

A "PLUG-IN" SHORT-WAVE TWO

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Amateur Wireless And Electrics

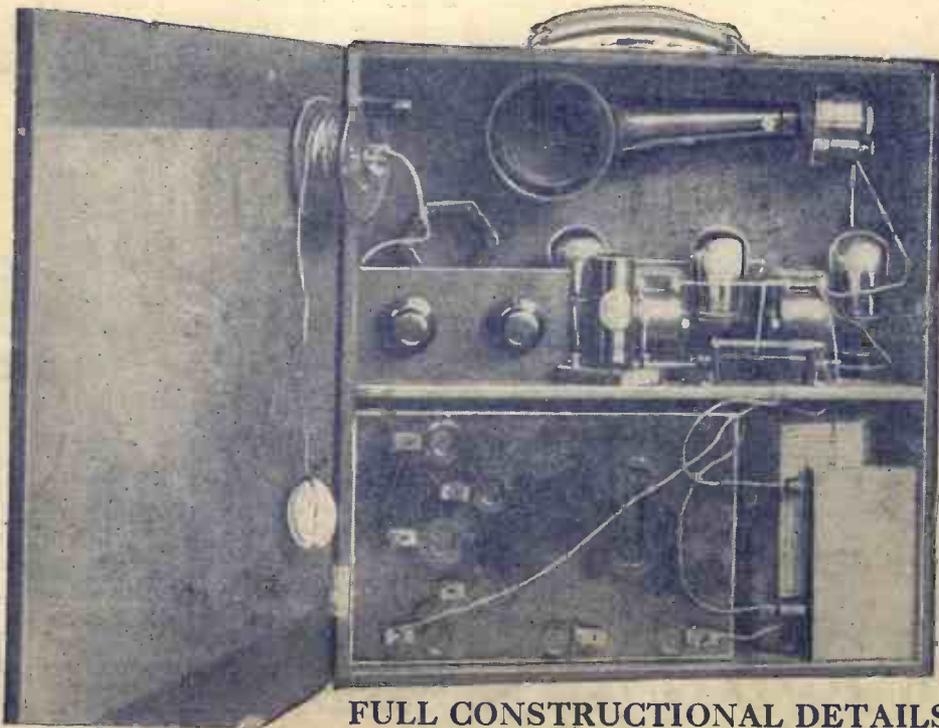
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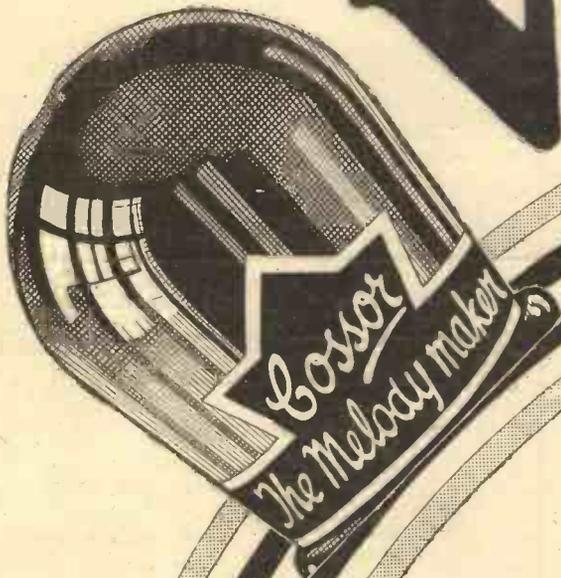
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Amateur Wireless

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The Leading Radio Weekly for the Constructor, Listener
and Experimenter

Vol. XI. No. 270

Edited by BERNARD E. JONES
Technical Editor: J. H. REYNER, B.Sc.(Hons.), A.M.I.E.E.

August 13, 1927

A Good Aerial—Eighteenth-century Programme—Chess Strain— Wireless in Africa—For Belfast Listeners—Filling the Ether

A Good Aerial!

AN experimenter recently obtained a very good aerial by supporting the wire vertically with the aid of a dozen or so gas-filled balloons. We understand that a well-to-do enthusiast who once saw an Indian juggler throw a rope up into the air, is thinking of obtaining the man as an accessory for his portable!

A Howling Success

AN American father found that when the radio set was going strong he couldn't hear the baby crying upstairs, so he gave baby a microphone, amplified the current and ran a line downstairs. Let us hope his set is stable or he will be dashing up and downstairs for nothing!

More Interference

THE Air Ministry has finally decided to utilise a plot of ground near Mitcham Common for the new station it is erecting. QRM!

Chess Strain!

IS it because the B.B.C. were unable to find an announcer strong enough to withstand the thrills of chess that we were not given a running commentary of the International Chess Congress?

An Eighteenth-century Programme

AN eighteenth-century programme, arranged by Iolo Williams, under the title of 1770, will be broadcast from London on August 26. Apart from songs from Sheridan's play, *The Duenna*, music by Handel, and other compositions of the period, it will also include imaginary conversations between Dr. Jonson, Boswell, and Oliver Goldsmith.

EARTHING-SWITCHES AND LIGHTNING-ARRESTERS

Although the risk of any particular house being struck by lightning, even though it be fitted with an unearthed aerial, is admittedly very small it is so very simple to protect a house from such an occurrence that every wireless-user should do so.

It is beyond dispute that a properly-earthed aerial, far from being an added danger, actually provides a considerable degree of protection from lightning to buildings in its vicinity, inasmuch as it forms an efficient lightning conductor. It is a very easy matter to fit an earthing switch to enable the aerial to be connected directly to earth when the set is not in use, and it is an equally simple matter to change over such a switch from one position to the other.

A lightning-arrester, which is merely a small spark-gap connected between the aerial and the earth-connection, serves to protect the set and the house, even should the former be in use when the aerial is struck by lightning. Although the received signals are far too weak to be affected by the presence of the gap the current due to lightning would have no difficulty in jumping it and so finding its way directly to earth.

Wireless for Africa

A LICENCE has been issued to the British East African Broadcasting Company, who propose to supply Kenya with broadcast music and, presumably, lectures. The company is also considering the construction of a short-wave station at Nairobi. These two stations should become popular with the "distance getters"!

For Belfast Listeners

FOR August 15, the Belfast station has devised an interesting entertainment entitled, "A Quiz at the Theatre," in the

course of which listeners will be given a short tour of the London theatres of the late seventeenth century. Drury Lane, the new house in Lincoln's Inn Fields, and the Little Theatre in the Haymarket are to be visited in turn. The music for this production has been resurrected from the British Museum.

Empire Broadcasting

ACCORDING to a recently-issued A.B.C. statement, plans for regular Empire-wide transmissions have been set on foot. It is hoped that eventually a complete inter-Empire service will be established.

Filling the Ether

FRANCE, besides projecting increased power for several stations, has also a new fifty-kilowatt Eiffel Tower station and a new Rennes station in view. Germany is talking of four new stations, including a 25-kilowatt plant at Hertzgostrand. Holland is increasing the power of Hilversum to 25 kilowatts, building a station at Huizen, and beginning to build a five-kilowatt station at Amsterdam. Norway is having new stations at Skiën, Stravanger and Tromsø. Belgium promises Ghent, Liège and Ostend, and Sweden, Vienna and Budapest are contributing one each. All this sounds a little astonishing, but it is Russia that takes the palm with 50 new stations, many of them ultra-high power too!

Scare-speakers!

INSTEAD of using scare-crows a Dutch farmer has installed loud-speakers in his orchards to protect the ripening fruit from hungry birds. If the method be adopted in England, a use will be found for those educational talks which we hear so much about.

PRINCIPAL CONTENTS

Current Topics 169	On Your Wavelength .. 177
How to Design Your Own Receiver 170	Davenport Junior—Some Pictures 179
A "Plug-In" Short-Wave Two 171	Practical Odds and Ends 180
Grid Bias: Its Use and Abuse 173	Without Fear or Favour 181
Getting the Best from the Crystal 174	A Holiday Portable .. 182
	Our Information Bureau 186
	"A.W." Tests of Apparatus 188



HOW TO DESIGN YOUR OWN RECEIVER

ALTHOUGH full constructional details of tested sets are published regularly in *AMATEUR WIRELESS*, many readers must, for one reason or another, sometimes wish to design sets for themselves. It is, for instance, an added pleasure to some people to know that they have been responsible for the construction of their sets right from the start. In other cases it may be that a set is required to fulfil somewhat unusual requirements, so that some time might elapse before a suitable design is published.

And there is really no reason why any amateur with a fair knowledge of wireless should not design and construct an excellent receiver entirely off his own bat, provided that he is possessed of a little patience. Patience may be needed, because a layout which appears ideal in theory does not always prove so in practice, and when the set is first completed, a few slight alterations may have to be made in order to obtain entirely satisfactory results. Of course, in the case of published sets, all this preliminary experimental work has already been done.

The Circuit

The first thing to do when designing a set is, of course, to decide exactly what circuit is to be used. Various considerations will influence the ultimate decision, the most important being, of course, the results it is desired to obtain. Allowance must, however, be made for the amount of money one is prepared to spend on the set, what components one already possesses, and other subsidiary factors.

The advantages of using H.F. amplification, with regard to range and selectivity, must be carefully weighed against the disadvantage of an increased number of tuning controls. Upon the amount of L.F. amplification required and whether or not extreme purity in reproduction is wanted will depend the number and type of the L.F. stages to be used.

If it is decided to use one stage of H.F. amplification the question as to whether this stage is likely to be stable without being neutralised should be carefully considered. If two H.F. stages are to be employed some form of neutralisation will most probably be considered essential and then one must decide upon the exact method to use.

Couplings

For the greatest possible volume with the minimum number of valves, L.F. transformers will, of course, be employed

on the L.F. side. If purity is of more importance than volume, however, resistance-couplings will naturally be preferred and now-a-days it is not necessary to sacrifice much volume to purity when this latter method of coupling is employed instead of transformers, even if the number of L.F. stages is not increased.

After the circuit has been decided upon comes the task of choosing the exact components to be used. Here the question of using components already on hand becomes important. For the rest the choice will obviously be influenced by the question of cost, and one should always aim at obtaining the best quality components that can be afforded.

Next follows what is perhaps the most interesting part of set-designing—arranging the layout. It is not at all such a simple matter to arrive at a good lay-out (except in the case of the simplest receivers) as it might appear at first sight.

Many are the considerations which must be borne in mind. Efficiency is, of course, the chief object, but the good appearance of the finished set is also a matter of importance. It is, however, much easier to strike a good compromise between efficiency and symmetrical appearance in these days of sets built on the panel-and-baseboard principle than it was when all the apparatus was mounted on an ebonite panel.

Baseboard Layout

The arrangement of the baseboard-mounted components is also, however, a matter for compromise to some extent. Symmetry is, of course, not very important here but the various components must be spaced as far apart as is consistent with the leads between them not being unduly long. Although as has so often been emphasised, the spacing of components and the length of the connecting leads is far more important on the H.F. side than in the L.F. portion of a set, it is a mistake to assume from this that the layout of the L.F. components is of no importance.

When once the layout has been definitely decided upon, a full-size working drawing should be prepared. Too many people make the mistake of building a set "as they go along." In such cases it is often found that some point has been overlooked, which makes it necessary to alter the layout after some of the components have been fitted in their places. Possibly, for instance, it is discovered that when the panel and base-

board are secured together one of the variable condensers cannot be operated through its entire range because the moving vanes foul one of the baseboard components.

When a set is being built from one of the *AMATEUR WIRELESS* blueprints such a thing cannot, of course, happen.

After the set has been completed it will, of course, be tested and one must not be disappointed if its performance does not, at first, come up to expectations. A few simple experiments, such as reversing the connections to a transformer winding, etc., can easily be carried out and if the design is sound it will not be long before the set is working perfectly.

G. N.

TELEVISION NOTES AND NEWS

MR. RALPH H. LANGLEY, for many years associated with the General Electric Company at Schenectady, has stated recently that the near future will bring the development of a combined receiving set and television apparatus. "Both machines," he said, "will be controlled by the same dial; the loud-speaker will be located behind the screen, and a turn of the dial will bring in music and pictures simultaneously.

An announcement was made the other day at a meeting of Mr. Baird's Television Company that work was proceeding on the lines of recording on gramophone records the succession of electrical signals that went to make up a "televised" image. One of the objects of this research is to make it possible to record a view of a scene etc., simultaneously with recording the music or sounds associated with it. The two can then be reproduced together at any future time.

This is a daring move on the part of the television experts, as in many cases it will mean direct competition with the talking film. The difference of course will be, if things turn out as we all hope, that the wireless amateur will be able to make use of the television record on a simple apparatus, whereas the cinematograph display involves a costly projector and a theatre in addition.

There are many indications both here and abroad, that television may develop on rather divergent lines from those we had been originally led to visualise. Some of these side issues may indeed, give the impetus that is needed to bring television into the prominence it deserves.

A "PLUG-IN" SHORT-WAVE TWO

A Sensitive Receiver for All Short Wavelengths

Designed by ARTHUR YORKE

WITH the expansion of short-wave broadcasting in all parts of the world, there is an increasing demand for a reliable short-wave receiver. In spite of statements to the contrary, many listeners still believe that a receiver capable of picking up short-wave transmissions below 100 metres is quite different from the ordinary broadcast type of set.

That this belief is unfounded is demonstrated quite conclusively by the performance of the "straight" two-valver illustrated in the photographic reproductions accompanying this article.

capacity effects, which, be it remembered, are much more noticeable on short waves than on the broadcast band.

As short-wave reception has to be done with headphones, there is no especial call for ultra purity of reproduction. We are justified in using a transformer-coupled L.F. amplifier, in order to benefit by the step-up in signal strength which is thereby



obtained. A 4-1 ratio is a good all-round figure for the purpose under consideration. Provided that it has a sufficiently high primary impedance, we can still use a high-impedance valve, with a high amplification ratio as a detector.

The value of the grid leak on short waves should be not less than 5 megohms for greatest sensitivity.

The H.F. choke should be one of reputable make, since the whole of the sensitivity of a "short-waver" depends upon the nicety of the reaction application.

Masses of metal are to be avoided in assembling an efficient short-wave receiver, and for this reason we have used an extremely compact type of variable condenser.

Other points of interest in a consideration of the circuit diagram are the two separate

H.T. + tappings and the use of ordinary rheostats to control the filaments of the valves.

This may seem somewhat old-fashioned to the up-to-date constructor, but it must be remembered that on short waves adequate filament control is essential.

The following components are required for the set:

One ebonite panel, 14 in. by 7 in. by 1/4 in. (Ebonart).

One terminal panel, 9 in. by 2 in. by 1/4 in. (Ebonart).

Three single coil plugs, B.B. mounting type (Lotus or Lissen).

Two valve holders (Whitely-Boneham, Lotus or Lissen).

Baseboard, 14 in. by 9 in. by 3/8 in. thick (Carrington).

One .0003 and one .0002 variable condenser (Peerless or Centroid).

One .0003 fixed condenser and one 5-megohm resistance (Lissen or Watmel).

One combinator (Lissen).

One H.F. choke (Lissen or Lindley).

One L.F. transformer: ratio 4-1 (Pye, Ferranti or Lissen).

Two 7-ohm filament resistances (Lissen).

One set of short-wave coils (Igranic).

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

Connecting wire (Glazite or Junit).

No serious deviation from the specified layout is advised, because interaction losses, due to a faulty layout, are easily caused and difficult to trace.

When all the components are screwed into their correct positions, attach the panel and terminal strip to the baseboard in readiness for the wiring up. Fig. 2 is the wiring diagram.

No attempts at elaborate right-angle-bend wiring should be made, because this would result in inefficiency.

Note, when wiring, the following points: The two connections to the aerial-coil socket consist of suitable lengths of rubber-covered flex wire, because it may be necessary occasionally to swivel round the socket to loosen the aerial coupling. The number of battery terminals has been reduced by "commoning" H.T. - and L.T. +, and also L.T. - and G.B. +. Readers who prefer separate terminals will need a terminal strip 2 in. longer than the one specified.

Plug in an Igranic size 2 or 4 coil in the aerial socket, a size 9 in the grid socket, and a size 6 or 9 in the reaction socket. If the wiring has been correctly carried out, oscillation should be easily obtainable by turning the reaction condenser dial. Some initial difficulties are usually experienced by the newcomer to short waves, in getting

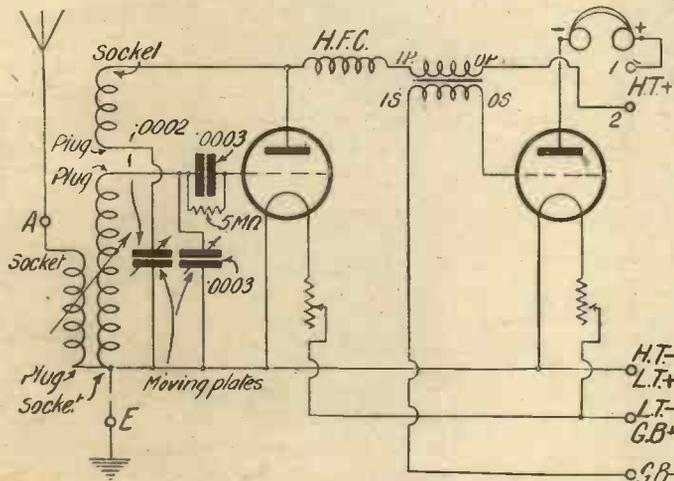
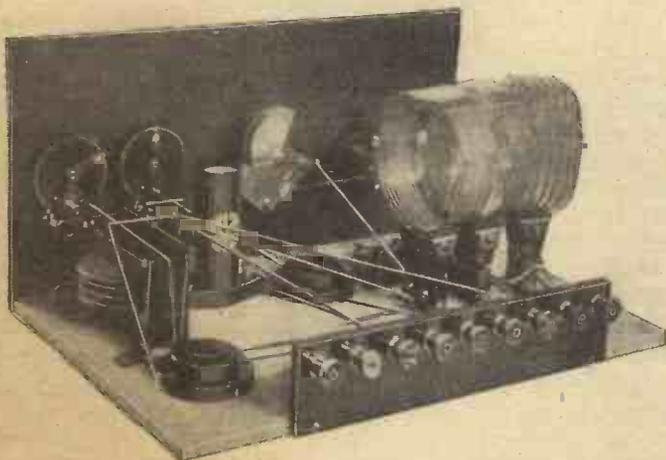


Fig. 1.—The Circuit Diagram

How straightforward is the arrangement can be easily seen from an inspection of the circuit diagram shown as Fig. 1. A modified Reinartz circuit is indicated, and there are three separate coils, each of which is a special Igranic short-wave plug-in coil.

