says: "All you want is a detector and an amplifier, and there you are," or words to that effect. Yes, S. F. C., but one detector and amplifier does not bear the least resemblance to another, when it comes down to question of detail. I know of detectors that don't detect, and amplifiers that don't amplify. But perhaps you have been more fortunate.

C. A. S., of Southampton, sends in an excellent log of short-wave broadcasts, and also of amateur telephony, with a "P.W." two-valver. He wants to know whether he is my youngest correspondent, his age being sixteen! Who is going to break this record? Forward, all the short-wave infants-in-arms.

J. S., of Magull, Lancs., writes an interesting letter on things in general, and

SHORT-WAVE NOTES

Here are some useful remarks on happenings down on the short waves by W. L. S., a very well-known amateur transmitter and a leading expert on the subject.

the Russian programmes in particular. His caustic remarks might cause trouble if I printed them, although I heartily endorse them all.

By the way, he, among others, inquires whether I am too lazy to write a full page of notes any more, as used to be the case. The answer to this is that the Editor has arranged for these regular weekly notes to occupy half a page, but, in addition, I shall be writing other articles on less general short-wave matters. So, in the long run, I shall be doing just as much work, and the accusation is unfounded!

Was It Strasbourg?

Now we have S. F. L., of Bristol, who wants to know whether anyone has a prior claim to his of hearing Strasbourg, A N C. Is this call-sign right? There should be nothing beginning with A or B nowadays.

A. J. A., of Burton-on-Trent, describes his set, and inquires whether the "Antipodes Adaptor" would be any good to him for short-wave work. Certainly, A. J. A., the set mentioned is suitable for anyone with almost any kind of receiver, and certainly

appears to be suited to your circumstances. Next, I have to acknowledge a long and interesting letter from G. E. C., of Porto Alegre, Brazil, who is a regular "P.W." follower. He confirms the final remarks in these columns about the Buenos Aires station and his announcements.

He also gives a good station for the DX-hound, in the shape of "P R A G Radio Sociedade Gaucha, Porto Alegre." This chap transmits on 35.5 metres with an input of 500 watts between 13.30 and 14.00 G.M.T., and G. E. C. lives in the hotel, to the roof of which this station's aerial is attached! Hence his ardent desire that other people should hear it as well.

All the Way From Japan.

Brazil appears to be well placed for short-wave reception, particularly from the States. Many thanks, G. E. C., and I should like to hear again.

Three readers report reception of K A I X R, Manila, for the first time for a long period. This confirms the sudden improvement in conditions "out East" on 20 metres. For the first time on record several Japanese amateurs have been received really well here, and several of our higher-powered transmitters have had good two-way contacts with them. This is quite an unparalleled event in amateur radio, for only very half-hearted contacts have been possible before, and even they were extremely rare.

Generally speaking, conditions continue to be extraordinarily good, and there is a good prospect of their remaining so for a long time.

OPERATING A FLEXI-COUPLED RECEIVER



Some hints and tips that will help you to enjoy to the full the wonderful results that are obtainable with sets employing the new and uncannily effective "P.W." system for super-selectivity.

By G. P. KENDALL, B.Sc.

MOST of us know how to operate the more conventional types of sets, and instructions for handling them to the best advantage are scarcely necessary nowadays. Their controls are usually very much alike, and it is just a matter of getting used to handling one, two or in some cases even three dials, to become perfectly at home with any particular receiver.

In "Flexi-coupling," however, we have something quite out of the ordinary, and to get the best out of a set incorporating it you have one or two new tricks to learn. It is really very simple, but since the scheme is so new it has occurred to me that possibly a few special hints on the subject might be of assistance.

Not a Critical Control.

Users of such sets as the "Comet" Two and the "Comet" Three will already have discovered that they are very much easier to operate than any receiver with two tuning dials, although both the single dial and the selector knob must be set to the right positions for the best results from a given station.

The reason is, of course, that the selector knob is very much less critical in its setting than the ordinary tuning dial. You can thus pick up your station on the condenser dial alone, and you will hear it after a fashion with the selector knob set almost anywhere.

It is consequently quite possible to search for the stronger stations at first on the condenser dial alone, and only when one has been picked up, to bring the selector to the correct stud. When you do so, of course, the station will come up in strength and interference will disappear in the delightfully complete manner characteristic of a "Flexi-coupled" receiver.

The fact that this can be done renders searching a decidedly easy process, but it brings me to the first operating hint which

I want to give you. Now, it is decidedly easier to pick up the weaker stations when you are searching, if your selector switch is kept roughly in step with the tuning dial as you proceed in your search, and there are several ways of doing this.

Searching For Stations.

Here is a rough-and-ready method which works quite well. Tune-in a station anywhere on the lower wave-band, and find the right selector stud for the best volume. Now suppose you want to search in an upward direction, i.e. in the direction of higher dial readings.

Turn your condenser dial slowly, using reaction to keep the set just below the edge of oscillation, and for the first five degrees or so leave the selector coil on its present stud. Having covered these five degrees, move the selector onwards one stud in a right-hand or clock-wise direction and continue your search for another five degrees, and so on.

To search in a downward direction from a given point, you will naturally proceed in the opposite fashion, and by using this method it is a very simple business to cover the whole dial in a matter of a few moments. In effect, as you will see, you keep your

aerial circuit, controlled by the selector coil, pretty closely in step with the secondary circuit the whole time, and so the final adjustments each time you pick up a station are very quickly made.

The method I have just described is probably the best to use when making a systematic search over the whole dial, picking up the stations as they come along, but when you are looking for some particular station whose position among the others you know roughly, it is less convenient. In such cases I would suggest you proceed as follows.

This, as a matter of fact, is a hint which I should advise all users of "Flexi-coupled" sets to follow. For a start, tune-in a station very near the top of your dial; as near the top as you can actually get. Find for this station the best stud on your selector coil, and then make a pencil mark on the panel to denote the position of the knob pointer.

Those Little White Scales.

Now tune-in a station as near to the middle of the dial range as you can find one, and again make a pencil mark to indicate the position of the selector knob pointer. Finally, repeat the process for a station very near the bottom of the dial at a dial reading of, say, ten degrees or thereabouts, once more making a pencil mark upon the panel. (This will not be necessary if you have one of those makes of selector provided with a marked dial.)

Now you have three pencil marks upon the panel to denote the position of the pointer at the upper end of the range, at the middle and at the lower end. Incidentally, some people even go so far as to make out a little white cardboard scale for their selector knob, and stick this to the panel, but I, personally, have never found this necessary, the simple device of three pencil marks meeting practical conditions quite well.

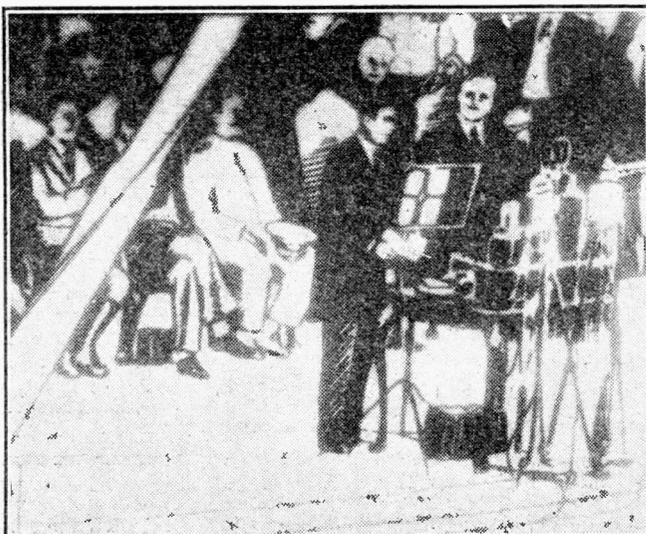
With their aid it becomes a very simple matter to estimate the position for the pointer for any given station whose position on the tuning range you know even roughly.

Easily Found.

Thus, suppose you expect your station to come in somewhere on the upper half of the dial; just put your selector knob halfway between the upper limit mark and the mid-point mark, and tune-in upon the condenser dial. You will almost certainly

(Continued on page 224.)

FLASHED THROUGH THE ETHER



A photo of the Prince of Wales giving his opening speech at the Buenos Aires British Trade Exhibition. This picture was flashed across by radio to London in 13 minutes, and it is claimed that this is a quite unique feat.

JOTTINGS FROM MOORSIDE EDGE.

We have already told readers many of the wonders of the North Regional, and here is an account of the official visit by the Press.
FROM OUR SPECIAL REPRESENTATIVE.

IN every room at Moorside Edge there is a series of coloured signal lights on the wall. Each light has a significance. Thus, if an engineer gets into difficulties with an obstinate piece of apparatus he presses a button, and in every room a bell rings and one of the lights flashes, and everybody dashes to the rescue.

Another light, I believe, signifies "Big Noise arriving." When the Chief Engineer, the North Regional Director, the Director of Information from Savoy Hill, the Assistant Director of Information, the North Regional Director of Information, the North Regional Dramatic Producer, sundry other high officials, and about fifty pressmen all arrived at the station one wet and misty afternoon, the "Big Noise" light must have flashed more insistently than ever to put the station on its best behaviour.

"And which light," I asked, "do you put on when Sir John Reith appears on the horizon?"

"We jam the lot on!"

Five Years' Progress.

My mind went back five years or so to just such another wet day when 5 X X was opened, and when just such another party of pressmen walked up Borough Hill at Daventry, and were conducted round the new high-power station by enthusiastic engineers whose talk of oscillators, potentials, and amperes completely flummoxed the representatives of the lay Press.

On that occasion in 1925, Captain Eckersley and his colleagues showed us with evident pride their greatest achievement—the largest and most perfect broadcasting station in the world.

To-day 5 X X is definitely old fashioned, and now Mr. Noel Ashbridge and his fellow technicians put Moorside Edge before us as the highest point reached by the B.B.C. engineers in their constant endeavour towards better and better transmission.

The difference between 5 X X and North Regional represents five years of progress. To-day North Regional is as fine an achievement as 5 X X was in 1925. Shall we, five years hence, look upon Moorside Edge as old-fashioned and be singing the praises of some new wonder?

30 to 10,000 cycles.

During the engineers' tests of Moorside Edge you may have heard the transmission of a tuning note which started at a very low note and went slowly up the scale until it was a high-pitch whistle.

This was a test of North Regional's frequency characteristic. I am told that the new transmitter is capable of transmitting any note between 30 cycles and 10,000 cycles perfectly.

This represents a range from the deepest grunt of an organ to notes higher than are produced by any orchestral instrument. With such a quality performance, Moorside

Edge has naturally aroused the enthusiasm of Northern listeners.

I was told that both Brookmans Park and Midland Regional have very similar characteristics, but I understand that 5 X X is not so good. Any listener with a good set can, in fact, mark the difference in quality between the old Daventry and these new regional stations.

Improvements at Moorside.

I was chiefly interested in the differences between Moorside Edge and Brookmans Park. The aerial system is, of course, quite different. The masts are more than twice as high, and with such high aerials and the long (479 metres) wave-length the North

not return immediately normal modulation is resumed.

Thus, if the engineer protests that he did not make the mistake the tell-tale meter remains for some time showing the over-modulation.

Higher Power.

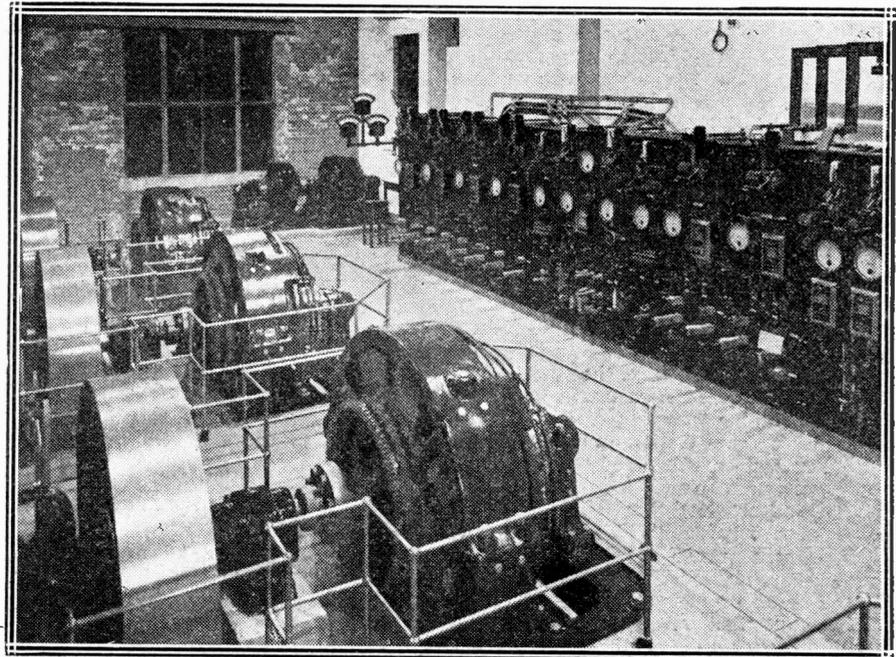
The four Diesel engines at Moorside Edge each give 345 horse-power at 335 revolutions per minute, to drive the main dynamos. Those at Brookmans Park give 300 horse-power at 300 r.p.m.

