TIME CONTROL FOR RECEIVERS

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PRINCIPAL CONTENTS

WELL ILLUSTRATED

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SECRET WIRELESS

The photograph shows the receiving apparatus for use with the new secret system of broadcasting. Left to right: Mr. C. R. McVittie, Mr. P. J. Ford, M.P. (directors), and Mr. J. D. Chisholm, the inventor.

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QUEER NOISES!

WHEN any kind of continuous howling is heard the first step is to ascertain whether the sound originates in the receiver or whether it is due to a disturbance picked up by the aerial from an outside source. In order to test this the aerial tuning condenser or variometer should be slightly adjusted. If a regular series of impulses from outside are being received, giving rise to a howl or whistle of constant pitch, an adjustment of the aerial tuning will either increase or decrease the *intensity* of the sound, just as it would alter the volume of ordinary signals. No change will take place in the *pitch* of the note, however, for that depends entirely upon the nature of the disturbance. In such a case the trouble is almost certainly caused by some owner of a receiving set in the neighbourhood allowing his valves to oscillate, the set thus acting as a continuous-wave transmitter. Although interference from this cause may take the form of a continuous whistle, it usually rises and falls in pitch.

Oscillating Valves

When the howl does not come from outside it may be produced by a high-frequency or detecting valve oscillating. This is brought about as follows. On account of a certain degree of electromagnetic or electrostatic coupling between the grid and plate circuits of the valve in question, a portion of the energy in the output circuit is transferred back to the input, or grid circuit, and passes once more into the valve. This process is repeated, more energy being released from the high-tension battery and being supplied to the wave-trains leaving the valve. The result is that the wave-trains become longer and longer, and one train commences before the preceding one has died away.

When this takes place a continuous series of waves is produced, and the valve is said to be oscillating. Now, unless the grid circuit is exactly tuned to the wavelength of the incoming signals the oscillations from the valve will combine with the carrier-wave being received, giving rise to relatively low-frequency beats.

Coupling

The coupling between the valve plate and grid which causes the self-oscillation may be intentionally introduced by the reaction coil, in which case the obvious cure is to weaken the coupling. Sometimes, however, a set will oscillate when no reaction coupling is introduced, especially when more than one high-frequency valve

THERE are few owners of valve sets who have not at some time had their enjoyment impaired by howling or humming sounds in the headphones, the origin of which is often a puzzle to locate. This article describes how the trouble may be traced.

is employed. This is due to capacity coupling between the plate and grid circuits, which occurs in the valve itself, in the valve holder, or in the wiring of the set.

Go very carefully over the wiring of the receiver and space all wires carrying high-frequency currents as widely as possible. Then, if tuned-anode or tuned-transformer intervalve coupling is employed, the capacity of the tuning condenser should be increased, the size of the anode coil being correspondingly reduced.

Filament rheostats should be connected in the *positive* lead, and the earthed end of the aerial circuit taken to the *positive* low-tension terminal. Separate valve legs should be employed in place of ebonite valve holders, and where two or more stages of high-frequency amplification are employed, specail anti-capacity valves should be used. A reversed reaction coil will sometimes be necessary in a very unstable circuit, but where several high-frequency stages are required some special type of circuit, such as the neutrodyne, is to be recommended. Some types of valve are very sensitive to changes in plate voltage, and a slight reduction of the high-tension is sometimes all that is necessary.

L.F. Howls

Continuous howling may also be set up on the low-frequency side of a set, and when this occurs no alteration of the controls will change the pitch of the note.

The fault may be due to a badly designed or wrongly connected low-frequency transformer. A condenser of .001 microfarad capacity connected in parallel with one winding will sometimes set matters right, as may also a reversal of the connections to one winding.

Reaction may be introduced through a low-frequency, just as through a high-frequency valve, and the result is always a howl. Such reaction can be introduced by magnetic coupling between two low-frequency transformers, which should always be mounted with their magnetic axes at right-angles to one another.

Where tuned-anode coupling is employed after the dual valve in a reflex circuit employing a valve detector, the voltage impulses set up across telephones connected in series with the anode coil may get passed on to the next valve, the ultimate result being a low-frequency howl. To overcome this a condenser of .0003 microfarad capacity should be inserted in the lead from the anode coil of the dual valve to the following grid condenser, and a high-frequency choke-coil connected from the junction between the two condensers to one of the filament leads.

Reflex Receivers

Some reflex sets are dependent for stability upon the damping introduced by a crystal detector, and will howl if the crystal and catwhisker become separated.

Another cause of howling is a grid leak of unsuitable value. If the resistance of a grid leak is much too high, signals will fade away and only be restored when there is a sufficient pause in the incoming wave-trains to allow the accumulated negative charge on the valve grid to drain away. As the resistance of the leak is reduced the rapidity of the fading is increased until the signals are coming in surges, occurring so rapidly that a continuous howl is produced.

Sometimes a very low hum is heard in the phones, which is absolutely independent of any tuning operations. This is probably due to interference received from neighbouring power lines carrying alternating current. If the source of the trouble is an overhead wire running near the aerial the latter should be removed as far as possible from the power line and be run at right angles to it. Loose-coupled aerial tuning should be employed if the interference is persistent.

Humming may sometimes be introduced into a receiver by the presence in the same room of alternating-current electric-lighting wires. In this case the cure is to move the set as far from the wires as possible, and, if necessary, mount the set in a metal-lined box.

C. E. F.

WHAT YOU SHOULD KNOW ABOUT THE ACCUMULATOR

SINCE the advent of broadcasting, the accumulator has come into prominence, but it is not always understood, with the result that the efficiency and length of life is appreciably decreased.

Construction

Commencing with the construction of the type of accumulator usually required to heat the filament of the valve, the case, it will be observed, is constructed of celluloid, glass or ebonite, and is divided into compartments, according to the total voltage derived from the accumulator, each cell yielding two volts.

When the negative terminal of one cell is connected to the positive terminal of the adjoining cell, the cells are connected in series, and although the amperage remains constant, the volts will be increased to four, plus two for every cell connected in this manner. If the two positive terminals are connected together and the negatives connected together, the cells are connected in parallel, and in this case the voltage remains two, although the amperage is doubled. In the case of two cells thus connected, every further cell added increases the total amperage to the extent of the sum of the amperage of each cell.

Frothing

Glass and ebonite cases possess the advantage of preventing the frothing of acid out of the vents, although celluloid cases are lighter and are easier to repair. Repairs of celluloid cases are effected with a small piece of celluloid gummed over the leak—the cell being in a dry state—with amyl acetate or acetone. The latter possesses the quality of drying quickly, although the work must be warmed, otherwise a whitish appearance will form when the acetone is dry; another method consists of dissolving small pieces of celluloid in either of the above liquids until the composition has the consistency of jelly, and pasting this in the hole.

The case contains sets of plates, there being two sets of plates to each cell, one set positive, the other negative. These plates are constructed of lead in the form of a grid. The positive plates are pasted with a composition of red-lead and sulphuric acid, the negative plates with litharge and sulphuric acid.

The positive plates are a chocolate colour and the negative plates are grey. The number of plates per cell is governed by the discharge capacity required of the accumulator, the greater the number of plates the greater the discharge capacity; this depending also upon the area of the plates. The plates are attached to a lead bar with a lug and a terminal for the connection to be made. Each set of positive and negative plates are separated with pieces of celluloid, ebonite or wood between each plate to prevent the plates from short-circuiting.

Functioning

When an accumulator is to be charged it is connected to a suitable source of electrical power with a suitable resistance connected in the circuit to enable the correct amount of current to flow, the voltage of the source having little to do with the actual charging, providing it is higher than the total voltage of the accumulators to be charged.

An accumulator when new is filled with dilute brimstone sulphuric acid of a specific gravity of about 1.200. When the charge commences the positive plates are converted to peroxide and the negative plates to pure lead. The electrolyte becomes ionised and positively charged hydrogen atoms are attracted to the negative plates. Oxygen atoms obtain a negative charge and are attracted to the positive plates. When the charge is completed bubbles rise to the top of the liquid and the voltage of each cell rises to 2.5. If the specific gravity is tested with the aid of a hydrometer it will be noticed that the acid has increased in density.

When the accumulator is connected to the wireless set and the valves are switched on, a reversal of the process takes place, the acid density falling to normal as the discharge continues. After a certain amount of discharge has taken place the voltage will commence to drop, although if the accumulator is given a comparatively short rest the voltmeter will still register 2 volts per cell. However, if the accumulator is again subjected to discharge, the voltmeter being placed across the terminals, the reading will drop below 2 volts as the discharge continues until no more signals are audible. The readings will probably be in the neighbourhood of 1.8 volts per cell, and then it is imperative that the accumulator should be charged without much delay, as sulphation is liable to take place.

General Treatment

A fault common to many makes of accumulator after some use is the frothing of acid, mentioned above; this occurs while the accumulator is being charged, and is caused by the action of the acid on the celluloid. If mild frothing occurs it can often be remedied by the addition of a little sulphate of soda. Another method is to have the accumulator charged with water in place of the acid, repeating the charge with a fresh quantity, distilled, if necessary, and charging again after a short discharge with sulphuric acid of a specific gravity of not more than 1.200.

If an accumulator is charged or discharged at a high rate it will be observed after some time that the paste from the plates, mostly positive, will have become dislodged and will fall to the bottom of the cells. This would be responsible for a partial short circuit of the plates.

Sulphation

As previously mentioned, if an accumulator is discharged below the safety limit (1.8 volts per cell), it is liable to sulphate. Sulphation of the plates, mostly the negative, takes the form of a white coating. It will render an accumulator useless if allowed to get in an advanced state, although if the sulphation is slight it can often be completely cured by clarifying the acid and allowing the accumulator to have a long charge at a slow rate. Another method is to charge at a reversed polarity for a short time, this charge being followed by a long slow charge of correct polarity.

Another cause of sulphation is when the accumulator has been left over a long period without being charged, or if the specific gravity of the acid is low, or if the acid level is below the tops of the plates.

Purchase and Maintenance

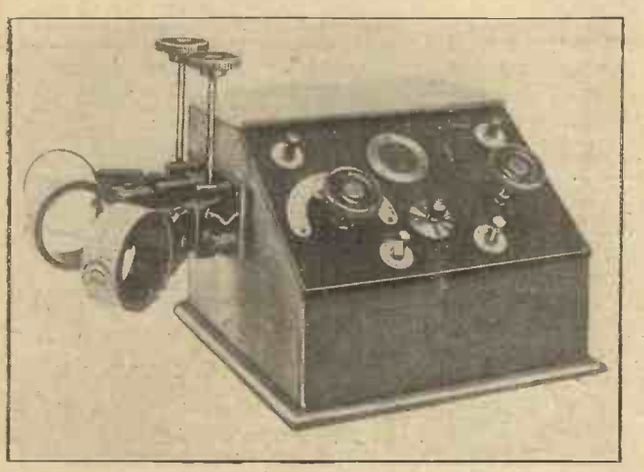
A few words on the purchase of an accumulator will not be amiss. Many firms advertise their accumulators by the ignition-capacity rating. This is very misleading, as the ignition-capacity rating is twice the continuous-discharge rating, and does not concern the valve user.

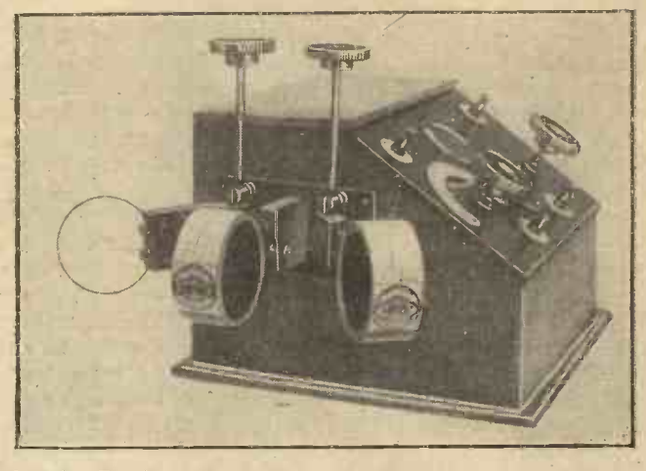
Before purchasing an accumulator it is advisable to consider carefully to what discharge the accumulator will be subjected. For example, if the present set is a one-valve set and it is unlikely that other valves will be added, a 4-volt 20-ampere (actual) accumulator would be suitable, although if it is likely that another valve will be added it will be advisable to purchase a 4- or 6-volt accumulator of at least 30 amperes (actual) capacity. A good maxim is to never discharge the accumulator at a higher rate than one-tenth of the continuous-discharge capacity.

It is necessary if the utmost efficiency of the accumulator is to be maintained that it be well looked after. Always smear a little vaseline on the terminals and bushes and keep the tops of the cells clean and dry.

H. J. H.

AN "ALL-IN" ONE-VALVER





Two Views of the "All-in" Single-valve Receiver.

A SPECIAL feature of the receiver described below is that both the high- and low-tension batteries are completely hidden from view in the specially-shaped case. They are all easily accessible, and can be inspected at any time by raising the small lid at the rear. The untidy appearance of the usual outside batteries and connecting wires is thus obviated, and at the same time the cells are protected from possible damage. A straight one-valve circuit as shown in Fig. 1 is used in the set, but other one-valve circuits may be easily adopted if preferred. By fitting a three-coil holder the set may be wired up to have a single circuit tuner, a loose-coupled tuner, or alternatively, as shown in the photographs, a ring of copper wire may be fixed into the third holder to act as a vernier tuning device.

Components

Below is given a list of components required for the construction of the set:

One oak or mahogany case of the dimensions shown in Fig. 2; one .0005-microfarad variable condenser (one-hole fixing) (this may with advantage be fitted with vernier); one Microstat filament resistance; one Aermonic valve holder (it should be noted that the photograph of the back of the panel shows a different method of valve mounting, which has now been altered to that shown in the drawings); one Dubilier fixed condenser, .002 microfarad; one Dubilier fixed condenser, .0003 microfarad; one valve window; one variable grid leak (Watmel); one dozen terminals (these may be of the Belling-Lee marked type, or ivorine tabs may be used for naming as follows: aerial, earth, phones, phones, H.T. +, H.T. —, L.T. +, L.T. —, and four blanks for reaction- and tuning-coil connections); one ebonite panel, 9 in. by 7 in. by $\frac{3}{16}$ in. thick (this should preferably be of the specially surfaced guaranteed type); four screws for fixing panel to box; one 180-degree ivorine scale for variable condenser; one pointer; 3 yd. No. 18 square tinned-copper wire for wiring up; one two-coil holder, preferably of the vernier type suitable for fixing to the box side.

Details of the panel drilling are given in Fig. 3. The sizes or positions for the valve window or condenser scale holes are not given, as these will depend on the individual components obtained. After drilling the ebonite, a thorough cleaning of the surfaces—unless the material is of the guaranteed type—must be carried out. This operation is most essential for good results. Emery-cloth of medium grade should be used for the first rubbing, followed by cloth of the FF grade. A pleasing matt finish may finally be given by smearing the panel with vaseline or machine oil, afterwards removing the excess oil with a clean dry rag.

Fig. 4 shows the position of the various components on the back of the panel, together with the wiring details; it should be noted that the eight terminals for the battery and coil connections are fixed on the inner side of the panel, so that they are hidden from view when the lid of the box is closed.