Note that one side of the tuning condenser and variable reaction condenser are earthed; this is in order to cut down hand-



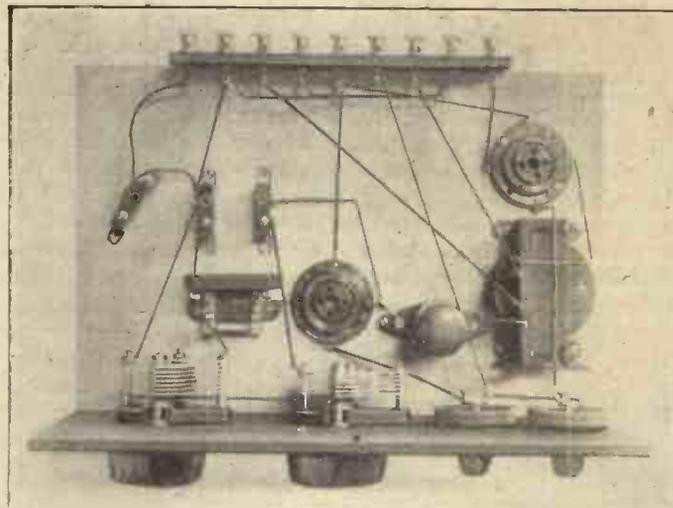
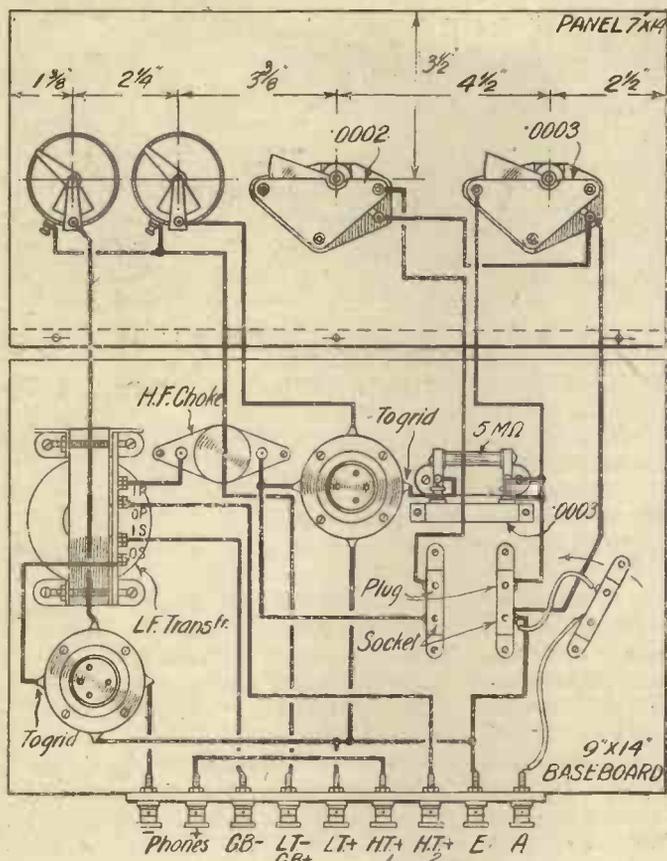
A Rear View of the Short-wave Two

oscillation over the whole tuning range of any given coil.

Much depends on the externals which are connected to a short-waver whether

slight movement of the aerial coil away from the grid coil may cure the fault. Another way out of the difficulty is to increase the size of the reaction coil. As

With the sizes mentioned, this set should tune in 2XAF, the 32-metre short-wave relay of WGŸ, Schenectady, New York, somewhere round the middle of the dial.



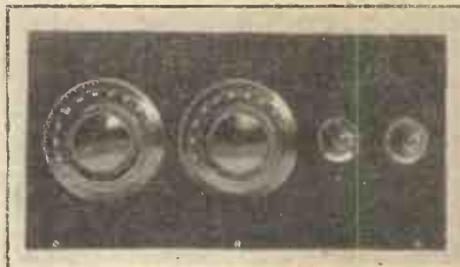
Above: Plan view of Short-wave Two showing the simplicity of the layout.

Fig. 2 (left): The Wiring Diagram

Right: Photograph of panel showing rheostats and condensers in position

With a size 9 grid coil, KDKA can be picked up any evening after 11.30 p.m.

There is an ever-increasing number of short-wave transmissions which the



easy oscillation is obtained. An insuitable detector valve is a frequent cause of failure in this respect. If the receiver is functioning properly, it should not be necessary to increase the H.T. on the detector valve above normal.

Bear in mind, however, that even a

a general rule, the size of this should not exceed the size of the grid coil. Lastly, it is quite a simple matter to reverse the aerial and earth connections on the aerial coil socket, a procedure which often makes an astonishing difference to the ease of reaction control.

amateur can pick up with ease these days, on wave-lengths as low as 20 metres.

In addition to the host of amateur morse and telephony transmissions on 45 metres, there are many regular commercial stations in operation, including the "Beam" telephony from Canada.

A NEW 6-VOLT RANGE OF VALVES

WE have recently had an opportunity to test a new six-volt range of valves manufactured by The Marconi Osram Valve Co., Ltd. These valves are marketed by The General Electric Co., Ltd., and The Marconi Co., Ltd., as Osram DE610 and Marconi DE610 valves respectively. The series consists of the DEH610, DEL610 and DEP610.

The makers have attempted to give the public a valve having a good performance consistent with economy in filament current: from an inspection of the figures obtained by us on test, it is evident that they have been successful.

The DEH is a high-impedance valve, having a high amplification factor, and is, therefore, especially suitable for use in resistance capacity amplifiers, although it

may also be used with advantage in a tuned anode circuit and as a rectifier followed by resistance capacity coupling.

The DEL is a general purpose valve, its moderate impedance makes it suitable for use as a high frequency amplifier in conjunction with inter-valve transformers or tuned anode system; it will be also eminently suitable as a rectifier when followed by transformer coupling. Finally, it may be used in the first stage of a low-frequency amplifier when a large step-up in voltage is desired.

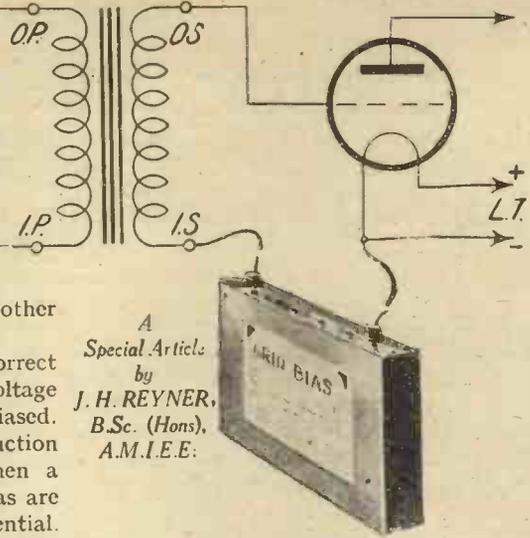
The DEP is an efficient power-valve capable of amplifying high-voltage swings without distortion, whilst the amplification factor in comparison with the impedance is noticeably high.

	Fil. Volts	Fil. Current	Anode Volts	Impedance	Amplification factor
DEH610	5.5	0.1	60	120,000	36
DEH610	5.5	0.1	90	83,000	33
DEL610	5.5	0.1	90	18,000	12.3
DEL610	5.5	0.1	120	15,000	10.8
DEP610	5.5	0.1	90	7,000	7
DEP610	5.5	0.1	120	6,200	6.1

We have confidence in recommending these valves to all readers.

There are 72,000 licensed receiving sets in Moscow but it is officially estimated that a much larger number are illegally enjoyed. The city authorities maintain loud-speakers in more than twenty parks and public squares which bellow speeches and music from dawn to darkness.

GRID BIAS ITS USE AND ABUSE



Special Article
by
J. H. REYNER,
B.Sc. (Hons),
A.M.I.E.E.

EVEN the veriest novice is aware that accumulators require periodic recharging and high-tension batteries either recharging or renewing. There are however, quite a number of people who are unaware of the purpose of the grid-bias battery. The practice of incorporating these batteries inside a receiver is generally favoured as they have small dimensions and can be readily housed.

There is, however, one outstanding disadvantage of placing this battery in such a position. The performance of a set may be quite satisfactory for a certain period of time, after which it may commence

between wide limits according to the other potentials.

The factor which controls the correct value of grid bias is the H.T. voltage applied to the valve which is being biased. It is possible to obtain good reproduction from a particular power valve when a number of varying values of grid bias are used without changing this potential. Actually, however, there is only one correct value of grid bias corresponding to any particular value of high-tension voltage. That this is evident can be seen from the curves shown in Fig. 1. Here we have a number of static characteristics drawn for different values of high-tension supply. It will be noticed that as the high-tension voltage is increased, the curves tend to move towards the left, that is to say that more of their straight portion lies on the left-hand side of the zero grid-bias line. In a low-frequency amplifier, in order to obtain distortionless amplification from a valve, it is necessary to operate this valve on the straight portion of its characteristic and not to allow the grid potential to become positive under any circumstances. The oscillations to be amplified vary from a maximum positive to a maximum negative value, so that it is necessary to work at the points B, B1 or B2, midway between the straight portion of the curve ac. In this manner, we can make fullest use of the valve without running off the straight portion of the characteristic as the result of the negative half cycle, or running into grid current as the result of the positive half cycle.

Correct Values of Grid Bias

The negative bias corresponding to the points B, B1 or B2 are the only correct values for a valve of this type with anode potentials of 60, 90 and 120. It often happens that bad reproduction is the direct result of wrong grid-bias values. This may occur as the result of applying too large a potential, just as easily as it may through applying too small a potential. Instances of the former case are quite common. A reader may purchase a new high-tension battery with a voltage of 100, and set his grid bias at the value given by the makers of his valve for the particular H.T. voltage in use. After a few months, the battery may run down to 80 volts, in many cases no attempt is made to re-adjust the value of the grid bias, so that with strong signal the grid bias is excessive and distortion occurs.

A good method of finding the correct grid-bias value for any high-tension voltage can be obtained as follows:

Take the figures of grid bias given by the makers for two different high-tension voltages such as 70 and 120 and plot these

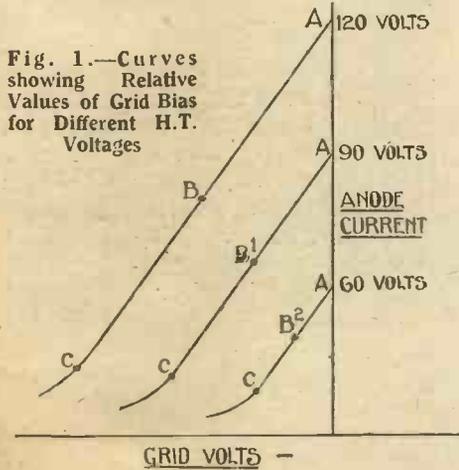


Fig. 1.—Curves showing Relative Values of Grid Bias for Different H.T. Voltages

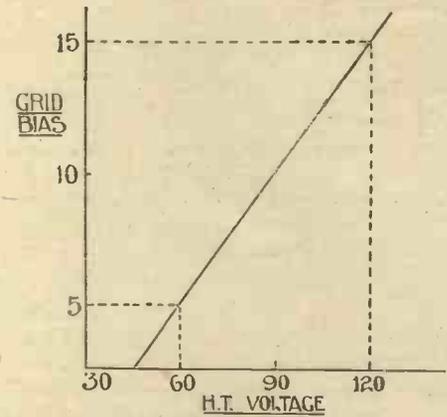


Fig. 2.—Graphical Method of Determining Correct Grid Bias

to fall off and ultimately give very poor reception. Such a state of affairs has often occurred in our experience and in many cases has been traced to the deterioration of a grid-bias battery which is out of sight.

Although there is no fear of over-discharging the small grid-bias battery, it usually happens that the small cell battery deteriorates fairly rapidly, even when not in use. The larger type of cell however, as employed to-day for multi-valve receivers, will hold its voltage for a much longer period.

The Grid Voltage

Most of us are aware that in order to obtain good reproduction with our power and super-power valves, it is absolutely essential to bias them to the correct degree. Unfortunately, the value of voltage to be applied to the grid varies considerably with the potentials on the valve itself. This fact is often a pitfall and one frequently hears the statement made that "such and such a power valve requires a grid-bias voltage of so many volts," whereas actually this value may vary

on squared paper, using the grid bias as ordinate and the high-tension voltage as abscissa. Join the two points by a straight line as in Fig. 2. In this manner it is possible to read off at a glance the correct value of grid bias corresponding to any known H.T. voltage, so that as the voltage of the H.T. battery drops, so the grid bias may be adjusted to within approximately 1 volt of the correct value.

Effect of Wrong Values

We have already seen that for the best results in a low-frequency amplifier, the grid bias should be adjusted to one particular value for a given high-tension voltage, otherwise distortion may occur, due to over-loading. There are however, other disadvantages resulting from the use of an incorrect grid bias which may affect the tone or the current consumption of the high-tension battery. The application of a negative grid bias in a valve reduces the flow of electrons between the filament and the anode or, in other words, diminishes the current flowing through the valve, and

(Concluded at foot of next page)

Getting the Best from the Crystal

An Article of Interest to All Crystal Users

This, and two following articles, will deal with matters of interest to all crystal users and experimenters. The author, Mr. H. Bramford, has no intention whatever of accepting existing theory as established fact

THERE are still, even in these enlightened days, thousands of enthusiasts who stand by the crystal for wireless reception. After all, this is quite understandable. For one thing, a crystal receiver is within the reach of all, and thus supplies an endless source of pleasure to those of moderate means. Unlike valve receivers, they do not go wrong, there are no batteries to give out at the psychological moment—there is no expense in upkeep, and really a crystal set is the most wonderful of all receivers, when it is considered that one simple element provided by nature supplies all that is really needed, and is constant in its functions over an indefinite period.

It is better to use a simple crystal set and enjoy pure music than to operate badly, to the detriment of others, a difficult valve set, and then only succeed in producing a great volume of distorted sound.

There is much to learn about the crystal of fascinating interest. What we want to grasp in the first place is how to get the utmost from a crystal set which produces comparatively weak signals.

Details

Firstly, the point should be realised that we are to make every effort in every conceivable direction and in the most minute and not always obvious details, to extract the last ounce of effort from a crystal set. If you already have a crystal set, see what improvements you can make, especially if you are not altogether satis-

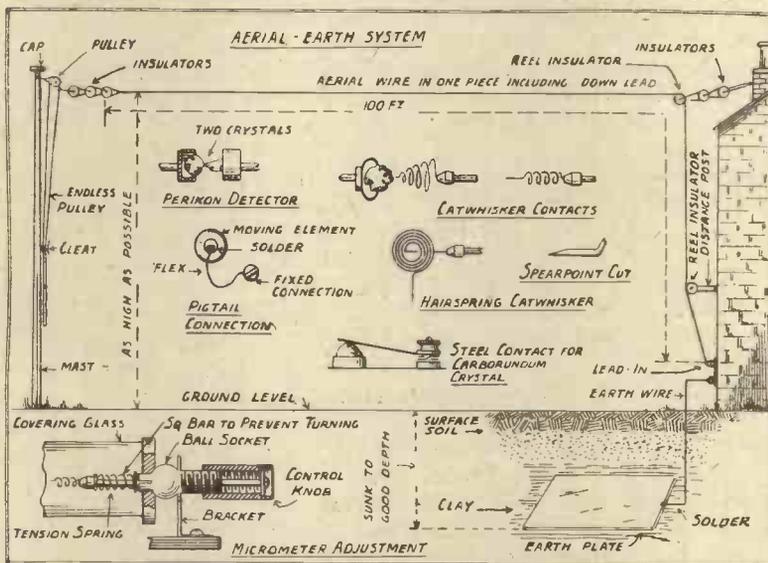
fied with it, and remember that you must do the work, then the crystal will do the rest. I am going to consider several vital points, and perhaps you will find they will help you to make remarkable improvements to your reception.

Aerial System

Your aerial must be a good one. With a

provide no advantage whatever. The wire may be bare or enamelled.

The earth is even more important than the aerial. A good aerial and a bad earth is no good at all. The surest way of obtaining a maximum degree of signal strength is to have a real earth. I do not recommend gas pipes, nor even water pipes, but only a really good earth, consisting of a large area of metal sunk into the ground, all joints being well soldered, the earth lead heavy and well insulated and as short as possible. With soil which consists of gravel to a depth of many feet the problem is difficult. Here a long metal tube driven well down may be better. Make all contacts perfectly clean, solder at all points and use an earthing switch of good design which provides good insulation.



The Receiver

Now look to your set. We shall have some form of aerial tuning inductance, and the design of this item is vital if the best results are to be obtained. With any type however, see that all contacts are firm and clean. With variometers see that bearing points do make contact and provide if necessary a pigtail connection. With regard to the crystal we have much scope for investigation. The crystal must be clean, must not be handled with the fingers, and the grain must be studied. The contact or catwhisker, as it is commonly termed, must be fine and springy, scrupulously clean, and micrometer adjustment possible. The drawings given illustrate some of the points mentioned in this article.

"GRID BIAS, ITS USE AND ABUSE"

(Continued from preceding page)

therefore the current taken from the high-tension battery. It therefore follows that the greater the grid-bias voltage the smaller will this current become.

There is a further point to be considered: as the current flowing through the valve is diminished, the impedance is increased or, in other words, by increasing the value of grid bias on a valve, we increase its impedance. Now the relative values of valve impedance and anode impedance have an important effect on the resulting

amplification. For maximum amplification, the impedance of the anode circuit should be high compared with that of the valve. If a transformer or L.F. choke or a loudspeaker having an inductive winding is employed, the impedance varies with the frequency, so that it may happen that for the higher frequencies the amplification will be a maximum but will fall off appreciably at the lower frequencies. If we increase the impedance of the valve, the ratio of the anode impedance and the valve impedance will be diminished, and in consequence this falling off in ampli-

fication will occur at a higher frequency.