North Regional's two aerials are supported by three masts, whereas Brookmans Park has four masts. The Moorside Edge masts stand on porcelain insulators which completely insulate them from earth, and I was interested to learn that each mast can be "tuned" to minimise its screening effect on the transmission. A very necessary precaution at Moorside Edge is the provision of means to switch the main generators direct to the aerials, to melt any ice attaching to them.

Spectacular.

"This is even more impressive than Brookmans Park," I remarked to Major

WHERE THE WATTS COME FROM



Here is a corner of the power house at Moorside Edge, showing three of the four huge generators and the main switchboard.

Regional transmitter has a wider range than London Regional.

There are a few detail differences in the transmitters. At Brookmans Park the five cabinets of each transmitter are connected by bare copper strips running from the top of one cabinet to the top of the next. At Moorside Edge these intercoupling leads are hidden inside metal tubes, giving both an improved appearance and better screening.

Tell-Tale!

An innovation at Moorside Edge is that each transmitter has a meter which gives a direct reading of the degree of modulation. If the engineer on control over-modulates, the needle of the meter flicks over *but does*

Gladstone Murray, the Director of Information from Savoy Hill. Major Murray agreed and suggested that it was due to the contrast with the surroundings of the station—primitive, mist-covered moorland does indeed throw into spectacular relief the brightly illuminated building with its whining generators, its throbbing engines, and its rows of huge glowing transmitter valves.

NEXT WEEK:

"BROADCASTING IN THE NORTH"

BY THE NORTH REGIONAL DIRECTOR
OF THE B.B.C.

Use
"GOLTONE" COMPONENTS —
 For **BEST RESULTS**
 Specified by **"POPULAR WIRELESS"**

GOLTONE "P.W." & "M.W." DUAL RANGE COIL
 Extraordinary Selectivity, Clear Reception, Exceptional Efficiency. When operating on Short Wave, the Long Wave winding is paralleled, thus ensuring the avoidance of losses usual in other types of Dual Range Coils. No. DW/12.



GOLTONE STAR-TURN SELECTOR COIL
 Price now Reduced to **10/6**

Built to Rigid specification, with Engraved Dial. One Hole Fixing. For Flexi-Coupling and other Circuits. Laboratory Tested to give highest possible efficiency. No. R8/106. **10/6**

You can always get **BETTER RESULTS** if famous Goltone "No-Mast" Aerial be fitted. Price 24/- Illustrated pamphlet giving press reports, extracts from testimonials and full particulars sent on request.

Extract from "Popular Wireless," January 31st, 1931.
GOLTONE CONTRADYNE AND "P.W." DUAL RANGE COILS.

I would urge constructors to choose their makes with care. I've had samples sent me by Messrs. Ward & Goldstone, Ltd., and these are **absolutely to specification**, and very well made indeed.



GOLTONE "CUB" WAVE TRAP
TENS OF THOUSANDS ALREADY SOLD

Tunes up to 5GB wave-length and suitable for the new Regional Transmitters. There is no need for you to lose those distant stations with the opening of **MOORSIDE EDGE** and other high-powered Regional Stations. The "CUB" will eliminate this interference, and enable you to bring in the selected stations loudly and clearly. Fitted in a moment to any set.

No. R. 48/16 (Medium Wave Model) 2/6 each.
No. R. 48/46 (Long Wave Model) - 4/6 each.
 Simple instructions with each Unit. Pamphlet with full particulars and testimonials sent on request.

READ THESE.

- Mr. F. B., Lytham, St. Annes. The performance is truly remarkable
- Mr. F. C., Spring Terrace, Waterloo Street, Hull. Unit is simply marvellous
- Mr. L. H., The Oval, Firthpark, Sheffield. Found it very remarkable.
- Mr. J. K., Rusholme, Manchester. Wonderful results.



"Goltone" Components are obtainable from all First-Class Radio Stores. Refuse substitutes. If any difficulty write direct—

Ward & Goldstone
 MANCHESTER LTD.
 PENDLETON



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

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

The constructional articles which appear from time to time in this journal are the outcome of research and experimental work carried out with a view to improving the technique of wireless reception. As much of the information given in the columns of this paper concerns the most recent developments in the radio world, some of the arrangements and specialities described may be the subject of Letters Patent and the amateur and the trader would be well advised to obtain permission of the patentees to use the patents before doing so.

QUESTIONS AND ANSWERS

COILS FOR THE "MAXIPOWER."

S. J. (Newcastle).—"I have got a 'Maxi-power' Four; but I do not know the proper coil sizes to use for different wave-lengths. What coil sizes are required for this set, and where should they be placed? (Which coil holder?)"

In order to know which coil goes where you had better number the coil-holders as follows. Looking at the set from the back of the baseboard, that is to say, over the terminal strips, there is, to the right of the screen, a group of three coil holders, two placed close together and the other one separate. Number the outer or right-hand coil holder 1, the adjacent holder as 2, and the single holder standing towards the panel as 3.

On the other side of the screen there are three more holders, one pair standing near the screen and the other one by itself. These should be numbered 4, 5 and 6, No. 4 being that nearest to the screen, 5 the coil beside it, and 6 the isolated holder near the H.F. choke.

The coils to be inserted in these holders are as follow:

A No. 25 or 35 in the holders marked 1 and 4. A No. 60 coil in the holders marked 2 and 5. A No. 150 or 200 in the coil holder marked 3.

All these are ordinary coils, but of course, centre-tapped coils can be used if they are on hand. For the remaining coil holder, No. 6, you must use an X coil, and this can be either a 200 or a 250 X.

Where two coil numbers are given above either may be used, but the smaller coil will give the greater selectivity. Thus, if a 25 coil is used instead

but I am always dreading that it will do once again what it has done several times in the past—suddenly and without any cause whatever, developing a sort of singing noise which gets louder and louder and louder, until it is simply unbearable.

"The last time it happened my neighbour could hear it howl in his house, which is not attached to mine, but stands about twenty feet away, and he tells me there was nothing wrong with the broadcasting at that time as he was listening to the same programme.

"What causes a set to make this awful row, and most important, how can I stop it?"

This is a very old trouble and one which is easily stopped when the cause of it is understood. It happens because you place your loud speaker too close to the set, thus allowing the sound waves from the loud speaker to affect the valves.

It can be caused by almost anything that shakes the valves, as you will find if you tap your detector with your finger. What happens is that a mechanical shock of this kind, or a powerful sound wave from your loud speaker cause the valves to shake slightly, thereby altering to a small degree the very careful spacing between its electrodes.

The effect of this is to set up an audible note in the loud speaker and if this is placed near the set it naturally emphasises the disturbance, causing the howl to get louder and louder until the set is howling for all it is worth.

The remedy is simply to protect the set from little shocks of this kind. Sprung valve holders instead of those of the rigid type will be necessary, and the set can be cushioned on a rubber mat or other such shock-absorber, instead of standing direct on a table. It must be protected from the loud-speaker vibrations by keeping the speaker well away from it, and

"P.W." PANELS. No. 16.—RADIO RECEIVER CURRENT.

The main purpose of the L.T. Battery is to supply filament current. But in some circuits the potentiometer also draws current from the L.T.B.

Anodic current comes from the High-Tension Battery, but the screening grids also derive current from the H.T.B.

In a set with S.G. and pentode valves the screening grids generally require much more current from the H.T.B. than is taken by the detector valve.

of a 35 coil it will give sharper tuning, but there may be a little loss in signal strength as a result of using a smaller coil. So that if the set is to be used rather near to a powerful station, the smaller coil size should be used, or if it is to be used farther out, the larger will be better.

"IT ROCKS THE HOUSE."

W. F. L. A. (Peterborough).—"Do sets ever go mad? Mine seems to, anyway, and on two occasions it has been quite startling. It rocks the house.

"I cannot make out why this should be, as usually it gives every satisfaction with good quality, plenty of strength and so on,

if these precautions are observed the trouble will disappear.

THAT MAGNETISED WATCH.

Recent remarks in these columns on the demagnetising of a watch have brought many interesting letters from readers, and enquiries as to the results of experiments on these lines. In this connection the following letter from a Worthing reader (who is an A.M.I.E.E.) will be of interest.

"Dear Sir,—My attention has just been drawn to your reply to a correspondent in 'P.W.' of Feb. 7th, re demagnetising a

watch. I was successful in curing this trouble as follows.

"A coil of vulcanized wire about 10 in. in diameter and 110 yards in length was inserted in a 60-watt lamp circuit on a 200-volt alt. supply. This was done by connecting the end of the coil to the terminals of the tumbler switch controlling the lamp, and leaving switch in the open position, thus putting the coil in series.

"The watch was then held in the centre of the coil and then very slowly withdrawn. This seemed to put matters right, for the watch resumed its previous regular habits.

"A coil of the particular diameter and length employed was just chosen because it was handy (No. 18). Perhaps one with

"CAN'T GET THE SET TO WORK?"

Perhaps the switching doesn't work properly? Or some mysterious noise has appeared and is spoiling your radio reception?—Or one of the batteries seems to run down much faster than formerly?

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

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

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

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

more turns and more like a solenoid would do even better. Hoping this may interest you, and with many salaams,

"Yours faithfully,

Worthing.

"J. H. S., A.M.I.E.E."

RESISTANCES IN YOUR SET.

F. C. J. (Dollis Hill, London, N.10).—"In the article, 'Resistances In Your Set,' page 19, 'P.W.' March 21st, 1931, you say about fixed condensers: 'Connect a battery across the two terminals and no current passes.' Yet in the bottom right-hand corner of the same article it says . . . 'will hold charges of electricity for days at a stretch.' If no current passes, how can a fixed condenser get saturated with electricity?"

Yours is not an easy question to answer in a few words, and perhaps the best way to put it briefly is the following:

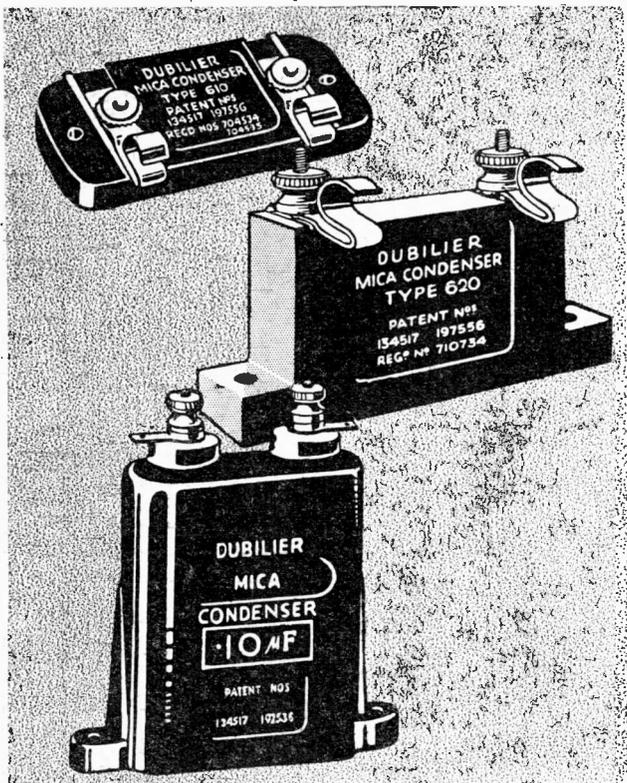
First of all let us generalise and say that an electric current is electrons which are moving, and also that an insulator is a substance through which electrons find it very, very, very difficult to travel. Having cleared the air in this fashion, let us remember, now, that a fixed condenser is an arrangement of an insulator on both sides of which there is a large conductive surface.

