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WIRELESS

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WIRELESS WEEKLY

2D WEEKLY

Vol. V.] SEPTEMBER 25, 1926 [No. 6

HOW TO BUILD THE "ELSTREFLEX TWO"

Full Constructional Details.

[Registered at the G.P.O. as a Newspaper.]

Free Transfers for your Set in This Issue

FREE

with the OCTOBER NUMBER

NOW ON SALE

WITH every copy of the October issue is presented a Free Gift Booklet, **"How to Build Your Own Wireless Set"**—containing 20 pages of absorbing interest to every home constructor.

This is a special number in every sense of the word. Beside containing a comprehensive review of the Radio Exhibition at Olympia, full constructional details are given of two Radio Press Star Receivers.

THIRTY-ONE STATIONS ON LOUD-SPEAKER

"The Night Hawk," Mr. Percy W. Harris's latest design, is selective, sensitive and compact; it can be built with the simplest tool kit. The very low sum of £20 will purchase all the apparatus complete with loud-speaker, batteries and valves.

TWENTY STATIONS ON LOUD-SPEAKER

The Elstree Laboratories describe **"The Distaflex Two,"** a really astonishing reflex instrument, giving remarkable volume on local and distant stations with two valves and a permanent crystal detector.

J. H. REYNER, B.Sc. (Hons.), A.M.I.E.E., who describes "The Distaflex Two."

The Wireless Constructor

SIXPENCE MONTHLY

From all Newsagents, Bookstalls and Booksellers, or direct from the Publishers, Radio Press, Ltd., Bush House, Strand, London, W.C.2. Subscription Rates, 8/6 per annum United Kingdom, 7/6 per annum Canada and Newfoundland, and Other Countries 8/6 per annum. *Lesser periods pro rata.*

From the nearest Newsagent—

WIRELESS
INCORPORATING
WIRELESS WEEKLY
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THIS WEEK'S NOTES AND NEWS

The Wavelength Changes

THE proposed new European wavelengths, which were to have come into force this month, will now not arrive until October 15. The reason for this delay is said to be that the technical preparations required more time than was originally supposed.

Very Welcome

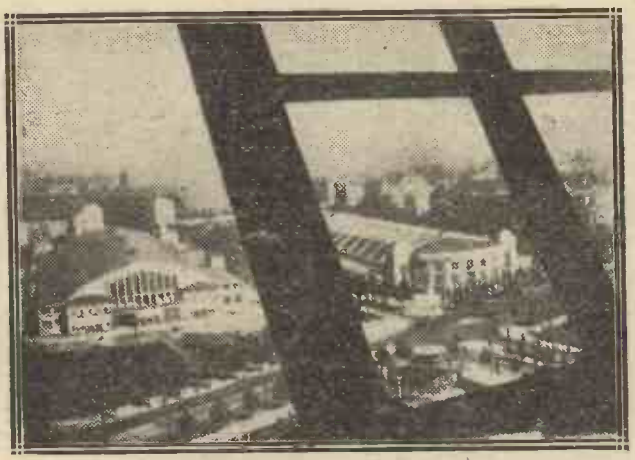
ACCORDING to reports in the daily Press we shall soon be receiving our radio programmes in the same manner as electricity, namely, by cable. This is just what I have been waiting for. Don't you see, dear reader, that I shall now be able to get into telephonic communication with my neighbour who is responsible for that loud loud-speaker!

The Very Latest

TRULY this is an age which craves amusement on all occasions. The latest is a proposal that broadcast receivers should be installed on the Imperial Airways machines on the Cross-Channel service, in order that passengers might obtain diversion upon their otherwise tedious journey. It is learned that the officials of the company do not consider the proposal a practical one, although they have given it due consideration, the main objection being the considerable weight of an outfit capable of giving satisfactory reception under rather adverse conditions.

A Misunderstanding

I HEARD the episode at the close of the service on Sunday, the 12th, from St. Martin-in-the-Fields, and I fail to understand how anybody could have misunderstood its nature. Surely some people's sets must be still giving the type of reproduction which used to be called "gramophonic," and it seems to me that they should look to their grid bias! It is perhaps significant that in one report, at any rate, it is stated that the woman's voice was quickly drowned by the organ, whereas on my own set it remained perfectly distinct after the organ started, since the latter instrument did not produce the blasting heard with a receiver of poor performance.



A restaurant in a wireless mast may sound rather impossible, yet the new wireless tower in Berlin supports a cafe with seating accommodation for 200 people. Our photograph was taken from one of the new restaurant windows.

A Royal Visitor

AMONG the visitors to the Radio Exhibition at Olympia was the ex-King of Greece, who was presented with a wireless receiver by one of the exhibitors.

The National B.B.C. Orchestra

THE ambitious scheme of the B.B.C. for broadcasting national concerts from the Albert Hall is progressing, and some further details have become available. Sir Hamilton Harty will conduct at the first concert, and other dates which have been provisionally fixed are October 21, November 9, November 25, and December 16, a date in January, two in February and one in April. Among the famous conductors who have already promised their services are Sir Edward Elgar, Sir Hamilton Harty, Sir Landon Ronald, Mr. Albert Coates, Mr. Percy Pitt, Richard Strauss, Otto Klemperer, Hermann Scherchen, Bernadino Molinari, and Erich Kleiber.

Among interesting items which will be given at these concerts will be a symphony, a choral work, a poem and a song-cycle selected from among the prize-winning works submitted for the recent B.B.C. competition for British composers.

A Giant Organ

DETAILS which have been published of the great organ at the Liverpool Cathedral, which has cost £35,000 and is believed to be the largest in the world, have aroused such interest in the United States that it has been suggested that a broadcast of the organ should be carried out, with a view to reception on the other side of the Atlantic.

It is suggested that the transmission should take place from Daventry, and arrangements will probably be made for this to be done. Some idea of the great size of the organ will be gathered

(*Continued on next page.*)

This Week's Notes and News—*continued*

from the fact that the motors which supply the compressed air and operate the various mechanisms have a total power of 35 h.p.

Yet Another Use for Wireless

THE very latest in the use of wireless in everyday life was when the annual sale of sheep at Shrewsbury was cancelled by the broadcasting of a message from 2LO at the request of the Minister of Agriculture. The reason, of course, was a suspected outbreak of foot-and-mouth disease, which would surely seem to be only very remotely connected with radio!

The Thorough German

THE German postal authorities have a stand of their own at the German Radio Exhibition, the idea being to show that a wireless aerial need not necessarily be ugly. The German postal authorities apparently feel a sense of responsibility for the effect upon the appearance of their cities of the widespread exploitation of broadcasting, and are endeavouring to influence public opinion in the direction of aerials which are not unsightly. Another interesting exhibit at the German Show is a replica of one of their broadcasting studios, but I believe that just for once in a while we have stolen a march on them at our own Exhibition, since their studio is not actually used.

The Daventry Mystery

ALL sorts of rumours are going round about the new aerial at Daventry. It appears that a new permanent aerial has been erected at the station, and it is explained that the previous arrangement was really only a temporary one. The alteration does not appear to have made any difference in the signal strength of Daventry at any of the localities at which I have made inquiries.

For the Schools

A VERY ambitious programme has apparently been arranged for the transmissions to schools in the near future. Between September 20 and December 17, at special times in the afternoon, there will be talks on a great variety of educational subjects, including geography, music, history and languages, all of them by quite well-known speakers. Among those who will lecture from London are Sir Walford Davies, Mrs. E. Fielder-Hodgson, Mr. Gerald Gould, Miss Mary Somerville, and Mr. E. Kay Robinson. Lucky children!

The Radio Doctor

AN interesting suggestion has been made by the Port Sanitary Officer at Havre for the institution of a regular service of medical consultations for the benefit of ships at sea. These suggestions are being considered by the League of Red Cross Societies in Paris, and they are intended to provide a system of medical assistance to vessels at sea which do not carry a doctor.

It is suggested that a special station be erected at the Azores, for the benefit of ships in the Atlantic, and the originator of the scheme urges the League of Red Cross Societies to consider this point in preparing a comprehensive scheme.

2LO's Military Tattoo

FROM the London station on October 9 a studio version of a military tattoo is to be broadcast. The sounds of troops on the march, the movement of guns, and the passage of tanks will be ingeniously reproduced, and listeners will be left to guess the way in which the various noises are obtained.

Export Trade

IF the export figures are anything to go by, wireless in the Far East is becoming very popular. Japan imports wireless goods from this country to the value of £250,000 every year. The rapid strides which have taken place during the last year or two lead me to wonder how long it will be before we have a "Japanese relay to all stations."

Licences

SINCE the beginning of broadcasting in this country there has been a steady increase in the number of people holding receiving licences. The latest figures show the number of licences issued to be 2,103,150, which in my opinion is not representative of the total number of receivers in use. I imagine that there are a number of people who still think that 10s. is too much to pay. Three concerts for a penny is, in my humble opinion, more than value for money!

Town-Crier Broadcast

DID you hear the broadcast last week by the winners of the Town Criers' Competition at Pewsey, in Wiltshire? Surely it was the most extraordinary combination of old and new methods yet heard. The control room people must have had a somewhat trying time, if the story of the winner's voice being audible at seven miles in the open air is true!

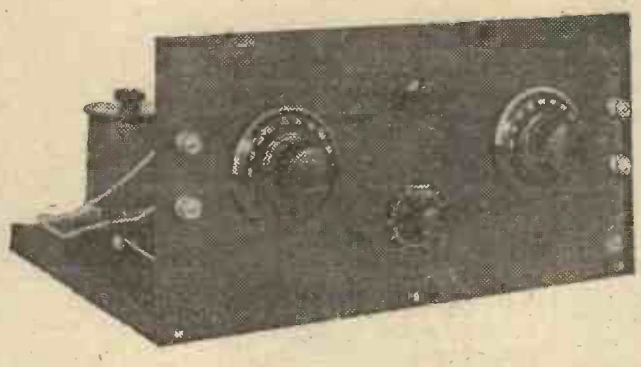
CALL-SIGN.

HOW IT WAS DONE

The broadcasting of "supper time" at the Zoo aquarium was recently attempted from 2LO. Above may be seen B.B.C. engineers with the hydrophone (under-water microphone), and below one of the giant conger eels which made several bitter attacks upon the hydrophone.

How to Build the "Elstreflex Two"

By JOHN SCOTT-TAGGART, F.Inst.P., A.M.I.E.E.



The Preliminary Test Report on this instrument appears on page 191

SIMPLE TO BUILD. *EASY TO OPERATE.*

IN last week's issue I gave details of the defects in reflex circuits, and showed how work at Elstree has enabled the old troubles to be overcome. The details of construction of the actual "Elstreflex Two" are given below.

Turning to the actual building of the receiver, it will be found that there are two outstanding features of this set, apart from the simplicity of operation and the range of reception which is possible by its use.

The first of these is the compactness and simplicity of layout. The whole receiver can be constructed in a comparatively short time, and no difficulty will be experienced in the actual execution of the work The other point is that, as far as possible, the cost has been reduced. Any features which tended to increase the cost have been excluded, and the components used have been the cheapest obtainable compatible with reasonable quality.

Panel Details

The usual vertical panel has been provided, which carries the two tuning condensers, the reaction condenser and the filament rheostat, which is also used as the switch. The aerial and earth terminals and the telephone terminals are also placed on this front panel, all the other terminals being placed on a strip at the back of the receiver

Coils

In view of the development which has occurred in screened coils, it was thought desirable, if possible, to utilise these transformers in the present circuit. With only two tuned circuits, however, the necessity for screening itself is not very marked, and quite satisfactory results can be obtained without the use of the complete screening afforded by the shielded coils.

The ordinary six-pin transformers, therefore, have been used by themselves, special bases having been designed by various manufacturers to take these coils, so that they may be used without the screen. Any of the various makes of these coils on the market may, therefore, be employed, provided they are fitted with the standard six-pin base. The components required are given on this page.

Those readers who desire to make their own transformers can do so by using the unwound former. Details of the actual windings adopted will be given in a future issue for the benefit of those who prefer to make their own coils.

WHAT YOU WILL NEED

One ebonite panel 14 in. by 7in. by ¼ in, and cabinet and base board to suit. (Feto-Scott.)
One .0005 dual condenser. (Ormond.)
One .0005 single condenser. (Ormond.)
(Both these condensers are fitted with a slow-motion device, which is desirable in this particular circuit.)
Two special bases for six-pin coils. (Lissen.)
Two Split-secondary type High-frequency transformers. (Any standard make.)
Two "Antiphonic" valve-holders. (Burndept.)
One L.F. transformer, ratio 5 to 1. (Igranic.)
One L.F. transformer, ratio 3 to 1. (Lissen.)
One "Etherplus" 30 ohm rheostat. (M. and A. Wolff.)
One P.M. crystal detector. (Radio Instruments.)
One .002 fixed condenser. (Finston.)
One neutralising condenser. (Igranic.)
One strip of ebonite 8 ins. by 1½ ins. by ¼ in. Twelve terminals.
Connecting wire. (Glazite.)