Thus, as a result of the increase of valve impedance, we tend to cut off the low tones which are so desirable where quality is concerned. It has been found that by decreasing the value of grid bias from 9 to 5 volts in a power valve the resulting tone was rendered noticeably more pleasing and the lower tones were in much greater evidence. In this particular case, the valve was being overbiased as the H.T. voltage was only 80 volts; had this been increased to 120 volts, 9 volts grid bias would have been more suitable.

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VALVES

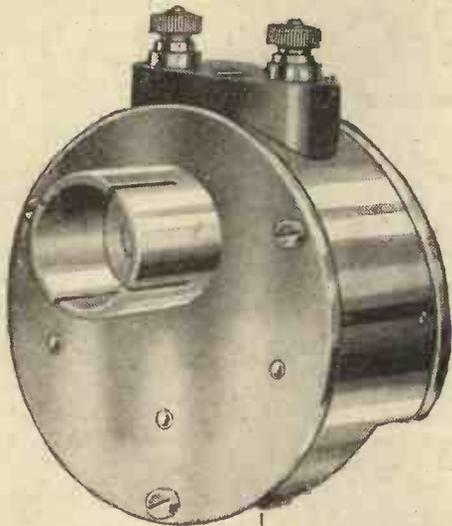
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On Your Wavelength!

The End of the Mystery

I GAVE recently some particulars of 2XG, the shortwave station which has puzzled a good many readers. What is still perplexing some of them is that though they hear the American station speaking, generally after calling "Hullo, London!" or "Hullo, New Southgate!" they never hear the reply. The reason, I believe, is that this is a beam service. We hear the American part of it because the beam is directed towards us, but unless one lives in the west of England the reply cannot be picked up for the simple reason that the beam is directed away from one's aerial. The wavelength generally used at the present by 2XG, is 16.02 metres, though this is changed from time to time experimentally. The service seems to be used mainly for testing work on the short waves, though sometimes when ether conditions are too bad in the neighbourhood of 6,000 metres trans-Atlantic telephone calls are put through by means of the beam. On some afternoons you will find quite a number of these in progress. It seems queer to hear the operator on the far side of the Atlantic call up a number in Chicago and say, "You're thrurrough." Speech is wonderfully good and there is very seldom any fading worth mentioning.

Short-wave Newcomers

Time was when those who made up short-wave sets had hardly anything to listen to in the way of telephony. Nowadays there is something going on every night of the week. In addition to the well-known KDKA, 2XAF and 2XAD in America, we have now WLW at Cincinnati, who often comes through exceedingly well, WIZ at Boundbrook, and WRNY at New York, who has recently put in a short-wave transmitting set. Europe is rather badly off for short-wave stations, PCJJ being at present the only regular "professional." Both Königswusterhausen and Berlin are, however, heard at times on 58 and 40 metres respectively. I hear on good authority that the Eiffel Tower intends shortly to carry out some tests on a wavelength in the neighbourhood of 75 metres. At one time I heard fairly frequently an Italian station with the call sign ISX, whose wavelength was about 45 metres, but I have not picked him up for some weeks. In this country we have one exceedingly powerful amateur station, that of 5KH, whose transmissions almost blow your head off should you happen to pick it up with the earphones on. A newcomer in distant parts is Radio Malabar, the Dutch station in Java, whose call sign is PCG and

wavelength 16 metres. PCJJ broadcasts to the Dutch Colonies, and PCG returns the compliment by transmitting to the Mother Country. No one need complain nowadays that there is not plenty to listen to on the very short waves.

Queer Facts

I have, as most of you probably know, always been an advocate of the nice fat, high-tension battery, where those of the dry cell pattern are used. Some time ago when the power valve began to creep into popularity, I felt sure that there would be a cry for heavier and heavier batteries. And then, when the super-power valve came along I had no doubts at all on the point. It appears, however, that those forecasts anyhow were incorrect. This very morning I had a circular from an eminent firm of battery manufacturers in which they set out their programme for the coming season. From this it appears that the small battery is still much more popular than the large one, owing probably to its lower first cost. I quite appreciate the feeling which prompts a man to say, "Why should I spend thirty shillings or so on 100 volts, when I can get one for half that price?" But it is not the initial cost really that counts anything like so much as the total cost for a year's working.

Power valves devour a good deal of current, and it is surprising to find how much even high-frequency valves and rectifiers can put away. You can probably take the average for a three-valve set with a power "toob" in its last holder at round about 9 milliamperes and that for a four-valver at from 12 to 15 milliamperes. What I find is that the big battery scores hands down over the small fellows. Those that I have in use at present are 45-volt units, weighing fourteen pounds apiece. They were purchased last November, since when they have been heavily used, having been called upon frequently to deliver juice from eight o'clock in the evening until three o'clock the following morning on occasions when I spent the evening in broadcastcatching and the small hours of the morning in listening to American short-wave transmissions.

Big Batteries Best

Yet there is no unit which does not show 40 out of its original 45 volts and I have every hope that they will complete well over a full year's service before they are done. If I had used small batteries during this period, I am quite sure that I should have had to replace them at least twice before now. A neighbour of mine used at one time to have a lot of trouble with

high-tension batteries. On my advice he put in big ones thirteen months ago to supply a set which uses three valves on the local station and four for more distant transmissions. Out of 105 volts originally available he still has 94. Not too bad, what?

H.F. Chokes

I referred more than once in these columns to the bothers that one may experience with H.F. chokes. In the past a good many of these caused trouble because they displayed marked resonance humps. Some of them were a real nuisance because not content with showing peaks on certain wavelengths, they showed similar ones on the harmonics of these wavelengths. Thus you might find that your reaction control was replaced by an entire lack of control at, say, 1,800 metres and that the set played up to some extent on 900 metres and on 450 metres as well. Manufacturers have lately gone into the choke question most thoroughly and several have been produced recently which are a real pleasure to work with. I have two just now of different makes which give beautifully even working over amazingly wide wavebands. One of them gives good results on wavelengths between 30 and 3,000 metres, the other over a slightly bigger band. The high-frequency choke is such an important part of a receiving set using any kind of capacity-reaction control that it should be selected with extreme care. It is no exaggeration to say that a poor choke will completely spoil the performances of a set that is otherwise first-rate.

A "Portable" Holiday

I met Mr. Reyner the other day, and he tells me that he has become a convert to the portable set craze. It appears that he has recently returned from a camping holiday in Scotland—which, by the way, appears to be all the rage just now. Everyone is forsaking hotels and cultivating a more or less wild life—but as I was saying, he has just returned from this holiday and he took with him, as an experiment, a portable set.

He tells me that he was surprised at the ease with which he was able to keep in touch with the various B.B.C. transmissions, even though all reception had to be carried out by daylight and in fairly mountainous country, where, as he put it, one might expect the waves to arrive in a somewhat bruised and damaged condition. Daventry was receivable at good strength on a comparatively simple receiver, but even the short-wave stations could be received with surprising ease with very little trouble at quite considerable distances. In one case

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On Your Wavelength! (continued)

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the Newcastle transmission was received well before sunset, at a distance of nearly 200 miles!

Simple Receiver

I naturally enquired what form of receiver was used and I was surprised to learn that it was a straightforward four-valve set, consisting of H.F. detector and two note mags,—in fact, the "Countryside Four," recently designed for the *Wireless Magazine*. Although this set was designed primarily for use comparatively close to a local station, and was thus fitted with a frame aerial, an extra terminal had been fitted enabling a short length of about 60 ft. of wire to be used as an external aerial for obtaining reception at somewhat greater distances.

Is it a "Portable"?

Apparently, a length of bell wire was used, which was just slung over a convenient tree or even a telegraph pole, when the Postmaster-General was not looking! Indeed, Mr. Reyner tells me that on one occasion, he received good signals at a range of 60 miles using a camera tripod as an aerial mast! I protested, admittedly with my tongue in my cheek, that such a set was hardly a portable set, but I was bluntly told that the whole bag of tricks, except the loud-speaker, could be shut up and stowed in the car when finished with, and that was all the portability that was necessary. As for the separate loud-speaker, this, he said, proved very useful on some occasions, when the unfortunate set was left out in the rain and the loud-speaker placed inside the comparative comfort of the car. Fancy having to make such provision in the height of summer!

External Portable Aerials

I must say that I myself am rather in agreement with this idea. I think an increasing number of portable sets intended for use at a considerable distance will be provided with means for attaching an external aerial. They may be designed to give frame aerial reception at comparatively short distances, in which case, particularly if the loud-speaker is built in, they are completely portable, but the range can be considerably extended by the use of an external aerial. The question of whether the loud-speaker should be included in the set or not is a moot point.

Certainly it means an extra package to carry about, but it is difficult to get batteries of adequate size, a wireless set capable of giving good quality, and a loud-speaker also capable of reproducing adequate quality all in a reasonably compact space, and it occurs to me that the use of an external loud-speaker is probably most

conducive to satisfactory results. This, at any rate, is the case with the motorist who can quite easily stow two small packages in the car without any difficulty. Probably the man who has to carry his set about anyhow, leaves it on the piano—or wherever it is usually kept—for the really portable set that can do anything is still not produced.

Queer Variations

If you listened to 2LO's programme on the night when he gave us *Miss Hook of Holland* followed by the Southern Command Tattoo you must have been rather surprised at the difference in the volume of the two. The piano music which immediately preceded the musical comedy came through very powerfully and with extraordinarily good quality. But as soon as the change was made to the bigger studio there was a very noticeable drop in the signal strength. Nor could one increase it with one's ordinary valves in the L.F. holders, for if one did so overloading took place on certain notes. I imagine that either the studio in question or the particular microphone with its associated amplifiers made rather for "peakiness" so that the operator in the control room had to keep down the general modulation. When *Miss Hook* came to an end the announcer, reading the second news bulletin, came through much more powerfully than any of the players had done and the music of the Tattoo was exceedingly well heard.

A curious point is that it is often possible to allow a deeper degree of modulation when a transmission is relayed after a journey of many miles over the land line. It is partly for this reason that the Eastbourne concerts on Sunday evenings are so wonderfully well heard.

World Time Signals From Rugby

It is good news to hear that arrangements are being made for sending world-wide time signals from the great station at Rugby. Hitherto many parts of our Empire have had to rely for their time signals upon France, Germany and the United States, making use of the transmissions of the Eiffel Tower, Nauen and Annapolis.

After all, the whole world uses Greenwich Mean Time as its standard and it seems rather absurd that the country which owns Greenwich should not so far have bothered about transmitting international time signals. The only snag lies in the difficulty of finding transmission times that are suitable for everyone.

The old saying that the sun never sets upon the British Empire means also when you come to think of it that when it is mid-day here it may be any hour of the twenty-four at some part or other of our

vast possessions. The obvious solution is to send out the time signal not merely twice during the twenty-four hours but at fairly frequent intervals. I look forward to the time when Big Ben's chimes will be broadcast every hour by short-wave transmitters linking up the Empire.

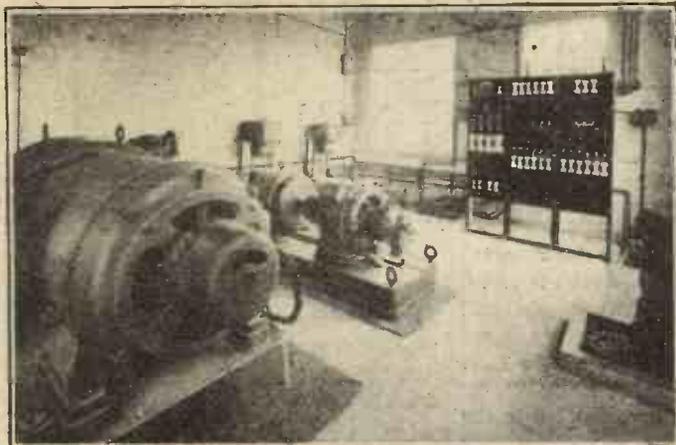
Hush, Hush, Hush!

I cannot yet say anything definite about it for the simple reason that I am sworn to the most profound secrecy but I can assure you that you may expect something very wonderful indeed at the forthcoming Wireless Exhibition. Just what the component is that does it I may not say, but this I can tell you: it will completely revolutionize methods of high-frequency amplification. Thorough and searching tests have already been made and it is no exaggeration to say that one H.F. stage using this new wonder gives results in every way as good as those produced by two of the most efficient stages in use at present. I hear, too, that some other rather extraordinary bits and pieces have passed through the experimental stages with flying colours and will be on view at the Exhibition. Myself, I believe that it is going to be one of the most wonderful exhibitions since broadcasting began and that we shall see displayed there not a few really startling improvements in radio reception.

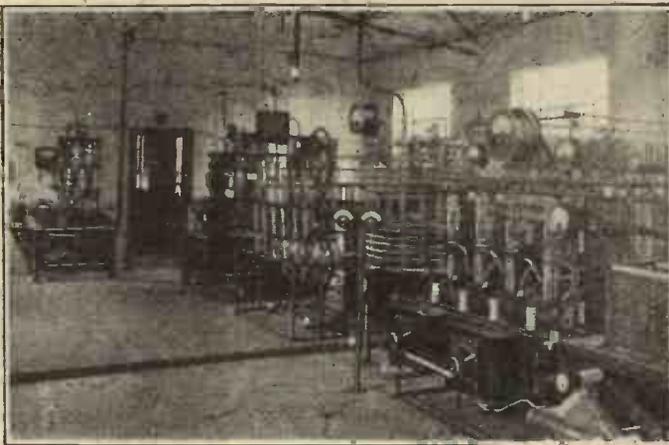
A Great Relief

I was surprised to find the other day when using phones that I was almost stone deaf in my left ear. Feeling very worried about it I took them off and took a little walk about the room. As it was in the small hours of the morning I could not get anybody to give me speaking tests; there was no clock in the room and I had no watch. At last I decided that it was no good crying over spilt milk and that in any case I could not do anything then and there. I sat down to the short-wave set again, and found to my surprise that though my left ear had miraculously recovered I had gone deaf in the right. I had visions of an entirely new malady for doctors to talk about—Oscillating Deafness or Thermion's Disease—then the truth dawned on me. It was not I who had gone deaf in one ear, but the phones that had gone dumb in one receiver. This kind of thing does happen after long periods of use, in fact, with an old pair of phones you will nearly always find that one receiver is a good deal better than the other. All that is needed is to send them to the makers for an overhaul, when they will come back, as mine did, just as good as ever. Don't throw away "bast" phones!

THERMION.



The Generators

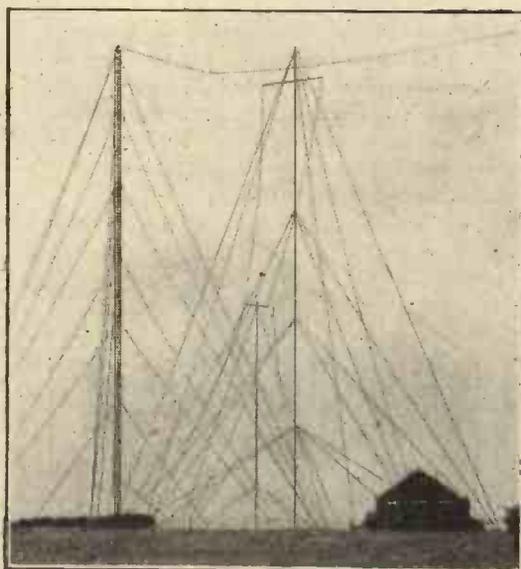


Transmitting Panels

MORE ABOUT DAVENTRY JUNIOR

As soon as the Post Office sanction has been obtained listeners will be hearing the short-wave high-power transmissions from the New Daventry Station illustrated on this page. The B.B.C. engineers have completed their experimental tests and they are satisfied with the results. Definite information regarding the new station's power and wavelength is not yet available, since the whole matter now rests entirely with the G.P.O.

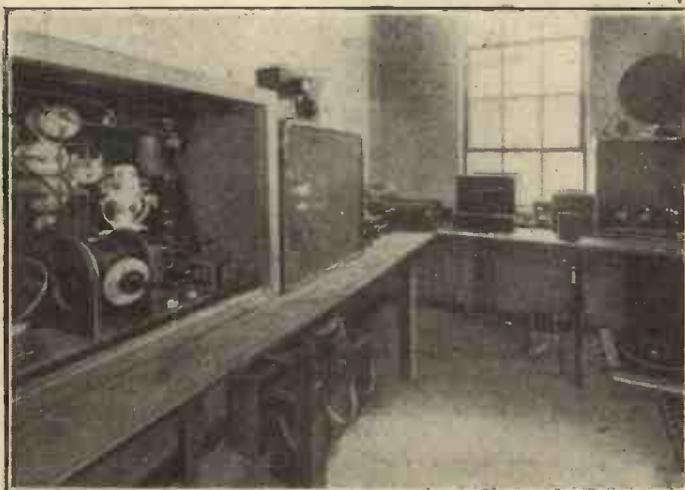
But, subject to the Postmaster General's permission, it can be stated that the power will be between 12 and 15 kw., 12 kw.



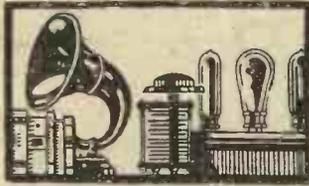
The Aerial System

being given as the probable minimum. The wavelength will in all probability be between 300 and 400 metres.

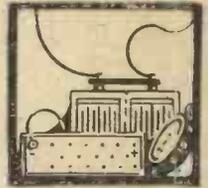
Listeners will have noticed that the regular experimental transmissions have now ceased. Except for an odd transmission here and there very little will be heard of the new Daventry until its inauguration which, it is hoped, will be towards the end of the present month. The photographic views shown here should give the reader a good idea of the general appearance of the station and radiating system.



Some further Interior Views of the New Station

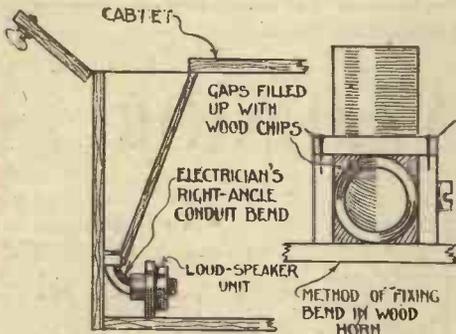


PRACTICAL ODDS & ENDS



A Simple Loud-speaker for the Portable

THE provision of the horn for a portable loud-speaker set is often a perplexing problem, which, however, the writer solved in the following simple manner.