If such a large condenser is connected in series with a battery and a suitable measuring instrument, the latter would show a large momentary movement of electrons. In other words a large electric current might flow, at least for a time, but this does not necessarily mean that current will pass through the insulator.

If some electrons left the battery and simply took up a new position on one set of plates on the fixed condenser, this movement of electrons would represent electric current, although none of these electrons might actually pass the insulation. Similarly on the other side of the insulation the electrons which were already in the condenser might migrate from it into the battery, and this, too, would be an electric current although none of these electrons would actually pass through the condenser's insulation.

Such a procedure would completely alter the potential on both sides of the condenser and if it were disconnected from the battery, etc., and if its insulation were miraculously good, the potential-difference effect would be noticeable for days. In other words it would hold a charge of electricity for days.

(Continued on page 220.)



THAT ARBITRARY WORD "BETTER"

IT is easy to say that one's products are "better" but, after all, it's experience that counts. You can say of anything that it is better, but that does not make it better.

Only by long years of manufacturing experience of some of the finest engineers in the country can the perfect condenser be produced.

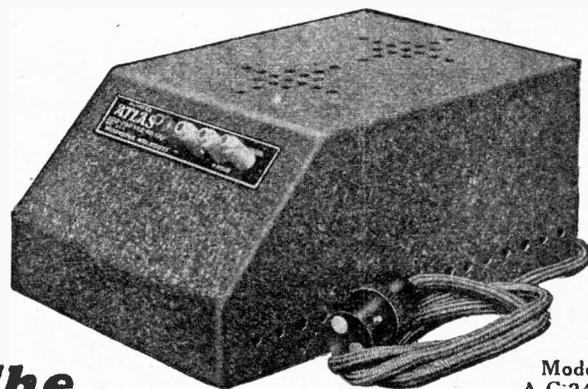
Such condensers are built by Dubilier who first produce a thoroughly reliable condenser, both electrically and mechanically, and then—only then—consider the box into which it is going. Verb. sap.

DUBILIER CONDENSERS

DUBILIER CONDENSER CO. (1925) Ltd.
DUCON WORKS, VICTORIA ROAD, N. ACTON, W.3

Cheaper Radio!

Everlasting High Tension for a trifle over the cost of 2- 120 Volt Batteries



Model
A.C.244.

The Neatest & Cheapest A.C. Unit ever made

With alternating-current electric lighting in the home it is now possible for you to banish your Radio troubles and assure H.T. for your Set for a lifetime at a little more than the cost of a year's supply of Batteries—the secret is the "ATLAS" new Unit A.C.244. A development of the famous "ATLAS" Olympia Winner—Model A.C.188. It is no larger than a 60v. Battery, and no matter what your Set is—from one to four Valves, Standard or Portable—the facilities and output of A.C.244 will be found more than satisfactory. Three Tappings are provided—60/80 Volts for Screen Grid Valve, 90/100 Volts for Detector Valve, and 120/150 Volts for Pentode or Power Valve. Output: 120 Volts at 20 m/A or 150 Volts at 15 m/A. It incorporates the Westinghouse Metal Rectifier, and is complete with Wander Plugs and Earth Terminal, and fully guaranteed for 12 months.

59'6
CASH PRICE

"CLARKE'S ATLAS" MAINS H.T. UNIT—A.C.244

Ask your Dealer for a demonstration of this amazing Unit, and, in case of difficulty, write direct for Folder No. 56 to the makers:—

H. CLARKE & Co. (M/CR), Ltd., Atlas Works, Old Trafford, Manchester.
LONDON OFFICE: 60, CHANDOS STREET, STRAND, W.C.2.
GLASGOW OFFICE: 24, OSWALD STREET.

RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 218.)

So if you connected such a condenser across the mains for a second instead of across an H.T. battery, you could, as mentioned in the article, "post an electric shock in it!"

This latter must not be taken too literally, for the P.M.G. would certainly have something to say about such a procedure. But it was a very picturesque way of illustrating the above point.

WHAT WAS WRONG WITH IT?

We have often commented in these columns on the fact that one small fault will ruin the performance of an otherwise perfect set. Examples of this are continually coming to



RADIO SYMBOLS. No. 16. RESISTANCE AND CONDENSER.

This symbol combines a resistance and fixed condenser, so it often represents the paralleled grid leak and condenser.

It is usual to state the respective values against the symbols on the diagram.

Common values for the above purpose would be .0002 and 2 megohms.

light, and the following interesting letter from a reader to the Editor is a good instance. Moreover, it is a good example of a puzzling fault that was manfully tackled and put right by the owner of the set himself. He says:

"Dear Sir,—I am writing you this letter as it may interest you to know what happened when I built the 'Comet' Three. I used all brand new British parts, including the Star-Turn selector coil.

"On trying the set out I was greatly surprised to find that on the ordinary waves with reaction full on, I could only get the British

stations very faintly and on the long waves only 5XX. Of course, the two London stations came in very powerful and no reaction was needed.

"It took me many hours before I could trace the trouble, which proved to be the reaction condenser.

"On taking this to pieces I found a thick film of black oil between the fixed arm and the spindle. When this oil was removed and the condenser put back the 'Comet' did everything it was supposed to do. Wishing you every success. I am,

"Yours truly,
"E. W. (London)."

LOOKING AFTER THE L.T. BATTERY.

C. S. T. (Redhill, Surrey).—"Now that Spring is in the air I shall be neglecting my set in favour of the old side-car. But I have so enjoyed it this winter that I want it to be in tiptop condition in the autumn, and I think I have seen it somewhere in 'P.W.' about the care of accumulators when they are not being used very much. Could you please tell me the few points to bear in mind so as to keep the battery in good condition?"

There are several things to watch when an L.T. battery is not being used very much, for as a matter of fact constant use is good for the battery and consequently disuse is liable to be bad for it. However, it will be quite O.K. and will keep right up to scratch provided the few following simple rules are carefully observed.

First of all, remember that the ordinary L.T. battery needs re-charging at least once in eight weeks, whether it is used or not. This generalisation does not, however, apply to every type, because some L.T. batteries are specifically constructed to stand up to very long periods of disuse. But every ordinary battery needs the two-monthly charge.

Regular charging and discharging is one of the best means of keeping a battery in good condition. As soon as it is run down it should be taken to the service station and re-charged.

The best way of checking its condition is not by the voltmeter only, but by the voltmeter in connection with the hydrometer, which will show the

specific gravity of the acid. A regular check with these two instruments, say once a fortnight, will indicate the beginnings of any trouble and will enable you to nip it in the bud.

If one or other (voltage or specific gravity) is found not to be up to standard a prompt call to the service station, and a liberal dose of charge and discharge for a day or so will generally overcome any tendency to sulphation.

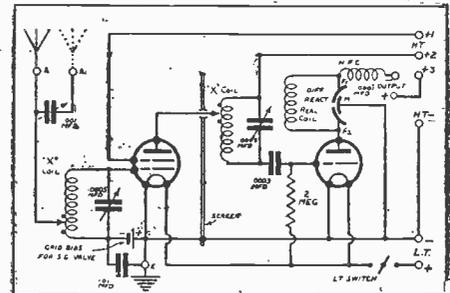
Although the battery may be standing idle a certain amount of evaporation is liable to go on all the time, and it is important that the liquid inside should always be sufficient to keep the top of the plates covered.

Cleanliness of the terminals (ensured by emery paper and a coating of petroleum jelly), and attention to such little matters as keeping the connecting bars tight and the vent plugs clean and open and in place, will also ensure long life. Finally, do not forget that the old acid should be turned out and the battery filled with new acid at least once a year. This, however, is generally a job for the service station, and not for the listener himself.

(Continued on page 222.)

MISSING LINKS, No. 6.

AN S.G. AND DETECTOR.



If you compare this with last week's diagram you will see that two fixed condensers and a switch have now been inserted to complete the circuit.

THE LAST WORD



Highest Efficiency—
Lowest Cost.

Consider the price of the Wufa and read the letter below

Southall, Middlesex.
March 24th, 1931.

Dear Sirs,
At a meeting of our local Radio Society held last Wednesday (March 18th), there was a Loud-speaker Test to determine the best loud speaker.

The speakers were placed behind a screen and played off in twos. The best of the two which speaker was the better of the two. This process of elimination was kept up until there was only one speaker left, which was therefore by universal vote, the best.

Although there were about twenty-five speakers of all makes, and including two moving-coil speakers, my Wufa was found to be the winner.

The members were amazed at the fidelity of its reproduction and afterwards a lecture was given on its merits.

Hoping this may be of interest to you.
Yours truly, E.C.P.

Beware of imitations. The genuine Wufa has RED Magnets

40/- Complete with Chassis. 27/6 UNIT ONLY

From All Dealers—
WUFA M. LICHTENBERG,
4 Gt. Queen St., London, W.C.2.

The World's Best Stories

The ARGOSY offers a splendid variety of really first-class fiction. Every story sets a standard of excellence, for the policy of this magazine is to print those stories which are indisputably great, and written by acknowledged masters of the past and present day.

The Argosy Magazine
Monthly 1/-.
At all Newsagents.

HERE IT IS—
The NEW
Mains Units
(Prov. Patent No. 1642 31.)
TYPE G.B.1. (for A.C. Mains.)

- H.T. 150 v. at 15 m/a or 120 v. at 20 m/a. (Also S.G. and DET. TAPPINGS).
- G.B. Three Tappings up to 12 v. Independent of H.T.
- L.T. 2, 4 or 6 v. Trickle Charger.

Full wave WESTINGHOUSE RECTIFIERS
for **9/2**
and 11 payments of 8/8 or

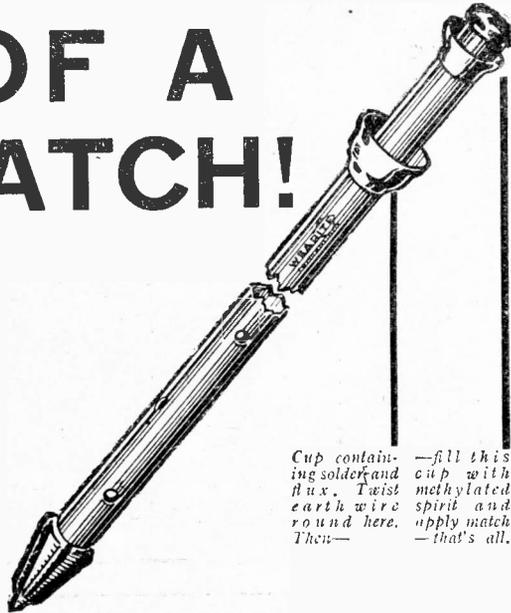
Cash Price **£4:15:0**

TANNOY
PRODUCTS

The only mains unit for portables incorporating independent G.B.
Turn to page 206 of this issue and read what "P.W." thinks.
DALTON ST., WEST NORWOOD, S.E.27

The Picture Paper with the MOST News
SUNDAY GRAPHIC

A PERFECT EARTH at the TOUCH OF A MATCH!



Cup containing solder and flux. Twist earth wire round here. Then—
—fill this cup with methylated spirit and apply match—that's all.

The new Wearite Earth Tube gives perfect earth contact and is provided with a most ingenious device by which a perfect and lasting soldered joint is obtained just by striking a match! Every listener who has attempted to make a good soldered joint out-of-doors will appreciate this special Wearite feature. Made of solid drawn copper of substantial thickness and fitted with cast-iron driving head.

Price **3s. 6d.**

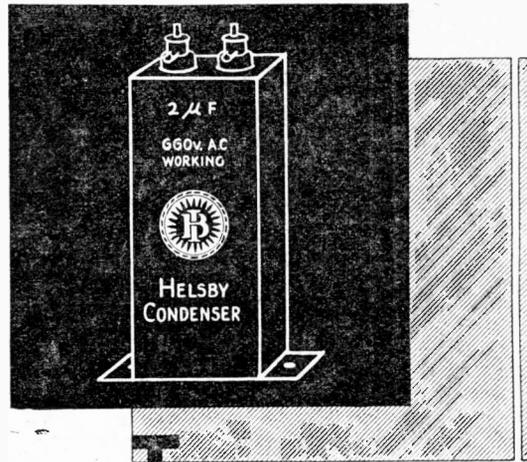
Send for descriptive leaflet.

WEARITE COMPONENTS

WRIGHT & WEAIRE, LTD.