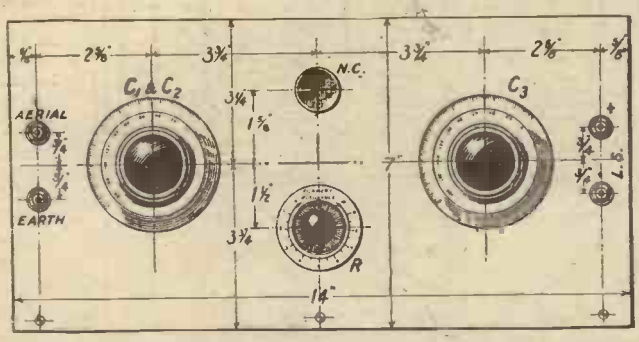


Fig. 1.—Symmetry is the keynote of the panel layout, full dimensions of w ich can be obtained from this diagram. Blue Print No. W2009A.

Panel Assembly

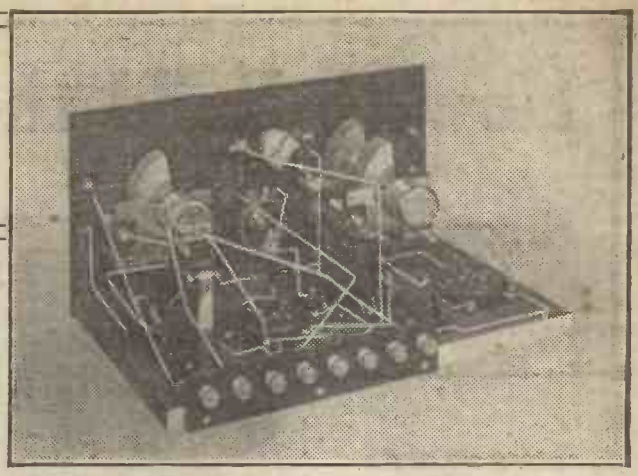
The actual constructional work is comparatively simple. First of all, mark out the panel in accordance with the details given in the front-of-panel diagram, and fix in position the dual condenser, single condenser, the neutralising condenser at the top of the panel and the filament rheostat at the bottom of the panel in the centre. The dual condenser, of course, is placed on the left-hand side of the panel looking from the front. Finally, the four terminals—two on each side of the panel—should be fixed in position as shown, which completes the front-of-panel layout. The panel should then be placed in its correct position on the front of the baseboard, and the remainder of the components placed in their appropriate situations on the baseboard.

Lay-Out

The actual details of the lay-out of the parts on the baseboard will be clear from the wiring diagram given, and there is no difficulty at this stage. Attention may be drawn, however, to the two sockets for the plug-in coils, which are not both in the same relative positions. They have been turned round in this manner in order to simplify wiring as far as possible, and they should be kept in the same position.

The "Elstreflex Two" Receiver

(Continued).



The dual condenser is that seen on the right of this back-of-panel photograph.

Low-Frequency Transformers

The L.F. transformers in use are not very critical, and there is a choice of several makes. The only point which is of importance is the self-capacity of the secondary winding, which must be low. One of the functions of the secondary of the reflex transformer is to prevent any parasitic oscillations occurring, and if its self-capacity is too high, the parasitic oscillations will have a free path through this self-capacity, and the whole object of the split-condenser circuit will have been destroyed.

The Remedy

Should any such trouble be encountered, it may be overcome by inserting a high-frequency choke in series with the secondary of the transformer. Parasitic oscillations will readily be observed by the fact that the set at some particular point on the condenser scales suddenly goes off with a loud click, and no amount of adjustment beyond that point will cause the set to exhibit any life whatever. If, however, a high-frequency choke is inserted in series with the secondary of the transformer, it will overcome any difficulty due to excessive capacity in the secondary winding.

The whole problem may be avoided completely, however, if the transformer specified is used, or if another reputable make of transformer having a low secondary self-capacity is employed. This is the only point of the circuit which is at all critical, and particular attention should therefore be paid to these remarks.

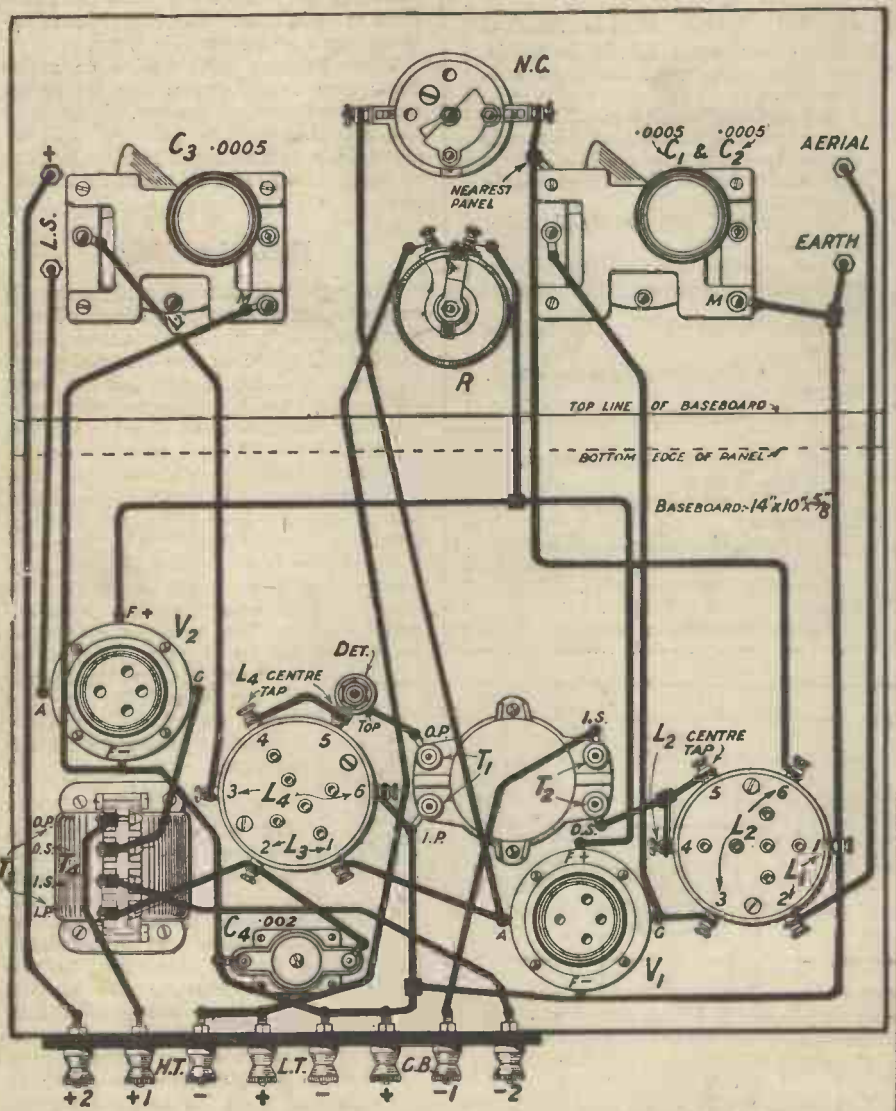


Fig. 2.—The wiring instructions given in the next column should be used in conjunction with this wiring diagram. Free Blue Print W2009B.

WIRING INSTRUCTIONS.

Join Aerial terminal to terminal 2 of L1.

Join Earth terminal to moving plates of double condenser C1, C2 and thence to terminal 1 of L1, F− of V1, G.B. +, L.T. −, one side of C4, F − of V2, and moving plates of C3 respectively. Join G.B. + also to I.P. of transformer primary T1 and thence to terminal 6 of L4.

Join H.T. − to L.T. + and thence to one side of R.

Join other side of R to F + of V1 and F + of V2.

Join terminal 3 of L2 to G of V1 and to fixed plates of C1 (remote from panel).

Join terminal 6 of L2 to one side of neutralising condenser N.C. and thence to fixed plates of C2 (nearest panel).

Join terminals 4 and 5 of L2 together and to O.S. of transformer secondary T2.

Join I.S. of same winding to G.B. − 1.

Join A of V1 to terminal 1 of L3, and to remaining side of N.C.

Join terminal 2 of L3 to remaining side of C4 and to I.P. of transformer primary T3.

Join O.P. of same winding to H.T. + 1.

Join terminal 3 of L4 to remaining side of C3.

Join terminals 4 and 5 of L4 together and to one side of crystal detector.

Join other side of crystal detector to O.P. of transformer primary T1.

Join O.S. of transformer secondary T4 to G of V2.

Join I.S. of same winding to G.B. − 2.

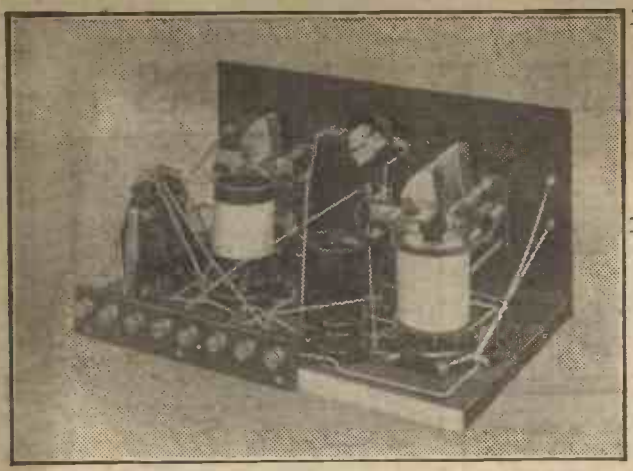
Join A of V2 to lower L.S. terminal.

Join upper L.S. terminal to H.T. + 2.

Wiring

Having placed the components in their correct position on the baseboard, they may be screwed in position, and the set is then ready for wiring up.

The actual wiring itself is quite simple, and can be readily followed



The V2 valve-holder, which is not visible in this photograph, is situated behind the left-hand coil.

Full Details of the Latest Reflex Receiver

from the wiring diagram provided. It is advisable to wire up the filament circuit first and to complete the remainder of the wiring subsequently. Particular attention should be paid to the photographs of the receiver, as the high-frequency wiring has been kept free of the other wiring as far as possible. In order to accomplish this, most of the wiring has been of the point-to-point variety instead of being "squared up," as is often done. In particular, no wires carrying high-frequency currents cross each other close together, but are always separated by a distance of half an inch if possible, and if the wires are taken, as far as is practicable, along the same lines as is shown in the photographs of the receiver, no difficulty will be experienced.

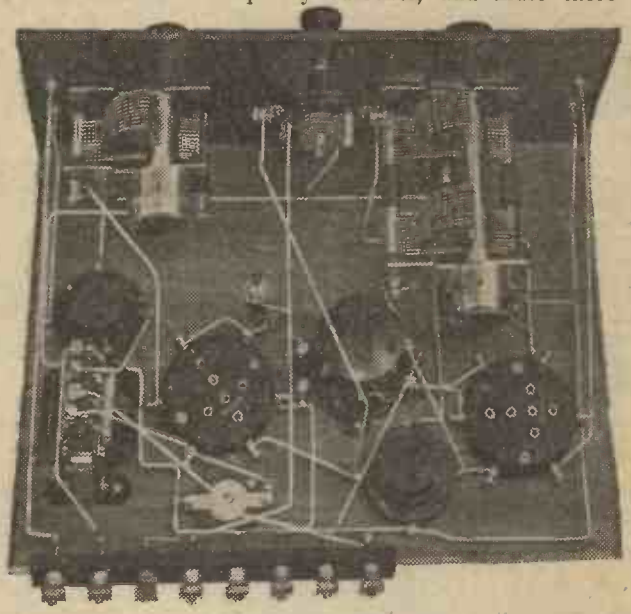
A Warning

Care should, of course, be taken that all traces of flux are wiped off the soldered joints after the work has been completed, and every joint should be carefully tested, as an indifferently soldered joint may cause a good deal of trouble in attempting to locate the fault.

Complete operating details of this receiver will be supplied next week. For the benefit of those readers who finish their receiver before these details become available, however, the following rough instructions will be of interest.

Valves

Place the reaction condenser (at the top of the panel) at the minimum position; insert suitable valves into the sockets. Both these valves should be of the "power" class. The first valve has to handle not only the high-frequency currents, but also the low-frequency currents, and must therefore be of a type having a very long, useful characteristic. Otherwise distortion and blasting will occur on the local station.



This view of the "Elstreflex Two" will be helpful when the wiring stage is reached.

Sharp Tuning

Having inserted the valves and the two high-frequency transformers, the receiver may be switched on by means of the filament rheostat and the two dials turned until the local station is heard. A little difficulty may be experienced owing to the sharpness of tuning, but when the appropriate position has been found stations can be tuned in quite easily.