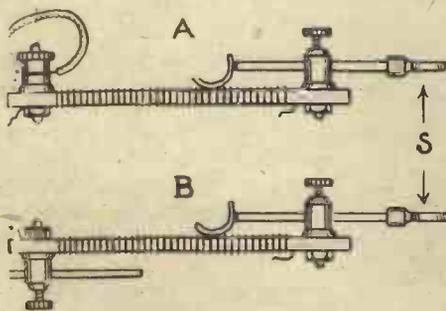


Simple Loud-speaker

Two right-angled triangles were cut out of a piece of three-ply and fitted in a corner of the cabinet so as to form the horn. The loud-speaker unit was then connected with the small end of the horn by an electrician's right-angle conduit bend, which was tightly packed in the latter in the manner shown. R. W. M.

"Variable Fixed" Resistors

THE sketch shows how a simple filament rheostat may be arranged on the fixed-resistor principle, the parts required comprising two small terminals, a small brass rod with spade S, a small spring brass slider, a small strip of fibre, and the necessary resistance wire.



The brass rod is passed through a telephone type terminal and then soldered to the slider.

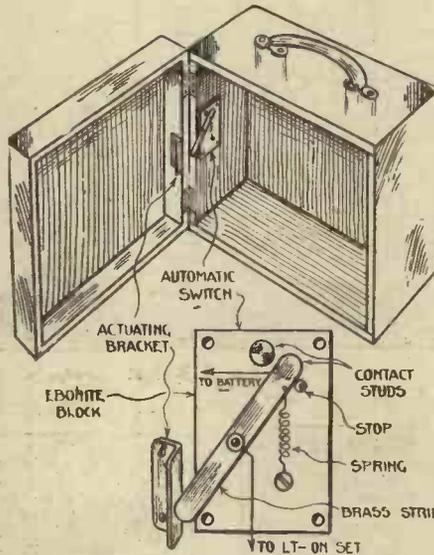
At A the spade is connected to one of the filament terminals on the valve holder the other terminal (on left) being joined to one of the L.T. leads by means of a short flexible lead.

It is then possible to adjust the rheostat by sliding it bodily over the fixed rod. At B the flexible lead is dispensed with, a second telephone terminal being arranged as shown to slide over the end of one of the L.T. buss bars.

The spade on the rod is connected to the valve-holder terminal as in the previous example. The resistance wire, of course, is only joined to one terminal (left in both examples), the other end being left disconnected and anchored in a small hole in the former. O. J. R.

Preventing Current Waste

IT would not be pleasing on returning home with the portable to find one had omitted to switch off the L.T. current. The switch described below, by automatically breaking the circuit when the door of the cabinet is closed, makes current waste by this means impossible.

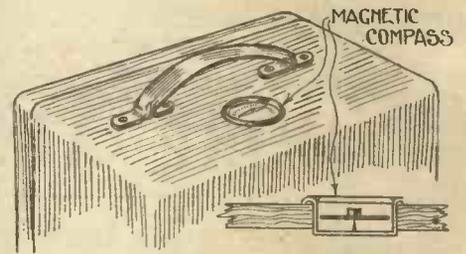


Automatic Switch for Portable

A small piece of strip brass or copper is pivoted on a rectangle of ebonite so that one end projects while the other slides over two contact studs. A stop and a spring are so arranged that when the strip is free contact is made with one stud, and when depressed so that the spring is stretched, contact is made with the other stud. A bracket of sheet brass is fitted on the door for depressing the contact when the door is closed. The contact strip is connected to the L.T. battery negative, the stud with which it makes contact when the door is open being connected to the L.T. negative of the set. J. S. A.

A Portable-set Gadget

WITH frame aerials and portable sets, it is useful to know the direction the station it is desired to receive lies in; but one's sense of direction can soon become confused after an hour or so on the road.



The Compass fitted in top of Portable

A magnetic compass used with a map can soon put one right again, however.

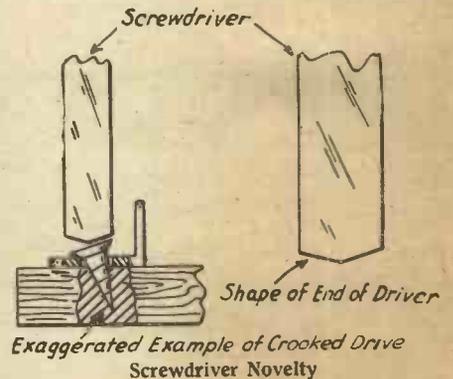
The compass—obtainable for a shilling—can easily be let into the top of the cabinet by drilling a hole slightly smaller than the compass and forcing the latter into position.

In use it should always be remembered that the geographical north lies slightly to the right of the magnetic north. R. W.

A Novel Screwdriver

SOMETIMES a screw is placed in such a position as it is only possible to get at by screwing it in to a base board, as the case may be, at a slight angle, instead of driving it in truly.

It is a useful idea to have at hand a screwdriver with an end shaped as shown

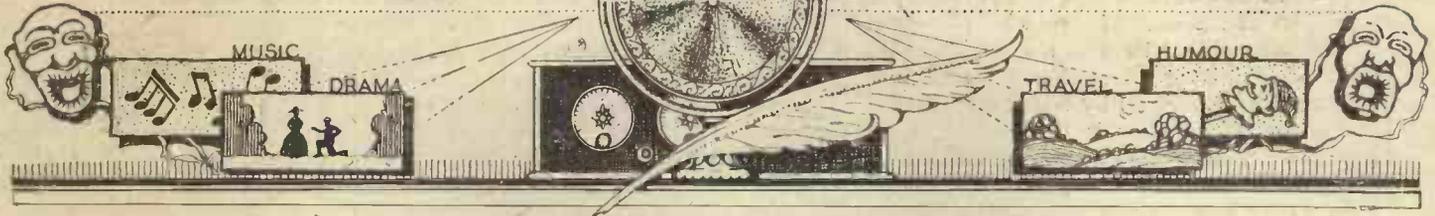


in the drawing, for this purpose. It will be obvious from the diagram that if the screw is crooked, a driver thus shaped will accommodate itself to the angle of the slot at each half turn of the driver.

It is advisable to use an old screwdriver for this purpose, the end of which may be filed and finished in the manner described.

H. B.

WITHOUT FEAR OR FAVOUR



A Weekly Programme Criticism by Sydney A. Moseley

AN official of the B.B.C. has been good enough to tell me that the innovation of announcing the pianoforte pieces during the interval and, at the same time, of playing small and well-known pieces instead of snippets was the result of the suggestion made in these columns. This will particularly interest those readers who wrote to me supporting this suggestion.

And now I have another brainwave. The B.B.C. make a great play of their "Bank Holiday Programme." They give the impression that it is an extra special programme set out with a knowledge of a holiday's requirements. Why not cut out, then, the talks for this once? Personally, I am an adherent of the talks feature, as my readers know, I often regret that we hadn't the advantage of a good many of them years ago when I was keen to drink to the full from the fount of knowledge. But somehow Bank Holidays and "straight talks" do not fit in.

I admired the Welsh singing from Cardiff. Especially the "Ting a-ling a-ling" song, which was sweetly rendered. Yet even with a Welsh dictionary I found it difficult to follow the words of the song. And Welsh poetry! Perhaps I am suffering from after-the-holiday density, but will the Programme Department of the B.B.C. kindly inform me why Welsh poems are broadcast to a multitude who haven't the gift of understanding the language?

And so to Manchester instead, where a popular concert was given. For which relief many thanks, great City of the North.

I have been lately throwing bouquets at the Children's Hour efforts, but I would warn our friends that the cross-talk is being rather over-done. I am perfectly certain that children can't follow these bright repartees. Especially when they are made in unison.

That was a fine concert relayed from the Hotel Victoria, by Emilio Colombo's orchestra. And Miss Megan Thomas' Aria from Verdi's *Traviata* held me spell-bound—until the ten o'clock time signal was super-imposed just at the climax!

John Armstrong has been singing the songs of Richard Strauss with fine feeling.

This feature of classical songs is to be highly commended.

Did you hear Mr. B. Tomkin's talk on "Water Divining." What a voice, eh? In fact, a voice divine. And as strong as—well, not water!

That Sir H. Walford Davies has made good may be seen in the fact that he has been re-engaged for next season. Congratulations!—I mean to listeners.

A first-rate symphony concert was that given by Dr. Adolph Brodsky and his orchestra. They played *A Roman Carnival* (Berlioz), the Bach Concerto in A minor, for violin and orchestra and Brahms *First Symphony*. Not so highbrow as it must have seemed to some listeners when they first heard this kind of music through the good offices of Savoy Hill.

Wilson Harris's talk on naval disarmament was very useful and appropriate to the moment. It was well delivered, too.

The performance of *The Vagabond King* was particularly interesting to me, since, quite as a coincidence, I had just finished

reading Justin McCarty's book "If I were King"—the story on which the play has been founded. Winnie Melville was articulate but sometimes flat. Sometimes too, it sounded as if the play were being relayed not from the Winter Gardens but from a bear garden. I suppose these vagabond fellows *must* create a lot of din. But they might have acted a little more gentlemanly for the purposes of the wireless! As for the comedians, I could only understand one joke. "The King, good Lord!" exclaims a character as Louis arrives. "The King, good-night!" was the retort of another character who felt safer in the fresh air outside. Why the comedy failed to get across was due to faulty enunciation.

I see Mr. H. C. Hart's talk was entitled—"Persia, the Land of the Lion and the Sun" and as I am all for high game adventures I pricked up my ears. Alas! I was sold. There ain't no lions in Persia.

It was good to hear the Sullivan programme, for unless I am mistaken, this is something of an innovation. At any rate, I don't think the immortal composer has been given a special programme more than two or three times at the outside. By the way, *The Lost Chord* was announced as "lorst," although the singer used the short vowel. Since this synchronises with the announcement of the B.B.C. Advisory Committee on spoken English I beg their Erudite Highnesses to give a ruling on this point.

Which, by the bye, was the Norman Wilkinson who gave a talk on "Camouflage." There are two painters of that name, each eminent in his own way. One I met in the Artists' Rifles some years ago. There is a Norman Wilkinson too, who does those fine posters for the railway companies.

Mr. Crole-Rees on "How we can lead the world at Lawn Tennis," was clear and full of common sense, and he knew when to stop, too, despite the fact, that according to schedule, he was allowed twenty minutes, whereas the important talks on big international affairs are given fifteen minutes and sometimes ten.

The one-act play *High Tea*, by H. E. Holme, was a little better than those to which we have been recently treated.



"The Biggest Microphone in the World." The appropriate Symbol over the Entrance to the New Studio at 3LO Melbourne

IN designing the portable set described in this article, an attempt was made to utilise all the available space in the carrying case. It can be fairly claimed that this object has been achieved, and though the complete receiver is by no means light in weight, it certainly is portable. One of the chief drawbacks to real portability in wireless sets is the awkward shape of the carrying case. Special attention was therefore paid to this point.

Layout

The photographic views and drawings show the general arrangement of the interior of the portable.

At the bottom of the case are housed the 60-volt Columbia H.T. battery, 3-volt Hellesen L.T. battery, and 9-volt grid-bias battery.

Above these is fitted a shelf along the whole width of the case, and on this are mounted all the receiver components. At the top of the case is screwed the loud-speaker horn and unit. The space at the top left-hand corner is occupied by the aerial-wire reel when the door is closed.

A superficial inspection of the layout should be enough to convince the reader that practically every square inch of space has been utilised.

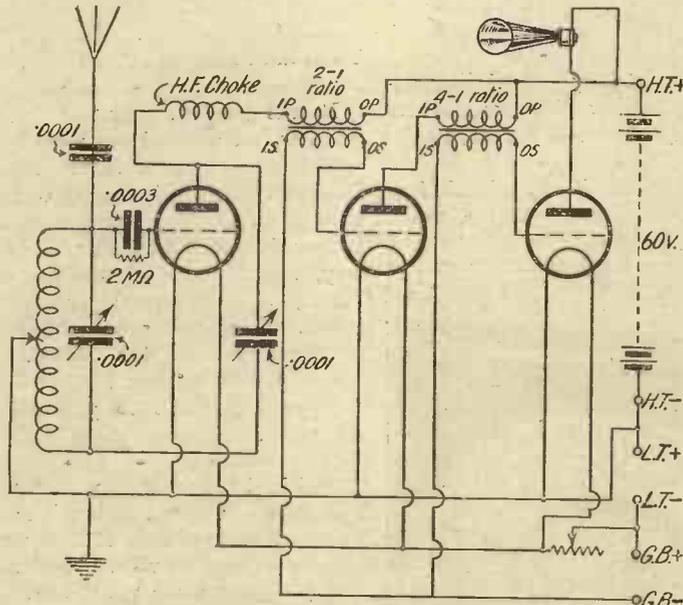


Fig. 1—Circuit Diagram of the "Holiday Portable"

The small amount of unoccupied space between the components and the loud-speaker horn is unavoidable, if the valves are to be withdrawn occasionally.

A frame aerial has not been used, as it was thought that the greatly increased signal strength obtained when an "extended" aerial was used more than justified the extra trouble of erecting the aerial wire. Another point in favour of the reel of

aerial wire is its greater portability. There is an outstanding disadvantage of the frame-aerial system. Unless two frames are used, the wavelength band on which the portable can be worked is limited to one band of wavelengths. With the type of aerial incorporated, it is just as easy to receive Daventry and other long-wave stations as the local short-wave ones.

Suitable Circuit

When deciding on the type of circuit to be used for portable work, two essentials must be considered: sensitiveness and high overall amplification. The first can be obtained by adopting some form of reaction with a "knife-edge" application. Two stages of transformer-coupled L.F. amplification will give a good "build-up," even with initially weak signals.

Probably the simplest of all modern reaction systems is known as the Hartley, and because of its simplicity it is especially useful where the bulk of components has to be minimised as much as possible. Shown in Fig. 1 is the complete circuit embodied in the portable set under consideration. A single centre-tapped coil serves the double purpose of tuning coil and reaction winding.

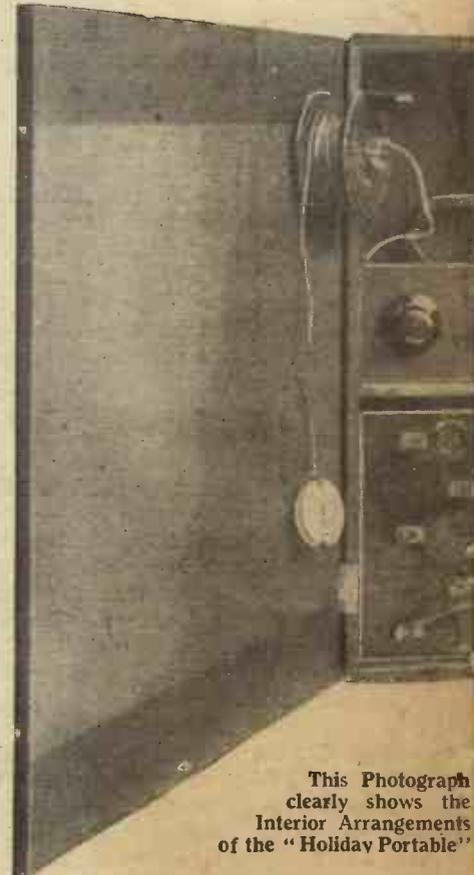
The whole coil acts as the tuning coil and the lower half as the reaction coil. As the earth is taken to the centre tap, the grid-filament damping across the coil is reduced and only a small reaction condenser is needed between the lower end of the centre-tapped coil and the anode of the detector valve to produce reaction effects. The tuning and reaction condensers are both .0001 microfarad capacity, and the particular type specified results in a very compact layout. Grid-leak-and-condenser rectification has been employed, as this is still considered to be

the most sensitive form of valve rectification. In series with the anode of the detector valve and the primary of the first L.F. transformer is an efficient H.F. choke.

An H.F. valve is used for the detector, consequently a low-ratio transformer with a high primary impedance is used for the first L.F. stage. As the first L.F. valve has a fairly low impedance, a 4-1 ratio transformer is suitable in the second stage.

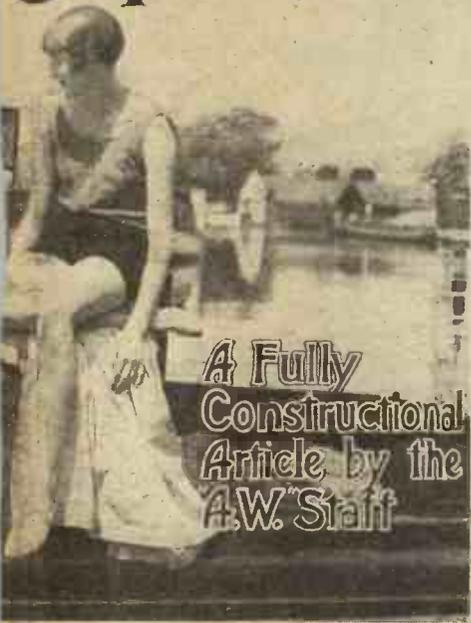


On the Broads with the

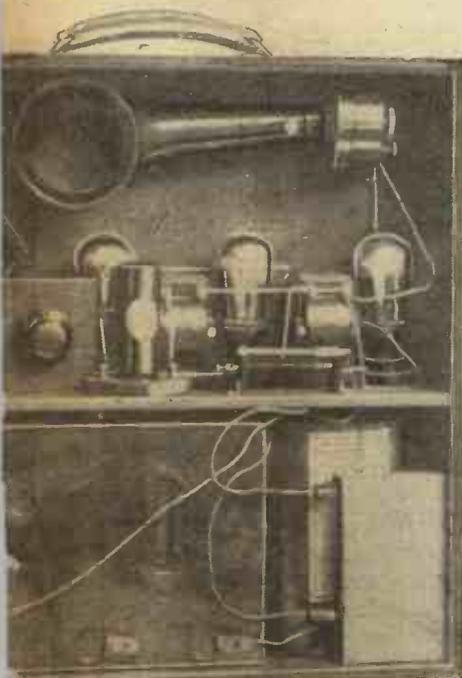


This Photograph clearly shows the Interior Arrangements of the "Holiday Portable"

ay Portable



"Holiday Portable"



Individual control of the filaments was thought to be unnecessary, but a master rheostat, which simultaneously controls all three filaments and also acts as an "on-off" switch has been incorporated. A variable control is necessary, as the filament battery has a maximum voltage of 3 volts, whereas the valves used are 2-volt ones. There is

little more requiring comment as regards the circuit arrangement.