740, High Road, Tottenham, N.17.

Telephone: Tottenham 3847



TESTED TO DOUBLE WORKING PRESSURE

Helsby Condensers have been supplied to the G.P.O. and to large manufacturers for thirty years. They are engineer-built, with plates of pure foil, non-hygroscopic, fully tested, and the capacity rating is guaranteed. A boon to the experimenter, for their reliability is unailing.

Ask for **Helsby Condensers** by name—there is a full range to cover every purpose. Types 212 and 212T are particularly suitable for eliminator circuits.



HELSEBY CONDENSERS

BEST FOR THE CONSTRUCTOR

If any difficulty in obtaining from your local dealer, please send us his name and address.

BRITISH INSULATED CABLES LTD
PRESCOT... LANCASHIRE
MAKERS OF B.I. CABLES



RADIOTORIAL QUESTIONS AND ANSWERS

(Continued from page 220.)

RECEPTION OF W 2 X A D.

Since W. L. S. was incautious enough to admit that he was finding it difficult to receive W 2 X A D, many letters referring to this have been received.

As W. L. S. has explained in his Notes since, the failure to pick up W 2 X A D was only a temporary one, and all correspondents who helped with reports on reception are hereby thanked. The really practical and helpful information tendered in this way is well illustrated by the following letter from a reader who lives at Athy.

"Dear Sir,—I was very surprised to read in 'Short Wave Notes' of your valuable paper that 'No one seems to be able to find W 2 X A D nowadays on his 19.56 metres wave.' I receive this station stronger than any other American every evening from 6 p.m. to 8 p.m. He is so loud on speaker that I have to cut down volume to make it pleasant.

"I use the 'Magic' Four, with Philips H.T. unit, battery valves. The following tips may be useful to users of this circuit.

"I was troubled with bad threshold howl and I tried the following cures—600-ohms resistance in H.T. lead to plate of S.G. valve, then a .0005 condenser across output terminals, but there was no improvement.

"I then added a short-wave Igranic H.F. choke in series with Lewcos choke in plate lead of detector valve with .001 condenser to earth. This improved matters.

"I finally placed another .001 condenser from plate of last valve to earth, and now I have beautiful, smooth reaction without howl or handcapacity effects.

"In addition to W 2 X A D I get the following at great strength on speaker, as I never use 'phones. Rabat, 23.28; Rome, 25.4; P C J, 31.38; W 1 X A Z, 31.35; Zeezen, 31.38; W 2 X A F, 31.48; O X Y, 31.51; W 8 X A L, 48.86; W 3 X A L, 49.18; W 8 X A L, 49.5; and Vatican station on both waves.

"One night I had four American stations on broadcast band between midnight and

1 a.m. I firmly believe in the S.G. valve for short waves.

"Yours faithfully,
"T. C. O'G."

FROM A FILADYNE ENTHUSIAST.

Admirers of that famous and favourite old circuit, the "P.W." Filadyne may perhaps be able to help the writer of the following letter.

"Dear Sir,—I have been listening to a friend's set and have been struck by its wonderful volume and DX qualities. He called it the "P.W." Filadyne (det., 1 L.F.).

"He gave me the copy of 'P.W.' dealing with this set, remarking that the Filadyne was very critical as to the type of valve used, he mentioned a few suitable types such as the D.E.R. B.5, D.R.2, D.E.2 L.F.

"I would like to build a set like his, but on inquiring for one of those valves I was told that they were old valves and consequently gone off the market.

"My object in writing this letter to 'P.W.' is hoping it will catch the eye of some reader who has come across a valve equally as good as the old types, which might be easily procured. Hoping some reader will oblige for the benefit of all Filadyne enthusiasts.

"Yours faithfully,
"J. ROGERS.
"P.S.—Maybe Mr. English could give us a suitable modern type?"

THOSE BACK NUMBERS.

Will P. M. (Kingsnorth), J. W. (London, S.W.1), "Atlas," and others please note that we regret we cannot publish their requests owing to lack of space. We are very sorry, but on previous occasions when we have tried to do this we have been inundated with so many similar letters that we have disappointed more readers than we could possibly please.

Nevertheless, the requests have been noted and if we are able to help later we will certainly do so.

TECHNICAL TWISTERS

No. 58.

USING A MILLIAMMETER.

The milliammeter (m/a) has innumerable uses in radio maintenance. It measures the current flowing from the

The m/a should be joined in the H.T. lead to ascertain the current flowing from the H.T.B.

To measure the plate current of any particular valve the m/a must be joined in series with its

It is essential to connect the m/a in accordance with its polarity markings. (In certain circuits a should be joined across its terminals.)

CAN YOU FILL IN THE MISSING LETTERS ?

Last week's missing words (in order) were : Earth, Outside, Gap.

EXTENSER

ALWAYS first with progressive Condenser design we announce the CYLDON "Extenser" which will become available to the Radio public on May 1st. Embodying exclusive CYLDON features: Cone bearings; vastly improved insulation over anything yet used in condenser design; straight through spindle; improved one-hole mounting which makes it impossible to loosen the end bearing when fixing to the panel; complete rotation through 360° either way; brush collector contact (superceding

the pigtail) with provision for soldering direct to collector if required; commutator switching system; self-cleaning contacts and phosphor-bronze brushes; plus CYLDON quality and the CYLDON 5 years guarantee. The CYLDON "Extenser" is a complete unit that will readily gang with other CYLDON "Extensers," being as simple to mount, connect and operate as the ordinary old-fashioned type of condenser. **WAIT FOR THE CYLDON "EXTENSER."**

SYDNEY S. BIRD & SONS LTD. CYLDON WORKS, SARNESFIELD ROAD, ENFIELD, MIDDX. Phone Enfield 2071/2

SHORT WAVE ADAPTOR
("Popular Wireless" this issue)
Fit a CYLDON Air Spaced Differential Condenser. Air spacing, together with CYLDON superior construction and quality, make this condenser essential for this Short Wave Adaptor. .0001 mfd.

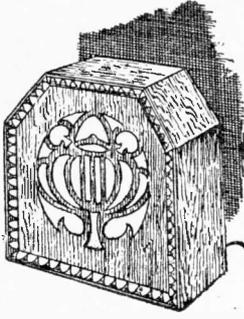
7/6

cyldon

15/-

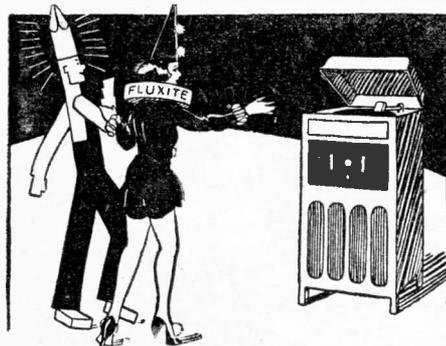
COMPLETE

FIVE YEARS GUARANTEE



Everybody's calling for

Player's Please

"We're Fluxite and Solder—
The reliable pair,
Famous for Soldering—
Known Everywhere!
You've trouble with
Wireless!
Well, don't get put out—
We'll SOLDER the
connections
That's the trouble, no
doubt!"

See that Fluxite and Solder are always by you—in the house, workshop, garage—anywhere where simple, speedy soldering is needed.

They cost so little but will make scores of everyday articles last years longer! For Pots, Pans, Silver and Brassware; Radio; odd jobs in the GARAGE—there's always something useful for Fluxite and Solder to do.

ANOTHER USE FOR FLUXITE.
Hardening Tools and Case Hardening. Ask for Leaflet on improved method.

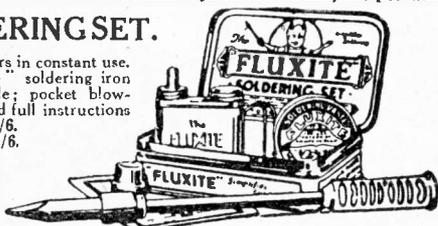
All Hardware and Ironmongery Stores sell Fluxite in tins.

8d., 1/4 and 2/8

NEW "JUNIOR" SIZE, 4d. per tin.

FLUXITE SOLDERING SET.

Simple to use and lasts for years in constant use. Contains special "small space" soldering iron with non-heating metal handle; pocket blow-lamp, Fluxite, Solder, etc.; and full instructions
COMPLETE 7/6.
or LAMP only 2/6.



FLUXITE LTD.
(Dept. 324.)
ROTHERHITHE, S.E.13

ALL MECHANICS WILL HAVE

FLUXITE

IT SIMPLIFIES ALL SOLDERING

BULLPHONE ELIMINATORS

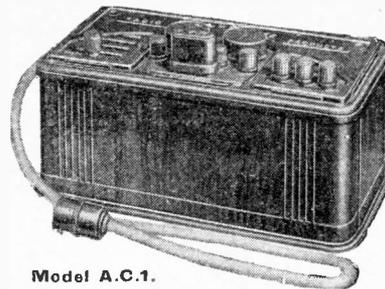
Incorporating Westinghouse Metal Rectifiers

A.C.1 ELIMINATOR

3 Tappings, 2 Variable,
1 Fixed. Output 120
volts at 20 milliamperes.

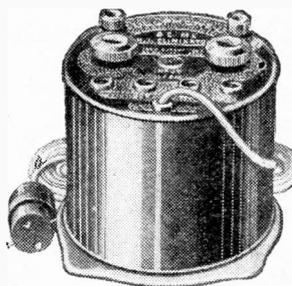
In Bakelite Case.

65/-



Model A.C.1.

With Trickle Charger **£4-5-0**



D.C. Models
In Bakelite Cases

25 Milliamperes Output **27/6**

Model D.C.2. 30 milliamperes output with 2 variable resistances **37/6**

BULLPHONE LTD. (Dept. P.W.),
38, HOLYWELL LANE, LONDON, E.C.2.

WHATEVER SET YOU BUILD

USE SOVEREIGN, the components that are specified again and again in the best circuits. The Volume Control shown here is extremely popular for its smooth silky action and sturdy construction. Fit Sovereign to improve any circuit.



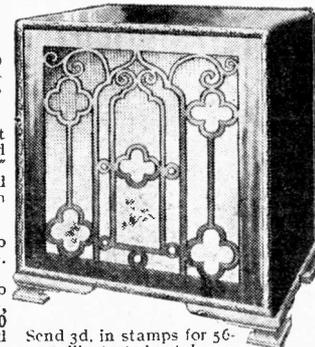
50,000, 100,000 and 500,000 ohms
1 and 2 megohms **4/6**
EACH



Sovereign Components have been specified in the "Comet 4", "3" and "2". Why not consider for a moment where you can use other Sovereign Components as well? Send direct if your dealer cannot supply.
SOVEREIGN PRODUCTS, LTD.
52/54 Rosebery Av. London, E.C.1

OSBORN LOUD-SPEAKER CABINET

Model No. 59. A Loud-Speaker Cabinet with rare design fret and richly embossed moulding. Inside measurements 18" x 18" x 10 1/2" deep. Piece of specially prepared Silk Fabric is included free. Obtainable in Figured Oak and Mahogany.



STAND No. 486
FIRST FLOOR,
EMPIRE HALL,
"DAILY MAIL"
IDEAL HOME
EXHIBITION
OLYMPIA.
April 7th to May 2nd.

PRICES:
Machined ready to assemble: Oak 13/-, Mahogany 15/-.
Assembled ready to polish: Oak 18/-, Mahogany £1 0 0.
Assembled and polished: Oak 23/-, Mahogany £1 5 0.

Send 3d. in stamps for 56-page illustrated catalogue. All Models carriage paid.

CHAS. A. OSBORN, Dept. P.W., The Regent Works, London, N.1. Telephone: Clerkenwell 5095. And at 21, ESSEX ROAD, ISLINGTON, N.1 (1 min. from the Agricultural Hall). Telephone: Clerkenwell 5634.

FOR THE LISTENER

(Continued from page-204.)

be "a little place where one drinks." It is a tavern. In fact, being an urban institution, it is a "Tavern in the Town."

But in France where, not as with us, drinking is not an end in itself but an adjunct of entertainment, the proprietor of such a place would bestir himself to provide some sort of amusement for his clients.

It was all very informal. Much of it was impromptu. Poets sang their songs; rhymesters recited topical verses, "taking off" some political personage, some local event, or even some member of the audience actually present; and so on. It was all very intimate; indeed, the last thing in the world intended to be broadcast.

A Shock for "Philemon."