Using the Set

To test the instrument with a

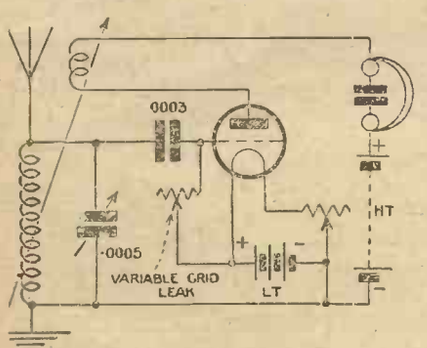
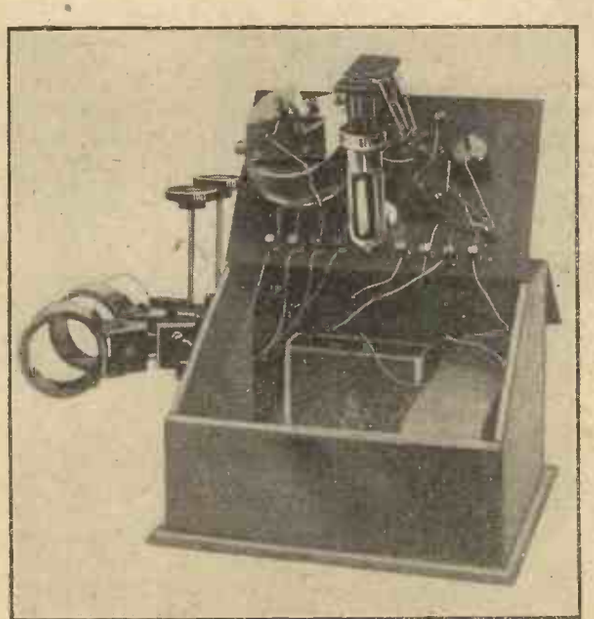


Fig. 1.—Circuit Diagram.



View of Interior.

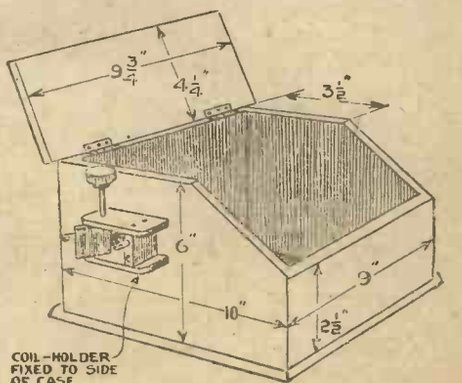


Fig. 2.—Details of Case.

standard 100-ft. aerial on broadcast wavelengths, a No. 35 coil should be plugged into the aerial tuning coil holder and a No. 50 in the reaction coil holder, the batteries, aerial, earth and phone connected up, and a valve suitable for detection placed in the valve holder. The L.T. current is then turned on until the valve lights up, and with the phones over the ears the tuning condenser manipulated until signals are heard.

The reaction coil may then be moved slowly towards the aerial coil, and if the connections have been correctly made a considerable increase in the strength of signals will result. Great care should, however, be used in carrying out this operation in order not to cause oscillation. If no increase in signal strength is obtained on bringing the coils together, the connecting wire to one of the coils should be reversed.

Exceedingly fine tuning control may be obtained by fitting a ring of copper wire into a third coil holder as shown in the photographs; carefully moving the metal ring nearer to or away from the coil gives a vernier control very useful when tuning in distant transmissions.

As regards the batteries, these may be of any make or size, providing they can be accommodated in the case.

Where, however, the set is to be used for several hours every day the use of a miniature accumulator, such as is supplied for driving model electric motors, is advisable for filament heating. For intermittent use, however, a dry battery of the box type will also be found quite satisfactory.

The H.T. may conveniently consist of nine or twelve ordinary 3-cell flash-lamp batteries soldered together in series.

Any really good make of .06 valve will give excellent results in the set. R. N. W.

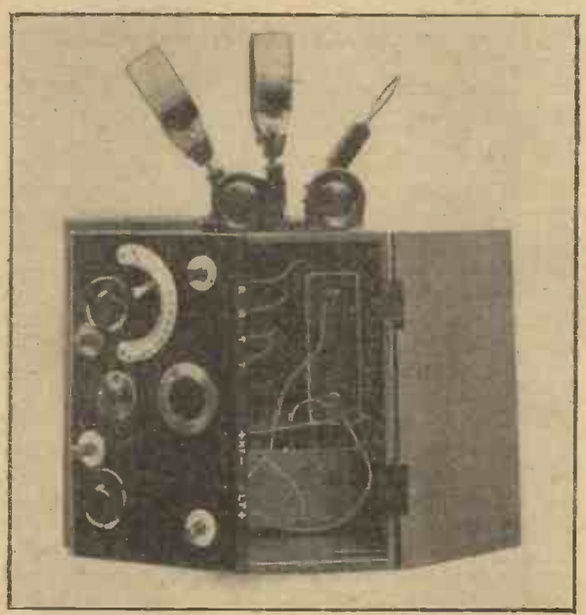
SEQUENCE IN WIRING

THERE is a proper way of doing everything, and this applies as much to the wiring of a receiver as to anything else. When you wire up a set do so in a systematic way. A little trouble taken at this stage will amply repay you by the improved results you will obtain.

Use the thickest wire you can obtain; whether it is of round or square section is a matter of personal preference. Whatever kind of wire you use, however, it is essential that you should keep all leads as short as possible; do not let them wander about like a clump of tangled weeds. As far as possible let all wires cross one another at right angles, as by so doing capacity will be kept at a minimum. Start with the grid circuits, making the leads as short and direct as possible. Do not worry about making elaborate right-angle bends. They may look very nice, but what you want are the shortest possible leads from point to point.

Having wired the grid circuits, proceed with the anode or plate circuits, again keeping all the leads as short as possible and not making elaborate bends merely for the sake of appearance. Keep the anode leads as far away as possible from the grid leads and make them cross at wide angles.

Finally, the filament circuits should be wired. These leads should be kept a good distance away from the high-frequency (grid and anode circuit) leads, even at the expense of using greater lengths of wire. G. W.



The "All-in" One-valver on End showing Position of Tuner.

THE B.B.C. LISTENS-IN

WITH a view to detecting oscillators, a receiving station, to be established by the B.B.C. near Bromley, Kent, will begin operations in a few weeks.

The station is being equipped with direction-finding apparatus, which will enable the engineers to trace any offender. This Central Listening Station will be able to pick up any British or Continental station, as well as KDKA, the Pittsburgh station in the United States, so that any item could be relayed at a moment's notice.

By means of the receiver it is hoped to keep a check on the wavelengths and transmissions of all the B.B.C. stations.

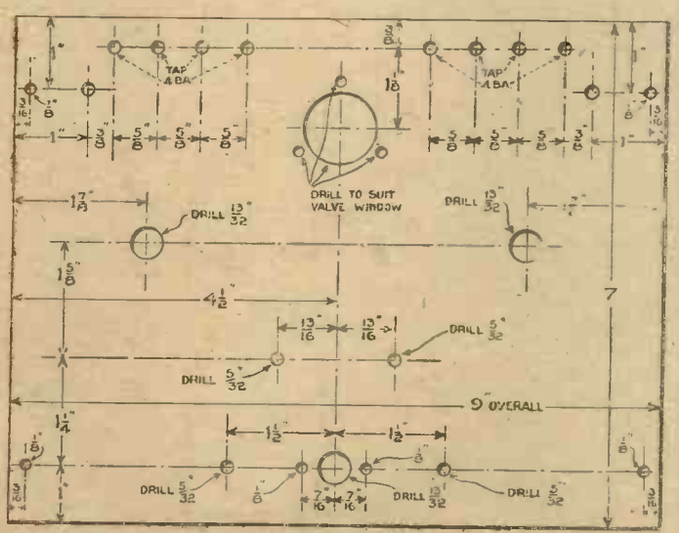


Fig. 3.—Layout of Panel.

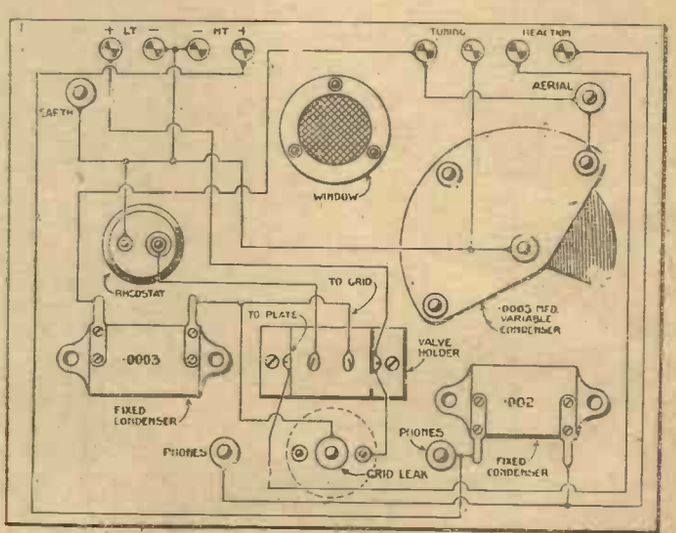


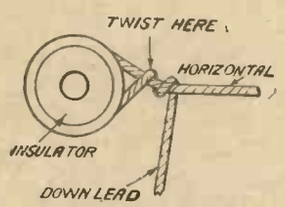
Fig. 4.—Wiring Diagram.

PRACTICAL ODDS AND ENDS

Connecting the Lead-in

IT is necessary, when erecting an aerial, to ensure good contact between the lead-in wire and the aerial itself. Soldered joints are of great advantage.

A much simpler method, however, is to make the aerial and lead-in in one piece, and thus to do away with any joints in



Connecting the Lead-in.

the aerial circuit. The wire is attached to the insulator by twisting, as shown in the diagram, and the lead-in is brought straight down to the aerial terminal of the set, care being taken that it does not touch any earthed body.

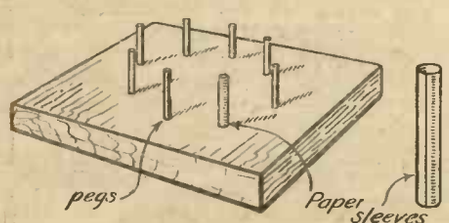
An aerial thus erected will have a much greater mechanical strength owing to the absence of a joint, and the electrical resistance will also be decreased.

F. W. R.

Winding Honeycomb Coils

THOSE amateurs who wind their own basket or honeycomb coils, and use a block with pegs permanently fixed, as in the diagram, will often find that they scrape the insulation from the wire when they endeavour to remove the finished coil from the former.

This can be overcome by winding little paper sleeves over the wooden pegs. When the coil is fully wound the papers



A Coil-winding Tip.

come off with the wire they protect that from the wood. These sleeves can be made from very thin paper about 1½ in. wide and the same length as the peg. The sleeves must be fitted loosely to the pegs and the edge fixed so that there is no tendency to bind when the wire is wound on

F. C. L.

Preventing Twisted Leads

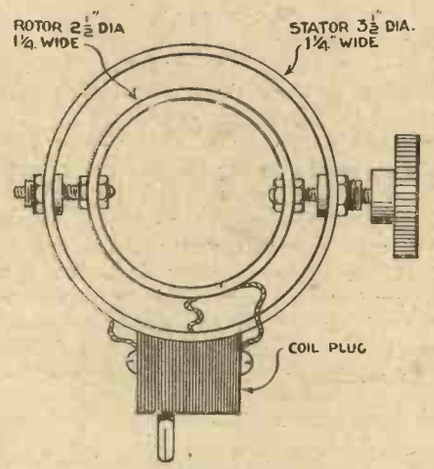
WHEN long leads are used with headphones there is a marked tendency for these wires to twist or kink. This can be overcome by slipping a length of rubber tubing over the leads and fastening by means of rubber bands.

F, C.

A Tip for Tuning-in

THE coil described below will be found very efficient and, as the construction is simple, will be suitable for owners of crystal sets who desire to get the utmost volume from the local station.

The outside coil, or "stator," should have twelve turns of No. 26 gauge d.c.c. wire wound on each side. The same number of turns should also be wound



An Efficient Tuner.

on the inner rotating coil. Connect the beginning of the stator to the end of the rotor, and connect the two free ends of wire to the terminals on the set. The complete variometer can then be plugged in across the aerial terminals of the set.

The dimensions of both rotor and stator are shown in the diagram.

E. J. S.

Lacquering Terminals

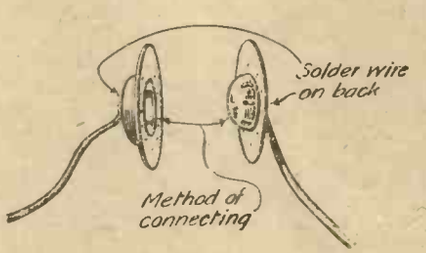
AN easy way to keep the terminals on the set polished and bright is to lacquer them with ordinary shellac varnish, such as is sold for electrical purposes. The varnish should, however, be diluted before use or it will spoil the appearance of the metal when dry. If a small quantity of varnish is thinned with about six times its volume of pure methylated spirit, a clear lacquer for terminals will result.

M. B.

A Wiring Hint

THE diagram shows a simple method of connecting up the batteries and other outside components to an experimental receiver.

Tinned dress fasteners, such as can be bought at any draper's, are soldered on



A Wiring Tip.

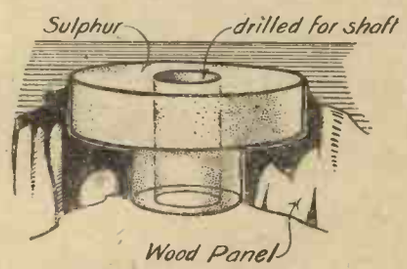
to the end of the wires to be connected, and contact can be made whenever necessary by pressing one fastener into another.

Many other uses will be found for these handy connectors, such as a means for tapping coils or adding extra pairs of phones to a set. It should be noted, however, that certain kinds of fasteners are covered with a thick covering of black enamel, and this should be removed before the fasteners are used. Plain tinned fasteners without the enamel covering can, however, be obtained.

S. P.

Insulating a Wooden Panel

WHEN it is desired to use a wooden panel instead of ebonite or glass the difficulty of insulation and prevention of leakage can be overcome by boring a large hole in the panel and filling this with melted sulphur. When the sulphur has



Insulating Wooden Panels.

hardened a hole is bored through it, large enough to take the shaft of the instrument. Similar holes should be made and filled in the panel to take the screws which hold the instrument in place.

L. F.

The Complete Condenser.

BUILDING A LOW-LOSS CONDENSER

THE chief characteristics of an efficient low-loss tuning condenser are (1) small mass of solid dielectric insulating the moving and fixed vanes, (2) even spacing of the vanes, and (3) absence of moving contacts.

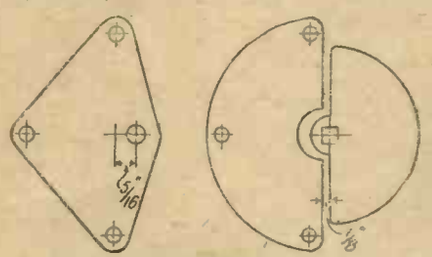


Fig. 1.—Arrangement of Plates.

In the instrument here described the first point is met by using 3/16-in. ebonite ends instead of the usual 1/4-in., thereby reducing the mass of the dielectric by 25 per cent. (2) By using fairly wide spacing with ample means of adjustment, and taking special precautions to ensure that the end plates are square with one another. (3) By making contact with the moving vanes by means of a pig-tail.

In addition to the above, a very simple device is introduced which greatly decreases the minimum capacity value of the condenser without materially affecting its maximum capacity. This advantage gives considerably increased tuning range with any given coil. For instance, it enables a fifteen-plate condenser to tune all the short-wave B.B.C. stations from Bradford at 310 to Aberdeen at 495 metres on a 75 or 50 coil, according to whether the tuning arrangement is auto-coupled or direct-coupled to the aerial system (always providing the aerial is of normal proportions and capacity).