It will be noticed, however, that a common G.B.— potential is applied to both L.F. valves.

Components Required

To duplicate the portable set shown in the photographic views and drawings, the reader will require the following components:

- One cabinet (Carrington or Caxton).
- One ebonite panel, 6 in. by 3 in. (Peto-Scott).
- Two low-frequency transformers (B.T.H. or Lissen, R.I. and Varley).
- One loud-speaker unit (Lissen).
- One loud-speaker horn (Radion).
- Three valve holders (Lotus or Benjamin or Lissen).
- One H.F. choke (Lissen or Lindley).
- Two variable condensers, .0001 (Peto-Scott or Peerless).
- One combined grid leak and condenser (Watmel or Dorwood).
- One baseboard-mounting variable rheostat (Lorostat).
- One aerial reel (Trix).
- One 50-volt H.T. battery (Columbia or Lissen).
- One 3-volt battery (Hellesen).
- One baseboard-mounting coil holder (Eissen).
- Aerial wire (L.E.W.).
- Connecting up wire (Glazite or Junit).

Construction

The first part of the construction of this portable should be devoted to the assembly of the components on the wooden shelf, which should be removed from the cabinet for this purpose. As there is practically no room to spare when the components are in position, the constructor must necessarily follow the specified layout rather closely.

The small ebonite panel at the left-hand end of the shelf supports the two .0001-microfarad variable condensers. Immediately behind the condenser panel are screwed the series aerial condenser, coil socket, and combined grid leak and condenser. To the right of the tuning condenser are the detector valve holder and the H.F. choke. Then come the L.F. transformers and remaining valve holders.

The master rheostat is mounted in an accessible position in front of the first L.F. valve holder.

Wiring

When wiring together the various components, great care should be taken in soldering all joints soundly, to avoid the annoyance of a breakdown when the set is in some out-of-the-way spot.

Constructors should find no difficulty in wiring, especially as there is now available a full-size blueprint of the receiver, price 1s. The developed wiring diagram (Fig. 2), which is a reduced reproduction of the blueprint, should also be of assistance when wiring. Covered Glazite wire was actually used, and some such wire is recommended in this case. There is no terminal strip, and suitable lengths of rubber-covered flex are taken from the required points through holes in the platform, to the various battery connections underneath.

Preliminary Testing

It is just as well to test the receiver before fitting the platform inside the carrying case. A suitable centre-tapped Lissen coil should be plugged into the coil socket, and a flex connection taken from the centre-tap terminal to L.T.+ . An

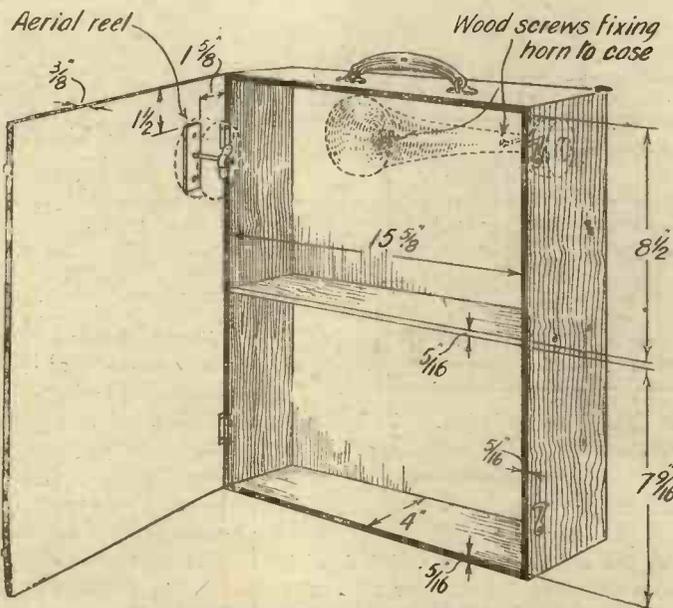


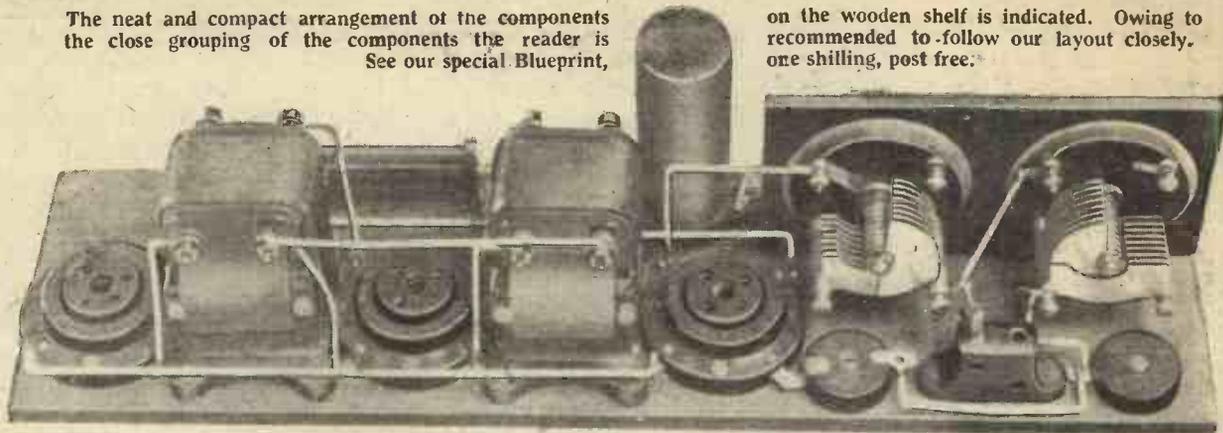
Fig. 3—Dimensions of Carrying Case. Note Loud-Speaker and Aerial-Reel Fixtures

H.F. valve is inserted in the detector stage and two L.F. valves in the amplifying positions.

As only a dry battery is used for the L.T. supply, it is not recommended that power valves be used. In addition, it will be recalled that only 60 volts H.T. are available, and whilst this will give adequate volume with ordinary L.F. valves, it is not enough to work a power valve properly.

The neat and compact arrangement of the components the close grouping of the components the reader is See our special Blueprint,

on the wooden shelf is indicated. Owing to recommended to follow our layout closely. one shilling, post free.



The aerial lead should be connected temporarily to the free side of the series fixed condenser. The H.T., L.T., and G.B. batteries and the loud-speaker unit are also connected by flex leads for the preliminary tests. The battery connections are somewhat simplified by the fact that there is only one H.T. + tapping and one G.B. - tapping.

The H.T. and L.T. batteries should fit snugly in the space between the component shelf and the bottom of the case. Final flexible connections to loud-speaker, aerial reel, and batteries complete the construction of the portable, which should be given a final test to see that everything is correct.

At the moment Tesla is designing a wireless power plant at Niagara Falls. Senator Marconi recently told the Institute of Civil Engineers that the transmission of power by electrical waves only waited for the perfecting of some device to project the waves in parallel beams in such a manner as to minimize diffusion of energy into space.

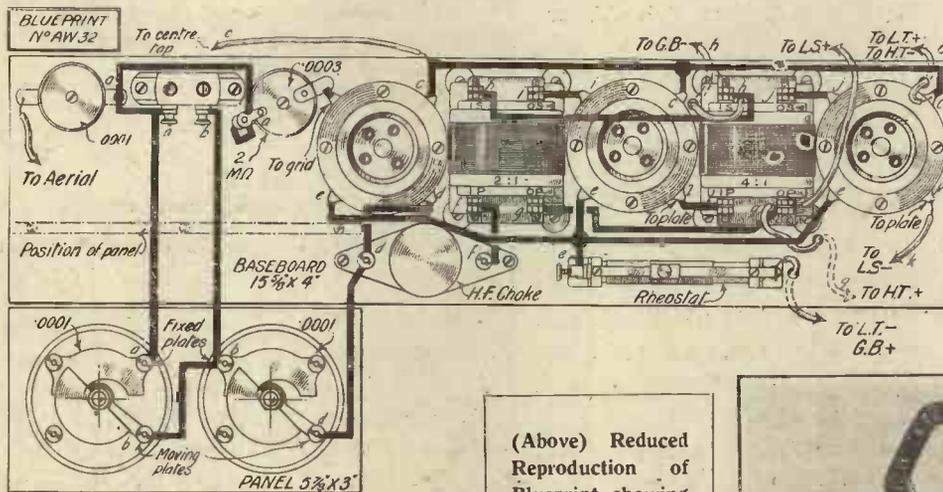
Earth Wire

The earth wire should be attached to the positive terminal of the L.T. battery, after which the receiver should be ready to pick

Wireless Power Transmissions

THAT the houses of the next generation will be heated and lighted by power transmitted via the wireless beam, is the prediction of the editor of a scientific

Dr. Thomas, a prominent member of the New York Electrical Society, recently demonstrated the lighting of an electric lamp by transmitted power. In his hand he held an ordinary electric bulb, to which was attached a four-foot copper rod. A short distance away an ordinary valve as used in wireless was turned on, and instantly the lamp he held glowed brilliantly. "Short waves, 10,000 times shorter than those used in broadcasting, is my aim," said Dr. Thomas. "If it is possible to make wireless waves short enough—and powerful enough—and focus them to a narrow, four-inch ray by means of a curved metal mirror, there should be no difficulty in transmitting the beam to its required destination. Such rays would criss-cross a city and wires for power transmission



up the local transmission. Full loud-speaker results should be obtained if the wiring and batteries connections have been correctly done.

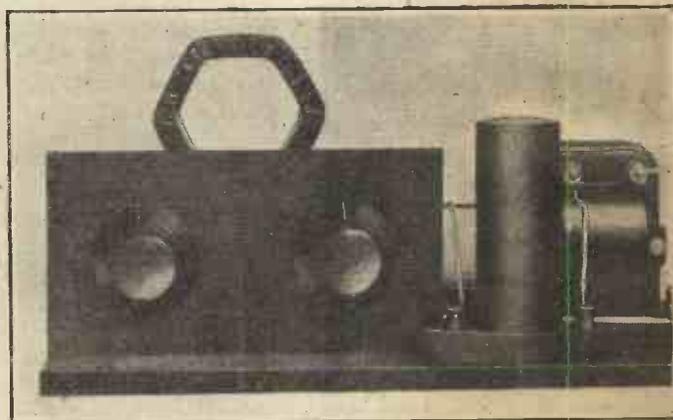
Final Adjustments

When the constructor is satisfied with the performance of the receiver on actual reception, the final fitting up can be undertaken. The receiver shelf is firmly secured to the interior of the case by means of seven wood screws, two at each end and three at the back. The loud-speaker horn is attached to the back of the case, above the components, by two screws, one passing through the neck of the horn and the other through the back of the flare. The Lissen unit is tightly wedged into the horn with a suitable rubber sleeve.

The aerial-wire reel is screwed to the top right-hand corner of the door, and a flex lead is taken from it to the unconnected side of the series fixed condenser.

(Above) Reduced Reproduction of Blueprint showing Detailed Layout and Connections

(Right) Photographic view of the Condenser Panel of the "Holiday Portable"



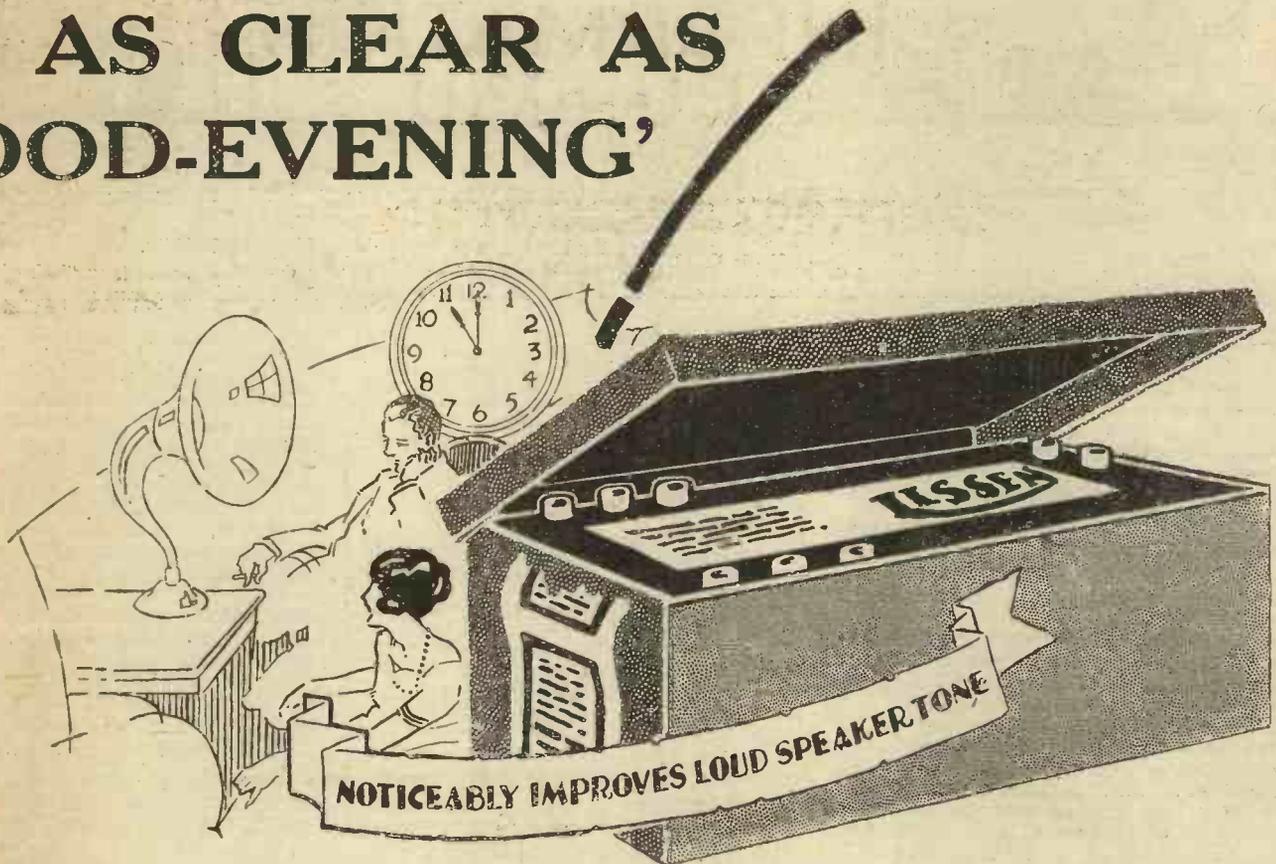
magazine in New York. Many scientists are at work on the problem of wireless power transmission, and at any moment it may be realised on a practical scale.

The idea of transmitting power without wires is not new. Heinrich Hertz, who first discovered wireless waves proved it possible, while Nikola Tesla, who devised a system to transmit alternating electric currents now used throughout the world, has been experimenting in that field for some years.

would become obsolete. Each home or factory would have its own 'rod receiver,' i.e., a short copper wire, with which it would be possible to tap the power flowing through the air, exactly as you now listen in to the broadcast programme on your receiving set."

On August 16, Mr. Elliot, principal of the Universal Radio College, Birmingham, will give a talk on "Wireless as a Career."

LET 'GOOD-NIGHT' BE AS CLEAR AS 'GOOD-EVENING'



60 VOLTS
(reads 66)

Now
13/6
7/11

100 volts (reads 108) 12/11

9 volts (grid bias) - 1/6

If, while using a LISSEN Secret Process Battery, you measured the clearness and strength of the "Evening Greeting" and compared it with that of the "Good-night everybody," you would find the last words of the announcer clear and fresh, and the last bars of the music at midnight full of truthful tone.

An ordinary battery deteriorates if the programme is long, but the LISSEN battery keeps your loud speaker fresh voiced and natural right through. This lasting purity of tone and improved power is remarked on by everybody who uses a LISSEN Secret Process Battery. The reason for this rests with the new LISSEN Process of manufacture and the unique chemical combination which is used only by LISSEN, because it is known to nobody else.

And by dint of determination and a single minded aim, LISSEN has brought this fine battery down in price, by distributing direct to the dealer and eliminating big wholesale profits, until now nobody need be without this fine battery.

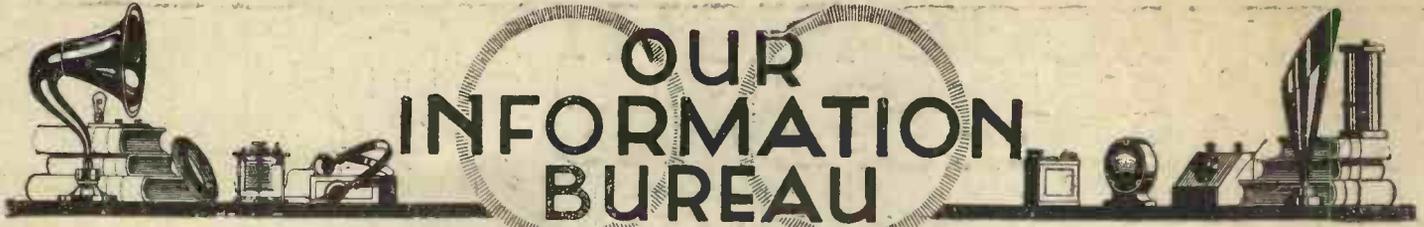
It is obtainable at all good dealers. Ask for LISSEN Secret Process in a way that shows you will take no other.

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L378



RULES—Please write distinctly and keep to the point. We reply promptly by post. Please give all necessary details. Ask one question at a time to ensure a prompt reply, and please put sketches, layouts, diagrams, etc., on separate sheets containing your name and address. See announcement below.

Crystal Set.

Q.—In a crystal set the crystal detector and the phones are connected in series with each other and across the tuner. Does it matter whether the crystal or the phones are connected next to the aerial?—*W. A. K. (Kensington).*

A.—In the case you mention care should be taken to connect the crystal detector next to the aerial and the phones next to the earth. If this order is reversed the capacity of the phones, through your body, to earth will be in parallel with the tuner and will reduce the strength of received signals.—*G. N.*

Testing H.T. Condenser.