A year or two ago I was present in such a place in Cairo. There were perhaps fifty of us in a small room, and hardly a petticoat among us. We were all drinking. Most of us were drinking coffee!

A rather bedizened lady on the platform, our hostess, sang for three-quarters of an hour, on and off. I did not understand her language, but it was translated for me in my ear. Those who did understand were laughing all the time, sometimes shaking with laughter.

Her verses were accompanied by a guitar and a wheezy fiddle; and were interspersed with a good deal of merry backchat between herself and persons in the audience—obviously friends.

She made some daring rhymes about her guests; worse, some of them, than the way Tom Webster handles Mr. Inman! In the midst of this, and suddenly, she made a rhyme about me!

She called me, in her own tongue, her "little English cabbage." She invited me (in the verse only!) to rest like a posy on her bosom! Everybody was delighted; and I was delighted to be the cause of such universal merriment.

She called other men something a good deal worse than cabbages; but I suppose she felt she must be polite to me. Then a man recited some political lampoons; and the man-apes became man-tigers; and I felt that revolution was in the air and that daggers might be up the sleeve!

It was all rather Rabelaisian; but there was nothing sly and suggestive about it; most of it was pretty straightforward!

Sensational Side-shows.

The modern cabaret, even in Paris, is not perhaps quite like this; not the cabarets you hear your Paris-week-end friends talk about. Both the word and the entertainment have degenerated from their originals. Much of the old intimacy has gone. They are sensational side-shows for foreigners.

And in our own country the cabaret is chiefly associated with the supper-rooms and night-resorts of the rich, and is usually an affair, often a brilliant affair, of jazz and acrobat dancing. Here and there, oddly enough, you may visit a "cabaret" on the outskirts of a church bazaar!

A Studio "Wonder Bar."

"The Jockey" is a famous Berlin night-club. I understand that the actual persons who provide the fun there, the proprietor and the barman and the rest of them, will

come to Savoy Hill. One of the studios will become a "wonder bar." If the thing can be adequately reproduced here, it should prove an interesting and amusing experiment.

The great difficulty will be to get the right atmosphere, for this is everything. If there is no intimacy, there is no cabaret. If there is no frank and pungent and daring, there is no cabaret. We shall see.

OPERATING A FLEXI-COUPLED RECEIVER

(Continued from page 215.)

be able to find your station quite easily, and then you can get the selector switch accurately set to give the best results.

You will quite likely find, by the way, that the mark for the lowest station is that obtained with the selector coil turned fully to the left, for it is with this adjustment that you will tune-in quite a number of the very low-wave stations.

Exceptionally Large Aerial.

Just a hint in this connection. If you get the feeling that your selector coil does not tune down quite low enough, it may be that you are using an exceptionally large or large-capacity aerial, in which case a series condenser of a suitable capacity, permanently in the aerial lead, may be an

INTERESTED IN DX?

If you find fascination in listening to foreign programmes the special supplement that appears each month in "Modern Wireless"

THE WORLD'S PROGRAMMES

will make your appreciation all the greater, and will help you to get the most out of it.

MODERN WIRELESS

Every Month. Price 1/-

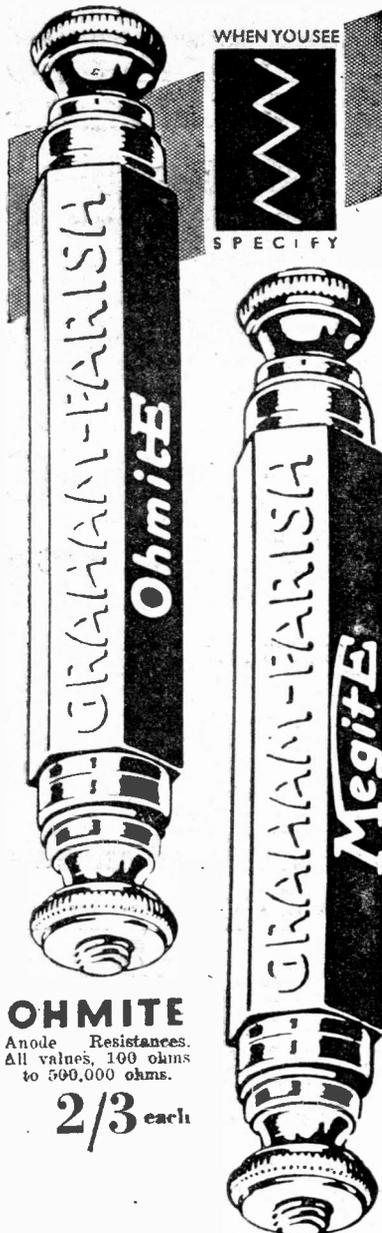
advantage with a "Flexi-coupled" set. Try one of .001 mfd., in the unlikely event of your aerial proving of this type.

Again, you will almost certainly discover, that your mark for the upper limit of the tuning range will not be at the extreme right-hand end of the effective travel of the selector arm. This is because the coil has been designed to cover even quite small aerials, and so there is something to spare on one of average size.

Different Tuning Points.

This is a point worth noting. You must remember that you are working with a fully-tuned aerial circuit, and so allowance has been made for variations in aerial size and tuning properties. This means that in designing the selector coil we have to allow for aerial variations, and so on different aerials, different selector coil settings will be required for any given station.

This is not a point that need concern you, in the case of a set working always upon the one aerial, but if you ever take your set to a friend's aerial you will naturally expect to find different selector coil readings in most cases.



OHMITE

Anode Resistances. All values, 100 ohms to 500,000 ohms.

2/3 each

Ohmite and MEGITE

Grid Leak. All values, 1 megohm to 5 megohms.

2/- each

Resistances are constant in value, of negligible self-capacity and non-inductive. Dead silent and always reliable, they provide the most effective resistance on the market, giving the full range of values required. Supplied with vertical or upright holders of superior brown bakelite construction 6d. extra. Graham Farish components carry a written guarantee of accuracy.

Ask your dealer to obtain, or write to

GRAHAM FARISH LIMITED BROMLEY, KENT

TECHNICAL NOTES

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

Special Broadcasting Records.

THE use of records as parts of broadcast programmes dates back, of course, to the beginning of broadcasting, but a somewhat novel type of record is now being introduced which is expressly designed for broadcasting purposes.

This record, which is of large diameter, so as to carry a much greater amount of recorded matter, is specially made up by re-recording (or "duping" as it is called) existing records, thus combining several records into one.

In this way it is easy to record an entire broadcasting programme upon a small number of records so that the whole programme can then be forwarded to different broadcasting stations in a sort of "potted" form.

Potted Programmes.

This method is rapidly gaining ground in the United States where, as you know, there are an enormous number of individual broadcasting stations scattered throughout the country, some of which are comparatively small stations unable to undertake the expense of maintaining programmes of artistes.

A central organisation makes up the recorded programmes—for all the world like making up the menu of a dinner, or a set of lantern slides for a lecture—and compiles an expensive library of complete programmes, which can be supplied to stations at a fraction of the cost of maintaining programmes of living artistes.

Any particular programme is, of course, only distributed to stations fairly widely separated, so there is no likelihood of two nearby stations both sending out, say, programme No. 1 at the same time. The records are officially referred to as "electrical transcriptions," and the system has already been adopted by a number of stations in the United States. In view of the number of subscribers to the scheme it is possible for small stations to have practically the same talent as the larger ones.

Time Factor.

Another important point in the United States, although it would not be important in this country, is the question of the difference in time.

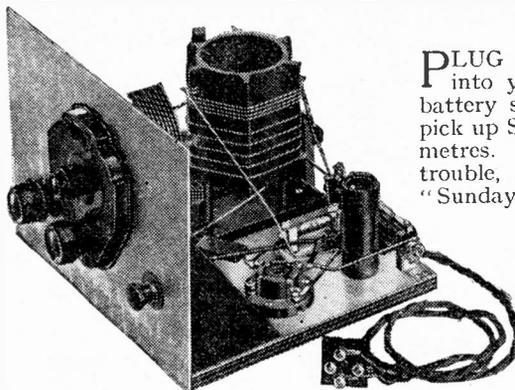
For example, a programme sent out at 8 o'clock Eastern Standard Time, would be heard in San Francisco at 5 o'clock in the afternoon, whereas by the use of these electrical transcriptions or potted programmes the items can be broadcast at the appropriate time in any part of the country.

There are, naturally, some people who object to recorded programmes and who feel that without the voice of the living artiste the radio loses its most vital and characteristic feature, but on the other hand there is a good deal to be said for a really first-class programme, even though produced from records.

I understand that at the present time some 95 per cent of the broadcast stations throughout U.S.A. have indicated their

(Continued on next page.)

SHORT WAVES ON YOUR COMET



PLUG in the Kelsey Short Wave Adaptor into your "Comet" Set (or any other battery set) and you are instantly able to pick up Short-Wave stations from 16 to 52 metres. No extra apparatus required, no trouble, no coil changing. Read what the "Sunday Express" said (12/4/31) about

Trans-atlantic cavedropping! The Kelsey Short Wave Adaptor completely assembled, guaranteed and ready for use C.O.D. Pay the Postman. We pay all charges. **37/6**

SHORT WAVE ADAPTOR

(As described in "Popular Wireless," April 25th, 1931).

KIT "A" with all components as specified by "P.W." less wood for cabinet **£2-0-6**

EXTRAS NOT IN "SHOPPING LIST" :-

Drilled Ebonite Panel, 8" x 5 1/2"	2 6
Cabinet, standard upright, American type	12 6
No. 4 and 6 Atlas S.W. plug-in coils. The pair	5 3

C.O.D. Pay the Postman. We pay all charges.

PILOT KITS

"COMET 3" Foundation Circuit

Kit "A" (less valves and cabinet) **£4-0-0**

C.O.D. or CASH with ORDER or 12 monthly payments of 7/4.

KIT "B" (with valves) C.O.D. or cash, **£5-7-6**, or 12 monthly payments of 9/10.

KIT "C" (with valves and cabinet), C.O.D. or cash, **£6-7-6**, or 12 monthly payments of 11/8.

Any parts supplied separately. If value over 10/-, sent C.O.D.

FINISHED INSTRUMENT.

Ready built, exactly as specified, French polished Oak Cabinet, aerial tested and fitted **£7-15-0** with valves or 12 monthly payments of 14/3.

FLEXI-COUPLED "COMET 3"

Extra Components required:
1 Keystone Star-Turn selector coil ... 12 6
1 400-ohm B.M. potentiometer ... 1 6
1 Bulgin panel light (without bulb) ... 2 6

Complete Kit "A" **£4-16-6**

or 12 monthly payments of 8/10.

KIT "B" (with valves), C.O.D. or cash, **£6-4-0**, or 12 monthly payments of 11/5.

KIT "C" (with valves and cabinet), C.O.D. or cash, **£7-4-0**, or 12 monthly payments of 13/3.

"COMET 4"

KIT "A" (less valves and cabinet), C.O.D. or cash, Price **£6-4-9**, or 12 monthly payments of 11/6.

KIT "B" (with valves less cabinet), C.O.D. or cash, Price **£8-12-3**, or 12 monthly payments of 15/10.

KIT "C" (with valves and cabinet), C.O.D. or cash, Price **£9-14-9**, or 12 monthly payments of 17/10.

For additional refinements, as described in "P.W.," add **£1-18-6** to each cash price, or 3/4 to each monthly payment.

SEE OUR PREVIOUS ADVERTISEMENTS IN "P.W.," OR WRITE FOR FULL DETAILS OF "COMET" SERIES BY RETURN

POPULAR ACCESSORIES

C.O.D. CASH or H.P.