Minimum Capacity

The method of achieving this is to plot the centre of the moving vanes' spindle 1/8 in. from the usual centre. When the moving vanes are right out they stand 1/8 in. away from the fixed vanes instead of in line with them, as in the case of a standard condenser (see Fig. 1). This arrangement also has the effect of causing the moving vanes to enter between the fixed vanes in such a manner that the tips approach first and the centre part does not begin to enter until the condenser is "half in.". This has the effect of straightening the capacity curve of the condenser to a very considerable degree. The condenser may in fact be considered to be in the square-law category, although quite standard vanes are used.

Fig. 2 is the tuning curve of a set fitted with the condenser and using a 75 coil with an aperiodic aerial coupling of 18 turns. Fig. 1 also shows a scale drawing of the end-plates used. Naturally in making these great care must be taken to ensure that the positions for the holes are plotted accurately. Further, the holes of the lower plate must be drilled dead true. Unless these precautions are taken it is unlikely that the vanes will be evenly spaced and the two sections properly parallel with each other. The upper-end plate is screwed down to cause just sufficient friction to give the moving vanes a steady movement. The bearings can be oiled after the pig-tail has been soldered in place. The necessary adjustment of the vanes is effected by moving the fixed members on the three supports.

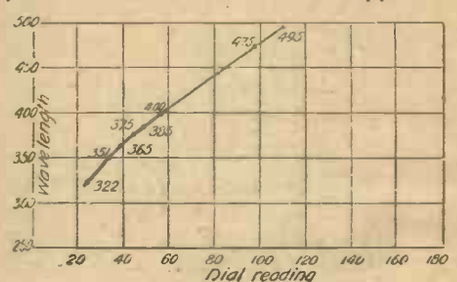


Fig. 2.—Example of Tuning Curve.

The complete instrument is shown in the photograph. D. G. O. H.

A LONG-WAVE TUNING HINT

MANY crystal enthusiasts use a loading coil in series with the A.T.I. for tuning up to Paris and other stations on high wavelengths.

When the short-wave inductance is of the tapped-coil type this is a very good plan, as a loading coil tuning approximately to the high wavelength may be used, fine adjustment being made on the tapped coil.

If a variometer is used for short waves it may so happen that its range is not sufficient to cover the adjustment needed for the loading coil. In this case it will be necessary to add a variable condenser in parallel with the long-wave coil. B.

Many German stations have organised opera companies, which perform in miniature opera houses with full orchestras and accessories.

GRID-CIRCUIT CONNECTIONS

GENERALLY speaking, the grid leak of a detector valve in modern circuit diagrams is connected to the L.T. +, although about a year ago the tendency was to connect the grid return lead to the L.T. −.

When building a receiver both connections should be tried. It is surprising the increase one gets with one particular method over the other. This, of course, has nothing really to do with the actual circuit employed, but depends on the type of valve in use.

It has been found that soft valves work best with the grid return lead connected to the L.T. −, hard valves being the reverse of this. S. J. M.

Radio-Lyon (France) has reduced its wavelength to 280 metres.

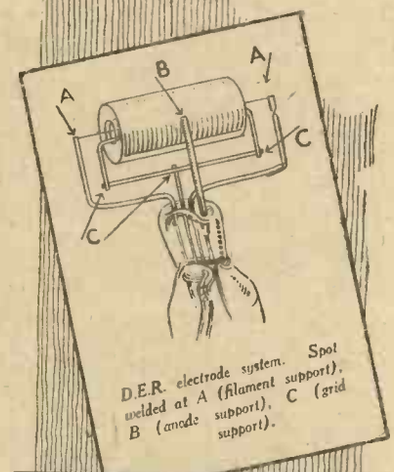
FIXING PANEL TRANSFERS

SEPARATE the transfer as usual from the stiff paper backing and hold it firmly in position on the panel. Moisten a soft-hair brush with methylated spirit and brush over the back of the transfer, working the brush with moderate pressure from the centre of the transfer outwards to the edges and ends.

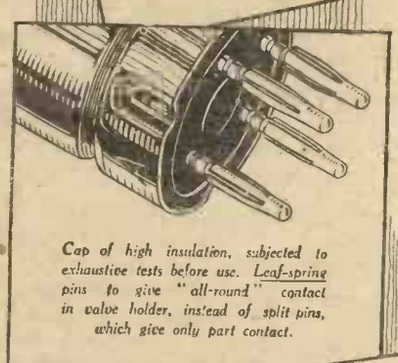
Go over the transfer again once or twice, with the brush squeezed dry, in order to smooth out air bubbles and to remove surplus spirit. Allow to dry, which only takes a few seconds. Then moisten the transfer with a little water and draw off the tissue paper. This is much more expeditious and easy than the hot-pad method. A. G. H.

The Duke of Sutherland is now president of the Radio Association.

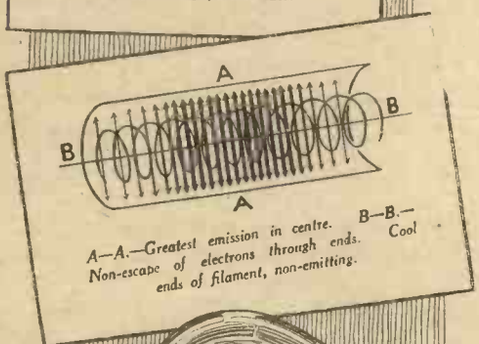
Get the *best* out of your set!



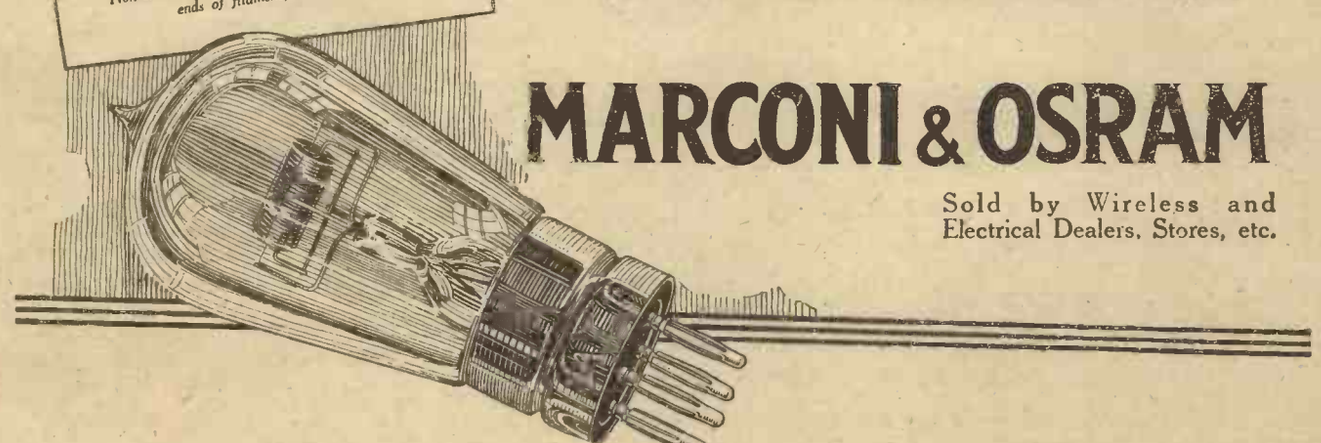
D.E.R. electrode system. Spot welded at A (filament support), B (anode support), C (grid support).



Cap of high insulation, subjected to exhaustive tests before use. Leaf-spring pins to give "all-round" contact in valve holder, instead of split pins, which give only part contact.



A—A.—Greatest emission in centre. B—B.—Cool Non-escape of electrons through ends. ends of filament, non-emitting.



The electrode system which is efficient for one type of valve is not necessarily suitable for other types. To be efficient a valve must be designed with definite reference to the conditions under which it will be used.

TYPE D.E.R.

This was the ***first dull emitter*** on the British market. To-day, as when it was introduced, it is accepted as the standard of efficiency for 2-volt general purpose dull emitter valves.

OUTSTANDING FEATURES:—

ELECTRODE SYSTEM

Of horizontal arrangement. This makes for the minimum leverage and the least possibility of displacement.

PLATE

The maximum emission is obtained where it is most needed (*i.e.* in the centre). The ends of the filament are cool and non-emitting; there is, therefore, no tendency of the electrons to escape.

LOW CURRENT CONSUMPTION

Emission from type D.E.R. (operating at a dull red heat) equals that from a bright emitter consuming up to four times the current.

FILAMENT IMPREGNATED THROUGHOUT

The high emission of Type D.E.R. is not dependent on an outer coating which may rapidly wear away. *The active material permeates the whole of the filament.*

REDUCED PRICE 14/-

BUY THE VALVES BACKED BY THE NAMES

MARCONI & OSRAM

Sold by Wireless and Electrical Dealers, Stores, etc.

On Your Wavelength!

Bottled Wireless

ONE or two newspapers made quite a fuss a week or so ago over what they described as "bottled wireless" or something of that kind. It appears that a system has been developed whereby wireless transmissions can be recorded upon a very fine steel wire and kept indefinitely for retransmission as and when required. A picture was drawn of the pleasure that we should derive from hearing American programmes transmitted from our own stations with the help of this system. The wire with the programme impressed upon it would be shipped to this country and then used for retransmission from the B.B.C. stations. Against this I have only two things to say. The first is that there is no joy in hearing a distant transmission unless you receive it either direct or relayed simultaneously. The second is that the average American programme is not nearly so good as our own. There might be a novelty in hearing "bottled wireless" once or possibly twice, but that, I think, would be the end of it. The description of the process is not very clear, but the suggestion is that the wire is drawn between the poles of magnets whose windings receive current modulated by means of a microphone. The field thus varies with the modulation, and the steel wire as it passes between the poles is permanently magnetised to a degree corresponding to the ups and downs of the modulation. For transmitting purposes the magnetised wire is drawn through an electric field in which it sets up variations which will reproduce the original sounds. There seems to be a good deal in the idea, but what, after all, is the matter with the gramophone if you want "bottled" speech or music?

Those Breakdowns

Both 2 L O and 5 X X have been rather unlucky recently in the matter of breakdowns. Of course these things cannot be helped, though all kinds of people rise up in their wrath when they occur and demand that steps shall be taken at once to ensure that nothing of the kind can ever happen again. I would like to take such people to spend just one evening in the transmitting portion of any main or relay station so that they might see for themselves something of the intricacy of the "works." A little time spent in studying the wiring of the S.B. switchboard at 2 L O might lead them to wonder, not that breakdowns occasionally happen, but that any programme should ever be got through without something or other going up in a blue flame. Even our own little receiving sets give a bit of trouble at times—and we do not always manage to repair the breakdown in the half-hour or so, which is about the B.B.C.'s maximum time for dealing with these contretemps. Have you never spent two or three hectic hours with screwdriver, pliers and soldering-iron, only to find at the end of your exertions that the set would have worked better if you had connected up the aerial in the first place? You have? So have I.

An Interesting Record

Last year I kept a record of the effects of advancing summer upon my reception. This year I am doing the same thing, and up to date I find that the two agree pretty well. My own belief is that the reception of broadcasting is influenced to a very great extent by the growth of vegetation as summer draws on. On the north side of my aerial, and only about 10 yds. from it, is a tall narrow tree—it does not belong to me or it would have fed the winter fires long since. When this tree is bare and sapless my reception of northern stations is quite good, and it goes on being respectable in spite of longer daylight hours in the early part of the summer. But as soon as the buds begin to burst into leaf these stations start to fade out and they finally disappear when the tree is in full foliage.

A big tree may make an almost as effective screen as a slag heap containing large quantities of metal. We must not forget, too, that a similar effect occurs when our aerials are suspended above bushes and so on. As these become covered with juicy leaves and filled with sap they are "earthed" right up to their topmost twigs. The result is that since the earth is raised, so to speak, by this means, the effective height of our aerials is reduced, and our range and signal strength suffer accordingly. You may also find that there is a slight difference in your winter and your summer tuning, for when the effective height of your aerial is reduced, its capacity is increased.

Why, Oh Why?

I have never been able to understand the affection that some manufacturers show for the odd B.A. sizes. The average constructor uses only one size of screw, No. 4. He possesses a No. 34 drill, which makes the tapping hole for this size, and a No. 26, which makes the proper clearance hole. If he has a tap at all it is, or should be, a 4 B.A. second cut. Just the other day a well-known condenser firm sent me their latest list, in which I find the statement that the fixing holes for all their condensers are for 5 B.A. screws. I really cannot understand this, for it is just as easy for them to make the holes 4 B.A. as 5 B.A., though it is not at all a simple business for the amateur to enlarge holes in moulded ebonite once they are made. You can do it with a bench drill, but with a hand drill you are very likely to split the material. You can buy 4 B.A. screws at any wireless shop, but No. 5 is a size that you may have some difficulty in getting—in small towns or villages at any rate. I would like to see (and I am sure that the majority of constructors will endorse my remarks) the 4 B.A. screw made standard for all wireless parts except for very small ones, in which considerations of space make a smaller size desirable. In this case No. 6 B.A. could be used.

Crystal Efficiency

I am doing some very interesting experiments just now with a view to exploring the possibilities of a really well-designed crystal set. The average crystal set when examined critically is a very inefficient concern. I have long had an idea that both the range and the signal strength normally obtained could be very much increased if the problem were tackled in the proper way. I am rather well situated for making experiments of this kind, since my aerial is by force of circumstances a thoroughly bad one. 2 L O, the nearest main station, is twenty-five miles from me as the waves waggle, and with a crystal set made on standard lines his signals are usually so weak that it is not possible to hear speech distinctly enough to be able to follow it. I have been able already to bring in the London station up to such strength that speech is quite clearly heard, and I hope before long to have still better results to report. In experimenting with crystal sets one has to beware of the freak results which occasionally occur and which are due in the majority of cases, I believe, to re-radiation from a neighbouring aerial in connection with which a valve set is being worked near the oscillating point. If, for example, a neighbour of yours tunes his valve set to a distant station and pushes reaction so that his set, though not actually howling, is oscillating to a slight extent, you with a crystal set tuned to the same wavelength will very likely hear the signal. As everyone has neighbours, and as most of them (or at any rate most of mine) let their sets oscillate at times, it is not safe to count big strength as having been obtained with a crystal unless you can reproduce it whenever you tune in.

A Frame Aerial Point

Some people, by the way, have an idea that so long as you use a frame aerial you cannot cause interference during experi-

On Your Wavelength! (continued)

ments, no matter to what extent the set is allowed to oscillate. This is entirely wrong, as I know from bitter experience. A neighbour has rigged up a super-heterodyne which he uses in conjunction with a frame. He has not yet become very skilful in operating it, and he causes a good deal of interference by oscillation. On some stations it is much worse than on others, and I imagine that this is due to the fact that he has to turn his frame owing to its directional properties. When it is in certain positions it affects my aerial, whilst in others it does not do so, or at any rate not to any appreciable extent. Experiments have shown that transmissions from quite long distances can be carried out with a frame aerial, and those who make use of this kind of device should bear in mind that they can cause a considerable amount of interference to others who live near them. The indoor aerial consisting of several strands of wire suspended near the ceiling of a room is almost as powerful a radiator as the ordinary outdoor type, so that great care should be exercised not to allow any set used with it to oscillate. The most powerful of all systems for causing interference appears to be that in which a counterpoise is used instead of an earth. If, then, you adopt this arrangement, do not forget that it extends the range and the power of your squeaks and chirps.

My Difficulties

I seize upon an article describing how to build the set and read it. I learn amongst other things that the wires should all be air spaced. Further on I read that the telephones shall have a fixed condenser across the terminals in order to by-pass the H.F. current, which would otherwise be damped by the high-resistance windings of the phones. This is where I first fall. I for the life of me cannot see the reason for that knobby little condenser across the telephones. Surely the fact that the two cords are beautifully twisted provides sufficient capacity to by-pass this current? If it were not so, why not bundle all my wires up in a nice neat bundle inside the set and by-pass it while there is yet time—before it becomes a matter of life or death, so to speak? Shall I tell you why? It is because the set would not function if I did it, but the blocking condenser across the phones is harmless. That's why it is put there, I suppose, just as a matter of form, for much the same reason as we put on our clothes on the hottest of summer days—because it's done!