Q.—I suspect the 2 mfd. condenser across the H.T. battery of being faulty. How can I test it?—*S. L. N. (Hull).*

A.—Remove all connections from the condenser. Then connect the full voltage of the H.T. battery across it. Remove the H.T. leads from the condenser and leave it for a minute or so. Then short the terminals of the condenser with the metal portion of a wood-handled screw-driver, taking care only to touch the wooden handle of the latter (in order to avoid receiving a shock) when, if the condenser is in good condition a bright spark should occur as the condenser terminals are bridged.—*N. F.*

Valve and Crystal Reflex.

Q.—I have recently built a one-valve and crystal reflex set and find that, although I can get fairly good results on the local station, signals are just about as loud when the catwhisker is lifted off the crystal. Can you tell me what is wrong?—*A. N. C. (Leeds).*

A.—As you can hear signals fairly well with the crystal out of action it is evident that your reflex valve is rectifying instead of amplifying only. Try adjusting the H.T. and G.B. voltages, and if this does not cure the trouble it is probable that the valve you are using is unsuitable for reflex work. You should not, however, worry if signals from a near station can be heard, at very much reduced strength, on the valve alone.—*G. N.*

Erecting Aerial.

Q.—I am going to put up an inverted L-type aerial in my back garden and should like to know whether, if the top part of the aerial is not perfectly horizontal, the free end should be higher than the lead-in end or vice versa. Also whether it will be better to take the lead-in from the end of the aerial farther from the house as this will allow me to use more wire?—*F. L. J. (Cheltenham).*

A.—In the case of an aerial of the inverted L-type, the lead-in should always be taken from the end of the top portion nearer the receiving room and the free end of the aerial should always be as high, or higher, than the lead-in end. There is no particular virtue in making the top portion horizontal as it is better to have the free end of the aerial higher than any part of the aerial.—*G. N.*

Connecting Phones.

Q.—If several pairs of phones are to be used in conjunction with a valve set, will it be better to connect them up in series or in parallel?—*R. P. (Leeds).*

A.—This depends upon circumstances. Providing that all the pairs of phones have the same

resistance and that the last valve of the set has a fairly low impedance the phones may be connected in parallel. If, however, the last valve of the set has a high impedance it may be better to connect all the phones in series. Should the resistances of the different pairs of phones vary greatly all the phones must be connected in

When Asking Technical Queries

PLEASE write briefly and to the point

A fee of One Shilling (postal order or postage stamps) must accompany each question and also a stamped, addressed envelope and the coupon which will be found on the last page.

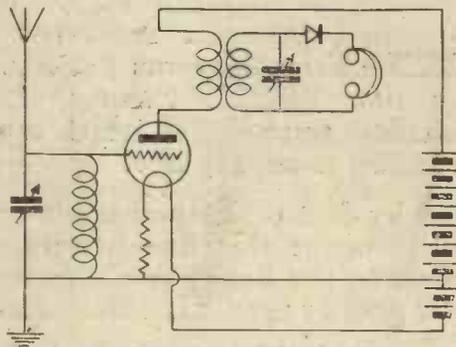
Rough sketches and circuit diagrams can be provided, but it will be necessary to charge a special fee (which will be quoted upon request) for detail layouts and designs.

series or the low-resistance phones will practically short-circuit those phones having higher resistances. Above it is assumed that not more than about half a dozen pairs of phones are to be used. If it is intended to use a very large number of pairs of phones it will be better to adopt a series-parallel arrangement, taking care, however, that the total resistance of each bank of phones is the same.—*G. N.*

One-valve and Crystal Circuit.

Q.—Can you supply me with a theoretical circuit diagram incorporating a H.F. valve and a crystal detector, the coupling between valve and crystal being by H.F. transformer?—*A. P. L. (Glasgow).*

A.—The circuit diagram for which you ask is



One-valve and Crystal Circuit

given on this page. The aerial and H.F. condensers may be of the usual sizes—.0005 mfd. and .0003 mfd. respectively. In the diagram we have shown the H.F. condenser connected across the H.F. transformer secondary. Some H.F. transformers are intended to have the condenser so connected, but if the makers of your transformer state that the primary should be tuned instead, the position of the H.F. condenser should, of course, be altered accordingly.—*N. F.*

Obtaining Stability.

Q.—With regard to methods of stabilising an H.F. valve what advantage has neutralisation over controlling the grid potential by means of a potentiometer connected across the L.T. battery?—*T. B. (Sutton).*

A.—The old method of obtaining stability by making the grid of an H.F. valve a certain degree positive (by means of a potentiometer) suffers from the disadvantages that this means introducing a certain (sometimes considerable) amount of damping into the grid circuit of the valve and that the best grid potential from the point of view of stability cannot be the best grid potential from the point of view of efficient amplification. The various methods of neutralising the inter-electrode capacity of the valve allow stability to be obtained quite apart from damping (which can, therefore, be reduced to the minimum) and from the grid potential which can, therefore, be so adjusted as to allow the valve to function most efficiently.—*N. F.*

Neutralising.

Q.—The instructions for the preliminary adjustment of a neutralised set usually state that the N.C. should be adjusted until the signals from the local station (with the filament circuit of the H.F. valve broken) disappear entirely. Is it really necessary to neutralise as completely as this, as stability can be obtained with the N.C. set at a less value than this?—*E. P. N. (Birmingham).*

A.—If the neutralising condenser is set to such a value as will only just give stability the unbalanced capacity between the grid and plate of the H.F. valve will give a certain positive reaction effect, which will be beneficial as far as sensitivity and selectivity are concerned. It will probably, however, be necessary to readjust the value of the neutralising condenser each time the tuning is altered but it will not, of course, then be necessary to employ a separate reaction control. It will, however, be necessary to neutralise completely should it be desired to obtain complete stability over the whole tuning range with one setting of the neutralising condenser.—*G. N.*

Television Troubles.

Q.—I am interested in television. At present I am using a Neon lamp for building up the picture, but I do not find it satisfactory. I should like to try the methods used by the famous experimenters, such as Messrs. Baird and Jenkins, but am afraid of infringing their patents. I have thought of using a highly sensitive relay. Could you advise me?—*J. (Glasgow).*

A.—The best way of getting the information required is to consult the various patent specifications, which often give information on points not covered by the claims. As regards the use of patented devices, it is true that it is illegal even for experimental purposes, but actions for infringement on that account are rare, and would probably not succeed unless damage or prejudice could be proved. Creed's telegraph relays work at a speed of several thousand per second, but require at least a milliampere of current. As regards lamps, a mercury vapour lamp like de Forest's photion might be suitable.—*E. E. F. d'A.*

"A.W." Solves your Wireless Problems.

"POWER" FOR THE LOUD-SPEAKER

"POWER"
60
VOLTS
17/6



COMPETITIVE TYPE—LARGE CAPACITY.

"POWER"
100
VOLTS
29/-

Dimensions 14½ × 5½ × 3¼ ins. high
Weight - 12¼ lbs.

Dimensions 16 × 8½ × 3¼ ins. high
Weight - 20 lbs.

A large section of the Wireless Public still use the ordinary small size H.T. dry Battery to operate Loudspeaker Sets, and it is certain that this public would welcome the opportunity of changing over to a large capacity battery were it not for the rather high initial outlay. The two special sizes of Siemens Batteries at very low prices represent a serious attempt to meet this need.

A most reliable and powerful battery for sets having one or more power valves.



COMPETITIVE TYPE—
SMALL CAPACITY.

For sets having 1, 2 or 3 general purpose valves, the SMALL-CAPACITY COMPETITIVE TYPE will be found quite suitable.

60 volts - - 9/6

100 volts - - 15/6

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The prices do not hold good for the Irish Free State.

Great Price Reductions!

NEW Osram Valves

for TONE & POWER

New General Purpose and Resistance Coupling Valves

for 2 volt users	(D.E.L. 210 D.E.H. 210)	Old Price	Reduced Price
		14/-	Now 10/6
for 4 volt users	(D.E.L. 410 D.E.H. 410)		
for 6 volt users	(D.E.L. 610 D.E.H. 610)	new valves at	10/6

New Loud-Speaker Power Valves

for 2 volt users	D.E.P. 215	Old Price	Reduced Price
for 4 volt users	D.E.P. 410	18/6	Now 12/6
for 6 volt users	D.E.P. 610	new valve at	12/6

Bright Emitter Valves

R. and R5v.	Old Price 8/-	Now 5/-
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*Lower Prices
Improved Results*

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"A.W." TESTS OF APPARATUS

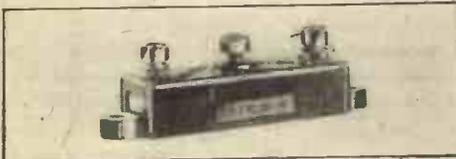
Conducted by our Technical Editor, J. H. REYNER, B.Sc.(Hons.), A.M.I.E.E.

XL Vario Denser

AN XL Vario Denser has been sent in for test by the Rothermel Radio Corporation, Ltd., of 24-26, Maddox Street, Regent Street, W.1.

This is a small compact variable condenser which is particularly useful for purposes other than tuning H.F. circuits: thus, it may be suitable as a variable reaction control, or as a means of altering the existing tuning range on a receiver. Other uses will suggest themselves to readers.

The component comprises a number of thin brass plates separated from each other by small pieces of mica. Rotating the adjusting screw in a clockwise direction compresses the plates and thus increases the capacity. In this manner a range varying from slightly over .0003 to .001 microfarad is obtained. A critical adjustment can be made by utilising a screw-driver with a wooden handle to operate the knob.



Rothermel's XL Vario Denser

The plates are completely enclosed in a neat brown insulated case with flanges for the purpose of fixing to the baseboard. Two terminals are mounted on the top. Readers should find many uses for such condensers.

Gecophone Two-way Coil Holder

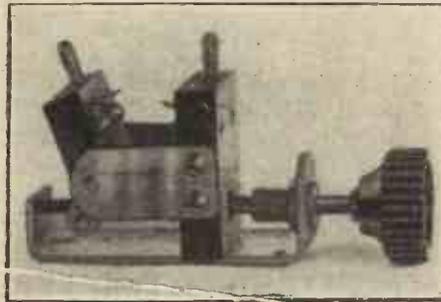
A GECOPHONE two-way coil holder has been submitted to us by The General Electric Co., Ltd., of Magnet House, Kingsway, W.C.2.

The design of a coil holder which is compact, but yet possesses ample and sensitive movement presents considerable difficulty. The makers have evolved a holder which possesses a number of advantages over the old-fashioned type.

The movement consists of a threaded spindle, which can be rotated by means of a small insulated knob. A metal block meshes with the rod and has two projections which fit in a specially designed guide cut in a metal attachment: this is rigidly fixed to the moving coil holder. The holder is constrained to rotate at a given centre, but the speed of rotation is governed by the pitch of the threaded spindle and

also the position of the guide relative to the spindle.

It has been arranged that the movement is slow when the coils are near to each other, whilst it becomes more rapid if they are moved further apart. Such a system is



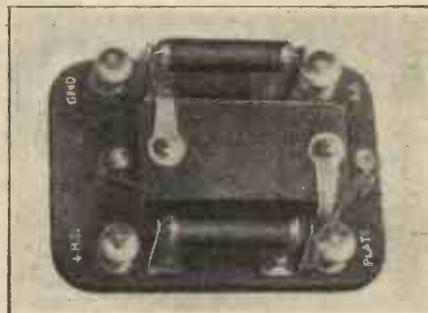
Gecophone Two-way Coil Holder

generally the most satisfactory for obtaining a fine control of reaction near the point of oscillation. The component takes up little room and can be fixed to the baseboard or panel as desired.

Atlas R.C. Unit

AN Atlas R.C. Unit has been recently introduced by H. Clarke & Co., Ltd., of Atlas Works, Eastnor Street, Old Trafford, Manchester.

This is a neat unit for baseboard mounting. The anode and grid resistances, together with the grid condenser, are mounted on a small highly-finished ebonite base, together with four terminals, which are suitably engraved. The resistances are readily removable and also interchangeable.



Atlas R.C. Coupling Unit

In designing an R.C.C. Unit it is essential that the values of resistances and condensers should bear the correct relation to each other, whilst the value of the anode resistance should be such that the best results are obtained from the modern high impedance valves.

On test the anode resistance had a value of 700,000 ohms; the grid leak proved to have a resistance of 2 megohms. These

values are suitable for use with the grid condenser, the capacity of which proved to be .01 microfarad.

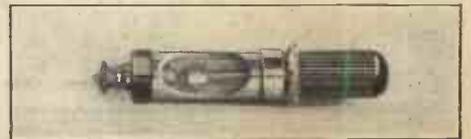
The unit gave good reproduction when tested in a valve circuit and can be recommended for general use.

Liontron Crystal Detector

A CRYSTAL detector known as the Liontron has been sent in for test by S. Lyons, of 119, Clerkenwell Road, E.C.1.

This is a very neat component which, whilst being totally enclosed, has an oval glass window through which it is possible to inspect the contact position of the crystals. The movement consists of a spring loaded plunger having a crystal at one end, which is made to bear on a second crystal.

For such a detector to be popular in this advanced age it must be permanent under all conditions: the Liontron has a



Liontron Crystal Detector

small ebonite knob, which allows easy adjustment to be made, but once it has been set even rough treatment cannot disturb the position. It will, therefore, retain its sensitivity almost indefinitely.

The preliminary adjustment does not call for any skill, as the sensitive point is soon found. As soon as this has been obtained the adjusting knob can be enclosed by screwing on an ebonite cover: this entirely prevents the possibility of knocking the knob out of adjustment. The component can be mounted to the panel by drilling a single hole.

The programme of talks and lectures which the B.B.C. has prepared for the long evenings, looks interesting. Sir Walford Davies will begin a new series of talks on "Music and the ordinary Listener," St. John Ervine will talk on "Modern Drama," Professor H. Swinerton on "Geology and Evolution," and Mr. B. Kingsley Martin on "What Society Means." Other talks by experts will be on the kinema, European history, electrical engineering, and the French and German languages.

An adult education section has been formed at Savoy Hill to deal with matters relating to the talks and lectures to be broadcast during the winter. Details will be sent on application.

TELL ADVERTISERS you saw their ad. in "A.W."

A type for every wireless purpose

CLEAREST · STRONGEST
LAST THE LONGEST

EDISWAN VALVES

REDUCED PRICES

Effective on and from 3rd August, 1927



R.C. THREESOME

This is the home-constructors set which led the way in resistance coupling. It is the most satisfactory application of the theory of resistance coupling so far evolved.

You can build the receiver in three hours at a cost of only £3 (or less) for the parts.

The Instruction Book and full-size Blue-print (both free) make the job easy. Join the contented tens of thousands who now enjoy crystal-clear reception on the loudspeaker.

SEND THIS COUPON

To Publicity Dept., The Edison Swan Electric Co., Ltd., 123/5, Queen Victoria Street, London, E.C.4.

Please send free the item (or items) against which I have marked a cross.

<input type="checkbox"/> "Ediswan Range" valve booklet.	
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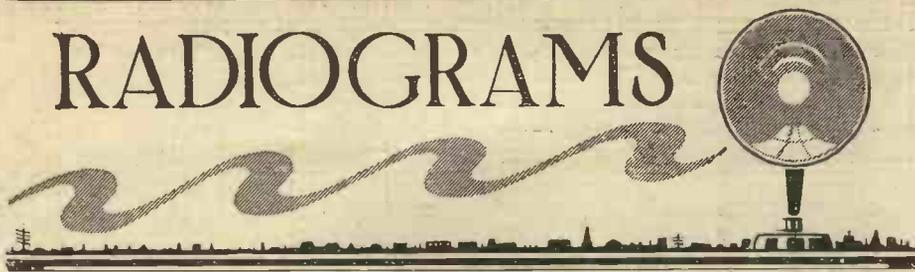
1d. postage with unscaled envelope.

V.52

TYPE	Fil. Volts	Amps.	Former Prices.	NEW PRICES
DULL EMITTER				
D.R. 2 (Detector)	1'8-2	'1	14/- each	10/6 each
G.P. 2 (General Purpose)	1'8-2	'1		
R.C. 2 (Resistance Coupling)	1'8-2	'1		
A.R.D.E. (H.F.) ...	1'8-2	'3		
A.R.D.E. (L.F.) ...	1'8-2	'3		
A.R. 06 (H.F.) ...	2'5-3	'06		
A.R. 06 (L.F.) ...	2'5-3	'06		
G.P. 4 (General Purpose)	3'5-4	'15		
R.C. 410 (Resistance Coupling)	4	'1		
E.S. 5 (H.F.) ...	5	'1		
E.S. 5 (L.F.) ...	5	'1		
R.C. 610 (Resistance Coupling)	5'5-6	'1		
BRIGHT EMITTER				
P.V. 2 (Power) ...	1'8-2	'15	18/6 each	12/6 each
P.V. 6 (Power) ...	1'8-2	'5		
P.V. 8 (Power) ...	3	'12		
P.V. 4 (Power) ...	3'5-4	'35		
P.V. 5 (Power) ...	5	'25		
A.R. (H.F.) ...	4	'75	8/- each	5/- each
A.R. (L.F.) ...	4	'75		
R. (General Purpose)	4	'75		

Send for new Valve Booklet (showing reduced prices). See Coupon.

RADIOGRAMS



FRED Duprez, the American comedian, will broadcast for the benefit of Bournemouth listeners on August 11.

An entertainment to be included in the "My Programme" series has been compiled for broadcast on August 17 by "a middle-aged man."

Following the Metropolitan Police Festival, it has been arranged for the winning band to contribute items to the 2LO evening programme on August 13.

Mr. Escott North, a "blood brother" of the Piegan (Blackfeet) Indians, is a native of Nottingham, who for many years has worked in America as a cowboy. In his broadcast from the London studio on August 18, he will tell some blood-stirring stories in connection with his association with trail riders in the Canadian Rockies.

In response to many requests, the B.B.C. have arranged to relay from the Central Hall, Westminster, on November 2, a further performance of Honegger's *King David*. It will be given by the Civil Service Choir, assisted by the Railway Clearing House Choir.

Sir Arthur Keith's opening speech on the occasion of the annual meeting of the British Association at Leeds, on August 31, will be relayed to 2LO.

During the coming autumn and winter,

indoor games will be added to the broadcast programmes. Listeners will get a sample of this new feature on August 19;

DO YOU KNOW?