COSSOR EMPIRE MELODY MAKER KIT, 1931 model, S.G., detector and power. Cash Price **£6 17 6** Send 10/- Only

Balance in 11 monthly payments of 12 9
1931 OSRAM MUSIC MAGNET KIT, 2 S.G., Detector and Power. Cash Price **£11 15s. 0d.** Send 23/6 Only

Balance in 12 monthly payments of 18 6
ATLAS A.C. ELIMINATOR TYPE A.C.244, 3 tappings—S.G. detector, power. Output 120 volts at 20 m.a. Cash Price **£2 19 6** Send 5/6 Only

Balance in 11 monthly payments of 5 6
EKCO IV20 H.T. ELIMINATOR, 20 m.a. Tappings for S.G. 60 volts and 120/150 volts. For A.C. mains. Cash Price **£3 19 6** Send 7/4 Only

Balance in 11 monthly payments of 7 4
REGENTONE W.5 COMBINED H.T. ELIMINATOR AND TRICKLE CHARGER, 1 S.G., 1 variable, and 1 fixed tapping for H.T. L.T. charging for 2 4. and 6 volts. For A.C. mains. Cash Price **£5 17 6** Send 10/9 Only

Balance in 11 monthly payments of 10 9
EXIDE 120-VOLT WH. TYPE ACCUMULATOR, in crates. Cash Price **£4 13 0** Send 8/6 Only

Balance in 11 monthly payments of 8 6
LAMPLUGH or FARRAND INDUCTOR SPEAKER, or perfect reproduction. Unit and chassis complete, ready mounted. Cash Price **£3 10 0** Send 6/5 Only

Balance in 11 monthly payments of 6 5
BLUE SPOT SPEAKER UNIT, Type 66R, 4 pole balanced armature with Major Chassis and Cone (37 cm). Cash Price **£2 10 0** Send 8/10 Only

Balance in 5 monthly payments of 8-10
EPOCH PERMANENT MAGNET SPEAKER with type B4 unit only. Cash Price **£4 4 0** Send 7/9 Only

Balance in 11 monthly payments of 7 9
PILOT AIR CHROME SPEAKER incorporating "K" type Double Linen Diaphragm. Cash Price **£7 6** Send 5/3 Only

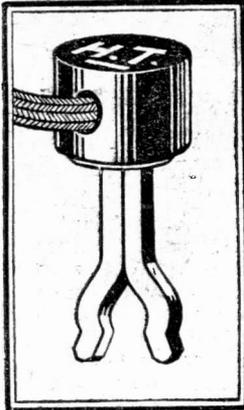
Balance in 11 monthly payments of 5/3

We now have the largest and most up-to-date stock of Radio Components in London. Send for Free Catalogue or send your enquiries for quotation by return.

PETO-SCOTT CO. LTD.

77, CITY ROAD, LONDON, E.C.1. Clerkenwell 9406. 62, HIGH HOLBORN, LONDON, W.C.1. Chancery 8266. Manchester: 33, Whitelaw Road, Chorlton-Cum-Hardy. Phone: Chorlton-Cum-Hardy 2028. Newcastle, Staffs.: 7, Albany Road. Phone: 67190.

A NEW BELLING-LEE SPADE TERMINAL for



2^D.

All British. Handles permanently engraved. Side-entry—the whole flex gripped, copper, rubber and fray.

Patent Nos. 329465 & 12423/30

Use it for neat and permanent connections to receiver terminals, tapped coils, L.T. accumulators, etc.—for hook-ups; clipped on to any screw or wire!

The new Belling-Lee Spade Terminal clips on to any terminal stem and makes good contact with its powerful spring prongs. Connecting up becomes a one-hand job.

See it at your dealer's.

BELLING-LEE

FOR EVERY RADIO CONNECTION

Advertisement of Belling & Lee, Ltd., Queensway Works, Ponders End, Middlesex.

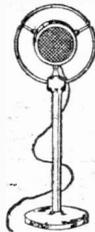
YOU CAN BUILD A £40 GRAMOPHONE WITH OUR SCALE FOR 40/-

Book of instructions, 3d. Catalogue of Motors, Tone-arms, Sound-Boxes, latest internal Amplifiers, Gramophones or Cabinets Free. Cash or terms.

V. BURT, 185 High St, Deptford

MIKES FOR HOME RECORDING

Pulpit Pedestal, 12/6, Pedestal Broadcaster, as illustrated, 18/6, Microphones with handle, 15/-, powerful Public Address models, 55/- and 65/-, Transformers, 4/6, Couplers 15/-, Valve Amplifiers, 55/-, for Band Repeater or Public Address work, Home Recorder for Gramo.



ELECTRADIX RADIOS

218, Upper Thames Street, London, E.C.4
CITY 0191.

"RED DIAMOND" DETECTOR

As used for the "Wireless for the Blind" Crystal Sets.

RD40

2/-

By Insured Post 2/3 or 2/9 with shield.



Can be mounted on brackets or through panel. Once set always ready. Not affected by vibration. Each one is tested on broadcast before despatch.

Of all high-class Radio Dealers or Sole Makers

JEWEL PEN CO., LTD.,

(Radio Dept. 46), 21-22, Great Sutton St., LONDON, E.C.1

PLEASE be sure to mention "Popular Wireless" when communicating with Advertisers. Thanks!

TECHNICAL NOTES

(Continued from previous page.)

willingness to accept electrical transcriptions for broadcasting. The organisations engaged in this electrical transcription work, in almost every case select talent, arrange the programmes, supervise the making of the records, book time "on the air" and, if necessary, supply suitable reproducing apparatus to broadcasting stations.

Valve Design.

It is often said that present-day broadcasting conditions in the British Isles and on the Continent have produced a state of affairs which makes selectivity of radio receivers more important than sensitivity. The modern three-valve or four-valve screened-grid receiving set has, in fact, such a high magnification that its extreme sensitivity is sometimes apt to become a disadvantage rather than an advantage to the user.

There is no lack of sensitivity, therefore, and the problem now confronting designers is rather that of making sets sufficiently selective. In achieving this aim the design of screened-grid valves is undoubtedly a most important factor and not only should the leakage between electrodes be reduced to the lowest possible minimum in order to assist in stabilising the valve, but also the valves should be capable of a reasonably large working grid-swing at moderate anode currents so as to maintain a high degree of selectivity free from cross-modulation.

Amplification Factor.

In this connection I should mention that I recently received samples of the New Osram M.S.4 screened-grid valve, which has been specially designed with the above points in view. The inter-electrode leakage capacity has been reduced to an exceedingly low value (roughly 0.0017 micro-microfarads) as shown by National Physical Laboratory tests.

Mutual Conductance.

Furthermore, the amplification factor and mutual conductance of this valve have been specially chosen to facilitate volume control, which is one of the most important points in modern receiver design, and also to eliminate cross-modulation, which is such a frequent trouble under modern broadcasting conditions.

A further advantage of the particular values of amplification factor and mutual conductance is that there is no need for very critical adjustment of grid voltage; this is an important point because, with a critical grid voltage the performance of a screened-grid valve is liable to be impaired owing to the danger of running into grid current on the one hand or rectification on the other.

As regards the importance of increasing selectivity in receivers as much as ever possible, it is interesting to note that this point has lately been very much emphasised by the Chief Engineer of the B.B.C.

I should add that I have some other samples of screened-grid valves on hand, as well as other types of valve submitted to me, and I hope to say something about these very shortly.

(Continued on next page.)

EASY TERMS

WE supply all good quality Radio Receivers, Components and Accessories on deferred terms. We carry adequate stocks and can give prompt delivery.

NEW HEAYBERD A.C. ELIMINATOR KIT C.150. Complete kit of parts for building an H.T. Eliminator, including steel case. Output 25 M.A. 150 volts. 3 H.T. tappings. One variable.
Cash Price £3 16 0
Or 7/6 with order and 11 monthly payments of 7/-

12 EXIDE W.H. HIGH-TENSION ACCUMULATORS (120 volts 5,000 M.A.). Higher voltages if desired
Cash Price £3 15 0
Or 6/6 with order and 11 monthly payments of 7/-

Carrriage charged on all orders from Scotland

N.K. FARRAND INDUCTOR. Loud speaker unit, quality reproduction almost equal to a moving-coil speaker.
Cash Price £3 10 0
Or 5/6 with order and 11 monthly payments of 6/6

B.T.-H. PICK-UP AND TONE ARM. One of the best pick-ups available.
Cash Price £2 5 0
Or 5/- with order and 9 monthly payments of 5/-

NEW BLUE SPOT 66R UNIT. The finest balanced armature movement on the market. Complete with large Cone and Chassis
Cash Price £2 10 0
Or 5/- with order and 10 monthly payments of 5/-

Send list of requirements and quotation will be sent by return.

LONDON RADIO SUPPLY COMPANY
11, OAT LANE, NOBLE ST., LONDON, E.C.2
TELEPHONE: National 1977.

MAKE OR BUY A GRAMOPHONE



at a quarter shop prices, or buy Cabinets for Wireless, British double spring motor, 12" velvet turntable, swan arm, metal sound-box, amplifier, needle cups, for £1/16/0 p.p. and build your own Cabinet. Portable Gramophones from 15/6, postage 1/6. Motors from 7/6. Lists free. 64 pp. 1931 Catalogue No. 220, with Reduced Prices. Drawing and How to Make Gramos. 3d

REGENT FITTINGS CO. (P.W.), 120, Old Street, London, E.C.1

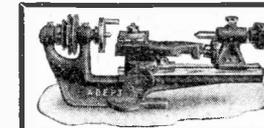
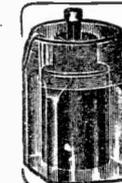
WET H.T. BATTERIES

Solve all H.T. Troubles.

SELF-CHARGING, SILENT, ECONOMICAL JARS (waxed), 2 1/2" x 1 1/2" sq. 1/3 doz. ZINCS, new type 10d. doz. Sacs 1/2 doz. Sample doz. (18 volts), complete with bands and electrolyte, 4/1, post 9d. Sample unit, 6d. Plus booklet free.

Bargain list free.

AMPLIFIERS, 30/-. 3-valve set, £5.
P. TAYLOR, 57, Studley Road, STOCKWELL, LONDON



The 'ADEPT' LATHE.

1 1/2" centres, 6" between centres. With compound slide rest, £1.

With hand-rest instead of compound - 12 6

A handy little model maker. Post 1/-

FEL-ECTRIC RADIO, 56, Garden St., Sheffield.

GABINETS for the COMET FOUR

Highest quality and special design.
Oak, 27/6; Mahogany, 32/6
THE LONGLEY RADIO MFG. CO.,
63, Longley Road, Harrow.

POWER CHOKES

guaranteed twelve months.

substantially built, for smoothing circuits in eliminators dealing with currents 100 to 300 milliamperes; inductance 30 henries,

8/6 post free. C.W.O.

REPAIRS

Any make Headphones, L.F. Single Ratio Transformers, Loud Speakers (except Blue Spot) repaired and despatched within

48 HOURS—TWELVE MONTHS' GUARANTEE

4/- POST FREE Cash with Order. Terms to Trade.

TRANSFORMER REPAIR CO.,
Dept. R., 953, GARRATT LANE, LONDON, S.W.17.

Make
THE DAILY SKETCH
YOUR Picture Paper.

TECHNICAL NOTES

(Continued from previous page.)

Practical Photo-Electric Cells.

It is not so long ago that the photo-electric cell was regarded rather as a scientific toy and the prospect of reducing it down to a really commercial form seemed rather remote, not to mention the question of finding any real practical applications for it.

Far and away its most important use, of course, is in connection with taking pictures, of the sound-on-film or optically recorded variety, but in addition to this the photo-electric cell is finding increasing uses in industry and in other directions. It is now being used for all manner of "counting" purposes, for automatic operation of artificial lighting and for "sentinel" duty, burglar alarms and so on.

So far as this latter application, the cell has been reduced to commercial form, and several manufacturers in the United States are now marketing simple and compact forms of photo-electric "relay." In one form the source of light and the electric relay are combined in a small instrument about the size of a pocket camera and this device is equipped with two lenses, one above the other; from one lens a beam of light is projected and this is reflected from a remotely placed mirror back to the other lens, where it is received by the photo-electric cell.

Interruption of this beam of light by any object causes the relay contacts to close, thereby operating a counter, power switch, signal, burglar alarm or other device, as the case may be.

G.B. from Mains.

Some little time ago I was writing in these Notes about the question of taking grid bias from the mains unit and I remarked that many people found it simpler to take their grid bias from a small G.B. battery in the ordinary way, rather than to complicate the wiring of the unit and at the same time to run the risk of a greater tendency to hum and instability.

The grid-bias battery—in most cases, at any rate—is a comparatively small and inexpensive item, and the cost is much less than the additional cost involved in providing grid bias in your mains unit.

At the same time, one of the greatest advantages of a mains unit is that—to give it its original name—it is a "battery eliminator," and the more completely it eliminates the batteries and the consequent need for attention, the more complete its advantages, so that if you are making up your own mains unit and you care to go to the length of including provision for grid bias, you will at any rate be cutting out one further item which would otherwise require periodical attention.