I also learn that the whisker should rest lightly on the crystal. Should it? Why should it? My whisker positively refuses to rest lightly; it has to be rammed home with all the force of which I am capable before I can get a vestige of a good signal in the telephones. It is one of those whiskers which resemble a blunted French nail with a bad kink in the middle, but it will not rest lightly. Perhaps my crystal is one of those stout-hearted fellows that dislikes anything that is light and prefers a more vigorous contact with the material things of life.

There are things, however, that cheer me up wonderfully in wireless. It is those jolly little things ohms, amps, volts, henrys and farads. If wireless were stripped of all these little trifles how flat and humdrum it would be. Take away the charm of the ohm and the boom of the ampere, and where should we be?

Interesting Experiments

Recently I amused myself by carrying out some interesting tests on the Chelmsford transmission. Actually I was measuring signal strength with a special apparatus which I constructed in order to use on the transmissions from the new 2 L O when tests were being carried out. Two points arose which might interest those of my readers who are keen on investigating freak results. I discovered first of all that a two-valve receiver consisting of a detector valve without reaction followed by a single stage of note magnification would when completely untuned bring in 5 X X at good phone strength. By untuned I mean with aerial coil (it was a single-circuit tuner) and aerial-tuning condenser completely removed. When one remembers the experiments which were carried out by Marconi with tuned and untuned apparatus in order to find out the comparative value of the two systems in the very early days of wireless, this small fact speaks volumes for the power of 5 X X and its ability to "resonate" an aerial system. My station during this particular test was at Highgate.

A Puzzle

The other freak result was more extraordinary altogether. Readers who were listening to 2 L O during the recent breakdown will remember that every now and then the carrier wave was switched on, apparently in order to see how it was going out, and then switched off again. It happened that immediately below my apparatus, resting quite unconnected in any way upon the surface of the bench, was a galvanometer which, besides being smothered in dust, had not been used for some time. During the breakdown period, while my receiver was tuned to 5 X X, I noticed that periodically the needle of my galvanometer swung violently round the dial, and at length I decided to investigate the cause. It took me some time to find it, but finally I discovered that every time 2 L O switched on her carrier the needle of my galvo did a Morris dance round the dial, returning to rest again as soon as the carrier was switched off. This, it seemed, did not happen when my receiver was tuned to 2 L O, but only when I was tuned to 5 X X. I leave it to someone with a predilection for mysteries to solve, for frankly it beats me.

The Summer Season

There is no doubt that wireless has now entered upon the summer season and, if present experiences are anything to go by, it looks like being a bad season for D.X. work. I have not been able to receive decent music from Radio-Paris for days, and Croydon yesterday afternoon must have found extreme difficulty in carrying out the normal work of aero-communications, for the volume of static interference was greater than I think I have ever heard. Even amateur transmitters working on 200 metres are finding scientific tests difficult to carry out for the same reason, and going as low as 60 metres static interference is still heavy. It is very rarely that static is annoying so low as this, but at the moment I personally find that I have to get down to 15 metres before I can be sure of working without interference.

Static

Anyone interested in static phenomena must have found out long since that when static is bad on the higher wave-bands it is usually absent entirely on the short waves, and vice versa. But tests carried out now will disprove this theory. Whether it is a temporary condition or not I cannot say, but just now static appears to cover the whole workable band with great intensity.

Amateurs interested in Transatlantic work will find that this summer will be a very bad one for D.X. work, I am afraid. There is little doubt that the last winter and even the previous summer were exceptionally favourable for long-distance working owing to the magnetic state of the ether. This summer bids fair to be less than normally favourable, and I am confidentally expecting that even K D K A's short-wave transmission will very soon cease to be audible in England.

Personally speaking, for a very long time ahead I am going to be scrupulously careful to efficiently earth my aerial system and I am also not going to touch the earthing switch with my bare hand, as the aerial system can, when this sort of atmospheric condition exists, accumulate a very heavy charge of electricity even when there is no thunder or lightning about at all.

THERMION.

Fig. 3.—Front View of Instrument.

TIME-CONTROL FOR VALVE RECEIVERS

Fig. 9.—Back View of Instrument.

NEED is often felt for an instrument to cut off the low-tension supply of receivers automatically and at the desired time. The instrument to be described in the following article accomplishes the above object successfully, and can be set to any particular time at which it is desired to stop the reception. It can be used for listening in bed, when one feels rather disinclined to leave the bed for turning the valve filaments off. Besides, it becomes indispensable when the receiver has to be left in charge of a listener who does not understand it.

Principle

The principle of the time regulator can be best understood from reference to Fig. 1. Button B is pressed to make a contact at G, which is in series with the receiver and the accumulator, thus the two strips E and F act as a switch. This switch is operated electrically when a second contact is made between C and D, and as C is worked by a small timepiece and takes twelve hours to complete a round, this contact can be timed. The time will depend on the angle between the projection on the disc C and the spring D. When this contact is made, current from the accumulator passes through an electromagnet M, which attracts an iron armature I, soldered to a spring.

When the button B is pressed it raises the spring A, and its curved end is engaged against the projection on A, thus preventing the spring F from coming back to its original position. In its new position it makes an electrical contact at G with the spring E, but this contact is broken if the spring F is released, when the magnet M attracts the spring A. Thus instantly a contact is established between C and D, the magnet attracts the spring A and the contact at G is broken, consequently no current can pass either through the receiver

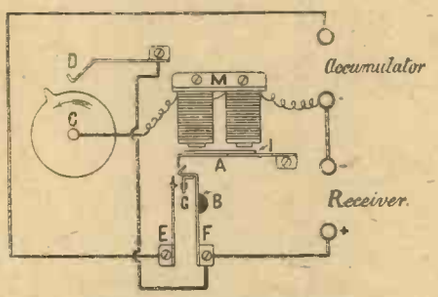


Fig. 1.—Details of Control.

or the magnet and the entire supply from the accumulator is cut off.

The contact points at G are tipped with platinum, while the contact between C and D, being frictional, is self-cleansing and

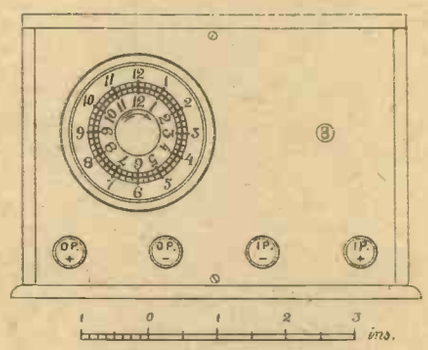


Fig. 2.—Front Elevation.

does not require to be tipped with platinum.

The complete regulator when all the parts are mounted on the panel presents the appearance shown in Figs. 2 and 3. The input and output terminals are clearly marked IP and OP respectively. The button to be pressed for switching on the current is shown at B and the timepiece dial on the left. The dial consists of two parts, the inner one which is fixed in place of the hour hand of the timepiece and the ring-shaped outer dial which remains fixed. If it is desired to stop the reception at eleven and the time at which the regulator is being set is nine, then eleven on the inner dial is made to coincide with nine on the outer dial, and the receiver will be automatically cut off from the L.T. supply at the required time. The adjustments of the dial are made by a small screw at the back of the timepiece, which is used for correcting the time.

The components fitted behind the panel are shown in Fig. 4. Electromagnet M is clamped in position by an ebonite piece H screwed to the panel. Timepiece T is shown on the right, which requires certain modifications to be made as described below.

Timepiece

The timepiece consists of an outer cover N (Fig. 5), fitted with a glass front R, which is separated from the dial V by a brass ring O. The hands U move on the dial, behind which is fixed the clockwork. The legs of the timepiece are unscrewed and the clockwork taken out of the cover. A brass disc of the shape C with a small projection is soldered to the central spindle in place of the hour hand, the minute hand being removed altogether. A thick disc of cardboard Q (Fig. 5, centre) is fixed on the brass disc by Seccotine, over which is glued the inner dial, care being taken that the projection on the brass disc is in front of figure 12 on the dial. The outer ring-shaped dial S is fixed just behind the glass cover R.

A rectangular hole as shown at the bottom is made in the outer cover for the spring D to go in, and the position of the outer dial is so fixed that the figure twelve comes in the middle of the rectangular hole. The object of so doing is that the

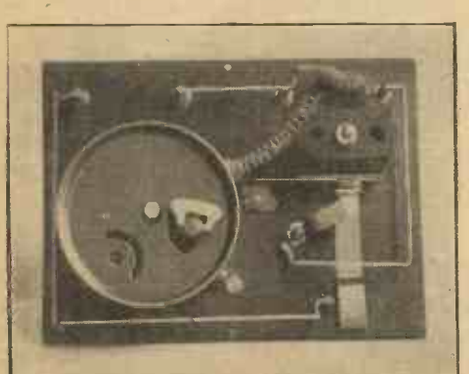


Fig. 10.—View of Back of Panel.

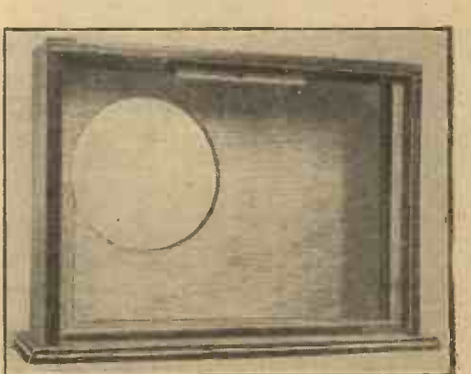


Fig. 11.—View of Case.

contact between the disc C and the spring D should be made when twelve on the inner dial is coinciding with twelve on the outer dial. Corresponding to the rectangular hole in the outer cover, a portion of the brass ring O is also removed to allow the spring D to make contact with the disc C, but care should be taken in fixing the spring D that it does not touch any metallic parts of the timepiece except the projection on the disc C.

Contact Springs

Fig. 6 also shows the details of the four brass springs E, F, A and D. Three views are given for each spring to show their construction. The upper view shows the actual shape of the brass sheet before bending, with dotted lines denoting the position of the bends. The middle view shows the elevation as seen fitted on the panel and the lower the plan. Ordinary brass sheet $\frac{1}{64}$ in. thick is used for these springs and

The dimensions of the springs and the various other parts can be ascertained with reference to the scale given below each diagram.

Wiring

The above components are fitted on an ebonite panel (see Fig. 7) 5¼ in. long, 3¾ in. wide and $\frac{3}{16}$ in. thick. The positions of the necessary holes to be drilled in the panel are shown. Fig. 4 shows all

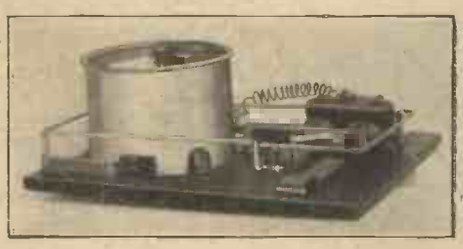


Fig. 12.—Side View of Control Instrument.

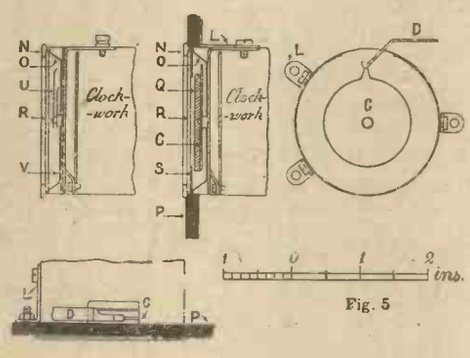


Fig. 5

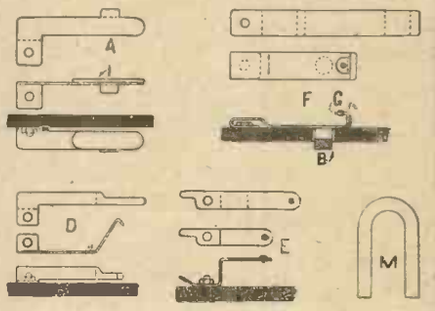


Fig. 6

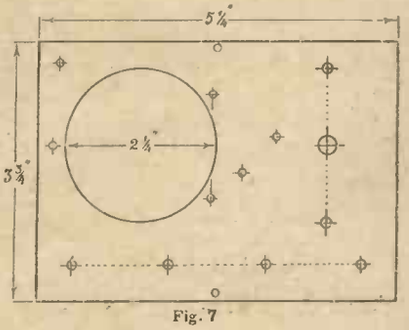


Fig. 7

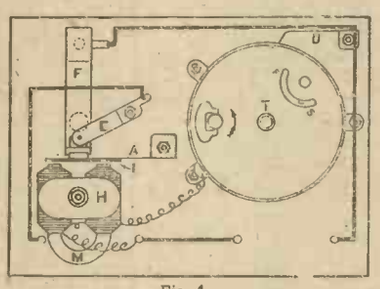


Fig. 4

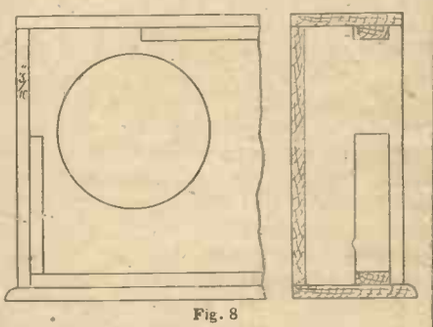


Fig. 8

Fig. 4.—Arrangement of Components. Fig. 5.—Details of Time Device. Fig. 6.—Contacts and Magnets. Fig. 7.—Panel. Fig. 8.—Part Elevation and Section of Case.

In order to fix the timepiece on the panel P small L-shaped brass strips are used, which are screwed both to the timepiece and the panel.

Electromagnet

The core of the magnet M (Fig. 6) is made by bending a $\frac{3}{16}$-in. soft-iron rod until the two limbs are parallel, which are then cut across by a saw. Waxed-paper is wrapped round the limbs of the magnet, and 8 yd. of No. 26 S.W.G. d.c.c. copper wire wound on each limb. The direction of winding is kept the same on each limb and the outer ends of each coil soldered together, thus leaving the two inner ends to carry the current.

hardened by beating with a hammer.

A piece of soft iron I is soldered on the spring A in the position shown, which is attracted by the magnet M. Thin paper of the same shape should be glued on its surface, otherwise the spring is liable to stick to the magnet even when the current is cut off.

The difficulty of tipping the springs E and F with platinum can be avoided by using a long strip out of a telephone switch for the spring E and by soldering the end of another on F as shown at G. The button B which projects above the panel consists of a valve socket cut to the required size and soldered on the spring F.

the components in position. The wire used for connections is No. 18 S.W.G. square tinned-copper wire.

Wooden Case

The details of the wooden case to hold the finished panel are shown in Fig. 8.

Other constructional details are shown by the accompanying photographs, Figs. 9 to 12. The necessary dimensions can be obtained from the diagrams, which are drawn to scale.

The finished regulator requires winding once in twenty-four hours. The setting of the dial, as already described, can be made so that the time control of the set can be made to function accurately.

M. J. C.

Fig. 2.—Case-mounted Coil

MOUNTING BASKET COILS

SOME USEFUL SUGGESTIONS

ONE of the most efficient types of tuning coil in common use to-day is the simple basket coil. It is efficient because the basket-weave winding of cotton-covered wire has a very low self-capacity. But how often is this efficiency retained when the problem of protecting, impregnating and mounting the coil is encountered? If the winding is not protected in some way the cotton covering on the wire will absorb moisture from the atmosphere and thus the desired low-capacity effect is to a considerable extent lost. On the other hand, the same undesirable effect is produced by impregnating the winding with wax or shellac varnish, and so it would seem advisable to adopt some method permitting the use of unimpregnated coils protected only by an airtight casing. Such is the arrangement to be described.