1. Which has proved to be the favourite station with listeners?
2. The wavelength (longest) of the Bordeaux station?
3. The call-sign of this transmitter?
4. How many American farms can boast of radio receivers?

Puzzle your friends with these queries; the answer will appear in next week's issue of "A.W."

Last Week's Queries: (1) Latvia. (2) Cracow. (3) A broadcasting station run by provincial radio clubs in France. (4) 7,600.

in this instance the game will turn on a letter charade or hidden sentence associated with a subject well known to most hearers.

Two further short queer stories entitled, "The Photograph" and "Charles," from the pen of A. J. Alan, will be found in the entertainment broadcast from the London station on August 27.

Heart's Desire, a comic opera burlesque, specially written for the B.B.C. by Miss Mabel Constanduros, will be broadcast for the first time from the Aberdeen station on August 26.

Mr. John Drinkwater, whose play, *Abraham Lincoln*, was recently broadcast, has prepared a radio version of *Mary Stuart*, to be given from the London station on August 23.

A repeat performance of John L. Meluish's musical burlesque, *Hearts Adrift*, will be given by London and many other B.B.C. stations on August 18.

An entertaining afternoon programme at Glasgow on August 12 is entitled, "Fond Farewells." It consists of a recital of good-bye songs, both grave and gay, by Billie Davidson.

In a Bluff King Hal programme at Glasgow on August 11, songs, music, and sketches written and composed by King Henry VIII will be broadcast.

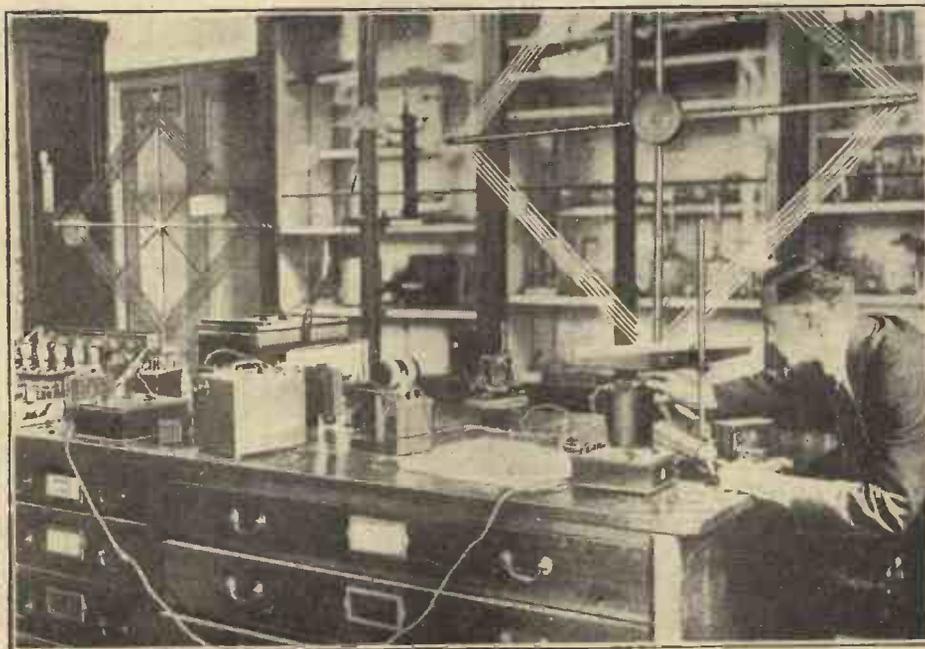
Although a few months ago broadcast critics in the West of Scotland were urgent in their demands for London programmes in preference to those of local origin, at the present moment sketches and revues in the Glasgow dialect seem to be proving the most popular items.

One of the features of the successful Empire Products Exhibition, which has just been held in Edinburgh, was the stand of the B.B.C., where every aspect of broadcasting was shown in concentrated form. Among the models on view were a typical studio, with microphone and announcer's silence cabinet, and a replica of the London control room, with line amplifiers and control tables for simultaneous broadcasting.

The Department of State at Washington, having invited the Union Internationale de Radiophonie to be represented in an advisory capacity at the forthcoming International Radio-Telegraphic Conference at Washington, in October, the Union has nominated as its delegate Captain P. P. Eckersley, chief engineer of the British Broadcasting Corporation and a member of the Technical Commission of the Union. The principal purpose of the Conference is to secure a revision of the International Radio-Telegraphic Convention, signed at London in 1912, and to prepare new articles which will be applicable to all the newer developments in wireless science, including broadcasting.

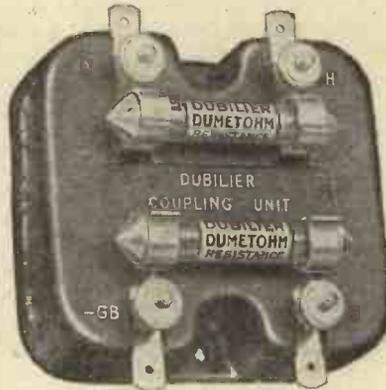
We understand that although statements have been published in Canada to the effect that the Canadian Marconi Co. is to pass under American control, the truth is that measures will be taken to ensure British control in perpetuity.

Work on the 60-kilowatt high-power Hungarian broadcasting station was begun on May 18 last, and is proceeding apace. Contrary to rumours spread at the time, the site of the transmitter is again on the Island of Csepel in the Danube, and not at Szigetszentmiklos, which was found unsuitable, owing to its heavily-wooded district. The aerial masts, which will attain a height of some five hundred feet, are being installed on a small hill (Saki Hegy) on the island, which lies some eleven miles from the city of Buda-Pesth.



Mr. P. O. Cherry, who has been appointed by the University of Melbourne, Australia, to conduct research into the causes of wireless fading, is here seen calibrating the portable set with which the signal intensity of stations is measured.

THE NEW DUBILIER RESISTANCE CAPACITY UNIT



FOR PURITY WITH VOLUME

Resistance Capacity Couplings can be made to yield a reproduction of crystal-like clarity and full round volume. But it is incorrect to assume that it will do this unless the components be carefully selected.

There are certain valves on the market which have been specially designed by their respective makers for use with R.C. amplification, and valves of this type should invariably be employed. Equally important is the selection of a Coupling Unit which contains condenser and resistance elements particularly suited to this work.

The Dubilier Unit contains a Dubilier condenser admittedly the best the world can produce. But in addition it employs two Dumetohms.

The qualities possessed by Dumetohms make them far and away superior to anything yet produced. They are constant under temperature, constant under load, and consisting as they do of single straight resistance rods can have no self-inductance or self-capacity.

The Dumetohms supplied as standard with our R.C. Unit are, in the Grid 3 megohms, in the Anode 1 megohm, and these valves, used in conjunction with a special high amplification factor valve (such as the B. T. H. Co.'s B8) will be found to give perfect distortionless amplification from 50 up to 10,000 cycles.

Other values of Dumetohm can, however, easily be clipped in to suit your own particular requirements. Dubilier R.C. Units can be obtained of all good Radio Dealers.

Price **7/-** Each

Your Dealer stocks



products — ask him

Advt. of The Dubilier Condenser Co. (1925) Ltd., Ducon Works, Victoria Rd., North Acton, W.3.

TC 20

Advertisers Appreciate Mention of "A.W." with Your Order

CHIEF EVENTS OF THE WEEK

LONDON

- August 14 Religious service, relayed from St. Martin-in-the-Fields. Vocal concert.
 " 15 Sir Walter Scott programme.
 " 16 Promenade concert.
 " 17 My programme, by a middle-aged-man.
 " 18 *All at Sea*, a musical comedy by Philip Lauraine and R. St. Jerome.
 " 19 *La Boheme*, music by Giacomo Puccini.
 " 20 Variety programme.

BIRMINGHAM

- August 14 Oratorio gems.
 " 16 Mr. W. P. Elliott: "Wireless as a Career."

BOURNEMOUTH

- August 18 *The Rest House*, a radio satire by Andrew Harding.

CARDIFF

- August 17 Red Indian entertainments.
 " 18 5WA'S Sunshine Carnival, relayed from Clarence Park, Weston-super-Mare.

MANCHESTER

- August 14 Special service, relayed from Grasmere church (St. Oswald's).
 18 Mr. Neville Cardus: a talk on "Cricket."

NEWCASTLE

- August 15 Echoes of Napoleon.

GLASGOW

- August 16 Scottish Humour Series, No. 12. Ed. Lowry (Keep Smiling).

ABERDEEN

- August 18 Mr. C. H. Webster's "Cricket."

BELFAST

- August 15 A quiz at the theatre.
 " 16 A musical comedy programme.

USING A TANTALUM RECTIFIER

(Concluded from last week)

TO bring the rectifier into action connect the three wires coming from the front of the baseboard to the accumulator. The wire on the right should be connected to the positive, that on the left should be connected to the negative, and the wire in the middle should be connected to the middle of the accumulator.

In case any variations have been made, however, it should be observed that the positive end of the accumulator should be connected, through one of the flash-lamp bulbs, to a tantalum electrode. Some way of marking these wires so that their polarity is permanently shown will occur to the constructor.

For a sixty-volt accumulator on a supply of from 200 to 240 volts a 40-watt lamp is suitable and should be put in the large socket. For other voltages a suitable value will have to be found by trial.

The flash-lamp bulbs should be inserted before switching on.

The correct charging rate is one which makes the flash-lamp bulbs glow with a dull red colour. If only one of the flash lamps glows the current should be switched off while all the connections are tightened. If the connections to the accumulator are wrongly made, the fact will be indicated by the flash-lamp bulbs, which will either burn out or glow so that one is much brighter than the other.

It should be remembered that the resistance of the cells to current is not infinite. If the accumulator is left connected while the mains current is off, there is a

slight drain of current from the accumulator. This can most easily be avoided by giving the flash-lamp bulbs a half-turn so as to break the contact at the bottom of the holder.

Thus the bulbs serve a threefold purpose: as current indicator, safety fuse, and switch.

T. B. C.

CHEAPER VALVES

ALL wireless enthusiasts will welcome the considerable price reductions in the principal types of receiving valves, which took effect as from August 3.

Bright-emitters, which used to be 8s. are now 5s. Amongst the dull-emitters, the large variety of 14s. valves are now 10s. 6d., whilst valves previously listed at 18s. 6d. are now 12s. 6d.

The valves affected by the new schedule are those manufactured by members of the British Radio Valve Manufacturers' Association, and are as follow: B.T.H., Burndept, Cossor, Ediswan, Six Sixty, Osram, Marconi, Cosmos, Mullard and Weco.

The new Lille broadcasting station erected by the French Posts and Telegraphs to serve the North of France, was formally opened at 9 p.m., on July 25. Transmissions are now effected nightly on a wavelength of 285 metres. On some evenings the Lille station relays the Paris PTT programmes. It is the first transmitter officially erected since the Wireless Telegraphy Bill of December 28, 1926, by which a system of State Control was passed on a definite basis.

THE NATIONAL RADIO EXHIBITION



This is the winning poster which gained first prize of £50 offered by the Radio Manufacturers' Association. The design is exceedingly attractive in the original, vivid blue and green entering largely into the colour scheme. In fact, it is worthy of the wonderful exhibition it advertises.

BROADCAST TELEPHONY



NOTE.—In the following list of transmissions these abbreviations are observed: con. for concert; lec. for lecture; orch. for orchestral concert; irr. for irregular; m. for metres; Kc. for Kilocycles and sig. for signal. Unless otherwise stated all times are p.m. (B.S.T.).

GREAT BRITAIN

London (2LO), 361.4 m. (830 Kc). 1-2, con.; 3.15-4.0, transmission to schools; 3.30-5.45, con. (Sun.); 4.15, con.; 5.15-5.55, children; 6, dance music; 6.30, time sig., news, music, talk; 8.10, music; 9.0, time sig., news, talk, con. Dance music daily (exc. Sundays) from 10.30 until midnight.

Aberdeen (2BD), 500 m. (600 Kc). Belfast (2BE), 306.1 m. (980 Kc). Birmingham (5IT) 326.1 m. (920 Kc). Bournemouth (6BM), 491.8 m. (610 Kc). Cardiff (5WA), 353 m. (850 Kc). Glasgow (5SC), 405.4 m. (740 Kc). Manchester (2ZY), 384.6 m. (780 Kc). Newcastle (5NO), 312.5 m. (960 Kc). Much the same as London times.

Bradford (2LS), 252.1 m. (1,190 Kc). Dundee (2DE), 294.1 m. (1,020 Kc). Edinburgh (2EH), 288.5 m. (1,040 Kc). Hull (6KH), 294.1 m. (1,020 Kc). Leeds (2LS), 277.8 m. (1,080 Kc). Liverpool (6LV), 297 m. (1,010 Kc). Nottingham (5NG), 275.2 m. (1,090 Kc). Plymouth (5PY) 400 m. (750 Kc). Sheffield (6FL) 272.7 m. (1,100 Kc). Stoke-on-Trent (6ST), 294 m. (1,020 Kc). Swansea (5SX), 294 m. (1,020 Kc). Daventry (25 kw.), high-power station, 1,604 m. (187 Kc). Special weather report, 10.30 a.m. and 10.25 p.m. (weekdays), 9.10 (Sun.); relays 2LO from midday onwards. Time sig.: 10.30 a.m., 4.0 and 10.0 p.m. Daventry Experimental Station (10 kw.) Testing.

IRISH FREE STATE

Dublin (2RN), 319.1 m. (940 Kc). Daily, 7.25, Sundays, 8.30 until 10.30 p.m. Relays Cork.

Cork (6CK), 400 m. (1 kw.). (750 Kc). Relays Dublin (exc. Sundays).

CONTINENT

AUSTRIA

Vienna (Radio Wien), 517.2 m. (5 kw.) and 577 m. 8, con.

Relays: Graz, 356 m. (750 w.); Klagenfurt, (750 w.) 272.7 m.; Innsbruck, 294.1 m. Linz (under construction).

BELGIUM

Brussels, 508.5 m. (1.5 kw.). 5.0, orch. (not daily) 8.30, talk, con., news.

CZECHO-SLOVAKIA

Prague, 348.9 m. (5 kw.). Con., 8.0 (daily). Brunn, 441.2 m. (3 kw.). 7.0, con. (daily).

*Bratislava, 263.2 m. (500 w.). Kosice, 1,875 m. (5 kw.) 7.30, con. testing *Relays Prague.

DENMARK

*Copenhagen, 337 m. (700 w.). Sundays, 10.0 a.m. sacred service; 8.0, con. Weekdays: 8. lec., con., news; dance to midnight (Thurs., Sat.).

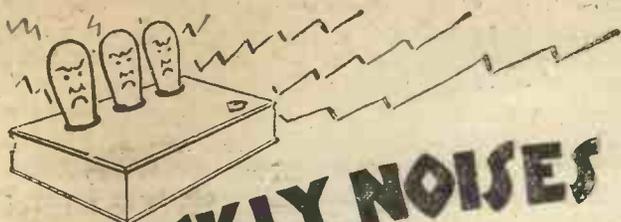
*Relayed by Soro (1,153.8 m.).

ESTHONIA

Reval, 408 m. (2.2 kw.). 6.0, con. (daily).

FINLAND

Helsingfors, 375 m. (1.2 kw.). 8.0, con. (Continued on page 195)



**CRACKLY NOISES
IS RADIO'S
WARNING
THAT YOU
NEED**



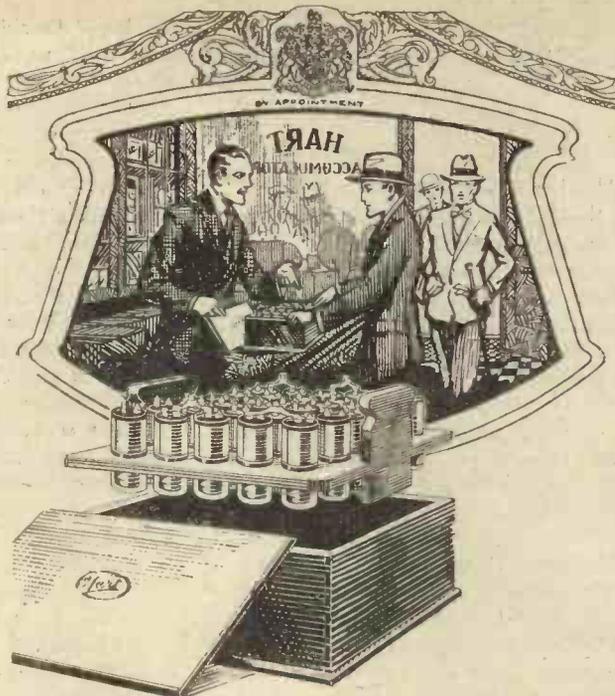
FLUXITE

it simplifies soldering

All Hardware and Ironmongery Stores sell FLUXITE in this price 8d., 1/4 and 2/8. Another use for Fluxite—Hardening Tools and Case Hardening. Ask for leaflet on improved methods.

FLUXITE, LTD.
(Dept. 326),
Rotherhithe, S.E.16

FLUXITE
Soldering
Set—
Complete
7/6



**Use Hart Accumulators
for High Tension Circuits**

THEIR steady voltage, low resistance and big reserve of power are a revelation to users of dry batteries. "HART" 'RAO' Type High Tension Accumulators are much more economical to operate over prolonged periods, and they also ensure that complete freedom from distortion of reception so welcome to critical listeners.

**HART
BATTERIES
FOR ALL WIRELESS CIRCUITS**

"HART" 'RAO' H.T. Accumulators
(Capacity—1250/2500 milli-ampere hours).
24 volt, £1/1/4; 36 volt, £1/12/0; 50 volt,
£2/4/4; 60 volt, £2/13/4

Write to-day to Dept. A.W. for particulars of "HART" Batteries for all wireless circuits, and for FREE BOOKLET of interest to all wireless users.

HART ACCUMULATOR CO., LTD.,
STRATFORD, LONDON, E.15



Goodall Ad

Use **REDFERN'S**
REG. NO. 469456.
Ebonart
NON-METALLIC SURFACE EBONITE
RADIO PANELS

They provide all the requirements necessary in a radio panel. Easy working, positive insulation, beautiful appearance, and an entire freedom from surface leakage.

In black and a beautiful mahogany grain, in nine standard sizes and prices.

Every panel safely packed in a damage-proof carton containing a station log chart.

Full directions for easy working in the Book of Ebonart.