An Ingenious Circuit.

Talking about the arrangement of the circuit of the unit for getting grid-bias tapplings, I have recently been examining and testing one of the new "Tannoy" mains units which were mentioned in POPULAR WIRELESS a little time back, and I notice that the Tannoy people have recently patented a very simple and ingenious arrangement, which is incorporated in this unit, for obtaining grid bias, the voltages

(Continued on next page.)

P.R. VALVES

The Best and the CHEAPEST

There's nothing shoddy or cheap about P.R. Products, but they represent the very highest quality at the very lowest prices. You can't go wrong when you buy them.

All valves despatched under guarantee of Money Back in Full if not satisfied and returned within 7 days. All valves are carefully packed and breakages replaced. 2 valves or more sent POST FREE.



Matched valves 1/- per set extra. Sent C.O.D. if desired.

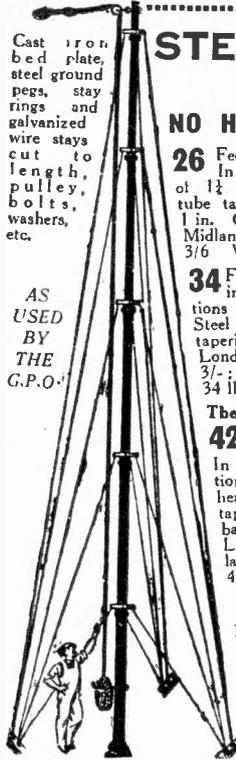
Phone City 3788.

STEEL MASTS

NO HOLES TO DIG

Cast iron bed plate, steel ground pegs, stay rings and galvanized wire stays cut to length, pulley, bolts, washers, etc.

AS USED BY THE G.P.O.



26 Feet High.

In 3 sections of 1 1/2 in. Steel tube tapering to 1 in. Carriage, London, 1/6; Midlands, 2/6; elsewhere, 3/6 Weight 24 lbs.

15/-

34 Feet High.

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

21/6

The "SUPER" MAST

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

29/6

GUARANTEE. Money refunded without question if not satisfied and returned within 7 days. Pay C.O.D.

Phone: City 3788.

P.R. PRODUCTS,

(Dept. R.) P.R. HOUSE, 14, NEWGATE STREET, LONDON, E.C.4. Opposite G.P.O. Tube Station.

LIST OF DULL EMITTERS						
Type	Wt.	Amp.	Imp. Ohms	Imp. Pa.	Lt. No.	Price
PR 2	2	.005	20,000	13	L.P.	1/6
PR 3	3	.005	15,000	20	R.C.	1/6
PR 4	4	.005	60,000	20	R.C.	1/6
PR 5	5	.005	20,000	20	R.C.	1/6
PR 6	6	.005	20,000	20	R.C.	1/6
PR 7	7	.005	20,000	20	R.C.	1/6
PR 8	8	.005	20,000	20	R.C.	1/6
PR 9	9	.005	20,000	20	R.C.	1/6
PR 10	10	.005	20,000	20	R.C.	1/6
PR 11	11	.005	20,000	20	R.C.	1/6
PR 12	12	.005	20,000	20	R.C.	1/6
PR 13	13	.005	20,000	20	R.C.	1/6
PR 14	14	.005	20,000	20	R.C.	1/6
PR 15	15	.005	20,000	20	R.C.	1/6
PR 16	16	.005	20,000	20	R.C.	1/6
PR 17	17	.005	20,000	20	R.C.	1/6
PR 18	18	.005	20,000	20	R.C.	1/6
PR 19	19	.005	20,000	20	R.C.	1/6
PR 20	20	.005	20,000	20	R.C.	1/6
PR 21	21	.005	20,000	20	R.C.	1/6
PR 22	22	.005	20,000	20	R.C.	1/6
PR 23	23	.005	20,000	20	R.C.	1/6
PR 24	24	.005	20,000	20	R.C.	1/6
PR 25	25	.005	20,000	20	R.C.	1/6
PR 26	26	.005	20,000	20	R.C.	1/6
PR 27	27	.005	20,000	20	R.C.	1/6
PR 28	28	.005	20,000	20	R.C.	1/6
PR 29	29	.005	20,000	20	R.C.	1/6
PR 30	30	.005	20,000	20	R.C.	1/6
PR 31	31	.005	20,000	20	R.C.	1/6
PR 32	32	.005	20,000	20	R.C.	1/6
PR 33	33	.005	20,000	20	R.C.	1/6
PR 34	34	.005	20,000	20	R.C.	1/6
PR 35	35	.005	20,000	20	R.C.	1/6
PR 36	36	.005	20,000	20	R.C.	1/6
PR 37	37	.005	20,000	20	R.C.	1/6
PR 38	38	.005	20,000	20	R.C.	1/6
PR 39	39	.005	20,000	20	R.C.	1/6
PR 40	40	.005	20,000	20	R.C.	1/6
PR 41	41	.005	20,000	20	R.C.	1/6
PR 42	42	.005	20,000	20	R.C.	1/6
PR 43	43	.005	20,000	20	R.C.	1/6
PR 44	44	.005	20,000	20	R.C.	1/6
PR 45	45	.005	20,000	20	R.C.	1/6
PR 46	46	.005	20,000	20	R.C.	1/6
PR 47	47	.005	20,000	20	R.C.	1/6
PR 48	48	.005	20,000	20	R.C.	1/6
PR 49	49	.005	20,000	20	R.C.	1/6
PR 50	50	.005	20,000	20	R.C.	1/6

SEND TO-DAY for the MARVELLOUS P.R. SCREENED-GRID 3-4.

The simplest cheapest station-getter. Picks up in DAY-LIGHT without fading HUIZEN — RADIO — PARIS — DAVENTRY — MOSCOW — EIFFEL TOWER — WARSAW — MOTAL — KALUNDBORG — OSLO — KIEV — and all stations going at night. Used as a Screened-grid Three, a push button puts in a fourth valve to get kick on distant work. Tunes from 175 to 1,800 metres and covers all the scale. Wiring plan and full instructions 1/3 post free.

COMPLETE KIT £5.5.0
WIRED SET - £6.6.0

DOUBLE YOUR VOLUME

This cone doubles the volume of ANY CONE speaker. Buckram cones are no good—not half the sound or notes that can be obtained. Our Standard Cone is 11 in. in diameter and 3 in. deep, but we make ANY SIZE TO ORDER.



DEAD TRUE because moulded to shape. Ten minutes fixes it. We offer you this cone on trial. If it isn't better, return it. No loss to you—refund by return of post.

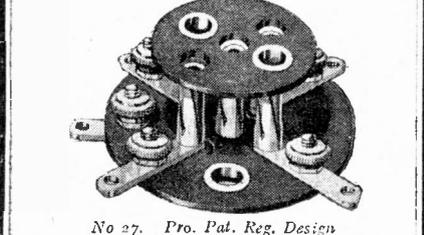
3/6 POST 6d.

EASY PAYMENTS

The first firm to supply Wireless parts on easy payments. Five years advertiser in "Popular Wireless." Thousands of satisfied customers. Send us a list of the parts you require, and the payments that will suit your convenience, and we will send you a definite quotation. Anything wireless H. W. HOLMES, 29, FOLEY STREET, Phone: Museum 1414. Gt. Portland St., W.1

CLIX VALVE HOLDER

Specified for the "Comet" Short Wave Adaptor



No 27. Pro. Pat. Reg. Design
Built for Efficiency
Not for Appearance

Type B for baseboard mounting.
4 pin Model with screw terminals - - 10d.
4 pin Model without screw terminals - - 8d.
5 pin Model with screw terminals - - 1/-
5 pin Model without screw terminals - - 9d.
If unable to obtain locally, please forward us names of dealers.
LECTRO LINX LTD.
254 Vauxhall Bridge Road, S.W.1

CHARGE YOUR ACCUMULATOR AT HOME BY THE "ECONOMIC" TRICKLE CHARGER AND SAVE MONEY AND TROUBLE

Does the same work as others costing £2 10s. to £3. Charges 2 volt. accumulator at 2-amp. Charges 4 volt. accumulator at 1-amp. The cost of charging a 25-amp. hour accumulator is 1d. Complete with flex, universal mains, plug, accumulator leads, metal oxide rectifier, and safety fuse, with full instructions. Ready to switch on.

PRICE 20/- CASH OR 6/- DEPOSIT & 2/6 WEEKLY

FOR A.C. MAINS ONLY. STATE VOLTAGE.
THE ECONOMIC RADIO SERVICE,
103E, CAMBRIDGE ROAD, SOUTHPORT, LANC.

AGENTS WANTED to SELL A.C. High-Tension Eliminators, Chargers &c. Hire Purchase or Cash. Write for particulars: FEL-ECTRIC RADIO, 56, GARDEN STREET SHEFFIELD.

EXACT TUNERS

250 to 2,000 metres. Thousands of these tuners are in use, and we can strongly recommend them. No further coils are required. Send P.O. for particulars and circuits—FREE.
THE EXACT MANUFACTURING CO.,
Croft Works, Priory Street, Coventry.

MACNUM

ALL THAT IS BEST IN RADIO COMPONENTS SETS ETC.

BURNE-JONES & CO. LTD.

296, BORO' HIGH ST., LONDON S.W.1

ENGINEERS!

Can't we get together?



WRITE FOR THIS BOOK TO-DAY IT'S FREE!

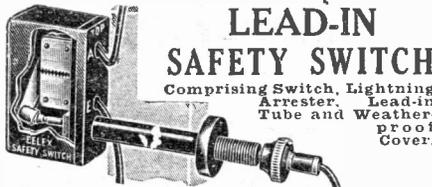
All we ask is the chance to prove that you can earn £300, £400, £500 per year or more. Other men are doing it and you can do the same.

We have an unrivalled and world-wide organisation waiting to help you, whether you be novice or expert. If you wish for something more than a "bread and butter" job you owe it to yourself to investigate our service. Our handbook, "Engineering Opportunities," has pointed the way to better things to over 50,000 of your fellows. It contains details of A.M.I.Mech. E., A.M.I.E.E., A.M.I.C.E., A.M.I.A.E., A.M.I. Struc. E., A.M.Ae.E., M.R.San.I., M.I.M.T., A.Rad.A., I.W.T. London Matric., C.&G., G.P.O., etc., Exams., outlines home study courses in all branches of Electrical, Mechanical, Motor, Aero, Wireless, Television and Talking Picture Engineering, and explains our unique guarantee of "NO PASS—NO FEE"

In a brilliant foreword Prof. A. M. Low shows clearly the chances you are missing. "Engineering Opportunities" and our advice are quite FREE. Don't neglect this offer—give vent to that "upward urge" and send a postcard NOW, stating Branch, Post, or Exam. which interests you. British Institute of Engineering Technology, 101, Shakespear House, 29/31 Oxford Street, W.1

BANKRUPT BARGAINS
List free. "Comet" kit, 50/-, all parts in stock. "P.W." coils, 8/6; Bullphone, 9/-; Drum dials, geared, 7/6, with .0005 condenser. Spaghetts from 10d. Foil, 1/3; Selector coils, 9/6; Panels, 3/-; Differentials, 2/6; Bullphone, 2-mfd., 2/- . Get my price for components first. All goods new.—BUTLIN, 143B, Preston Road, BRIGHTON.

ELEX



LEAD-IN SAFETY SWITCH
Comprising Switch, Lightning Arrestor, Lead-in Tube and Weather-proof Cover.

With 6-in. tube . . . 5/6 With 12-in. tube . . . 6/6
With 18-in. tube . . . 7/6

J. J. EASTICK & SONS,
Write for list T 14.

Elex House, 118, Bunhill Row, London, E.C.1
Phone: Met. 0314/5/6.

LOUD SPEAKERS REPAIRED, 4/-

(Blue Spot a Speciality, 5/-)

Transformers 4/-, Headphones 4/-, all repairs magnetised free. Tested, guaranteed, and ready for delivery in 24 hours.

Discount for Trade. Clerkenwell 9069.
E. MASON, 44, EAST ROAD, N.1.

DX SHORT WAVE COILS

2-Pin Type (Patented)

Used all over the world.

Set of 4. 2, 4, 6, 8 **7/6**
or 3, 5, 7, 9. Post Free

DX COILS LTD., LONDON, E.8.

TECHNICAL NOTES

(Continued from previous page.)

available being 1½, 4½ and 12; in addition intermediate voltage tapings on the unit, both for H.T. and G.B., can be had at an insignificant additional cost.