Mounting Large Coils

Fig. 1 shows how a large coil is placed between two discs of thick cardboard, which are bolted to the top corners of the standard coil plug. Long strips of glazed brown paper are then pasted over the edges of the discs, their ends being brought down flat on both sides in a line with the centre. Where the discs join the plug, the slight cavity is sealed with wax and the whole casing is then given a coat of shellac varnish. A circular label, indicating the number of turns and the gauge of the wire, effectively hides the ends of the paper strips.

A convenient method of mounting smaller coils is indicated in Fig. 2, where a ¾-in. or 1-in. length of cardboard tubing, cut from an ordinary 3-in. diameter cardboard former, is bolted to the studs on the top of the coil plug and provided with two cardboard discs, or end caps, which are glued to the edges of the ring after inserting the coil and connecting it to the studs. If desired, a round wooden lug can be attached to the inside face of one disc to support the coil and keep the lower turns clear of the studs. A better method of fixing the plug to the ring is shown in diagram A, Fig. 3, where a slot and two holes are cut in the ring, a small curved strip of thin sheet fibre or ebonite then being riveted or otherwise attached to it and the coil plug fitted to this so that the studs do not make contact with the casing.

Where the usual coil-mounting plugs are used the edges of the ring should be slightly recessed as shown at B, so that when the fixing strip is bound to same, as at C, the binding will be flush with the edges of the ring. When the glued discs are thoroughly set the casing should be well coated with shellac varnish or any other preparation which will seal all joints effectively.

Fig. 4 shows how two 3-in. diameter condenser dials may be used in place of the cardboard discs, these being secured to

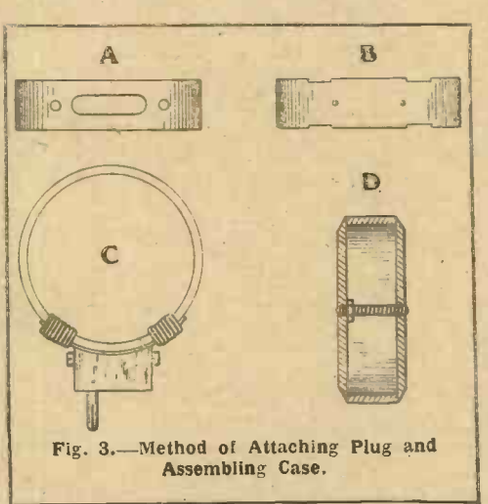


Fig. 3.—Method of Attaching Plug and Assembling Case.

the ring by means of a piece of No. 2 or 4 B.A. studding, which is firmly locked to one disc as shown at D (Fig. 3) and

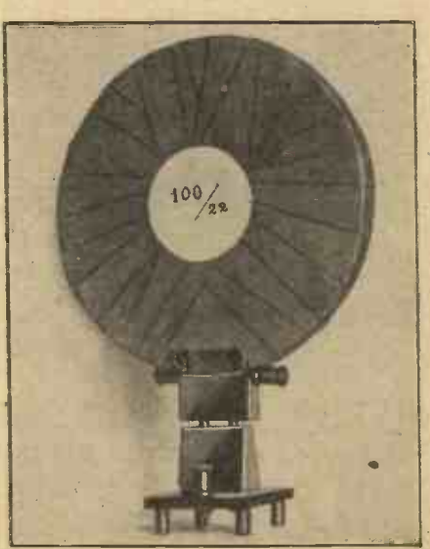


Fig. 1.—Method of Mounting a Large Coil.

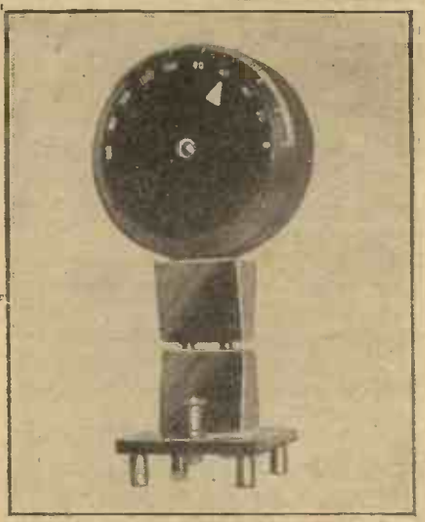


Fig. 4.—Coil Mounted Between Dials.

then covered with a short length of ebonite or rubber tubing to form an insulated support for the coil. The other dial is then screwed on over the opposite end of the stud, and a little wax is run round both edges. The calibration figures on one of the dials can be utilised for indicating the number of turns on the coil by pasting a small paper indicator against the corresponding figures, as shown in the photograph.

O. J. RANKIN.

NOISELESS MICA CONDENSERS

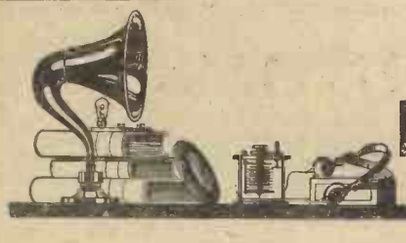
MANY of the troublesome noises in elaborate wireless receiving sets are due to imperfect condensers. With this in view attention is now directed to the mica condensers which can be obtained in various sizes and capacities and which eliminate the usual disturbances.

The latest type of mica condenser represents a novel departure in this field of design. The outer casing is of seamless brass or copper tubing. The interior is built up, after the best practice, of alternate layers of clear ruby India mica and brass or copper sheets.

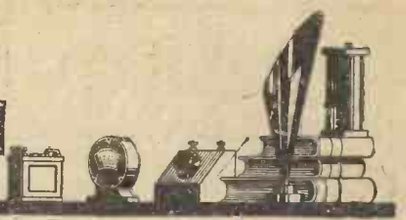
The tubing is partially flattened and the condenser inserted, after which powerful presses complete the operation by flattening the condenser into its final form. This process is claimed to produce constant and equal pressure over the entire plate area and does away with the troublesome noises.

The metal case protects the plates and reduces hysteresis losses to a minimum. These condensers are said to withstand a potential of several thousand volts if required.

F. C. L.



OUR INFORMATION BUREAU



RULES.—Please write distinctly and keep to the point. We reply promptly by post. Please give all necessary details. Ask one question at a time to ensure a prompt reply, and please put sketches, lay-outs, diagrams, etc., on separate sheets containing your name and address. Always send stamped, addressed envelope and attach Coupon (p. 912).

Aerial Wire

Q.—Which is the better material for aerial wire, pure copper or phosphor-bronze ?—G. D. L. (W.6).

A.—Copper is, of course, the better conductor, but is liable to stretch under tension. The conductivity of phosphor-bronze is very little inferior to that of copper and is sufficiently high for all practical purposes; also this material is to be preferred for mechanical reasons.—J. F. J.

The Armstrong Super

Q.—Can a single-valve Armstrong "super" be used for the reception of Chelmsford and Radio-Paris, and if so where should the loading coil be added ?—L. J. H. (Lincs.).

A.—The maximum wavelength on which such a receiver will function is about 600 metres, but its efficiency is not very high above about 450 metres. The efficiency quickly increases with a decrease of wavelength and on 200 metres is very high indeed. You will see, therefore, that it is useless attempting to use your receiver for reception on wavelengths above 1,000 metres.—J. F. J.

Blue Glow

Q.—Sometimes, when I am adjusting the filament current or the H.T. voltage of my detector valve, a soft Dutch one, there is a click in the phones and all signals cease. At the same time the bulb of the valve is filled with a blue or violet light. Why should this happen ?—H. R. S. (Swindon).

A.—This phenomenon is peculiar to soft valves. It indicates that the electrons passing from filament to plate have attained sufficient velocity to cause ionisation of the residual gas by collision with its molecules. Under such conditions a heavy ionic current flows to the filament which may disintegrate under the bombardment. At the same time the valve is rendered comparatively insensitive, and so for the sake both of good reception and the protection of the filament, a soft valve should always be worked with filament current and H.T. voltage so adjusted that "blue glow" does not occur.—J. F. J.

H.T. Negative Connection

Q.—In some circuits H.T. negative is shown joined to L.T. positive, while in others it is connected to L.T. negative. What are the advantages of each method ?—H. D. (N.1).

A.—When H.T. negative is connected to L.T. positive the effective voltages applied to the plate is that of the H.T. battery plus that of the filament battery, and these few extra volts may be useful in some cases. However, with such connection, should a part of the anode circuit be accidentally earthed there ia a risk of the filament being burnt out by the current from the H.T. battery. With the negatives of the H.T. battery and the accumulator connected together this risk is eliminated and the extra safety is often considered a fair recompense for the slightly lower effective H.T. voltage obtainable.—J. F. J.

Phone Connections

Q.—I have been using a crystal set with a pair of 4,000-ohm phones. If I buy another pair of phones, with the same resistance windings, should I connect both pairs in series or parallel for best results ?—F. P. R. (Lancs).

A.—For best results the total resistance of the phones should be approximately equal to the resistance of the crystal contact. If the phones are connected in series their total resistance will be 8,000 ohms, while if in parallel it will be only 2,000 ohms. As the resistance of crystal contacts varies greatly it is always worth while to try both methods of connection to see which arrangement gives best results.—J. F. J.

Condenser in Reflex

Q.—In a single-valve and crystal-reflex set, what exactly is the function of the fixed condenser across the transformer secondary and what governs its capacity ?—G. J. K. (Glasgow).

A.—The purpose of this condenser is to provide an easy path for the H.F. currents across the transformer secondary winding. If it is too small it will offer too high an impedance to the oscillations, while if it is too large it will offer too low an impedance to the L.F. currents, thereby partially shorting the transformer secondary. Correct value should be found by experiment and will usually be between .0003 and .001.—J. F. J.

Poor Amplification

Q.—I have a four-valve set, one H.F., detector and two L.F. stages. On the detector valve alone I get extremely good results (for one valve, of course), but switching in the amplifiers makes very little difference indeed. I have checked the circuit again and again, and have tested the batteries, etc., but cannot trace a fault anywhere. Four soft Dutch valves are used and have each been tested separately in a one-valve set where they gave very good results. Can you help me ?—H. D. (Ilford).

A.—Though soft valves are sometimes excellent detectors they usually make very poor amplifiers, and to this fact your trouble is no doubt attributable.—J. F. J.

Square-law Condensers

Q.—What, exactly, is the advantage of using a square-law condenser instead of one of the older type ?—T. U. (Bolton).

A.—Wavelength varies as the square of the capacity, so that when the type of condenser in which the capacity varies directly with the rotation of the dial is used the same movement of the dial does not produce an equal variation in wavelength throughout the scale. When the capacity is small a slight movement of the dial causes considerable alteration of wavelength, but when working on the second half of the scale the same amount of movement only produces a slight change in wavelength. The capacity of a square-law condenser varies as the square of the movement of the dial, so theoretically the wavelength of a circuit in which it is used will vary directly with the angle of rotation, and a given movement of the dial will produce an equal change in wavelength on any part of the scale. This is only true when the capacity of the circuit, with the condenser set at zero, is negligible.—J. F. J.

A WIRELESS DANCE

Music from the Savoy through the medium of a Brown Giant Loud-speaker.

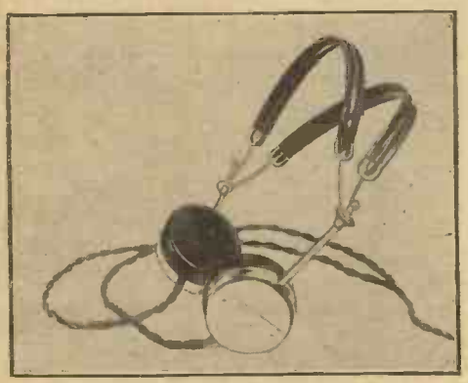
AROUND THE SHOWROOMS

Lilliput Phones

WHEN I see a wireless component selling at a very low price I am immediately tempted to see what has been sacrificed in the construction to account for the price reduction.

In the case of Sterling Lilliput phones it would seem that nothing has been scrapped to make up for an attractive price. Both in performance and appearance these phones rank with the best.

The ear-caps are specially shaped to



Sterling Lilliput Phones.

ensure snug fitting, and the double spring head bands are leather covered. The magnets are large (always a desirable feature in phones and loud-speakers) and are wound with heavy-gauge wire to remove all possibilities of a "burn-out." The tags are clearly marked for polarity in red and blue, so there is no excuse for demagnetising the phones by connecting them the wrong way round in the circuit.

Darco Grid Leak

THE standard method of mounting grid leaks in the clips usually provided on grid condensers is quite satisfactory; but what happens when the leak is connected between the grid and filament, or when no grid condenser is used at all? It is no easy job to solder wires to the rounded ends of a grid leak.

The Darco leak, or, to give it its full title, the Darco New Process Grid Resistance, has removed one of these little constructional difficulties, for although it can be fitted in condenser clips in the usual manner, it is provided with a pair of soldering lugs. Two small nuts are also fitted so that wire connection can be made even when the use of solder is not possible.

Darco leaks, manufactured by Darco Ltd., of 77-79, High Street, Watford, are supplied in various resistances from 5 to ¼ megohms.

The Atlas Condenser

BRITISH manufacturers are realising that it is no more trouble to make a good variable low-loss condenser than one of the usual "high-loss" type.

H. Clarke and Co., Ltd., of Old Trafford, Manchester, manufacture a very neat condenser. This new Atlas condenser is of the square-law low-loss type. The moving plates are connected to the end plates of the condenser, while the fixed plates are insulated by means of ebonite washers.

Clarke's Atlas Condenser.

The end plates are cut away to reduce unwanted metal as much as possible.

A nickel-plated brass dial engraved 0-180° is provided, giving a very attractive appearance. VANGUARD.

PROGRESS AND INVENTION

Valve Covers

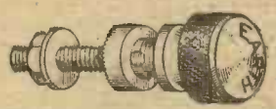
THE protection of above-panel mounted valves is the subject of Patent No. 232,022/24 (George Arthur Miller, of Tooting, S.W.17). According to the specification it is proposed to enclose the valves in a dome-shaped cover of wood, fibre, papier-mâché, or other material that can easily be formed into shape. The cover is lined with suitable soft padding material where necessary, and is held in position over the valves by means of a circular collar fixed to the base by means of screws.

The protecting cover can thus be easily removed when desired by slipping it off the ring at the base, and when it is in position the valve is totally enclosed and protected.

Easy Wiring Terminal

AN improved type of terminal is the subject of Patent No. 232,384/24 (Charles R. Belling, of 10, Glebe Avenue, Enfield, and Henry O'Connell, of 308, Brighton Road, South Croydon).

The primary object of the invention is to provide a terminal of simplified construction, in which the clamping nut has its upper face marked to designate the nature of the terminal, according to the apparatus to which it is connected, and in which the clamping nut is so mounted



Improved Terminal (No. 232,384/24).

that it cannot be removed from the stem, and possible loss is thus prevented.

The terminal shank is drilled radially so that wires may be inserted through the hole, and the terminal head then screwed down. Wires may also be twisted round the shank and held in place by the clamping nut in the usual way.

Valve Filaments

THE fragility of the hot filament is always one of the difficulties to be overcome in constructing valves, especially high-power valves for transmitting purposes.

Patent No. 232,320/24 (Claude Seymour, D.S.O., and Herbert R. Cantela, B.Sc., both of H.M. Signal School, Royal Naval Barracks, Portsmouth) describes a method of rendering the filament less fragile. It is proposed to construct a filament of a cable or rope of thin wires, having suitable thermionic properties, woven, twisted or braided together.