Test Results

To give a preliminary idea of the performance of the receiver it may be mentioned that on test at Elstree remarkably powerful and pure loud-speaking is obtained from 2LO and 5XX, while quite a number of distant stations, including Bournemouth and Birmingham, were heard on the loud-speaker.

(Detailed test report next week.)

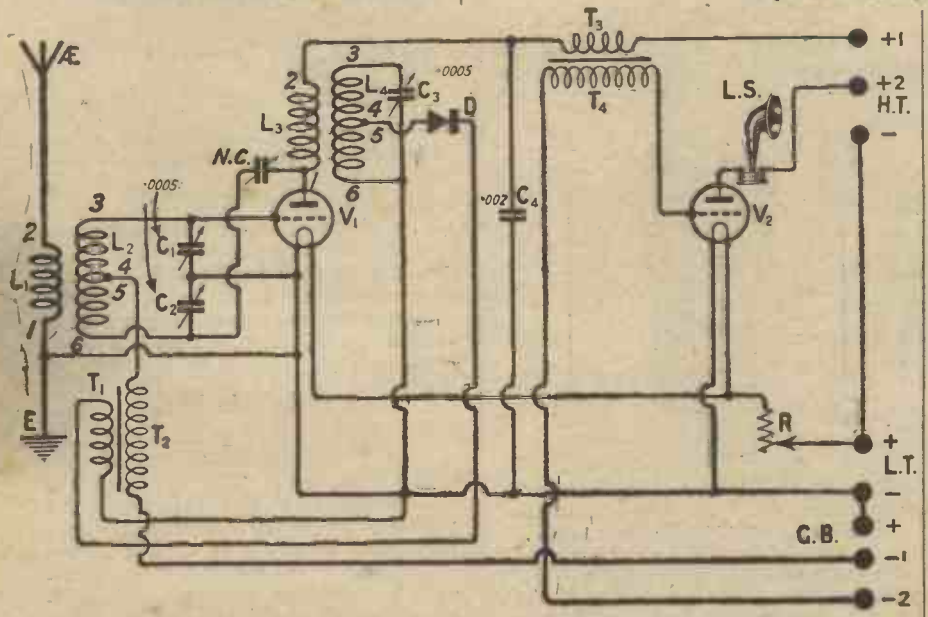


Fig. 3.—The condensers C1 and C2, form the dual condenser and both are operated by one knob.

BATTERY CHARGERS AND ELIMINATORS AT OLYMPIA

A Review by Our Special Representative

Having a D.C. output of 75 volts 12 amperes, this Tungar charger is intended for garages and battery charging stations.

Messrs. Clarke's "Atlas" H.T. and G.B. unit. This model is designed for A.C. mains.

THE use of the mains for the supply of H.T. and L.T., or for the charging of accumulators, is increasing in popularity, an impression fully confirmed by a visit to the recent National Radio Exhibition.

The great advantages of being able to charge accumulators at home, or of using suitable battery eliminators, are already too well known to need further explanation; yet there must be many readers who were unable to

The "Ethopower" H.T. battery eliminator for A.C. mains.

visit the exhibition to see for themselves the new and improved models which have made their appearance, and in the following paragraphs it is intended to give a condensed review of some of these exhibits.

L.T. Accumulator Charger

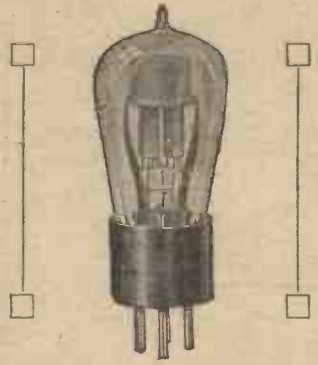
On the stand of Messrs. Burndept a very useful device, known as the "Balkite Trickle Charger," for use with A.C. mains, was exhibited. This device contains a special rectifying cell and a small transformer. The cell contains two electrodes one of lead and the other of tantalum, and is filled with accumulator acid. The combination thus formed has the property of rectifying alternating current for charging a 6-volt accumulator at approximately half an ampere. A switch is also incorporated in the instrument, the function of which is to place the accumulator on charge when the evening programme is over.

The "Balkite Battery Charger," another of the exhibits upon this stand, is for charging 6-volt accumulators at a higher charging rate—namely, 2 amperes. Both of these models are very compact and neat, and are made in two types for different A.C. main supplies.

Chemical rectification is employed in this accumulator charger manufactured by Messrs. Rectalloy, Ltd.

High-tension Units

In addition to an H.T. accumulator charger exhibited by this firm, a device known as the "Ethopower" H.T. unit is of interest. The special feature of this instrument is the valve employed, which gives full-wave rectification, and which has no filament. Two different voltages—namely, 40 to 60 for the H.F. and detector valves, and 120 to 160 volts for the power valves—are obtainable when this converter is in use.



This new rectifying valve, known as the "Ethotron," is the product of Messrs. Burndept Wireless, Ltd.

Chemical Rectification

The "Type A" low-tension charger, one of many models exhibited by Messrs. Rectalloy, is suitable for 2-, 4-, or 6-volt accumulators, and charges at .2 or .4 amp. A special chemical rectifier is employed in this model, which brings about full-wave rectification of the alternating current into direct current suitable for charging. The operation of the unit is very simple, since no attention is required beyond an occasional addition of a little water.

The Burndept Trickle Charger, which has recently been slightly modified.

New Igranic Lines

An input of 110 or 220 volts, 50 to 60 cycles, giving a maximum output of 1.5 amps. at 2, 4, or 6 volts is the specification of a new L.T. converter produced by Messrs. Igranic Electric, Ltd. The employment of one of the new double-anode valves produces full-wave rectification, and the finished instrument includes a voltmeter.

(*Continued on page* 195.)

Battery Chargers and Eliminators at Olympia

(Continued from page 192)

An H.T. battery eliminator which has just been produced by the General Electric Co., Ltd.

To dispense with the high-tension battery, two new converters are being marketed by this company. The first, model V208, is suitable for 110- or 220-volt alternating current having a frequency between 40 and 60 cycles. The maximum output is 30 milliamperes at 200 volts. Tappings are provided so that various H.T. voltages may be applied.

The second—list No. V123—is intended for use with an input similar to the converter just mentioned, but differs from this model, inasmuch as the maximum output is 20 milliamperes at 120 volts. Two tappings are provided on the second model—one at 40 and the other at 60 volts. Full-wave rectification is used on both models, the valves employed being of the double-anode variety.

Component Parts

It is a new departure to market a complete set of parts for the home construction of an H.T. battery eliminator, and such is the case with the new General Electric Co.'s model.

As is the case with nearly all other models, the present device is suitable for voltages of 100-110 and 200-220 volts, 25-80 cycles. Rectification is obtained by means of an Osram G.R.1 gas-discharge rectifier. This rectifier is something entirely new in this country, and has the useful feature that it cannot be overrun, since it does not employ a filament. Up to the rated output, hum is claimed to be entirely eliminated with this converter.

Two output voltages are obtainable —135 volts for the amplifiers, and for the detector a variable voltage from about 6 to 70 volts. Up to 25 milliamperes is the current rating.

An all-metal case forms the container of the "Tangent" H.T. eliminator.

Self-regulating over its range of operation, this "Tungar" model has a D.C. output of 7.5-100 volts, 0.1 to 2 amperes.

A Refinement

An H.T. battery eliminator which is provided with terminals for grid-bias is the product of Messrs. H. Clarke and Co. (Manchester), Ltd. The unit, which is illustrated in this article, takes up little room and is a neat and useful device. On one side are four terminals, H.T.−, H.T.+60, H.T.+20 to 150, and a fixed voltage of 150 is obtained from the top terminal. The voltage 20-150 is varied by means of a switch arm and studs, which are clearly discernible in the illustration. For grid-bias, five terminals are provided giving 4, 8, 12 or 16 volts as desired. This instrument is obtainable for alternating or direct current mains.

Designed for D.C. mains, this "Ekco" H.T. eliminator, model No. 2a, takes up little space.

Tungar Chargers

Pressure on space will not permit a review of all the models shown, but one of interest on the stand of the British Thomson-Houston Co., Ltd., was the Tungar high- and low-tension battery charger. This compact instrument has a D.C. output of 7.5 to 100 volts, 0.1 to 2 amperes. It is self-regulating over its range of operation, and any number of cells may be charged between the limits of two and six 2-volt cells (or equivalent) on the low-voltage circuit, and between ten and forty 2-volt cells (or equivalent) on the high voltage circuit.

Manufactured by Messrs. Wright and Weaire Ltd., this H.T. unit will give up to 15 milliamperes output.

New Dubilier Equipment

A dual purpose unit, known as the Dubilier "Hiloten" battery eliminator, supplies, as its name suggests, both high- and low-tension to a receiver. For filament supply, two accumulators are incorporated in the "Hiloten" and provision is made so that as soon as one is discharged it is automatically placed on charge, while the other, being charged, is switched into circuit in place of the discharged cells. Two high-tension supplies are provided, one at a fixed voltage of 200 volts for supplying low-frequency amplifiers, and the other with a variable voltage having a maximum of approximately 100 volts. The high-

(Continued on page 207.)

One of the Henderson H.T. supply units.

From my Armchair

BY EARL RUSSELL.

In these columns Lord Russell expresses each week his own personal views on matters of interest to "Wireless" readers.

Selectivity

I am always chopping coils and changing sets, so I thought the other day I would make a change, and have a good, steady go with one set, with the same set of coils in it. It is quite an old three-valver, just on three years old, and the results have been interesting. It is both very good and very bad. Altogether, I got about five British stations and seven or eight foreign ones, all at very fair 'phone strength; Dublin, Milan, and Union Radio were quite loud.

Union Radio of Madrid, which is 373 metres, was obtained quite clearly, and without interference, when both Bournemouth and London were working, and Cardiff also came in quite well in the same conditions, but Manchester I could not get. Of course, it is 200 miles from me, as against 50 for London and Bournemouth, and these stations appeared positively to overlap and leave no room for Manchester, though I quite believe that I might get it by accident.

The set at times appears selective, and at other times very unselective. For example, I had a German, a French, and an English station all together the other day. The fact is, the condensers are old-fashioned and stiff, all the leads are much too long, and the whole set is full of capacity couplings. Three years ago I was proud of it, and one can still get good results with patience; but I would not be proud of it to-day. It has one merit—it is very difficult to make it oscillate.

The Geneva Wavelengths

I think the arrangement made at Geneva for the exclusive and the common wavelengths is a very ingenious one, and I do not see why it should not work fairly well on the whole; but, of course, it will require stations to keep to their wavelengths, which they don't all do now by any means. The allocation of a common wavelength to Birmingham and Aberdeen seems to me a quite impossible arrangement. Cardiff and Aberdeen might have been possible, but, as it is, unless they are both to transmit the same programme, it must surely mean that they will be practically useless to any but crystal users in the vicinity. Anyone distant more than a hundred miles from both stations will be unable to get either.

Olympia

It is a great thing that we are having an exhibition this year which is fully representative of all British manufacturers. I am quite convinced that, from the point of view of business interests alone, there could have been no greater mistake than to have an exhibition of the N.A.R.M.A.T. only, with a rival one of those outside.

The present exhibition is more representative, and will clearly attract more visitors than two partial exhibitions. Indeed, I think, if the organisers had the courage to admit a limited number of foreign manufacturers, they would not really lose by it, from the business point of view. There should be no suggestion that we are afraid or unable to meet foreign competition. The British motor trade have not found that it has done them any harm to admit foreign competitors to their show. I am assuming, of course, that we should obtain reciprocity in any foreign exhibition.

SECRETS OF EFFICIENCY IN INTERVALVE COUPLING

By J. H. REYNER,
B.Sc. (Hons), A.C.G.I., D.I.C., A.M.I.E.E., Joint Editor.

This week Mr. Reyner deals with the important subject of intervalve coupling in continuing his exposition of the secrets of modern radio efficiency.

IN the first instalment of this article I showed that it was necessary, in the reception of distant stations, to employ a series of tuned circuits in order to obtain the necessary selectivity and still retain satisfactory reproduction. This being so, it remains next to discover how best we can incorporate these various tuned circuits into a receiver.

Limits of Amplification

Now in order to receive distant stations satisfactorily some measure of high-frequency amplification is desirable. This is due to the fact that a detector is more efficient on strong signals than on weak signals. It therefore pays to amplify the signal a little before rectifying, in order that the detector may operate reasonably efficiently. There is a limit to the amount of high-frequency amplification which is desirable, because after a certain point the interference begins to be magnified in a greater proportion than the signals. But until this limit is reached there is a definite advantage obtained in high-frequency amplification.

Simple Operation

This is, of course, demonstrated in practice. The modern high-frequency receiver is one which is comparatively simple to control. The reception of the various stations is accomplished by tuning the various circuits to the station required, and this operation by itself is sufficient to bring in the station. No fine adjustments of reaction are required, and although in many cases a reaction control is fitted, it is more a refinement than a necessity. One has only to compare this state of affairs with that existing a short time ago when our high-frequency amplification was not so efficient as it is now. Under those conditions the reception of distant stations was a matter of considerable skill.