The arrangement makes use of the trickle-charging rectifier and transformer winding, the output being adequately smoothed and decoupled by means of a 1-mfd. condenser and suitable resistances and small decoupling condensers, and it seems to work perfectly. Messrs. Tannoy Products have done a good thing in providing this undoubted advantage in such a comparatively inexpensive unit as the one in question, which is their type G.B.1.

Home Records.

I wonder how many of you have experimented with the making of home records? I have had several home recording outfits sent to me during the past few months and I have from time to time been making a number of very interesting experiments with these outfits.

For the benefit of those of you who may be interested to go in for home recording, I should say right away that, so far as my experience goes, and I think it agrees with the experience of others who have experimented in the same direction, you should not expect to get perfect results at first.

In other words, you cannot expect merely to fit up the device on your gramophone and produce a perfect home record at the first shot. As a matter of fact, it is this very point that gives much of its fascination to home recording.

If you could do it perfectly at the first attempt, it would not be nearly so interesting as it is when you have to keep trying and improving this, that and the other factor in order to improve results. In most of the home recorders at present on the market, the "blank" upon which the record is to be made consists of a thin disc of aluminium or celluloid.

In some cases the cutting needle is a specially shaped and sharpened steel needle, not unlike the ordinary reproducing needle, and in other cases a sapphire or diamond needle is provided. I have found that the diamond needle is very satisfactory if you get a good one, by which I mean one with a suitably shaped point, but it requires a certain amount of manipulation before you discover precisely the right setting and also the right angle between the needle and the face of the disc.

Tracking.

Usually the aluminium blanks supplied are of about 6 in. diameter, but on this quite a surprisingly large amount of matter can be recorded. The "tracking" of the recording needle across the blank disc is effected in some cases by means of a larger "tracking disc" which is placed upon the turn-table first with the aluminium blank upon the top of it, and in other cases by a tracking screw or screw-feed arrangement which is driven by the rotating turn-table.

The tracking disc has the advantage of simplicity, although unless the gramophone is perfectly level and a good deal of care is taken, I have found that often the tracking needle, "pilot" needle, as it is sometimes called, is apt to slip out of the tracking groove, with the result that the whole arrangement slides over the record face.

FACT!
If you drove a car with solid wheels and no springs, even over modern roads, it would soon shake to pieces. And if you put even a modern valve in a solid valve holder with no springs, vibration will soon play old Harry with the heated filament and you will lose emission. That isn't fancy, it's a fact.

THE BENJAMIN ELECTRIC LTD.,
Tarriff Road, Tottenham, N.17.
Tottenham 1500.

BENJAMIN

AGENTS WANTED to sell well-known H.T. units, etc., for cash or easy terms. Prices very competitive and good commission offered.
BROOKMAN RAPID RADIO SERVICE,
105, Spencer Street, BIRMINGHAM.
Wireless and Cycle factors. Specialists in Radio Cabinet work.

A Cabinet De-Luxe for YOUR SET
OR
RADIO-GRAM

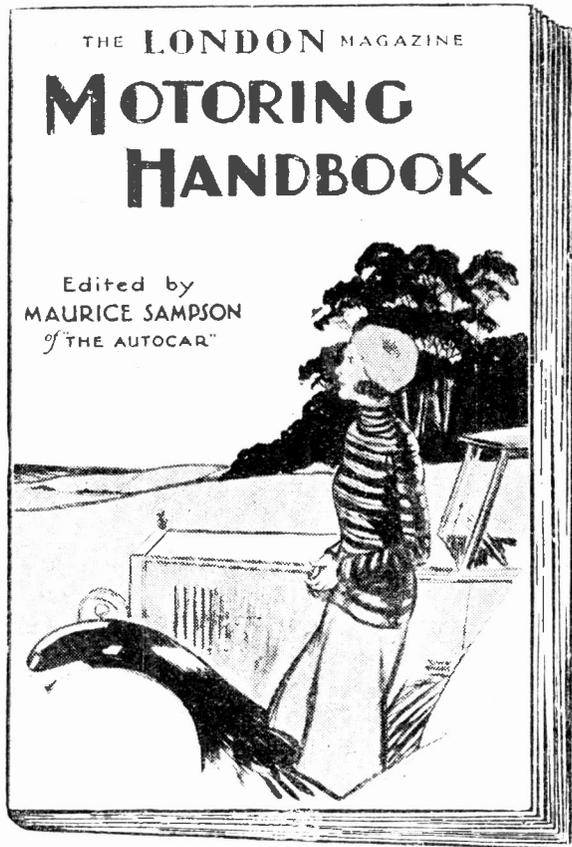
The sort people desire to possess and keep. Tasteful beauty—Piano finish—advantages also of **PIANO-TONE** baffle chamber. The **BETTER REPRODUCTION** that your Set is really capable of gives you a joyous sense of achievement. Sent **ON APPROVAL** direct from the makers. Prices £4 to £15 (Cash or Easy Payments). You may return at our expense if you wish to part with it. Photographs and List **FREE!**
PICKETTS, Radio Furniture (P.W.),
Albion Road, Bexleyheath, Kent.

PERMANENT POSITIONS are offered in the **RADIO AND TALKIE PROFESSIONS.** Prospectus of Specialised Correspondence Courses sent free. No obligation is incurred. *Special fees are offered to W/T operators.*
RADIO TRAINING INSTITUTE,
UNION BLDGS., ST. JOHN STREET, NEWCASTLE-ON-TYNE

ROBUST HEALTH!
I positively GUARANTEE to perfect your Health and double your Strength, Stamina and Vitality in 30 days or return your money in full!
The world-famous Stebbing 4-in-1 Course consists of four great courses in one; yet costs only 5/- post free. It has been proved (1) The most effective **HEALTH & STRENGTH** System ever devised; (2) It quickly builds superabundant **ENERGY, STAYING POWER and VIRILE MANHOOD;** (3) It develops a Strong Will and rigid **SELF-CONTROL;** and (4) Includes amazing **SUCCESS & Personal Magnetism** Course. Details, testimony free, or Enrol **Now!** Costs only **5/-**. No apparatus required.
Officially Recommended by "Health and Efficiency," "Health and Strength," "Health for All," and the General Press.

LIONEL STEBBING STEBBING INSTITUTE (W.P.),
28, Dean Rd., London, N.W.3

64 Page Motoring Handbook **FREE**



Every user of the road will welcome this invaluable motoring handbook. Edited by Mr. Maurice Sampson of "The Autocar," it is a veritable mine of useful information. Sixty-four pages of advice and hints from acknowledged experts, five road maps printed in two colours and numerous black-and-white illustrations amplifying the text. Such is the LONDON MAGAZINE MOTORING HANDBOOK, a copy of which is presented FREE with the MAY Number of this splendid magazine. A few of the contents, listed below, will give you some idea of the utility of this amazing gift.

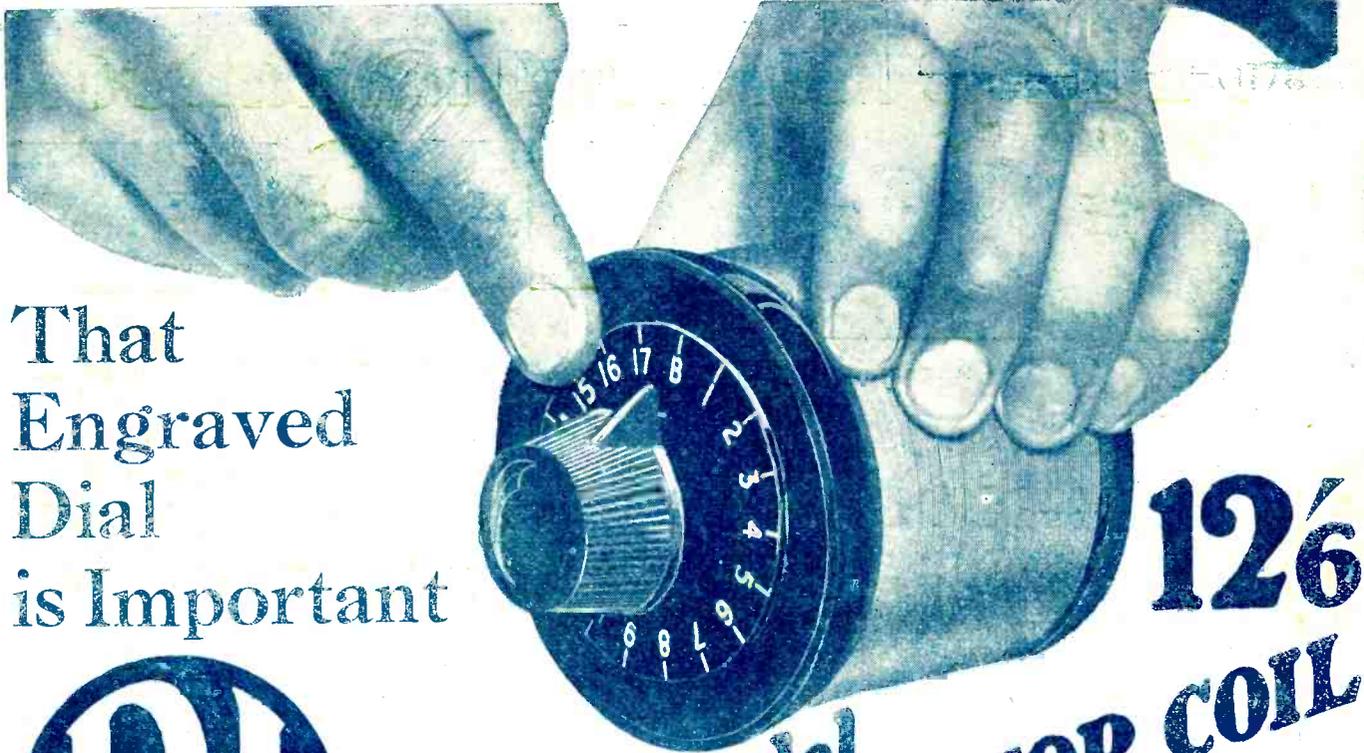
MOTORISTS and INSURANCE
 RUNNING-IN the NEW CAR
 DO's and DON'T's for DRIVERS
 BATTERIES and their BURDENS
 CAUSE and PREVENTION of FIRE
 TOURS in DEVON, NORTH WALES, etc.
 TYRES—BRAKES—IGNITION
 Useful TOOLS for CAR and GARAGE
 MOTORISTS AND THE LAW

Apart from the free gift, which is alone worth far more than the price of the magazine, there is the usual programme of fiction—the finest work of the best-known writers—articles interesting, amusing and splendidly illustrated, and many other fascinating features. Don't miss this bumper issue of

Among a big selection of brilliant stories in this issue of The LONDON you will enjoy especially
"ROOM 700"
 an amazingly dramatic new novel by
 Mary Hastings Bradley.

The NEW LONDON Magazine

For MAY - On Sale Everywhere - 6d.



That
Engraved
Dial
is Important



Improved model
of the "P.W." & "M.W." **SELECTOR COIL**

fitted with an **ENGRAVED SCALE**—a new and essential feature showing the exact position of the tappings



R.I. "P.W." & "M.W."
DUAL RANGE COIL

The amazing perfection of the R.I. Dual Range Coil and its immense success is due to the most highly critical laboratory tests, including the wavemeter and inductance bridge, and a special apparatus answering to all "P.W." and "M.W." published circuits in which the coil is specified. List No. B.Y. 20. **12/6**

R.I. have produced the irrefutably best production of the "P.W." and "M.W." Selector Coil, constructed to the exact specification of the designers, and perfected to an exceptional degree of efficiency and finished excellence.

The success of the R.I. Dual Range Coil, which gave unqualified satisfaction to thousands of users, is repeated in this R.I. Selector Coil, which is certainly a wonderful job, built of bakelite and fitted with the engraved scale which is indispensable for easy operation of your set.

The obvious thoroughness in design and manufacture, and the exactitude of this R.I. component (each individual coil is laboratory tested before release) clearly pre-determine that the results, claimed by the designers of the coil, will be positively attained by using the R.I. model with the engraved dial.

Ask your dealer for a copy of the new R.I. catalogue.

BUY THE BEST—IT COSTS NO MORE

Radio Instruments Ltd., Madrigal Works, Purley Way, Croydon
Phone Thornton Heath 3211.

T.A.