OBTAINABLE FROM ALL REPUTABLE DEALERS
REDFERN'S RUBBER WORKS, LTD.
HYDE, CHESHIRE



"A New Current-Supply Idea"

SIR,—With reference to the above article which appeared in "A.W." No. 266, there is a matter which I think should be pointed out to those making the battery eliminator and trickle charger described. For those like myself who possess an "Octopus Four," and others, in whose sets the H.T. minus and L.T. minus are connected together, some modification must be made to the original wiring before they connect up to their sets, otherwise a dead short-circuit across the accumulator will quickly result.

This pitfall is obvious to many people, but, I am afraid some will fall into the trap.

H. W. P. (Westcliff-on-Sea).

The necessary modifications referred to above were dealt with last week under the heading of "Further Notes on A New-Current Supply Idea."—Ed.

Earthing Switches

SIR,—I have just been reading THERMION'S remarks *re* earthing switches, and agree that his arrangements are o.k.—on paper. But really, is the earthing business worth while? A case was brought to my notice which occurred during the recent

storm. A 2-valve loud-speaker set is operated 10 miles from London with earth connection to water main, aerial lead-in through dining-room window frame up to a bed-room window sill where it terminates at an ordinary jack socket.

Hanging on a hook at the other end of the sill is a similar socket, at the end of an earth wire leading down to an earth plate buried in the garden. Each night when reception ends the aerial down lead is disconnected from the socket leading to the set and plugged into the socket leading to the earth plate. The whole down lead is then drawn away from the house and made fast to a button on the garden fence, so that at no part is the aerial nearer to any portion of the house than approximately 6 feet.

This was properly carried out at the time in question. During the storm the lady of the house was watching the rain from the back windows when she saw a heavy lightning flash.

Later on, the owner of the receiver went to release the aerial to connect up, but the aerial was found to be on the ground. Investigations showed that the pole had been struck. The insulators to each end of the aerial shattered, the flat top of the aerial having fused through each end, the down lead also fused through at the top and ground level. A coil of wire—a discarded aerial—lying on the ground about 4 feet from the earth end of down lead was so fused

in places that it is impossible to uncoil it.

In the house nothing was damaged except—the wireless set. Here was chaos. The lead in wire was fused through at the spade end, the earth wire ditto, the loud-speaker leads fused at speaker terminals 2 valves shattered, H.T. battery inside-out, and the whole outfit looking very sick. Neither the earth wire or the down lead from the window-sill were damaged anywhere else than at the set end.

My impression is that in the event of a direct hit, even if the aerial is in direct line to earth through a proper earthing switch, the flat top of an aerial is not an ideal lightning conductor unless fitted with distributing point to allow the juice to flow quietly away, as in a proper lightning conductor.

R. H. (East Sheen).

Hospital Wireless

SIR,—I notice that in your issue of July 23, it is stated that the Western Infirmary, Glasgow, is the first hospital in the British Isles to have equipment, for relaying the services taking place in the chapel of the hospital, to the patients in the wards.

I should like to mention, however, that at the County Mental Hospital, nr. Warrington, Lancs., services from the chapel and dance music from the recreation hall, have been relayed to the wards for some considerable time.

Thus, I think, Lancashire can claim to be the first in this matter. W. H. H. (Lancs.).

Used in the "Lighthouse Three"

LEWCOS Coils are specified in this highly successful coastal set, fully described in "Amateur Wireless," July 30. Coils for this receiver are as follows:—

D. B. C. Range

One Split Primary Aerial Coil, Ref: S.P.A. 5 ... 6/-
One Special Tapped Inductance Coil, Ref: T.I. 5 10/-

Daventry Range

One Split Primary Aerial Coil, Ref: S.P.A. 20 ... 6/-
One Special Tapped Inductance Coil, Ref: T.I. 20 12/-
Two Six-Pin Bases, with Screens, Ref: S.C.B. ... 9/6 each

Other Lewcos Products Specified

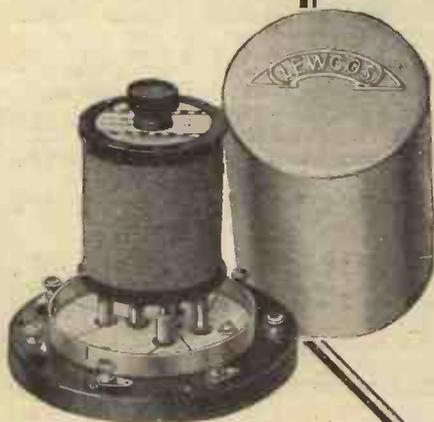
Glazite Coloured Connecting Wire. Lewcos 8-way
Battery Cords.

LEWCOS Radio Products are procurable from all
Radio Dealers.

The LONDON ELECTRIC WIRE CO. & SMITHS LTD.,
Playhouse Yard, Golden Lane, London, E.C.1.

LEWCOS

Radio Products



REDUCTION
in the price of
Lewcos Screen
and Base from
Aug. 1st, 1927
Price 9s. 6d.

"BROADCAST TELEPHONY"

(Continued from page 192)

FRANCE

Eiffel Tower, 2,650 m. (8 kw.). 6.30 a.m., 8.35; m. 20; weather (exc. Sun.); 11.0 a.m., markets (exc. Sun. and Mon.); 10.15 a.m., time sig., weather; 6.0, talk; 7.0, weather; con. 8.15, lec. Relay PTT, Paris, Sat., 9.10-11.0, and weekday afternoons.

Radio-Paris (CFR), 1,760 m. (about 5 kw.). Sundays: 12.0, sacred service; 12.45, con.; news; 4.30, Stock Ex., con.; 8.15, news, con. or dance. Weekdays: 10.30 a.m., news, con., 12.30, con., markets, weather, news; 4.30, markets, con.; 7.30, con. time sig., news, con. or dance.

L'Ecole Sup. des Postes et Telegraphes (PTT), Paris, 458 m. (5 kw.). 1.15, 3.0 (relay of Sorbonne University); 9.0 con. (daily).

Le Petit Parisien, 340.9 m. (500 w.). 9.15, con. (Tues., Thurs., Sat., Sun.).

Radio L.L. (Paris), 370 m. (250 w.). Con. (Mon., Wed., Fri.), 9.30.

Biarritz (Côte d'Argent), 200 m. 6.0, con. (Irr.)

Portable Aerial and Earth

as used in "The Holiday Portable" described in this issue.

Best Quality Copper Tube with strong ring at the top 3/6

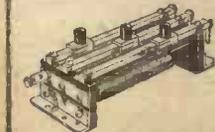
Aerial reel for portable sets, complete with stranded copper wire as shown; details on request.

From your local dealer, or if any difficulty from the manufacturers:

ERIC J. LEVER, 33 Clerkenwell Green, LONDON, E.C.1 Clerk. 3014/5

Trix H.T. Battery for long life and reliability. 60 volts

Price 6/11



LORIOSTAT (Patent applied for)

Rheostats are specified in

THE "HOLIDAY PORTABLE"

described in this issue

1-way ... 2/-	4-way ... 7/3
2-way ... 3/9	5-way ... 9/-
3-way ... 5/6	6-way ... 10/9

6-15-30

A. W. STAPLETON,
19a Lorrimore Buildings, Lorrimore Street,
WALWORTH, S.E.17

Do you want to make

- A Crystal Set,
- A Two-valver,
- A Three-valve Portable
- or a Seven-valve Super-het?

For full details of all the above, also nearly 50 other features, and a FREE Blueprint, get the

WIRELESS MAGAZINE

for August, 1/-. Now on Sale

Radio Vitus (Paris), 322 m. 9.0, con. (Mon., Wed., Fri.).

Radio-Toulouse, 392 m. (3 kw.). 5.30, news (exc. Sun.); 8.45, con.

Radio-Lyon, 291 m. (1.5 kw.). 8.20, con. (daily); 4.0 (Sun.).

Strassburg (8 G.F.), 268 m. (0.1 kw.). Con., 9.0 (Tues., & Fri.).

Radio Agen, 310 m. (500 w.). 8.30, con. (Tues., Fri.).

Mont de Marsan, 400 m. (300 w.) con., 8.30 (Irr.)

*Lyon-la-Doua, 478 m. (1 kw.). Own con., 8.0 (Mon., Wed., Sat.). Relays Paris or Marseilles.

*Lille, 285 m. (500 w.).

*Marseilles, 390 m. (500 w.).

*Grenoble, 278 m. (500 w.).

*Toulouse, 260 m. (500 w.) (exc. Mon.).

*Rennes 320 m.

*Limoges 326 m. Under construction.

*Relays of PTT, Paris.

Montpellier, 252.1 m. (1 kw.). 8.45 (Wed., Fri.). For news, relays Marseilles.

Beziers, 158 m. (600 w.). 9.0 (weekdays only).

Juan-les-Pins 230 m. 9.0, con.

Bordeaux (Radio Sud-ouest), 238 m. (1 kw.). 7.25, con. (Thurs.); also on 25 m. (Sun.).

Bordeaux (Lafayette), 273 m. (1 1/2 kw.). Con., 5.0, 9.0 (weekday), 2.30 (Sun.). Relays PTT, Paris, 8.30 (Sat.).

GERMANY

Berlin, on 483.9 and 566 m. 6.0 a.m., physical exercises (exc. Sun.). Then from 10.10 throughout day. Relayed by Stettin (236.2 m.).

Königswusterhausen (LP), 1,250 m. (8 kw.). 11.30-12.50 a.m., con. (Sun.); 3.0, lec. (daily), 8.30, relay of Berlin (Vox haus) con., or from other German Stations (daily).

Breslau, 315.8 m. (4 kw.). 7.0 lec.; 8.30 con. Relay, Gleiwitz, 250 m.

Dortmund, 283 m. (1 1/2 kw.). See Langenberg.

Frankfort-on-Main, 428.6 m. (4 kw.). 6.0 to 6.15 a.m. (exc. Sun.), physical exercises; 8.30 a.m., sacred con. (Sun.); 4.0, con. (Sun.); 4.30, con.; 8.0, lec., con., weather. Dance: relays Berlin. Relay: Cassel, 272.7 m.

Hamburg, 394.7 m. (4 kw.). Relayed by Bremen 252.1 m., Hanover (297 m.), Kiel (254.2 m.) Sundays: 6.50, relays Berlin; 9.15 a.m., sacred con.; 6.0, con.; 7.0 con., Weekdays: 5.45 a.m., time sig., weather, news; 9.0, con., dance.

Königsberg, 329.7 m. (4 kw.). 8.0, con. Relay: Danzig, 272.7 m.

Langenberg (Rhine-land), 468.8 m. (25 kw.). Relays Muenster, Dortmund, Cologne or Dusseldorf (daily). Throughout day.

Leipzig, 365.8 m. (4 kw.). Relayed by Dresden (275.2 m.). 8.15 con. or opera; weather news, dance music.

Munich, 535.7 m. (4 kw.). Relayed by Nuremberg, 303 m. (4 kw.). 11.30 a.m., lec., con. (Sun.); 6.30, con. (weekdays).

(Concluded on page 196)



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"BROADCAST TELEPHONY"
(Concluded from page 195)

Muenster, 241.9 m. (1.5 kw.). See Langenberg.
Norddeich (KAV), 1,100 m. 11.15 a.m., 10.30. weather.
Stuttgart, 379.7 m. (4 kw.). 11.30 a.m., con. (Sun.); 6.30, time sig., news, lec., con. (daily); Relay: Freiburg, 577 m. (1½ kw.).
Aachen (400 m.); Augsburg (566 m.).
Cologne, Raderthal 283 m.
Hochspeyer (Bavaria) under construction.

GRAND DUCHY OF LUXEMBURG
Radio Luxemburg, 217.4 (250 w.). Con. 2.0 (Sun.), 9.0 (Tues.). (Irr.)

HOLLAND
Hilversum (ANRO) 1,065 m. (5 kw.). Sun-days: 9.40 a.m., sacred service; 12.40 and 2.10, con.; 6.25, church service; 7.40, weather, news, con. Weekdays: 4.40, con.; 7.50, con.
Scheveningen-Haven, 1,950 m. (2½ kw.). Throughout day. Markets, Stock Ex.
Eindhoven (PCJJ), 30.2 m. (Tues., Thur.) 6 p.m.—midnight.

HUNGARY
Eudapest 556 m. (3 kw.). 8.0 con.

ICELAND
Reykjavik 333.3 m. (700 w.). Con., 8.30.

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ITALY
Rome (IRO), 449 m. (3 kw.). 8.30, news, weather, con.; 10.15, late news. Testing on 1,200 m. (5 kw.).
Milan, 322.6 m. (1 kw.). 8.15-11.0, con.
Naples, 333.3 m. (1½ kw.). 8.30-11.0, con.

NORWAY
Oslo, 461.5 m. (1.5 kw.). 7.15, news, time, lec., con.; 10.0, time, weather, news, dance.
Bergen, 370.4 m. (1 kw.). 7.30, news, con.
*Fredriksstad, 434.8 m.
*Porsgrund, 502 m. (1½ kw.).
*Tromsø, 500 m.
*Hamar, 566 m.
*Rjukan, 448 m. (1 kw.).
*Notodden 423 m.
*Relays Oslo.

SPAIN
Madrid (EAJ7), 375 m. (1.5 kw.). Con. daily. 8 or 10, con.
Madrid (Radio-Madrilena) (EAJ12). 308 m. (2½ kw.) (irr).
Madrid (Radio Espana) 391 m. (2 kw.). irr.
Barcelona (EAJ1), 340 m. (1½ kw.). 6.0-11.0 (daily).
Barcelona (Radio-Catalana) (EAJ13), 462 m. (1 kw.). 7.0-11.0, con., weather, news.
Bilbao (EAJ9), 438 m. (500 w.). 7.0 con.
Bilbao (Radio-Vizcaya) (EAJ11). 420 m. (500 w.). 8.0-12.0, con. (daily)
Cadiz (EAJ3), 400 m. (550 w.) 7.0-9.0, con., news. Tests daily (exc. Sun.), midnight.
Cartagena (EAJ15), 335 m. (500 w.). 8.30-10.0, con. (daily).
Seville (EAJ5), 357 m. (500 w.). 9.0, con., news, weather. Close down 11.0
Seville (EAJ17), 344.8 m. (500 w.). 7.0-10.0, con. (daily).
San Sebastian (EAJ8), 297 m. (1.5 kw.). Relays Madrid (EAJ7).
Salamanca (EAJ22), 402 m. (1 kw.). 5.0 and 9.0 con. (daily). Closes down 11.0.

SWEDEN
Stockholm (SASA), 454.5 m. (1½ kw.). 11.0 a.m., sacred service (Sun.); 6.0, sacred service; 7.0, lec.; 9.15, news, con., weather. Dance (Sat., Sun.), 9.45.
Relays.—Boden (SASE), 1,200 m.; Eskilstuna, 250 m.; Falun (SMZK), 357.1 m.; Gothenburg (SASB), 416.7 m.; Gefle, 204.1 m.; Joenkoepping (SMZD), 201.3 m.; Kalmar (SMSN), 252.1 m.; Karlserona (SMSM), 196 m. Motala, 1,320 m. (40 kw.).

SWITZERLAND
Lausanne, (HB2), 850 m. (500 w.). 8.0.
Zurich, 588 m. (600 w.). 11.0 a.m., con. (Sun.); 6.15, lec., con., dance (Fri.).
Geneva, (HB1), 760 m. (750 w.). 8.15, con.
Berne, 411 m. (1.5 kw.). 10.30 a.m., organ music (exc. Sat.); 4.0, 8.30, con.
Basle, 1,100 m. (250 w.). Relays Berne.

THIS WEEK'S "ENGLISH AND AMATEUR MECHANICS"

Wireless enthusiasts will find, week by week, interesting and valuable information in "English and Amateur Mechanics" (3d.), on sale everywhere. In this week's issue there is a special page, "The Trend of Wireless Progress." Other interesting articles in this week's issue include: "By Rocket to the Moon?" "Three Useful Workshop Articles," "Beautifying a Brick Wall Entrance," "Your Plants Watered Automatically," "A Super-Swing You Can Make," "The Art of Ornamental Turning," "Astronomy of the Week," "The Editor's Bookshelf," "Inventions."

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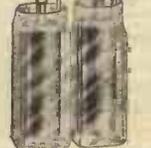
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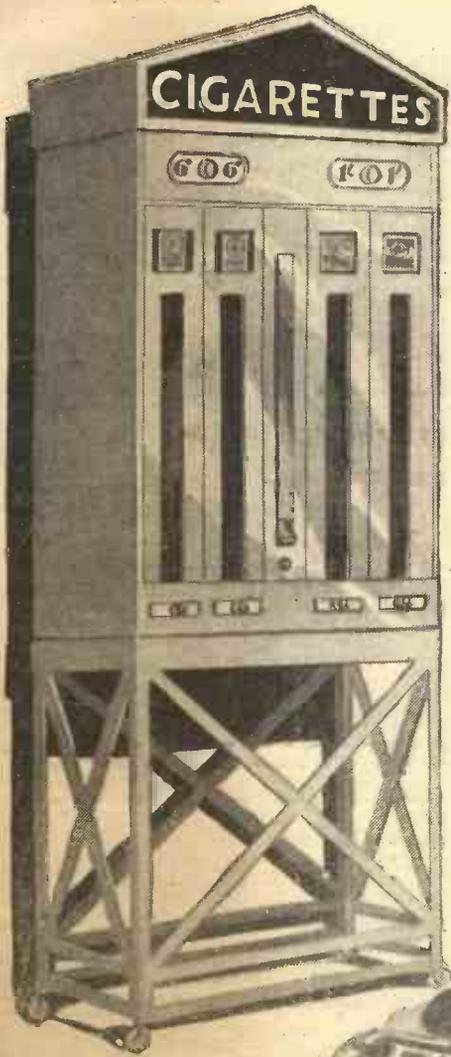
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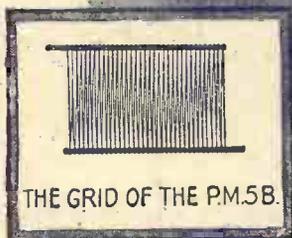


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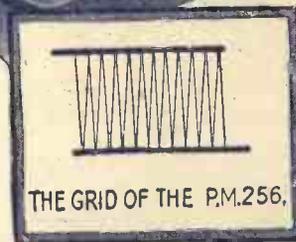
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