One of the simplest methods of obtaining efficient amplification is by the use of tuned circuits associated with the valves. Various methods have been devised from time to time for obtaining amplification at high frequencies without recourse to tuned circuits, but the difficulties in the way of such achievements are large, and the full measure of amplification cannot be obtained. The voltage amplification obtained in such cases is usually of the order of 4 or 5 only, if as much, whereas with a correctly designed modern high-frequency transformer an amplification of the order of 30 or even more may be obtained.

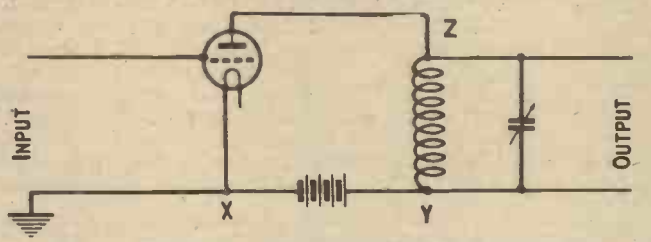


Fig. 1.—The simplest form of tuned-anode circuit.

Tuned Amplifiers

Such figures as these are only achieved because certain other problems incidental to high-frequency amplification have been satisfactorily solved, and I will deal with these problems in another article in this series. For the present, however, we will assume that satisfactory high-frequency amplification is possible by the use of tuned circuits associated with the valve, and therefore the most convenient arrangement for the reception of distant stations is to include the tuning arrangement and the amplifying arrangement in one unit, so obtaining a tuned radio-frequency amplifier.

Valve Difficulties

Now, unfortunately, as soon as we associate the various tuning circuits with the valve we obtain effects which at once detract from the efficiency of the tuning. In other words, if we utilise coils which would by themselves have characteristics suitable for a given degree of selectivity, we should find, when associating them with the various valve-amplifying circuits, that the actual selectivity obtained was not up to expectations.

It is quite easy to design coils which have all the necessary characteristics such that we can obtain really good selectivity with good quality. For example, if we wish, with a three-circuit receiver, to obtain Cardiff free from interference from London at a distance of, say, 5 miles from 2LO, it is necessary that such a coil shall have a decrement of the order of .025. This means that with a coil having an inductance of 200 microhenries we require a resistance of 7½ ohms at a frequency of 750 kilocycles.

Damping and Pick-up

Now such a coil is perfectly feasible, and in fact there are commercial coils on the market which come well within this limit. If such coils were used in an amplifier, however, the selectivity would be nothing like as good as we should expect theoretically. In fact, even if markedly superior coils are employed, we do not obtain the selectivity which would be expected at first sight, and this discrepancy is due to two causes. The first of these is the damping effect of the valves associated with the various tuned circuits, and the second is the interaction between the coils and the direct pick-up from the local interfering station. I shall deal with the question of interaction and pick-up at a later stage, and we will discuss at present the question of the damping effect of the valve.

(Continued on next page.)

Secrets of Efficiency in Intervalve Coupling—*continued*

A Simple Coupling

One of the simplest types of intervalve coupling circuits is that known as the tuned-anode, which in its simplest form is shown in Fig. 1. Now, the two ends of the high-tension battery X and Y do not vary in potential. Point X is at earth potential, and point Y is a steady potential usually of 60 to 100 volts above that of X, but both these points are fixed in potential, and therefore as far as any high-frequency circuits are concerned, they are the same point.

Hence between the points X and Y we have two circuits. The first of these is the tuned-anode circuit, and the second is the valve itself. Now, as is well known, a valve has an internal resistance or impedance of the order of some thousands of ohms, and this is virtually in parallel with the tuned circuits. Obviously, this will behave as if it were a leak connected across the tuned circuit. If we use a poor condenser having a bad insulation in a wireless circuit results would obviously be below standard. The presence of the valve produces very similar effects, making the tuning flat and unselective.

Remedies

Now there are two methods of overcoming the difficulty. In the first place we can use a high-impedance valve. If we made the impedance of the valve very high indeed, then the damping effect would be very small. There are two objections to such a procedure. In the first place, as we increase the internal impedance of the valve, so we have to increase the high-tension supply in order to obtain satisfactory results. As it is, the amount of high-tension voltage which has to be used in modern circuits is quite high enough, and any methods which tend to increase it cannot be considered practicable.

This difficulty in itself, however, could be got over. For example, it is possible to obtain the same effect as that of a valve having a very high impedance by utilising a four-electrode valve, which will enable us to obtain a similar characteristic with only a reasonable value of high-tension supply. The other difficulty, however, arises from the fact that the amplification of the valve depends upon the ratio of the external impedance and the valve impedance itself.

Limiting Factors

The anode circuit, consisting of a coil with a condenser in parallel, behaves, when in tune, as if it were a resistance having a value of $\frac{L}{CR}$ where L is the inductance of the coil, C is the capacity of the condenser, and R is the actual resistance of the circuit in ohms.

For example, a circuit having an inductance of 200 microhenries, a capacity of .0005 microfarads, and a resistance of 4 ohms would behave, in the circuit of Fig. 1, as if there were a resistance of 100,000 ohms. If this resistance is of the same order as that of the valve, then we obtain something approaching the full amplification of the valve itself. If, on the other hand, we could make the valve have an impedance of, say, 500,000 ohms, we should obtain less damping effect due to the valve, but the total amplification would fall off very considerably, since the external impedance would be small compared with that of the valve.

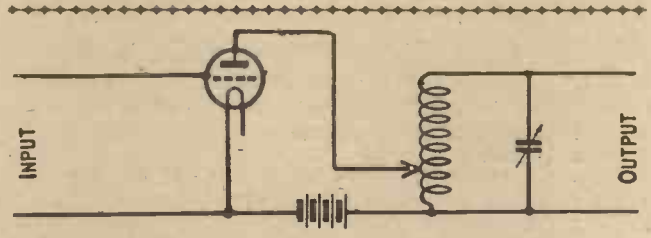


Fig. 2.—A skeleton circuit in which an auto-transformer is employed.

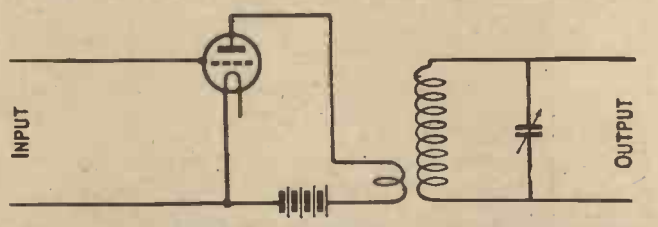


Fig. 3.—This circuit is electrically similar to Fig. 2, the difference being the exact method of coupling.

A Compromise

Consequently in practice we must arrange a compromise between the conflicting factors of selectivity and signal strength. This is done by arranging to tap the valve across a portion of the coil only. Obviously if the valve resistance is shunted across a portion of the tuned circuit only, then the extra damping which is introduced will not be so serious.

As a matter of fact, it can be shown that the damping introduced varies as the square of the tapping point. For instance, if we tap the valve across half the coil only, the damping is reduced to a quarter, and so on. Consequently, as we tap the valve across a smaller and smaller portion of the coil the damping effect decreases very rapidly.

Effect on Signals

The signal strength, however, tends to fall off at the same time, and to avoid this we step up the voltage by means of a transformer effect. The circuit shown in Fig. 2 is the skeleton circuit employing an auto-transformer. Here the anode of the valve is tapped across a small portion of the coil only, so that the voltages produced in the anode circuit are developed across this bottom portion of the coil. The voltage across the whole coil, however, is several times larger than that due to the auto-transformer effect of the coil which produces a step up in voltage.

Now up to a point we can compensate for the reduction in signal strength, due to the tapping down the coil, by the auto-transformer effect which is produced. There is a limit to this compensation, and beyond a certain point the signal strength begins to fall off very considerably. The design of a given circuit is therefore a matter of finding this optimum point at which the signal strength begins to fall off. Up to this point we can reduce the tapping, and consequently increase the selectivity of the arrangement very considerably.

Tapping Position

The actual optimum point depends upon the valve itself, and experiment and theory both show that for high-frequency work of this character the best results are obtainable with a fairly high-impedance valve. This point I explained in an article a few weeks ago, where I showed that the signal strength for a given selectivity gradually increases to a limit which occurs about 25,000 ohms.

The simple auto-transformer circuit shown in Fig. 2 is very little used, it being more common to employ a transformer circuit having a primary winding definitely separated from the secondary. One of the principal reasons for this lies in the fact that the primary winding is usually connected to the H.T. voltage, which must be kept away from the grid circuit of the succeeding valve.

A transformer circuit, however, such as is shown in Fig. 3, is electrically similar to the tapped tuned-anode arrangement of Fig. 2, the difference being one of coupling. With the Fig. 2 circuit the coupling between the

(*Continued on page* 201.)

I HAVE BEEN ASKED....

I wish to wind a box-type frame aerial of 16-inch sides to cover the lower broadcast range of 200 to 600 metres in conjunction with a .0005 variable condenser. Can you give me the required turn numbers, gauge of wire and spacing?

To cover adequately the 200 to 600 metre range, in conjunction with your .0005 variable condenser, you should employ 15 or 16 turns of 24-gauge enamelled wire, the spacing between turns being ¼ in. Providing the minimum capacity of your tuning condenser is small, the tuning range should be from 200 to somewhat over 600 metres.

What is the difference between an intervalve and a low-frequency transformer?

An intervalve transformer is one which couples two valves together in either the high-frequency portion—that is, the part of the circuit preceding the detector valve—or in the note-magnifier part of the circuit. Both high-frequency and low-frequency transformers are therefore intervalve transformers, but a low-frequency transformer is one which is used only after the detector valve. In certain reflex sets it often appears from the circuit diagram that a low-frequency transformer precedes the detector valve or a crystal detector; but actually as far as the sequence of amplification is concerned, the low-frequency transformer actually comes into operation after detection only.

During intervals between the various items of the programmes, a neighbour who employs a crystal set and has an aerial parallel and quite close to mine, can hear our conversation. How can I prevent this?

If you disconnect, or short-circuit your 'phones during the intervals in the programme, your conversation will not be heard by your neighbour.

I have a detector and two transformer-coupled low-frequency receiver, which functioned well when first constructed, but now it howls badly when I put my finger on any of the wander plugs or even on the pointer of the filament rheostats. What do you think is wrong?

From the symptoms given it would appear likely that your trouble is due to your H.T. battery having developed a high internal resistance or to a break in year earth lead. Try a new H.T. battery, which functions well in another set, or shunt your H.T. tappings with a large Mansbridge condenser of 2 microfarads or more. Try also alternative earths, or if the present earth lead is unbroken, but the earth is in very dry soil, soak this well.

NEXT WEEK.

Do not forget that next week's issue is another of our series of special numbers, and it will again be wise to order in advance to make sure of your copy.

Why Not Place a Standing Order With Your Newsagent?

PROGRAMME JOTTINGS

By Captain JACK FROST, M.I.R.E.

Notes on coming events in the week beginning September 26.

DID you see the Studio at Olympia? Although it was, as nearly as could be, a duplicate of the Studio at Savoy Hill, it was not nearly as large as the main 2LO Studio. You noticed, I expect, that the microphones were plugged into points here and there along the walls. This method of plugging is, comparatively speaking, a new idea. In the old Studios the microphones were plugged into sockets (two) fixed into the floor of the Studio. There were two sets of sockets which, by their position, divided into three parts, the floor space. As the leads from the microphone itself are some twelve feet in length, the stand upon which the instrument rests can be wheeled about with its burden into any part of the Studio required. Soon, the continual trampling of feet upon the floor made the plugs liable to removal during a transmission. That would, of course, never do, and the plugs were sunk into the floor for a sufficient distance for the sockets to be beneath the floor level, and a neat trap door was affixed above them. This was a little inconvenient, as you may guess, and when the new Studios were being erected it was decided to place them just above the floor level at the foot of the Studio walls.

Margate

Did you find that the Margate night was as good as it was expected that it would be? The performance by the Murray Ashford entertainers was, I thought, quite good, but a friend of mine who has heard them recently at Margate remarked that he considered that they could have been better. Everyone gets a different view you see, and the fact of being one of an audience at the actual "show" would make a difference. The Royal Artillery String Band was, as usual, good to hear. They play, during the winter months, at the Royal Artillery Theatre at Woolwich.

The "Mikado"

By the time that this is in print the broadcast of portions of the opening performance of the "Mikado" from the Princes Theatre will be over, and we shall, I am sure, have thoroughly enjoyed the two thirty-minute excerpts.

The B.B.C. have, for a long time, been endeavouring to arrange such a broadcast, and they are to be congratulated on their success. This will be, we all hope, the first of many Gilbert and Sullivan broadcasts, for there are few people who will not go a long way to hear performances by the D'Oyly Carte Company.