A filament of this description should also be very efficient when lit by alternating current, as there would be a large surface of metal to aid the "skin effect."

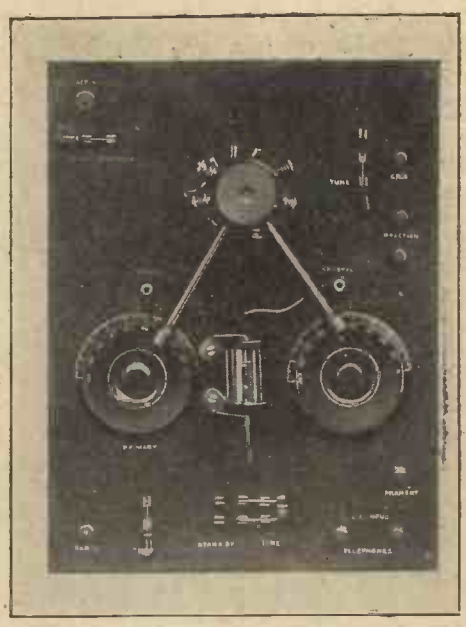
OWING to a failure in the land-line it was found impossible to broadcast the sounds from the Derby.

A CRYSTAL UNIT FOR CIRCU

THERE can be no doubt that the wireless enthusiast who is experimentally inclined is never satisfied for many weeks together with any one circuit, but wishes to try out every new circuit that is published in the technical press, and possibly also to try others that he has devised for himself.

The purpose of this article is to point out that many who change frequently from one circuit to another waste much time in building up certain standard aerial-tuning arrangements, which are required for every set over and over again, and to describe a tuner which will be as completely equipped as possible for adaptation to any circuit that the experimenter may wish to wire up.

Many designs for tuner units have already been published, but the writer has yet to meet one that is adequate to deal with the many dual-amplification circuits now available, and the tuner here described is an attempt to fill this want. In addition, a crystal detector has been incorporated in such a manner that it does not interfere with the use of the tuner as such, nor reduce its efficiency in the least; while a loose-coupled crystal set, using an excellent and well-tried circuit, is always available for the reception of local broadcast.



View of Front of Panel.

The Complete Uni

Aerial Tuning Arrangements

The standard aerial tuning arrangements for straight circuits are six in number, and are shown in Figs. 1 and 2. The arrangements are (*a*) direct-coupled, (*b*) loose-coupled, (*c*) loose-coupled with secondary earthed, with the aerial condenser either in series (Fig. 1) or in parallel (Fig. 2). Unless very short wavelengths are to be received, in which case a special type of low-loss tuner is required, the series aerial condenser may with advantage be replaced by a small *fixed* series condenser combined with a parallel condenser for tuning, as shown in Fig. 2. This arrangement makes it possible, if the series condenser has a value of .0002 microfarad, to tune down to a wavelength of about 160 metres with a No. 25 duolateral coil on a full-sized aerial, provided that the aerial-tuning condenser employed has a low minimum capacity.

Moreover, the unpleasant hand-capacity effects inevitable with a series-tuning condenser, together with the losses due to complicated wiring round the series-parallel switch, are avoided. In this tuner, then, the arrangements of Fig. 1 are not available, being replaced by the three corresponding circuits of Fig. 3.

The difference between circuits *b* and *c* in either figure is small, but for dual circuits the *b* type is preferable as tending to lessen "earth-hum" and similar stray noises; while *c* is to be preferred as giving greater stability if several H.F. or several L.F. valves are used; the change from one to the other being made on the tuner by a simple on-and-off switch.

When dual circuits are to be used, it becomes necessary to break the grid return lead at the points marked X in Figs. 2 and 3, and to insert a small fixed condenser across which to apply the low-frequency voltages derived from the detector, either by direct connection, as in the Voigt circuit, or from the secondary of an L.F. transformer, in the more usual type of circuit. In the tuner the small fixed condenser is included, as it is required to complete the aerial circuit for H.F. currents circuit, and two terminals are su transformer secondary may be c condenser may be shorted when

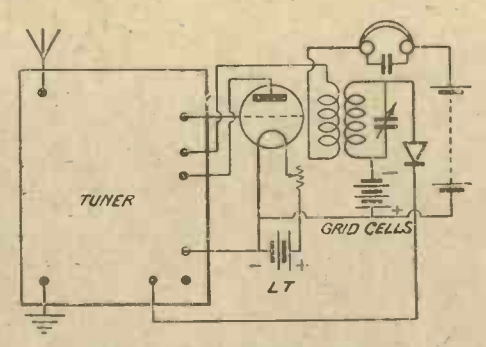


Fig. 6.—Voigt Reflex Circuit.

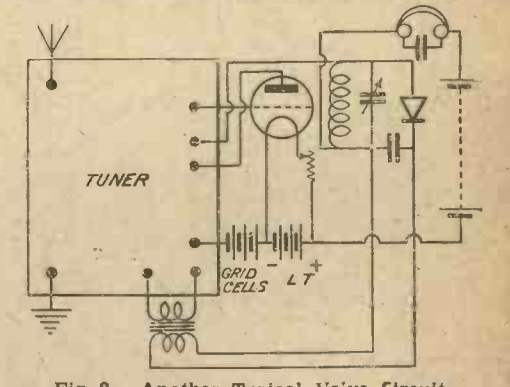


Fig. 8.—Another Typical Valve Circuit.

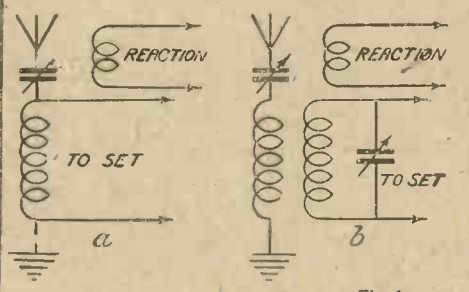


Fig. 1

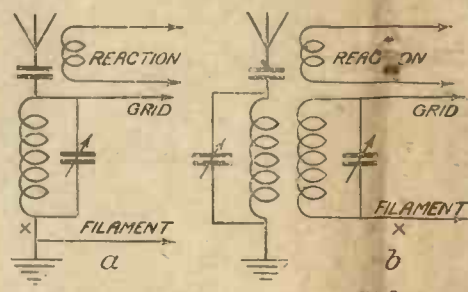


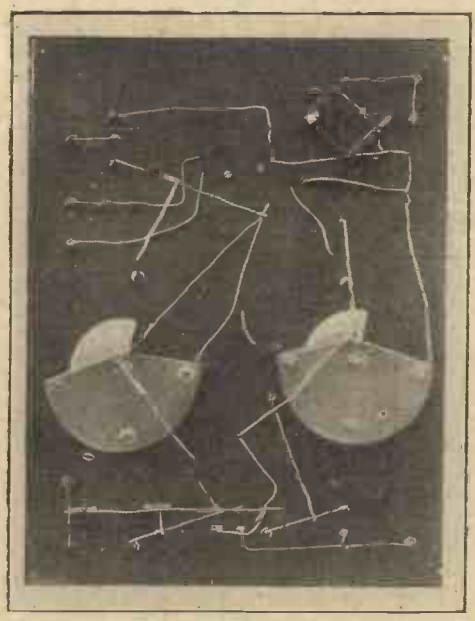
Fig. 2

Figs. 1 to 3.—Standard Aerial Tuning Arranger

L-TUNER R ALL ITS

t.

in any type of dual pplied to which the onnected, while the straight circuit is



View of Back of Panel.

in use by joining these terminals with a piece of wire.

To obtain the circuits required, a three-pole change-over switch with a considerable complication of wiring round its nine points of connection is necessary. Since in this switch three contacts are connected to points at a considerable H.F. potential, while the other six points are earthed for H.F. circuits, the writer has split the switch into two separate parts, so that there is a single-pole change-over switch to deal with the connections on the aerial or grid side of the tuned circuit, while a double-pole change-over switch deals with the connections at earth potential. These switches are disposed widely apart on the panel, each in the position which gives the most convenient and efficient wiring.

In addition to this double "tune-stand-by" switch, there are two single-pole one-way switches, the first of which removes the fixed series aerial condenser by simply short-circuiting it, and the second which earths the secondary as required, while the crystal is connected or disconnected by moving a plug from one socket to another.

The Full Circuit

The full circuit diagram of the tuner is given in Fig. 4; the switches and terminals are here disposed as seen from the *front* of the panel. The condensers have the following values: C1, .0002 microfarad, fixed; C2 and C3, .0005 and .0003 microfarad, variable, both with ebonite end plate; C4, .0003 microfarad, fixed. The value of C4 is not critical; anything from the value given up to .001 microfarad may be used without making any appreciable difference to the results with any dual circuit. It will be observed that this condenser also serves as the telephone condenser for the crystal receiver, but here almost any value will serve, and that indicated, though unusual, is perfectly satisfactory.

Fig. 5 is a dimensional wiring diagram, showing also the layout of the panel as seen from the back, for the benefit of those who may desire to wire up the unit. It will be seen from this diagram that wires connected to the aerial or grid terminals have been kept reasonably short and well away from any wires at earth potential, so that good efficiency and small stray capacity might be obtained. The extra connection on the H.F. side of the crystal has been kept short and well isolated, and a plug connection is used to minimise losses when the crystal is out of use.

The components necessary are as follows:

Ebonite panel, 13 in. by 10 in.; one box to fit; one variable condenser .0005 microfarad, and one variable condenser .0003 microfarad (preferably with metal dials and ebonite ends); one three-coil holder (W. and W.); four panel-mounting switches—two single-pole single-throw, one single-pole double-throw and one double-pole double-throw (Grafton Electric); one .0002-microfarad fixed condenser (Dubilier); one .0003-microfarad fixed condenser (Grafton Electric); crystal-detector (panel-mounting type); eight terminals (K. Raymond); two Clix sockets and one plug (Autoveyors, Ltd.); tinned-copper wire (No. 16 gauge); solder; transfers for lettering panel.

The makers' names are given for the components the writer has used, but any good-quality components will, of course, be

FIGS. 4 AND 5 ON NEXT PAGE

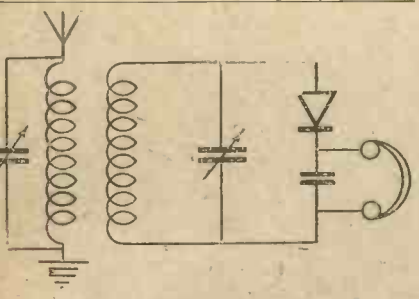


Fig. 9.—Crystal Circuit.

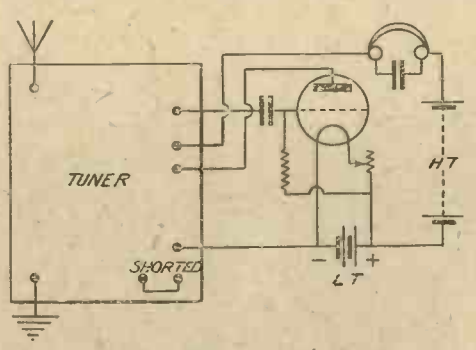


Fig 7.—Typical Valve Circuit.

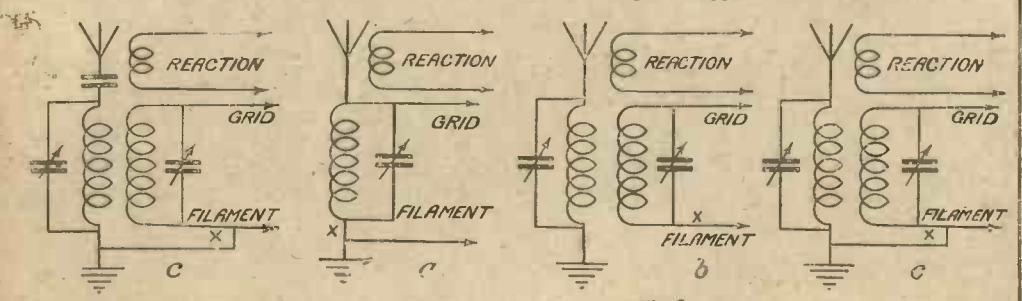


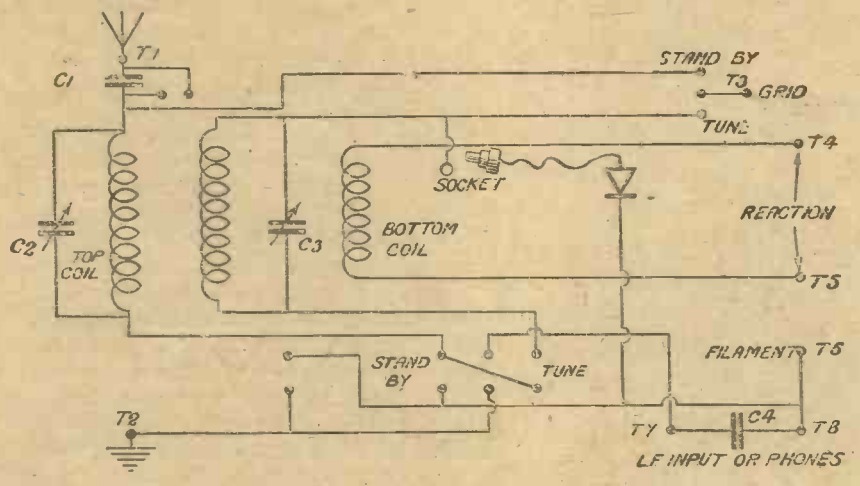
Fig. 3

nents for "Straight" Circuits.

equally suitable. The only component that is unusual is the three-coil holder adopted. This type was chosen because all three coils lie in a horizontal plane at all times, whatever the coupling adjustments, and thus are always at right angles to coils mounted in the conventional coil plugs on any high-frequency amplifier that may be connected with the tuner, so that unwanted coupling between the tuner and subsequent apparatus is minimised. Further, it may be remarked that in the stand-by position, when it becomes necessary to couple the reaction coil to the aerial coil, there is no need to remove the secondary coil when this type of holder is used; it is only necessary to de-tune it completely and to swing the aerial (top) coil clear of it, when it will be found quite easy to couple the two outer coils together sufficiently closely for all ordinary purposes.

A larger reaction coil may be needed than in the tune position, owing partly to the fact that the two coils cannot be brought very near to one another, but more particularly to the greater damping of the aerial circuit as compared with the secondary. In order to enable the adjusting handle of the lower coil to clear the condenser dials, it was necessary to mount the holder on a small base.

Stiff wire, brought through holes drilled in the panel, is used for connection to the coil holder; this limits the movement of the reaction coil, but as zero coupling is obtained with this type of holder *before* the coils are clear of one another, no trouble need be anticipated on this score. With stiff wire connections, however, a short-circuit may occur between the pin of the reaction-coil plug and one of the wires leading to the aerial coil, and as this involves shorting the H.T. battery—possibly through the valve filaments—it is advisable to cover this wire with sleeving, even though it is never necessary to swing the reaction coil round far enough for this short-circuit to occur.



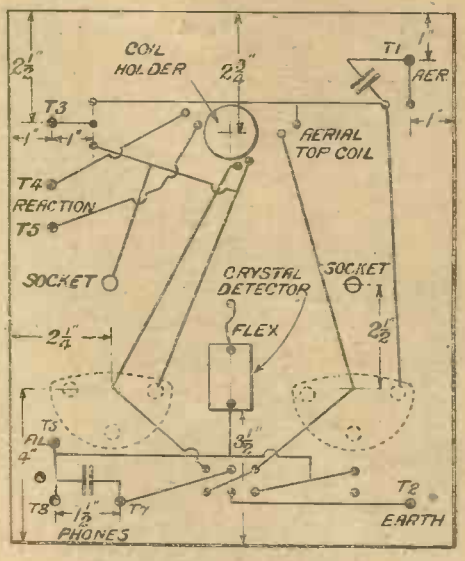


Fig. 4.—(above) The Full Circuit Diagram.
Fig. 5.—(right) Wiring Diagram of Back of Panel.