"The Vicar of Mirth"

On October 1, Mr. Vivian Foster, "The Vicar of Mirth," will be broadcasting from Newcastle. Some people think that it is a shame to "take off" the mannerisms and voice of the alleged vicar, and some letters were sent to the Press about it. Several reverend gentlemen of my acquaintance enjoy the jokes of their mirthful "brother-in-arms" every bit as much as we laity. Try to tune in Newcastle on October 1, for he will be well worth hearing.

Sir Hamilton Harty will conduct the first of the Albert Hall concerts.

Talks

The week's "Talks" offer some considerable interest. Mr. Desmond MacCarthy commences his fortnightly talks upon "Books" on September 27. We have had quite enough rain recently, and we are to hear about "Rain" from Dr. H. R. Mill on September 29. On the same day Mr. Edward Cressy is to tell us about "The Engineer in Adventure," and the title of his talk will be "The Colorado in Revolt." Book next Wednesday, October 6, in your diary for a talk by Sir Oliver Lodge at 9.30 p.m., his subject being "The Atom of Matter: Last Century." On October 1 A. P. Herbert, of *Punch*, is to amuse us with "An Imaginary After-Dinner Speech."

Pianoforte Recitals

Piano music during the coming week is to be as follows:—

September 27.—Concerto for two pianos in C minor (first movement), Bach. Andante and variations Op. 46 (Schumann).

September 28.—Variations on a theme of Beethoven (Saint Saens), Op. 35.

September 29.—Silhouettes Op. 23 (Arensky); Le Savant; La Coquette; Polichinelle; Le Rêveur; La Danseuse.

October 1.—Second Suite Op. 17 (first part) (Rachmaninoff); Introduction, Valse.

October 2.—Second Suite (continued) (Rachmaninoff); Romance, Tarantelle.

All of the above are at 9.45 p.m.

Schools' Transmissions

On September 27 Mr. E. Kay Robinson is continuing his weekly series of talks on fishes, with a talk upon "How Fishes Began." A great number of us know how fishes "end," but few know for certain as to how they began. We shall hear all about this in the transmission to schools programme at 3 p.m.

Programme Exchanges

On September 26 London is having a Massenet programme, Birmingham a symphony concert, and Cardiff a programme featuring famous overtures. London, on the following day, is having a continuation of the Dominion

(*Continued on page* 217.)

SECRETS OF EFFICIENCY IN INTERVALVE COUPLING

(Continued from page 198)

primary and secondary is practically unity, so giving a very tight-coupled arrangement, whereas with the transformer arrangement the coupling is somewhat looser.

Energy Wasted

With the separate winding, however, we have several undesirable effects, principally arising from the fact that the coupling is not as tight as it should be. This means that a certain percentage of the energy which is put into the primary circuit does not produce the proper effect upon the secondary, and this obviously means waste, so that we have a loss of efficiency. At the same time, there are capacity effects between the primary and secondary which tend to produce further loss of efficiency and signal strength, and these are to be avoided as far as possible.

A Difficult Matter

It will be seen, therefore, that the design of a high-frequency transformer is a matter of some difficulty owing to these various subsidiary effects which arise, and which have to be counteracted. In general, however, such design is based upon similar lines to that of the tapped-anode circuit shown in Fig. 2. We reduce the transformer circuit to an equivalent tapped-coil circuit, and then obtain the optimum tapping point for the particular type of valve in use. As we have seen, this point may be made lower and lower on the coil, with increased selectivity, up to a point where the signal strength begins to fall off, and this is the way in which the types of transformer recently used in Radio Press receivers have been worked out.

NEWS IN ADVERTISEMENTS

Readers will be interested to note in the advertisement of Messrs. Ormond Engineering Co., Ltd., that this company has in preparation a Ganged Triple Condenser for the Elstree "Solodyne."

* * *

A reduction in price of the Brandola is announced in the advertisement of Messrs. Brandes, Ltd.

* * *

Messrs. Sydney S. Bird & Sons announce the Cyldon Triple Gang Condenser.

* * *

One of the advertisements of Messrs. Lissen, Ltd., describes the new Lissen L.F. Transformer.

* * *

In connection with the Sylverex Crystal Messrs. The Sylverex, Ltd., offer the Sylverex Gift Pen.

* * *

Messrs. Jackson Bros. announce the introduction of the new J.B. S.L.F. Variable Condenser and the J.B. Triple Ganged Condenser.

SHOULD THERE BE AN AUDIENCE IN THE STUDIO?

By
Captain JACK FROST,
M.I.R.E.

Opinions differ as to the desirability of having an audience in the studio. In this interesting article, both aspects of the question are considered, and some unsuspected points are raised.

THE Press, during the past week, has been discussing the problem as to the desirability or otherwise of there being an audience present in the studio during a broadcast transmission. The points of view of many interested persons have been put forward, and it would be well for us to consider, first of all, the listener's aspect of the case and then the broadcast artist's probable viewpoint.

The aspect from which the listener looks at the question is of necessity all-important, because he is the man who finances the concern, for the very obvious reason that he pays his licence fee of ten shillings per annum. The artist is the employee, for the period of his appearance in front of the microphone, of the B.B.C., and therefore of the listener also.

Discretion Needed

The listener may like the atmosphere of laughter and clapping because, in his opinion, it gives a "surround" to the spoken word and jest. On the whole, I think he *does* like it, but he *does* want to hear the joke himself! It will never do for the man who listens to hear such a furore of clapping and such a roar of laughter that it completely swamps the words which have been the cause of all the merriment. He will very naturally complain, and will ask the reason that he, a man who pays for the service, should be denied his entertainment because of the audience of which he may or may not approve.

An Example

Such an incident did actually occur during the past few days, when Mr. Will Rogers, who has on several occasions deputised for Sir Harry Lauder, gave an entertainment from 2LO. At one time the laughter was so predominant that the comedian's words were swamped by it. That was annoying, to say the least of it. At the same time it would be well to remember that the applause and laughter, coming after the jest, and in a suitable pause in the programme, lend an invaluable atmosphere to the transmission. To laugh alone is to lose a great deal of the enjoyment of the item. That was the position before audiences were allowed inside the broadcast studio during an actual transmission, and before the orchestra was encouraged to applaud items.

The studio at the Australian station at Melbourne is furnished on very up-to-date lines.

The Artist's View

That is the listener's side of the question, and they are all points which are appreciated by the listener himself. But what is the point of view held by the broadcast artist?

The majority of variety artists are noted people whose particular sphere of service is upon the theatre and music-hall stage. There they have audiences. If it is a cold house to which they are playing they very naturally experience a damping and depressing sensation. But if the "house" is a really good one, and if they find themselves warmly received and heartily applauded, they feel encouraged and receive additional incentive to put forth the best that in them lies. A popular music-hall artist commences his "turn" with the atmosphere provided by the audience. The mere sight of his face and make-up provide an audience, out to enjoy themselves, with food for appreciation and applause. The sea of upturned faces, the sudden hush falling upon a number of people, all talking in an undertone, and making a buzz of conversation; the applause which bursts out in a roar following upon the hush; then, if the artist is a comedian, the laughter—all of this assists the performer in the creation of an "atmosphere." As the performance progresses he is able to tell by the applause whether or not his jokes are being appreciated. He can even alter his methods and change his tactics if he considers, on the spur of the moment, that some different "patter" will be more suitable to the type of audience.

A Trying Experience

Far, far different is the experience of the same artist who comes to the

(*Continued on next page.*)

SHOULD THERE BE AN AUDIENCE IN THE STUDIO?

(Continued from page 203)

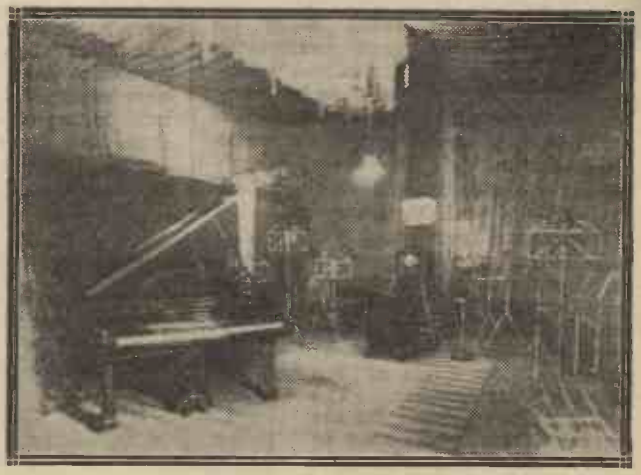
broadcast studio to perform. He may have been in front of the microphone previously and may be used to the type of "atmosphere" and surroundings presented by the studio. He may even have trained himself to adapt himself quickly to those changed surroundings. But he must have, at some time or other, been obliged to have made a first broadcast appearance. What were his impressions *then?* Different broadcasters would have different experiences, dependent upon their "nerve," their impressiveness. But, in general, they would all feel that they had come into a room in which their voices went out from them never to return. In the theatre, however, the amount of echo upon the stage itself would allow the voice to return to the ear of the performer.

A Bleak Reception

In the studio the effect would be similar to that found within a well-furnished and curtained drawing room. The microphone, sitting so silently and still upon its cushion of rubber, would seem to him to be the ear of no one knows how many people who, unseeing and unseen, may or may *not* be appreciating his efforts to entertain them. That was why, in the early days, and in fact nowadays, too, listeners were, and are, encouraged to write saying as to how they had enjoyed so-and-so's performance. The microphone, round and black, for all the world looking like a large jam-pot upon its side, gives no indication to the artist of the reception which the unseen audience are giving to the "show." In the music-hall the faces of the audience tell the performer all that he wants to know. The microphone in the studio cannot tell him! Please remember, too, that the number of people in a theatre is minute when compared to the size of the radio audience. Even when the item is not S.B. (simultaneously broadcast) to other stations, it is, likely enough, far beyond the sitting and standing capacity of the largest hall anywhere! Because a greater number of people are listening, the artist's reputation is at stake in a wider degree than when he performs from the stage. His jokes more rapidly become stale.

Imagination Needed

The artist completes his contribution to the programme, or he makes a joke which would call forth, he considers, a roar of laughter from his theatre audience were he in front of them instead of being before a jam jar! Perhaps, following the announcer's introduction, he has brought forth a humorous remark. Instead of a murmur of appreciation or a roar of laughter, he hears nothing, not a sound in the sound-proof room! Not much encouragement in that, is there? The microphone, in his eyes, has become almost a super-critic, smiling derisively at his feeble efforts. How can the comedian know that thousands and thousands of people are listening all over the British Isles, and, perhaps, on the Continent as well, who are really appreciating and applauding his efforts to amuse them?



One of the long-wave stations which is received at good strength in this country under favourable conditions is Hilversum, which transmits on a wavelength of 1,050 metres. The studio is very heavily draped as may be seen from our photograph.

A Real Help

Can we wonder, then, that it was distinctly favourable to the artist and to the quality of the programme to have a few people present in the studio with the artist, who would listen and applaud? The first idea was to have the orchestra in the studio. Then, as studios became larger and as accommodation was obtainable, audiences were welcomed. Applications which are made to the B.B.C. for the opportunity of being present in the studio during a transmission are answered with a card of invitation for the arranged day. The audience comes voluntarily.

The artist is able in that way to have real, live, speaking and applauding beings in front of him. He forgets, or tries to forget, that the micro-

(*Continued on page* 218.)

tension supply is capable of delivering up to 15 milliamperes without any hum, and should therefore work 2 stages of power amplification quite easily. A unique feature of the "Hiloten" is the control box. This consists of a small box by means of which all battery adjustments can be made. The advantage of such an arrangement is that the actual converter, which in most cases is hardly an ornament for the drawing-room, can be hidden away in a cellar or any other convenient place, and controlled from the neat and tidy control box.

Universal Voltage

Suitable for universal voltages, the H.T. battery charger shown by Messrs. Wright and Weaire, Ltd., charges H.T. accumulators at .1 amp. or less. The unit is small and of neat appearance.

Another H.T. battery eliminator, which I had the opportunity of inspecting on the stand of Messrs. Gent and Co., Ltd., is contained in an all-metal case. On this model two voltages are available, a variable voltage for the detector circuit and 150-170 volts for the power amplifiers. The output of the "Tangent Battery Eliminator," as it is called, is ample for most large sets, inasmuch as 20 milliamps may be obtained.

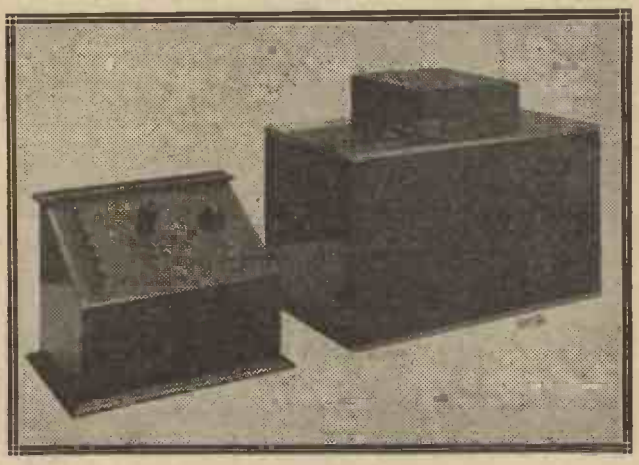
BATTERY CHARGERS AND ELIMINATORS AT OLYMPIA

(Continued from page 195)

Some "Ekco" Models

Among the useful range of H.T. units exhibited by Messrs. E. K. Cole may be mentioned the small D.C.-type model 1a. This unit is very small and compact and is suitable for one to four valve sets. Simplicity is an outstanding feature of this device, only four terminals and a standard lamp plug being external.

In the gallery I had the opportunity of examining still another H.T. supply unit suitable for A.C. mains, this time on the stand of Messrs. W. J. Henderson and Co., Ltd. The model referred to, one of many exhibited by this firm, is of attractive appearance. Two rectifying valves, the filaments of which are operated from the mains supply, are used to obtain full-wave rectification. The two voltage tappings are at +60 and +120 volts and the maximum current obtainable is 40 milliamps. Simplicity of operation is claimed to be a feature of this instrument, and when in use it is free from hum.

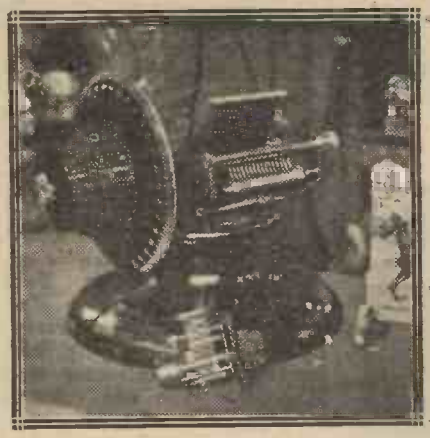


With the Dubilier "Hiloten" unit is supplied a control box (seen on the left), so that the converter can be placed in the cellar or convenient place, where it will not require to be touched.

Sets Incorporating Converters

Quite a large number of new receivers were shown for the first time, in which high-tension and in some cases low-tension converters had been incorporated in the instruments themselves.

In a short article it is impossible to review all these models and the foregoing is simply an account of the apparatus at Olympia for use with *existing sets*.



TENDENCIES IN VARIABLE CONDENSER DESIGN

By C. P. ALLINSON, A.M.I.R.E.

The notes on this page are intended to summarise the impressions derived by a visitor to the Exhibition whose main interest lay in the development of the variable condenser. It is not intended as a review of all the condenser exhibits.

AN examination of the variable condensers at the Wireless Exhibition at Olympia shows a very marked tendency towards the straight-line-frequency variable condenser; in fact, I should think that about three-quarters of the condensers shown were of the straight-line-frequency type. A few firms produce only the square-law model, but most of them have both types, while some firms produce the straight-line-frequency variety only.

Advance in Workmanship

The general workmanship and finish of the specimens I examined were far superior to that of last year. I was surprised, however, to find one condenser that was made by a well-known firm which had an extraordinary amount of side play on the spindle, while the vernier adjustment was rough and jerky. This was a pity, since this component incorporated several good points of design.

One noticeable difference to be perceived between this and last year is the fact that metal end plates and sound low-loss construction are almost universal. One or two makes still adhere to the old ebonite end plates, but they are few and far between.

Reducing Losses

Careful attention has been paid in many cases to the disposition of the dielectric, so as to reduce dielectric losses to an absolute minimum, and the advances made since the last show are very great.

Another important point that shows marked improvement is as regards the fit of spindles in their bearings. A number of condensers, which had probably been through some thousands of hands since the opening of the exhibition, showed no trace of side play or shake in the spindles, a gratifying discovery. The accuracy of the machining has obviously been increased, and closer limits have been set by the designers. Some condensers employed special types of cone, split, or ball bearings, whereby any wear that might occur, showing itself in the form of some kind of play in the spindle, could easily and surely be taken up. The ball bearing has become very popular among manufacturers this year, and justly so, for a well-designed ball race gives a delightfully smooth and even turning movement.

There is a number of examples at this year's Exhibition of condensers with entirely unconventional movements. (The example is the new Bretwood instrument.)

Single Support

It is interesting to note that there are two or three condensers which have only one end plate, and only one bearing for the spindle. It is claimed that this results in a decrease in the losses, so that the instrument becomes more efficient. In such an instrument it is, of course, extremely important that the bearing be well designed and constructed. I examined a number of specimens of this type, and in every case the workmanship was found highly satisfactory, special provision being made in these components for the elimination of any form of slackness in the spindle.

Die-Cast Plates

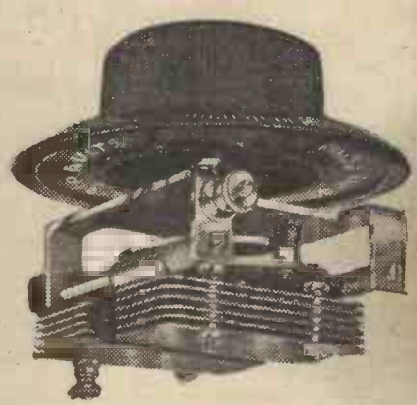
The "die-cast" method of construction has only two or three adherents as yet in this country, though, as most experimenters are probably aware, it has enjoyed a considerable measure of popularity in the United States. One of the instruments of this type that I had a good look at, though it appeared bulky and solid, was found to be quite light in weight when picked up, practically the whole of the instrument being made of aluminium.

Increased Use of Brass

While on the subject of metals, it was noticed that the use of brass for the construction of variable condensers is becoming more general, and one particularly noticeable model of this type was constructed throughout of brass and lacquered in every part. When a brass-vaned condenser *does* get dirty, it gets *very* dirty, and nothing is uglier than a blotched and blackened set of vanes. The thorough lacquering given to the condenser in question not only enhances its present appearance, old-gold lacquer being used, but preserves it in the future.

Another Improvement

A point I always examine when purchasing a variable condenser is the spacing of the vanes. If this is even and well done, it is a pretty good indication of the care that has been taken in its manufacture, and I was



The Ripault is another example of a condenser departing radically from the rotary-motion type.

pleasantly surprised as to the small number of cases in which uneven spacing was noticed.

(*Continued on page* 210.)

TENDENCIES IN VARIABLE CONDENSER DESIGN

(*Continued from page 208*)

The design and movement of the vanes of most of the instruments on view were quite orthodox, but one or two interesting variations were seen. In one case (on the Dubilier stand), where the shape of the vanes was more or less conventional, an ingenious geared mechanism picked up one vane at a time, and rotated it from zero to maximum (or the reverse, according to whether the capacity of the condenser was being increased or decreased). This method, as a matter of fact, gives an extremely fine and accurate degree of tuning; I was able to try one of these instruments some time ago, and I was struck by the positive control this instrument gave. Another condenser (the Ripault) had wedge-shaped vanes, which were interleaved by sliding them together. The moving vanes were mounted on two guides, and a specially-shaped cam engaged with a pin on a bridge piece carrying the vanes, so regulating their motion. The cam was shaped to give straight-line-frequency tuning, but I believe that various cams are available, so that whatever type is preferred by the purchaser can be obtained.

A Logarithmic Condenser

Of all the numerous makes at this exhibition, there was only one in which "logarithmic" shaped vanes were used. The use of a vane of this shape has certain advantages which make it of particular interest to the designer of "gang control" circuits, since it enables several circuits to be matched up without difficulty when gang control is used, and, once adjusted, will remain adjusted over the whole range of the condenser.

Use of Pigtails

Pigtails are in the ascendant, and a large number of the condensers I looked at were provided with a pigtail connecting the moving spindle to the connecting terminal. One of these pigtails, which was of the watch-spring type, was insulated, so that in the event of a couple of turns touching they would not short and cause noisiness in operation. In a few cases a heavy braided copper pigtail is used, but the watch-spring type appears to be in the majority.

For the "Solodyne"

Several manufacturers have produced a gang condenser for use with the "Solodyne," and a high standard of constructional skill and design is shown in these, and various ingenious methods are employed for allowing the moving vanes of each bank to be adjusted individually. One gang condenser I saw had five separate variable condensers in it.

HOW THE PRINCE BROADCASTS

A concluding instalment of the interesting article which appeared in our September 11th issue

OUR last talk was upon the way in which all of the many arrangements for a successful broadcast of the Prince of Wales' speech from the Portsmouth Guildhall, or, for that matter, from any place at which he may, in the future, be speaking, was carried out, or will be carried out.

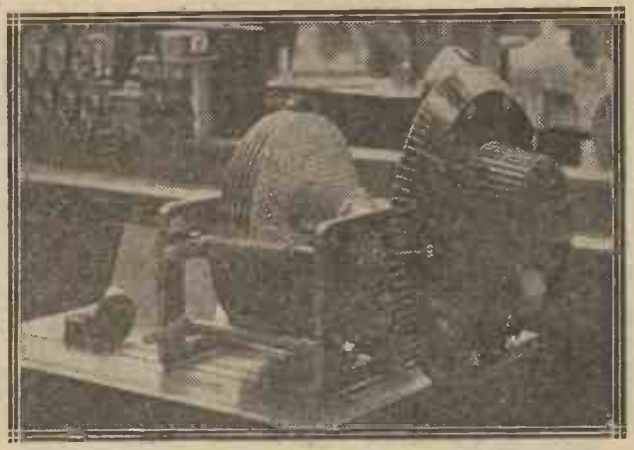
At our pleasure, the amplifiers and microphones have sat patiently awaiting the resumption of our story. We must not try their forbearance any longer, so let us resume.

Land Lines

In complete charge of the amplifiers and microphones is the engineer, and he, sitting in front of one of the amplifiers, wears a pair of headphones. These are in circuit with the amplifier, and everything coming from the microphone he hears and "controls." In other words, he adjusts the amount of amplification, or "step-up," which the amplifier is giving to the impulses received from the microphone, and which are flowing from the output terminals of the amplifier to the telephone lines provided by the Post Office engineers. These 'phone lines carry the current away to the local Telephone Exchange and then on to other lines, which may be local or trunk, dependent upon whether the nearest broadcasting station is local or at some distance. In this particular instance the land-lines were from the Portsmouth Exchange to the Bournemouth Exchange, and thence to the broadcast studio's amplifier and "control" room.

The Stand-by Line

Land-lines are absolutely vital in such a broadcast from outside the actual broadcast station. If they are subject to interference either at Exchanges or along the route that they traverse, then it is possible for a whole mass of "woolliness" or distortion to be introduced into the transmission. Sometimes you have spoken on the telephone and have heard other folk talking, so that the conversation being conducted by them seriously interferes with that being conducted by yourself. Imagine the broadcast line to be one of two such lines, and imagine "induction," as it is called, to be taking place between the two lines. Perfectly good work by the engineer at the Portsmouth Guildhall, in the placing of his microphones and in the "control" of his amplifiers, would be spoiled. Two lines are therefore specially engaged—one to carry the current from the amplifiers at the Guildhall to the Bournemouth Studio control room, and one as a spare in case the necessity for its use should arise. This second line is normally used for speech by telephone between the engineer at the Guildhall and the engineer working the apparatus at Bournemouth.



This giant variable condenser formed one of the exhibits at the recent National Radio Exhibition, and some idea of its size may be obtained by comparison with the normal condenser seen on the left. (Exhibited by Messrs. Dubilier.)

Arrival at the Station

So far we have seen how the Prince of Wales' speech from his seat in Portsmouth Guildhall has reached Bournemouth, or to use the technical term, how it has been "relayed" from the Guildhall at Portsmouth to the Bournemouth broadcast station.

Let us jump upon our magic carpet and take a trip from Portsmouth to Bournemouth. The telephone line comes into the control room which forms part of the broadcast station, and there is connected to more amplifiers, which can be tapped into with a pair of headphones. The quality of the speech, music, etc., received from the land-line can be determined by the engineer on duty, and adjustments notified to the man at the Guildhall, by bringing the second line into use for conversation. Adjustments in control may be necessary, and these would be carried out by the engineer on duty at the Portsmouth Guildhall.

"S.B."

Let us suppose now that all B.B.C. stations are to relay the Prince's speech. So far, Bournemouth has it and needs to pass it on to all stations. London is the hub, the medium through which this is achieved. In the London broadcast station's control room at Savoy Hill is an affair which covers nearly the whole of one wall of a room of moderate dimensions. This "affair" is called the "Simultaneous Board." This is a long name for something which has taken a long time to reach its present standard of efficiency. The story of the growth and development of the Simultaneous Board would make interesting reading on another occasion.

The Network

From this wonderful board trunk lines radiate, *via* the London Trunk Exchange. These go to each and every main station, relay stations being reached through their parent (main) stations.