Fig. 6 shows the Voigt reflex circuit, in which the position of the grid cells should be noted.

In conclusion, attention is drawn to Figs. 7 and 8, in which the connections of the tuner in a few typical circuits are shown. Fig. 9 shows the circuit of the crystal receiver incorporated. A. L. M. S.

NEW PANELS FOR OLD

THE experimenter who likes his apparatus to look well finished is often faced with considerable expense on account of ebonite. An old panel is frequently available.

An Economical Method

The writer had always rather dreaded tackling the job of plugging, but was practically forced to adopt this method on one occasion, and to his surprise found it very simple and most satisfactory. If a little care is taken, the plugs are to all intents and purposes invisible. He has a panel in which fourteen holes, varying from ½ in. to ⅛ in. in diameter, have been plugged, and whilst some of the places can be seen if looked for, others are entirely invisible now that the surface has been rubbed down.

A lathe is, of course, very helpful, though one of the simplest type is entirely suitable, and a few lengths of ebonite rod of various diameters are needed. The writer's procedure is to select a drill which just goes into the hole and then to measure this with callipers. A few thousandths of an inch are added to the measurement, and the ebonite is machined down to a slight taper, the large diameter being equal to the distance between the callipers points. The smaller end is to be a little less in diameter than the hole in the panel. No special care is required in the degree of taper; the plug just wants to look slightly taper to the eye. In the case of tapped holes it is best to drill them out with a clearance drill first so as to get rid of the threads.

Finishing

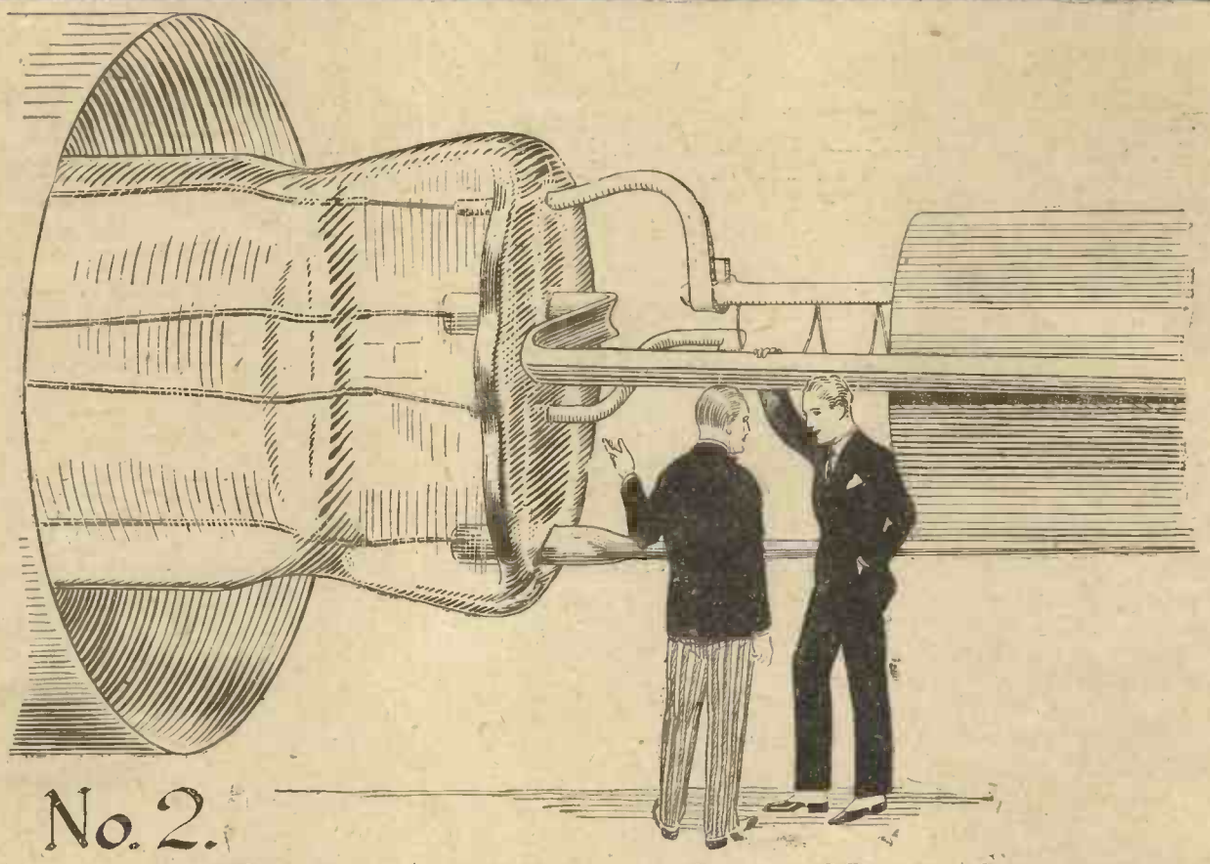
The ebonite is not turned, but is simply filed down whilst rotating in the lathe. This is easier and quicker than using a turning tool. The plug is driven into the hole in the panel from the front and cut off about ⅛ in. above the surface. In hammering the plug in it will be found that as the plug gets tight it goes in in a series of jerks, and much more can be done to make it really secure by varying the rate at which the blows occur than by using extra force. The rod can be cut off with a hack saw. The projecting ends are carefully filed down practically level with the surface of the panel, and when all the holes are plugged the surface is rubbed down in the ordinary manner.

If a lathe is not available much can be done with a drill held in the vice, the only limitation being the diameter which the chuck will take.

A Suggestion

Some enterprising firm ought to market ready turned plugs. The majority of holes are No. 2 or 4 B.A. tapped or clearance (plugs for the clearance sizes only would be wanted), and a few extra sizes for plugging holes made for condensers and resistances would enable one to renew almost any old panel. C. H. S.

THE INSIDE TRUTH ABOUT THE EDISWAN VALVE



No. 2. Examining the Pinch

"Pinch me!" exclaimed Will B. Shown to Eddy Swan. And well might he wonder if he was dreaming, for he found himself in the centre of the enormous valve which Eddy had pointed out to him.

"I'll *show* you the pinch," retorted Eddy. "That'll be much more interesting to you."

He led the way to the base of the Valve and halted at the flattened end of a glass tube leading from it.

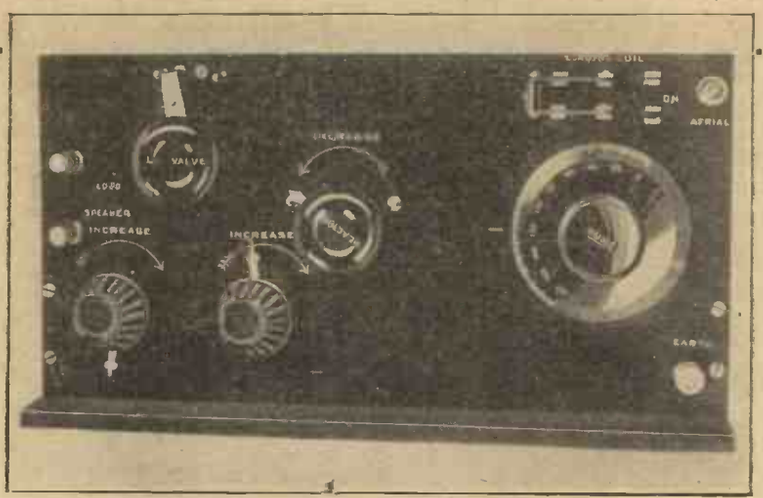
"This," he exclaimed, "is the pinch—and mind you don't knock your head on that filament support." "Oh!" was all that Will B. Shown could contribute to the conversation.

"The pinch," continued Eddy, "is the support of the electrodes, and as such it must be prepared to 'rough it.' Have a look down there—it starts, you see, as a hollow glass tube, and through this, the Ediswan operatives run the leading-in wires from the outside pins. These have the electrodes securely welded to obtain a strong electrical joint. Then, the end of the tube is heated to red-heat and placed under a 'pinching' machine, which squeezes it into a solid mass of glass, firmly holding the electrode supports, and making the inside of the tube air-tight. Notice, too, the wide spacing between the leads. They're very careful about that at the Ediswan works, for neglect of this would hardly enable Ediswan Valves to be recognised as 'Britain's Most Dependable Valves.' Now, let's take a stroll over to the Anode."

(To be continued.)

A PORTABLE LOUD-SPEAKER SET

The Second and Concluding Article on the Construction of a Useful Portable Receiver



View of Front of Panel.

The Loud-speaker

THE construction of the loud-speaker is by far the simplest part of the whole apparatus, although it may appear otherwise.

First make a bobbin to the dimensions shown in Fig. 10. This may be turned out of ebonite or built up of wood and card. Next obtain a length of parchment paper already pleated, or fold a piece in ½-in. pleats. The width should be 5¼ in. and the length 34 in. Join the ends so that it forms a pleated cylinder, and when set press downwards on a polished surface so that the bottom splays outwards.

Now place the bobbin in the centre, having previously given it a liberal coating of Seccotine, and press the diaphragm flat. Keep it in this position by small weights and allow it to set for forty-eight hours.

Cut down the square brass rod so that it is 11 in. in length, and drill as shown in Fig. 11. It will be seen that the ear-cap is fixed to the rod by two countersink 6 B.A. screws, which pass through the holes already in it into tapped holes in the rod. The diaphragm of the earpiece is removed, and the small screw holding it is soldered to the end of a piece of No. 16 S.W.G. wire. This is then replaced and the receiver screwed home, the length of wire being sufficient to enable it to press firmly against the diaphragm bobbin.

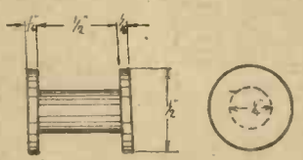


Fig. 10.—Details of Diaphragm Bobbin.

When the diaphragm has set hard, coat the edge of the panel with Seccotine and lay the diaphragm upon it, care being taken that the bobbin is central. Now screw the three-ply ring to the panel, clamping the diaphragm in position; fix the brass rod holding the earcap to the ring and allow the Seccotine to set firmly.

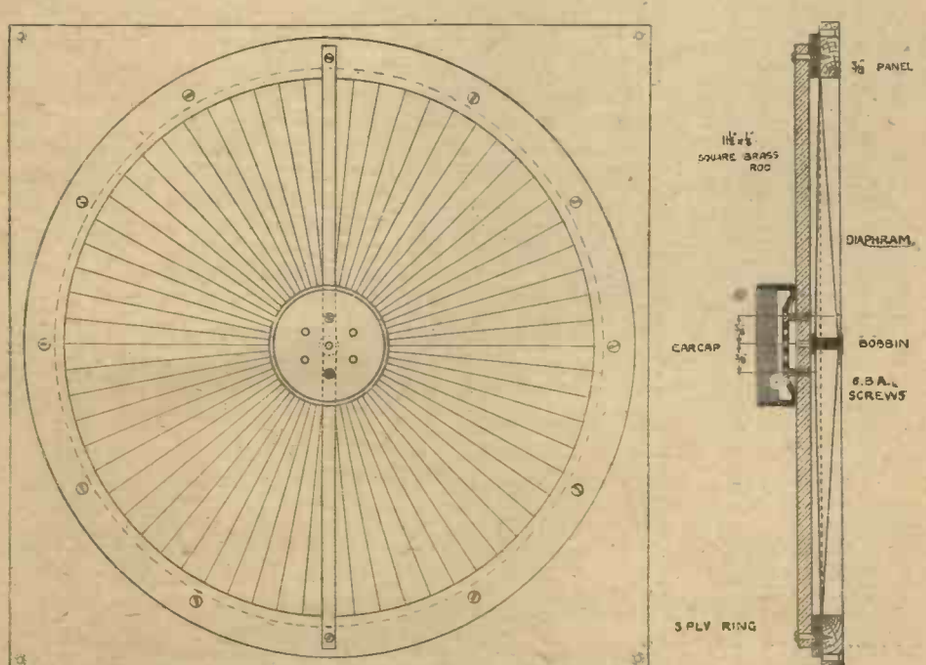


Fig. 11.—Elevation and Section of Pleated-paper Loud-speaker.

Operating the Set

Connect the accumulator and battery and join the aerial and earth, put the loading-coil switch to the "off" position and tune in the local station. Now bring the reaction coil up and the signal strength should increase; if this does not occur, reverse the flexible leads.

Next switch over the loading coil to "on," and again tune in the station required. If, when the reaction is increased to its maximum, the set fails to oscillate, reverse the ends of the reaction loading coil. If this improves matters, but still does not cause the set to oscillate, a greater number of turns are required; if, on the other hand, oscillations persist even when the variable reaction is decreased as much as possible, it will be necessary to decrease the number of turns on the fixed reaction coil.

The binding of this coil to the aerial loading coil should not be done until the number of turns has been decided by experiment. Having made these adjustments, the loud-speaker may be connected and the reed adjusted for maximum intensity.

To improve the appearance, and to make the diaphragm impervious to atmospheric changes, it may be coated on both sides with a mixture of bronze powder and celluloid varnish. Gold paint, in which the medium employed is oil, should not be used.

A. R. T.

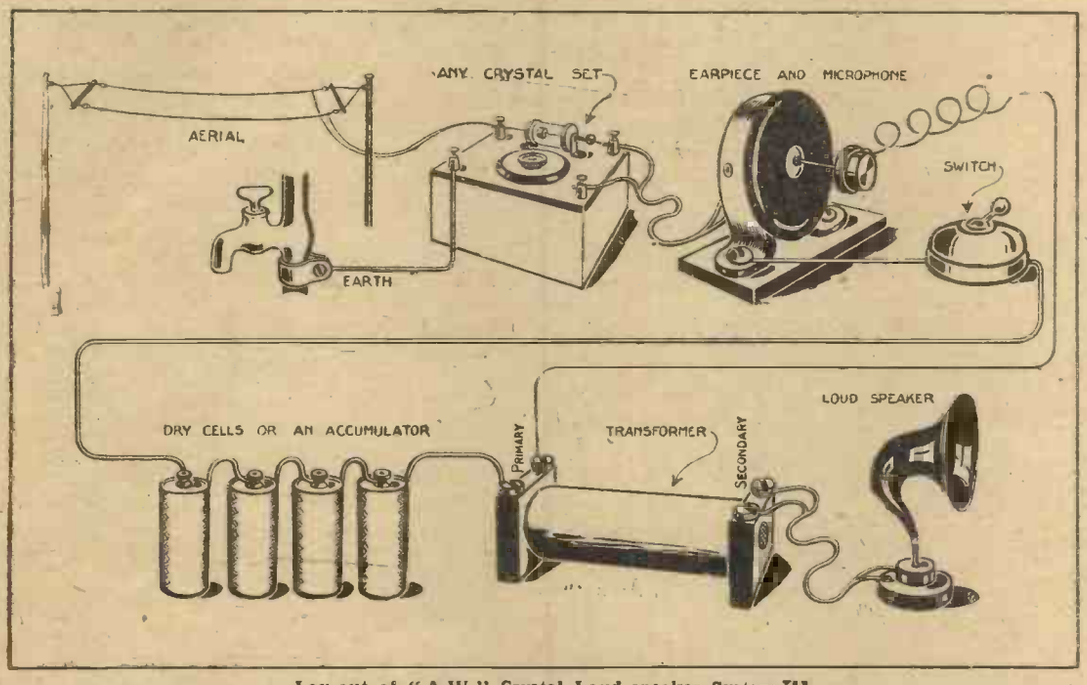
A NEW FRAME AERIAL

A NEW indoor aerial which is claimed to possess a considerably longer range of reception than the ordinary type of frame consists of a pancake winding of stranded wire 2 ft. high and 18 in. wide. There are three terminals, two of which go to the set, whilst the third from a centre tapping is taken to an earth, preferably the nearest water-pipe. A gas-pipe earth may safely be used with this if more convenient.