(*Continued on next page.*)

Bournemouth has a line reserved during certain hours of each day which passes from the control room to the Simultaneous Board in London. This line, too, is duplicated in case of breakdowns or faults, and on to this line pass the amplified electric impulses which have come from the Portsmouth Guildhall.

Away those impulses dash to London, through the circuits of the Simultaneous Board, through plugs and connecting strips, transformers and resistances, and into more amplifiers. There are upon this board not only the lines which radiate out to the several stations, but also, before those travel-worn impulses can get to the lines, an amplifier connected to each and every line.

Strength Adjustments

You will realise that a line to Aberdeen would be very much longer than one to Birmingham, and that a line to Glasgow is shorter than one to Belfast. That seems an unnecessary statement, but in point of fact there is a very distinct connection between the length of that line stretching away to Aberdeen and the humble little amplifier which occupies such an inconspicuous place within the interior of that Simultaneous Board in London.

The longer the line or wire, the greater its resistance to electric current passing through it. More "boost" or kick is therefore required to overcome this resistance. Were a weak electric impulse to be sent along that line it would be reduced to a

HOW THE PRINCE BROADCASTS

(Continued from previous page)

minute jet ere it reached Aberdeen, simply by reason of that resistance in the line. With lines travelling over great distances there is a greater liability to distortion—to noises picked up by the wire along its route, in telephone exchanges, etc.

Now you will see that the adjustment upon the amplifier connected to the Aberdeen line will have to be different to the adjustment upon the amplifier connected to—shall we say?—the Birmingham line, which is so very much shorter.

The Complete Process

Before we travel further let us connect up our chain once again. The Prince speaks, creating a sound wave which acts upon the microphone reposing upon the table before him. The microphone sends electrical impulses (corresponding to the sound wave) along to the amplifier in the dusty corner of the Portsmouth Guildhall. The amplifier increases the strength, and away the impulse dashes to Bournemouth, then to London, and then, after further amplification, to the trunk lines connected to London. Off again our impulse goes upon journeys of varying lengths, simultaneously, to Aberdeen, Birmingham, Belfast, Newcastle, Glasgow, and all the rest of the broadcast stations, where engineers are waiting to receive it. They feed it into more apparatus, inspect it, control it, and send it along another line, this time a much shorter one, to the building in which the transmitter is housed. The transmitter does its job and transmits the Prince's speech upon the wave in the ether which comes to your aerial. How the transmitter does this, and how it gets to your aerial, and how and why it becomes audible sound to you in your loud-speaker or headphones would fill a book, which would certainly not be within the compass of this article.

Relative Speeds

The time taken up by the journey of our friend the impulse from the microphone in the Portsmouth Guildhall to your headphones and loud-speaker was far, far less than the time taken for the sound of the Prince of Wales's voice to travel from his lips to the ear of a person sitting at the back of the Guildhall in which he was speaking!

As a matter of fact, a listener to the broadcast speech at a distance of 500 miles from Daventry, or something like 600 miles from Portsmouth, heard the sound of the Prince's voice 15 times as quickly as a person situated 50 ft. away from the Prince and actually present with him in the Portsmouth Guildhall!

JACK FROST.

The WEEK'S DIARY

I THINK the agitation which is being fostered in some quarters against the B.B.C.'s International Concert at the Albert Hall is rather silly. Apparently the critics resent the B.B.C. using our funds to make payments to foreign artists and conductors, believing presumably that British money should be used for British artists only. Quite apart from the fact that art knows no national boundaries, if such a policy were pursued to its logical end, goodness knows to what absurdities it would lead us.

For example, descriptions of foreign stations would have to be barred, as the payment to writers on such subjects could be construed as the use of public funds to dissuade Britishers from the policy of "see England first." Again, why relay programmes from foreign stations? Surely our own stations are quite good enough for Britons! Seriously, though, I do not see what real objection can be raised to the proposals, which strike me as being a particularly good way of giving the listener the best that can be obtained for him in the way of music.

* * *

I AM glad that Sir Oliver Lodge is to give us some more talks this winter. Few people have a more engaging way of talking on scientific subjects. When lectures are given by such speakers as Sir Oliver Lodge, few criticisms are made of the B.B.C. educational talks. The real grumbles and the legitimate ones come from those who resent the constant inclusion of talks on uninteresting subjects by people whose talks are either sententious or patronising—frequently the latter—and whose claims placed before the microphone do not sound at all convincing when introduced by the announcer.

* * *

IT is interesting to note how interest has once again been aroused by the cabinet type of wireless receiver. At the first Wireless Exhibition in London, great prominence was given to such sets, but owing to the immature state of broadcasting at the time, the public were not ready to take such instruments seriously or to look upon a wireless set as a part of the furnishing scheme of a room.

Subsequent Wireless Exhibitions showed a considerable diminution in the cabinet type of receiver, but now that we have arrived at the stage when everyone or nearly everyone knows that good reception is possible and that wireless receiving is not merely a scientific novelty, the woman's voice is heard in the discussion, and the male who pays has it strongly impressed upon him that the set must harmonise with the Jacobean or Carolean suite of Mr. Everyman's home.

* * *

INCIDENTALLY, Mr. Everyman can obtain his Jacobean wireless set on similar terms to his Jacobean dining-room suite; and even if it is not delivered in a plain van, his instalments can be spread over a very long period if desired. Speaking of the woman's point of view reminds me that not one woman in a hundred cares two pins for the reception of signals from anything else but the local station. For this reason I recommend those new to the art who are justifying considerable expenditure on a wireless set by the statement that it is so interesting for the wife and family when father is at the office, to remember that such promises of pleasures to come are not readily forgotten, and any interference with the set after dinner in an endeavour to pick up Rome or Madrid or some other station will be deeply resented. For this reason it is wise to keep one set for the family, always tuned to the local station and another for your own use. If you leave the family set alone and members of the family leave yours alone, everyone will get the maximum enjoyment out of radio.

* * *

A NUMBER of newspapers have given quite a considerable space to a description of what is alleged to be a new method of "broadcasting" over electric light wires. Actually the scheme in one form or another is quite old, and has been developed very extensively in America where the name of Maj.-Gen. Squier is intimately associated with the true "wired wireless" form. It is a comparatively simple matter to superimpose on the ordinary electric lighting currents, high-frequency currents, which can be tapped off where desired by any other

The latest in "portables" takes the form of a parasol which is claimed to receive broadcasting. Our picture shows two of the "parasol receivers" being used by Japanese film actresses for the reception of the Tokyo station.

This rather unusual photograph of an aeroplane was taken to show the position of the transmitter in the cockpit. The great difficulty associated with telephony transmissions from the air is the exclusion of extraneous noise, such as that from the exhaust.

The Week's Diary—*continued*

person to whose house the wires pass. In America the term "wired-wireless" has been given to this method, and indeed it has been given practical application in the case of electric power lines, telephonic speech by this method being imposed on the very high voltage lines carrying power from the generating stations to the points of use.

* * *

PRACTICAL difficulty in the application of the method, quite apart from financial consideration and the difficulty of collecting revenue to pay for the programmes, is that the average electric lighting system has so many disturbances in it that these obtrude themselves upon the ear of the listener. Mr. Chisholm, who is named as the inventor of some form of the system in this country, claims to have overcome these difficulties, but so far I have heard of no practical demonstrations, save on a private lighting system.

* * *

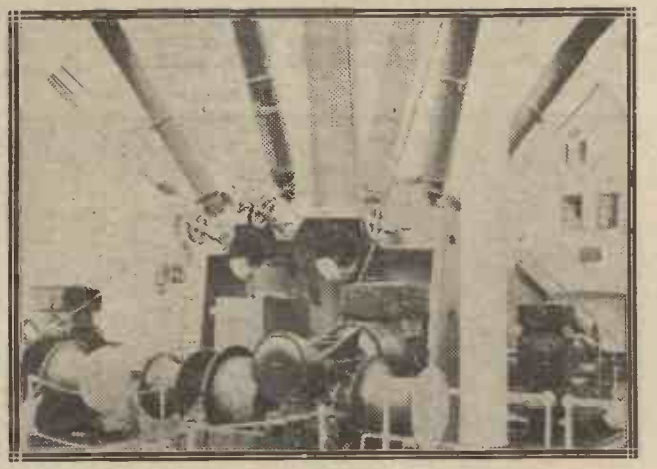
I SEE that it is announced that in connection with the new rearrangement of wavelengths in Europe, all broadcasting stations are to be equipped with a special electrical indicator, so designed that when the station departs from the wavelength allotted to it, warning will be given by means of a luminous signal. This sounds much too idealistic to be true, and implies that those in charge of the station, on seeing the variation of wavelength, immediately take steps to bring it back. It also assumes that they all know *how* to bring it back. And it further assumes that they *want* to bring it back. If they were all so conscientious about things, I don't think that we should have had the variations that we have had in the past, for surely these stations know that they are heterodyning one another.

* * *

MR. H. V. MORTON, who has just concluded a tour of rural England on behalf of the *Daily Express*, makes some interesting remarks on the effect of wireless on the countryside in his concluding article. "The intellectual isolation of the countryside is a thing of the past. The old-time cottager had only a dim perception of the great world beyond his narrow world; to-day the voices of Princes and politicians speak to him in his own cottage." In these circumstances, it is not surprising that so many people are pressing for an extension of the present news service sent out by the British Broadcasting Co.

Thousands never see a daily newspaper, and the weeklies, which have the biggest sale in the country, seem to aim at packing the maximum of crime into their sensational pages. On the other hand, of course, one must be careful not to interfere unduly with the entertainment side of the programmes, which, if a fuller service were given, might be seriously interfered with. In view of the fact that it is the country dweller who needs the service most (the town resident having ready access to the newspapers) an hour devoted to news in the late afternoon or early evening would appear to fill the bill.

The sound of the pipes at the Braemar Gathering was broadcast from the Aberdeen station.



A special music-distribution system has been installed by Messrs. Alfred Graham on the new motor liner "Carnarvon Castle." Groups of loud-speakers are placed at numerous vantage-points on the various decks.

* * *

A CERTAIN childishness seems to surround some of the attempts of the B.B.C. to avoid advertising commercial firms. For example, the other evening I listened to a sketch, the scene of which was laid in a "teashop, the name of which we must not mention." Obviously this arouses a certain curiosity, which was promptly satisfied a few moments later by one of the characters referring to the "Nippy." This rather reminded me of the talk given by Capt. Richard Twelvetrees a year or two ago when he had to use almost incredible mental gymnastics in order to avoid referring to a Ford car by name. In any case, if the B.B.C. are persistent in their non-advertising policy, why did they permit the word "Nippy" to be used? It added nothing to the artistry of the sketch, was quite unnecessary, and could easily have been replaced by a dozen other words.

* * *

THE transmission from Geneva of some of the proceedings at the League of Nations meeting was, as might have been anticipated, rather a fiasco. Apart from technical troubles due to imperfections of the land-line, the speakers themselves were not suited to broadcasting, and the material transmitted at the time was by no means inspiring. We are so accustomed to reading the intelligent summaries prepared by competent newspaper correspondents — summaries in which the grain has been very carefully selected from the chaff—that we are inclined to overlook the dreariness of the average political discussion.

All who are acquainted with the general tenor of the proceedings in the House of Commons, for example, know full well that if everything were broadcast the general opinion of the public on Parliamentary procedure would fall very rapidly. It may not occur to you that the snappy little summary to the effect that "Mr. ——, speaking yesterday in the House of Commons, stated that good progress was being made with the so-and-so scheme," may have been the only interesting point in a long speech.

FREE GIFT for Users of Sylverex

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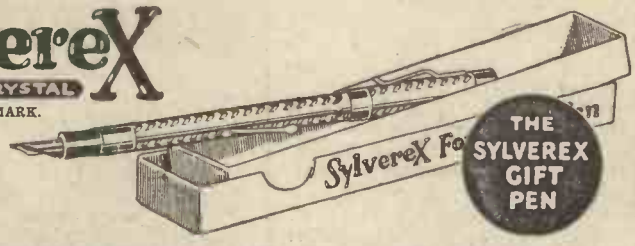
TRADE MARK.



Buy your "Sylverex" Crystal now and we will present you with a Free Gift of a "Sylverex" Fountain Pen. The "Sylverex" Fountain Pen is a well-made British production, self-filling, guaranteed and fitted with a 14-carat gold-plated nib good for long wear—a gift well worth having. Your Dealer will give you the pen when you buy a 2/- size Crystal or two 1/- test size boxes. If unobtainable at local Dealer's, send P.O. for 2/- direct, with Dealer's name and address, and the Crystal and "Sylverex" Pen will be sent you post free by return.

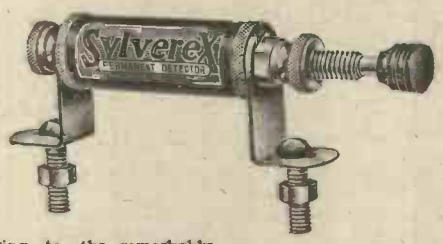
Read this user's letter:

Letters are continually reaching us testifying to the volume and sensitiveness of "Sylverex" Radio Crystals.

". . . Have been a valve user for nearly two years, but returning from holidays a few weeks ago had perforce to use a Crystal Set. I used a piece of 'Sylverex' which had been knocking about in my Wireless drawer, yet the shining little beggar performed splendidly . . ."
H. P——.

Test Size Per box with Catswhisker	Standard Size Per box with Catswhisker
1/-	2/-

A guaranteed Permanent Detector for 2/6



Owing to the remarkably low cost of the "Sylverex" Permanent Crystal Detector we are not presenting the Free "Sylverex" Pen with this Component. At the price of 2/6 the "Sylverex" Permanent Detector will give results fully equal to those sold at three times the price.

"Popular Wireless" reports as follows:—

"On test this Sylvex Component gave very good results indeed, and both in point of sensitivity and selectivity it proved to be equal, if not better, to any other we have had brought to our notice.

"It is a neat, well-made little article, and is most reasonably priced at 2/6 . . . the detector retains its sensitivity despite modern mechanical vibration and fairly heavy inputs."

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If out of stock locally, will be sent on receipt of P.O. for - - - **2/6**

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NO MORE EXPENSIVE HIGH TENSION RENEWALS!

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HIGH TENSION BATTERY ELIMINATORS

FIRST COST SAVED IN A SHORT TIME. A REFINEMENT AND CONVENIENCE BEYOND PRAISE.

Entirely dispenses with the use of high tension Dry Batteries or Accumulators, and provides a ready, convenient and cheaper method of high tension supply with greatly improved reception. Simply plug-in to the most convenient lampholder. Complete with Flexible Cord, Adapter, Switch and Flexible Cords for connections to Receiving Set.

DIRECT CURRENT MODEL
Approx. Voltage Tappings, 30, 50, 75, 90 and 120 volts.
£3 - 0 - 0

ALTERNATING CURRENT MODEL
Approx. Voltage Tappings 30, 60, 90 and 130 volts. Dual tappings are taken from each voltage, thus providing in all 8 separate tappings.
£5 - 10 - 0

Please state voltage and frequency when ordering. Constructors should send for full particulars of the "Goltone" Eliminator Constructional Kits.

EXTRACT FROM
"POPULAR WIRELESS"
Aug. 21st, 1926
"Laboratory Test Report"
"We have had one of these on test and it has given perfectly satisfactory results. Running costs are almost negligible and results equal to those given by battery supplies. We can fully recommend this 'Goltone' Product to our readers."

WHAT USERS SAY!

Mr. H., Market Street, Kirkby Stephen:—"We have had several which have given every satisfaction."
Mr. K., High Street, Church Stretton, Salop:—"We have tested same and congratulate you in having made an article which is much superior to others we have tried. We consider your Eliminator is quite as noiseless as the average H.T. Battery."
Mr. B., Littleborough:—"Have installed the 'Goltone' A. C. H. T. Battery Eliminator, and must say that it has exceeded expectations. It has not the slightest suggestion of hum or distortion of any kind, and is very satisfactory."
Mr. W. F. G., Longsight:—"I was delighted with the result, a beautiful tone, perfectly clear and no harshness, and at the same time I may as well tell you it is a great saving of expense."
R.C.L., Exmouth, writes:—"We have 3 of your units in use, and all are functioning O.K."
P.S., Westcliffe-on-Sea:—"On test I have found it far superior to dry batteries and the increase in volume and clarity is surprising."
M. & Co., London.—"The Eliminator that you supplied is giving our customer complete satisfaction."
S. & Co., London:—"I should like to say I find the Eliminator excellent, no hum whatever, and giving wonderful volume."

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CORRESPONDENCE

A New German Valve

SIR,—Respecting reports that have appeared in the Press recently on a new German wireless valve, which is claimed to incorporate three valves in one. It seems to me that this invention merely consists of a two or three-stage resistance capacity amplifier possessing the threefold disadvantage that it is contained in one evacuated bulb. The design to me seems so complicated that the manufacturing costs would appear to be considerably in excess of ordinary valves, and it is difficult to see how the device can cheapen broadcasting.

It must also be remembered that a serious objection must lay in the three filaments—the failure of any of which renders the whole valve and further, the whole set inoperative. As I understand it, the failure of a single filament really means constructing a new 3-valve set, or buying three new valves. I am loth to suggest that such an ingeniously designed valve is a pitfall to be avoided by wireless fans, but it does strike me that the scant information published conveys little to imbue the constructor with confidence.—Yours faithfully,

F. J. HURST.

Woodford Green, Essex.

Are We Behind?

SIR,—It seems a pity that the resourcefulness of our wireless inventors and manufacturers is not given the encouragement with which wireless is fostered in European countries.

Almost simultaneously with the opening of our first National Radio Exhibition, at Olympia, for example, when close upon two hundred exhibitors (a record number) are showing hundreds of intriguing devices, I read that the German railways have arranged for the time and foreign market reports and quotations to be picked up at fixed receiving stations and telephoned to catch the express trains for the benefit of the trades concerned.

One would like to imagine that any British railway would be as quick to apply the progress of science for the benefit of its patrons.—Yours faithfully,

W. J. KELLY, M.P.

House of Commons.

PROGRAMME JOTTINGS

(*Continued from page 200*)

evenings which have been so popular, and are presenting a New Zealand programme. Bournemouth and Manchester are sharing the same evening's music, and the former is taking the latter's transmission under the title of "Manchester calling."

Bournemouth is the more easily "tuned in" by London listeners, and the greetings between the two provincial stations will be worth some effort. Newcastle is presenting an "Autumn" programme, Aberdeen a play called "A Gentleman's Gentleman," and Glasgow are giving their listeners a light orchestral concert.

Light Opera for London

The 28th will see Londoners enjoying a light opera called "Young England," by Basil Hood; Birmingham will be having a "Bright and Breezy" evening, Manchester a concert party, and Aberdeen some light opera. London, on September 29, is going to the Far East for its programme—China. Birmingham is having a variety programme, Bournemouth an instrumental recital, Glasgow some French music, Aberdeen a Scottish programme, and Manchester is entertaining Mildred Dilling, America's greatest harpist. On the 30th London and all stations are having the same programme, which is a real "Star" one. The step by the B.B.C. of taking the Royal Albert Hall for a series of concerts is one which has been contemplated for some time, but which has been impossible of fulfilment. Now that it has been achieved we are to enjoy what is to be the first of the B.B.C. National Concerts. Be quite sure that your accumulators are all well charged!

London will herald October 1 with the Victor Olaf Sextette, Birmingham with popular classics, Cardiff with Irish music, Manchester with the opera "Maritana," and Edinburgh is relaying the Scottish Military Searchlight Tattoo as performed at Dreghorn Castle, near Edinburgh.

Saturday

Saturday, as usual, will bring jolly music, and London will have the "Radio Follies," Glasgow a Scottish programme, Aberdeen a light orchestral programme, and Manchester a few Madrigals of the Tudor period.

The "Star" event of the week is certainly the programme from the Royal Albert Hall, and that is one which should not on any account be missed.

COMING SOON

SPECIAL MYSTERY NUMBER WITH VALUABLE PRIZES :: FOR READERS ::

Fascinating "Popularity" Competition

Our Oct. 9 issue is the special "mystery" number, in which a fascinating feature appears in the form of a competition for which every reader can enter, with the possibility of winning a wonderful prize. Three prizes are offered, and the list forms the most attractive one ever offered in such a competition, including as it does three of the very latest instruments, each one complete and ready for use, and tested by our Elstree Laboratories.

FIRST PRIZE:

A specially-built and tested "Elstree Solodyne," the wonderful "one-knob" set described in the September number of *Modern Wireless*.

SECOND PRIZE:

A complete tested "Elstreflex Two," as described in this issue.

THIRD PRIZE:

A "Razor-Sharp" wavemeter, designed by Mr. J. H. Reyner, and described by him in a Radio Press Envelope now in the press.

ORDER EARLY!

SHOULD THERE BE AN AUDIENCE IN THE STUDIO?

(Continued from page 204).

phone is sitting there upon its pedestal. He complies with the technical requirements as to position and distance in relation to the "all hearing Mr. Mike," but his audience are of his own species, and from them he, of this I'm sure, would not for worlds be separated.

Let us then, as listeners, think not only of our point of view, but of that of the artist who entertains us. If he is happy, then our enjoyment of his performance will be the greater, for he will be the better entertainer for comfort in his environment.

Our concern is that the applause does not at any time "swamp" the artist's voice. Applause must be restrained to the necessary extent. That arrangement rests with the B.B.C., to whom listeners look for such adjustments.

COMPONENTS WE HAVE TRIED

Conducted by the "Wireless" Laboratories, Elstree.

Plugs and Jacks

WE have received several of their plugs and jacks from Messrs. Bowyer-Lowe, Ltd., for test.

The jacks are constructed on the girder principle, and the soldering tags to the spring contacts are set to either side so as to facilitate soldering connections to them. An excellent feature is applied in the method of fixing, which is of the usual one hole type. The bush itself is

The soldering tags on the Bowyer-Lowe jack are well spaced.

fixed, and a nut is employed to fasten this component on the panel. This obviates the need for any special spacing washers, and makes sure that the reach of the plug be correctly set, no matter what thickness panel is employed.

These jacks are made in various types both for single and double circuits and for filament control. They are robustly constructed and are efficient in use while the insulation between adjacent contacts was found to be infinity.

The plug for use with these jacks is constructed throughout of brass as regards the metal portion, while the fixing screws provided allow either of round tags or flexible wire being fastened. The insulated cover is highly polished, and the component has a neat appearance.

Emerald Wavemeter

WE have received an Emerald wavemeter for test and report from Messrs. Heath & Co., Ltd., of New Eltham.

This instrument is housed in a handsome mahogany box, clearly marked terminals being provided for connecting the batteries. The valve, which is carried within the wavemeter itself, is sunk below the panel so as to protect it from injury. The range of this instrument is from 200 to 600 metres, and two dials are provided, the main dial being divided in 50 metre divisions, and the smaller dial which is geared to the main dial, and actuated by the operating knob itself is divided into metre divisions. It is claimed that this instrument is accurate within one metre, and when checked against our standard instrument the largest discrepancy obtained was .67 of a metre.

The instrument is so designed that a variation in high-tension potential of five volts either side of the recommended value will not effect the calibration.

We can thoroughly recommend this wavemeter. It is simple to use, gives accurate results, and the workmanship of the whole instrument is exceedingly good. The price, including valve, is only £7 4s.

Safety Wander Plug

MESSRS. A. H. HUNT, LTD., have sent us one of their safety wander plugs for test. This wander plug consists of a small screw lamp holder which is provided with a plug fitting to enable it to be inserted in the usual high-tension battery. On the side is a small terminal under which the lead itself may be fixed. A small flash lamp screws into the holder and acts as a fuse, thus preventing the valve from burning out should a short take place.

When placed on test it was found that when this wander plug was placed in series with the H.T. lead, and the battery then shorted across a .06 valve, the

The Emerald wavemeter gives direct dial readings in metres.

safety lamp burnt out without the valve being damaged in any way.

This is a well-finished and useful accessory which commends itself to many amateurs as a simple means of protecting valves from being burnt out.

Grid Condenser

WE have received a grid condenser for test from Messrs. The Telegraph Condenser Co., Ltd.

This is similar in construction to their well-known components, a different terminal arrangement, however, being provided.

Instead of this component being provided with only two terminals, three are provided, which in conjunction with their grid-leak clips enables it to be used either for series or parallel arrangement of the grid-leak. Each condenser is accompanied by an explanatory leaflet showing how the desired connections can be obtained.

Rated at a capacity of .0002, its actual

(*Continued on next page.*)

COMPONENTS WE HAVE TRIED

(Continued from previous page)

value was found to be .000193, giving an accuracy within less than 5 per cent.

The arrangement provided widens the scope of this component which can, apart from its general utility, be recommended for its accuracy.

Safety Lead-In

MESSRS. PRESSLAND have sent us one of their safety lead-in tubes for test. This component is intended to provide a lightning arrester device which is permanently connected to earth, so that the disconnection of the aerial to the set, and the earthing of the set inside the room is thus made unnecessary.

The lead-in of the aerial is attached beneath a heavy terminal, fixed at one end of a length of brass screwed rod. This rod passes through the centre of a small brass ring to which an earth external to the building is connected. There is only a small gap between the screwed rod and this brass ring, so that in the event of a high static charge collecting on the aerial it is claimed that it will discharge straight to the earth across this gap rather than go through the set.

When placed on test it was found that the insulation resistance was infinity, while the capacity between the lead-in and the earth ring was found to be negligible. An insurance guarantee is supplied with each of these components under which damage to personal property or third party will be paid up to £100.

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