M. A. L.

THE "A.W." CRYSTAL LOUD-SPEAKER SYSTEM

A YEAR ago AMATEUR WIRELESS introduced a crystal loud-speaker system with which we had experimented over a period and with which we had obtained a marked success. Very briefly the system comprised any crystal set, the phone terminals of which were connected to a Brown reed-type earpiece, to the reed of which was mechanically attached a tiny microphone, in turn connected to the primary of a transformer. In series between the microphone and the transformer was a battery. From the secondary of the transformer ran connections to a loud-speaker. The microphone, known briefly as a button, and the circuit in which it was used were specialities of Mikro, Ltd., 32, Craven Street, London, W.C.2, and the part played by AMATEUR WIRELESS was chiefly in the matter of experiment relating to the right type and specification of transformer, on which much of the success of the system depended.



Lay-out of "A.W." Crystal Loud-speaker System.

The Button

Naturally the most important component was the microphone button. Our experiments were with a type of button that gave excellent results. That button is still in our possession and works well, allowing of music being very considerably amplified and rendered at a loud-speaker strength that was at that time associated with, say, a two-valve set, it being understood, of course, that the system will work satisfactorily only when the set gives vigorous signals in the earphones. The system does not work satisfactorily where crystal reception is feeble. We pointed out at the time that in the amplification of speech some distortion was introduced, the amount of such distortion depending upon the adjustment of the microphone button and very largely upon the quality of the transformer. Many readers will remember that at the time we published full specifications and instructions allowing of anybody assembling the loud-speaker crystal system for themselves. We described attachments to existing crystal sets, and we also described self-contained sets in which the new system was embodied. Many readers achieved a large measure of success with the new system, but unfortunately the company responsible for the microphone button encountered such difficulties in manufacture that they were not able to maintain the supply to the public of a uniformly even product, in consequence of which a number of failures were reported and some amount of disappointment inevitably caused. This was a matter generally to be regretted, inasmuch as the system itself was good with certain limitations, clearly explained by us at the time, and gave every promise of providing a most interesting field of experiment.

We are now happy to be able to say that the company have apparently seen daylight through their technical difficulties of manufacture and are now in a position to provide the experimenter with a microphone button of approved quality. They have produced a special button for loud-speaker work—they call it the "A" type—and they send it out complete with a number of extra mica diaphragms, as well as with a small excess of carbon granules. A word as to this. Mica is a somewhat intractable material, liable to develop flaws, and a button containing a faulty diaphragm is useless, setting up squeals and other irritating noises. The supply of mica "refills," as it were, sent out with each "A"-type button makes it easy and convenient to renew a diaphragm at any moment, or to experiment with different thicknesses, it being a simple matter to split the diaphragms with a knife. The button is made with a screwed rim, and is sent out tightly packed with carbon granules. The exact quantity of granules required is likely to vary with individual conditions, and here again experiment is extremely easy, all that is necessary being to unscrew the rim and remove a small proportion of the granules, the work of a few seconds, taking care to save the granules for further experiments.

Recent Tests

We have tried a dozen or so of the new "A"-type microphone button as supplied by Mikro, Ltd., and, subject to varying the content of carbon granules, we feel that it will give complete satisfaction in the crystal experimenters' hands. The button, with extra diaphragms and extra granules, is sold at 7s. 6d.

In working the crystal loud-speaker system, success is assured providing the following points are watched:

Use a *Brown reed-type* phone. *Follow our instructions implicitly when building the transformer.*

(A low-resistance loud-speaker gives slightly better results than a high-resistance instrument.)

Do not use flashlamp batteries for current supply.

Use a well-designed low-loss crystal receiver and ensure maximum volume of signals being applied to the reed phone.

The contents of the microphone button should be adjusted until the experimenter is sure that he is getting the best result.

We are shortly publishing a Handbook in which the system is described in complete detail.

WIRELESS IN PARLIAMENT

From Our Own Correspondent.

THE Government have dropped the Wireless Telegraphy and Signalling Bill. The Prime Minister, in reply to Mr. Forrest, who asked whether, in view of the importance of the measure to listeners-in, he could state when the Government proposed to take the second reading of the bill, said that, in view of the decision to hold a general inquiry into the broadcasting system towards the close of the year, the Government had decided not to proceed this session with the bill. A short bill would be introduced instead, with the single object of resolving any doubt as to the validity of the existing licence system.

On May 25 the order for the second reading was discharged and the bill was withdrawn.

In reply to Sir W. Lane Mitchell, who asked the amount collected for broadcast licences and the amount of the same paid to the B.B.C., Viscount Wolmer said the amount collected up to March 31, 1925, was about £1,240,000, and the amount paid to the British Broadcasting Co. to date was £622,000.

Mr. A. Alexander asked the Postmaster-General whether he was aware that the National Association of Radio Manufacturers were threatening to withhold supplies of wireless apparatus from traders who, having made all necessary allowances for costs and profits, might be willing to sell the apparatus at a lower figure than a minimum price fixed by the association, and what steps he proposed to take in the matter in the interests of the users of wireless?

Viscount Wolmer, who replied, said he had no knowledge of any such action on the part of the National Association of Radio Manufacturers, and, in any event, he had no power to intervene as suggested. The hon. member was no doubt aware that wireless licences contained no restriction as to the origin of the apparatus used.

TELEPHONY FROM LIGHTSHIPS

MANY listeners in the south-east of England will be interested to receive telephony from lightships off the Kentish coast, such as the E. and S. Goodwins, the *Tongue* off Margate, the *Gull* off Ramsgate, and the *Varne* off Folkestone. The most reliable time for picking them up is 5.30-6 p.m., when they call up Ramsgate P.O. to check their automatic call-up device.

The best coils to use are A.T.I., 35; A.T.C. in series, T.A. 50 and reaction about 25-50. W. W. D.

RADIOGRAMS

THE B.B.C. proposes to erect two new transmitting stations, one of them in North-east London (where reception is at present indifferent). These, together with 2 L O and Daventry, will increase the number of listeners with crystal sets who are able to receive alternative programmes to sixty per cent.

The possibility of the Pope delivering a message to the world by wireless is being discussed in ecclesiastical circles in Rome.

It is stated that representatives of the new company, Secret Wireless, Ltd., will shortly meet the Theatrical Managers' Association to discuss the broadcasting of plays.

Under the supervision of a heart specialist, the beats of healthy and diseased hearts were recently broadcast from the Eiffel Tower station.

Edison, the famous inventor, declares that he is pessimistic with regard to the future of wireless.

Mr. Cook Allard, chairman of the Amalgamated Wireless Company, will be Australia's representative on the Imperial Wireless Council.

Arrangements were made by the police for dealing with over 50,000 vehicles on the roads to Epsom on Derby Day, including the establishment of eleven fixed wireless stations.

A strenuous campaign against oscillators is being developed by the Radio Association, and at a recent meeting of the executive at the House of Commons it was reported that thousands of informative letters had been received from all parts of the country.

A symphony concert conducted by Sir Landon Ronald will be broadcast on June 17.

It is hoped to install wireless in the wards of St. John's Hospital, Twickenham, at a cost of £250.

Mr. E. T. Fisk, managing director of the Amalgamated Wireless Co., announces that the beam wireless service will be started with rates considerably lower than at present.

The programme for June 20 includes orchestral music, ballads sung by Miss Violet Lee (soprano) and Mr. George Fizzey (baritone), syncopated songs by Mr. Fred Arnold, entertainment at the piano by Douglas Beaufort, and original musical burlesques by Miss Toni Farrell.

At a recent meeting of the board of directors of the Marconi International Marine Communication Co., Mr. Frederick Hayburn was appointed manager of the company.

An rmperial Airways pilot left Croydon recently with a passenger for Manchester without knowing exactly at which of the several grounds around that city he could land, owing to there being no staffs on duty. Trunk telephone calls were made to ascertain at which landing ground a staff could be provided, and the pilot received his instructions by wireless while flying at 100 miles an hour.

When the Canadian Pacific liner *Montrose* arrived at Liverpool recently detectives arrested a commercial traveller who had been traced by wireless.

2 L O is running a memory test programme on Tuesday evening June 9. The programme will consist of familiar music performed by the orchestra and well-known wireless artistes. The title of each item and the name of each artiste will be withheld until after the item has been performed.

Six thousand working men's clubs and 12,000 provincial reading-rooms in Russia are being equipped with loud-speakers, and the demand for receiving sets exceeds the supply.

An exhibition of wireless goods will be held under the auspices of the Radio Goods Dealers' Association and the Norwegian Radio Union in Oslo from September 1 to 15. The exhibition will include apparatus sent in by Norwegian amateurs through their local wireless clubs.

(*Continued on next page.*)

RADIOGRAMS *(continued from preceding page)*

A new method of recording and storing-up wireless messages has been invented. Records of famous speeches and special concerts can be made, and later re-broadcast.

A light programme by the Wireless Octet will be given on June 13 between 4 p.m. and 5.20 p.m.

The wireless station on Yap Island for the Japanese Government is now under construction. It is estimated that the total cost will be 1,500,000 yen. While Japan will be in possession of the station, all other nations will be able to share the communication facilities and may make use of the station for relaying purposes.

An hour "In a New Art Circle" will be included in the programme for June 16, the artistes assisting being John Henry, Miss Evadne Price, Miss Mabel Constanduros, Blossom and Joe Murgatroyd. At 9.30 p.m. the transmission will be made from the Aldershot Command Searchlight Tattoo, which will include music by the massed bands there assembled and various bugle marches and calls. This transmission will be continued at 11.20 p.m. after Savoy dance music, when the music of the entry of massed bands will be broadcast.

The programme for June 14 is of Russian music, and is given entirely by Russian artists. The Vladimoff Balalaika orchestra will play various items.

The most notable feature in Scottish broadcast reception recently has been the increased strength of 2 L O. London now comes in better in many parts of the country than any other of the English stations, with the exception of 5 X X.

Glasgow claims the honour of being the pioneer of the broadcast serial. The Scottish headquarters station of the B.B.C. is to try out such a novelty next month, and high hopes are entertained that it may become a popular feature of wireless programmes. An adaptation of "The Three Musketeers" is to be presented in four episodes on different nights.

The construction of the new studios is proceeding at the London station, and arrangements are being made for the accommodation of a small audience in one of them.

The National Union of School Orchestras are to give their annual performance at the Crystal Palace on June 13, when the programme will be broadcast from all stations.

The programme for June 11 opens with an hour of the music of Edward German, played by the orchestra under Mr. Godfrey's conductorship. Mr. Harold Williams will sing three of German's popular songs with orchestral accompaniment. This will be followed by an hour of first performances of chamber music works played by the Virtuoso Quartet.

BROADCAST TELEPHONY

NOTE.—*In the following list of transmissions these abbreviations are observed: con. for concert; lec. for lecture; orch. for orchestral concert; irr. for irregular; m. for metres; and sig. for signal.*

GREAT BRITAIN

The times given are according to British Summer Time.

London (2LO), 365 m. 1-2 p.m., con. (not daily); 4-5 p.m., con.; 5-6, light music; 6.0-6.5 p.m., children; 6.40 p.m., light music; 7-7.30 p.m., time sig., news, talk; 8.0-10 p.m., music; 10.0-10.30 p.m., time sig., news, talk; 10.30-11 p.m., music. Tues. and Thurs. the Savoy Bands are relayed until 11.0 p.m., and on Sat. until midnight.

Aberdeen (2BD), 495 m. **Belfast** (2BE), 439 m. **Birmingham** (5IT), 479 m. **Bournemouth** (6BM), 386 m. **Cardiff** (5WA), 353 m. **Glasgow** (5SC), 422 m. **Manchester** (2ZY), 378 m. **Newcastle** (5NO), 403 m. Much the same as London times.

Bradford (2LS), 310 m. **Dundee** (2DE), 331 m. **Edinburgh** (2BH), 328 m. **Hull** (6KH), 335 m. **Leeds** (2LS), 346 m. **Liverpool** (6LV), 315 m. **Nottingham** (5NG), 326 m. **Plymouth** (5PY), 335 m. **Sheffield** (6FL), 301 m. **Stoke-on-Trent** (6ST), 306 m. **Swansea** (5SX), 482 m.

Chelmsford (high-power station), 1,600 m. Experimental transmission every Monday at 11.00 p.m. from one or other main or relay station.

CONTINENT

The times are according to the Continental system; for example, 16.30 *is* 4.30 *p.m., and* 08.00 *is* 8 *a.m. B.S.T.*

AUSTRIA.

Vienna (Radio Wien), 530 m. (1.4 kw.). 09.00, markets (exc. Sun.); 11.00, con. (Tues., Thurs., Sat., Sun.); 13.10, time sig., weather; 15.30, Stock Ex. (exc. Sun.), news, con.; 17.30, children (Mon.); 18.30, lec., women (Wed.); 19.15, Esperanto (Wed.); 19.25, news, weather, time sig., con., lec., news; 19.45, Engl. (Mon., Wed., Fri.); 20.00, con.; 22.00, dance (Wed., Sat.).

Graz, relay from Vienna, 404 m. (500 w.). Own con.: 16.00 (Mon., Wed., Fri., Sun.); 17.00 and 20.00 (daily).

BELGIUM.

Brussels, 265 m. (1½ kw.). 17.00, orch., children (Thurs.); 18.00, news; 20.00, lec., con., news (opera, Mon. and Wed.). Special gala con. every Tues. at 20.15.

CZECHO-SLOVAKIA.

Prague (Strasnice), 570 m. (1 kw.). 10.00, Stock Ex. (weekdays); 11.00, con. (Sun.); 11.30, Stock Ex. (weekdays); 17.00, Stock Ex., con. (Wed., Sat.); 18.00, Stock Ex. (weekdays); 19.15, con. or lec., weather, news, children (Sat.); 20.00, con., dance.

Brünn (OKB), 1,800 m. (1 kw.). 10.00, con. (Sun.); 14.00, Stock Ex., news; 19.00, lec. or con. or dance.

DENMARK.

Copenhagen (Kjobenhavns Radiofoni station), 775 m. (1 kw.). 19.35, notices, lec., con.* (Tues., Thurs., Sat.); 21.30, Esperanto (Wed.). *This con. is also relayed by the Aalborghus ship station on 445 m. Sun.: Copenhagen only.

Lyngby (OXE), 2,400 m. (2½ kw.). Weekdays: 19.20, news, Stock Ex.; 21.00 and 22.00, news, weather, time sig. Sundays: 16.00 and 21.00, news.

Ryvang, 1,190 m. (1 kw.). 20.00, con., news (almost daily).

FRANCE.

Eiffel Tower, 2,650 m. (6 kw.). 06.40, weather (exc. Sun.); 12.00, markets (exc. Sun. and Mon.); 12.15, time sig., weather; 15.45, 16.30, Stock Ex. (exc. Sun. and Mon.); 18.15, con.; 20.00 and 23.10, weather; 20.30, con. (on 2,200 m.), Wed., Fri., Sun. (temp.).

Radio-Paris (CFR), 1,750 m. (about 5 kw.). Sundays: 12.45, con., news; 16.30, Stock Ex., con. (Thurs.); 20.15, news, Esperanto, con. or dance. Weekdays: 12.30, con., markets, weather, news; 16.30, markets; 20.15, news, con. or dance. *Radio Magazine* con., 20.45, every 2nd Thurs. in month.

Le Matin, Paris, provides a special con. every 2nd and 4th Sat. in the month at 21.00. CFR frequently relays 5XX after 22.00.

L'Ecole Sup. des Postes et Télégraphes (PTT), Paris, 458 m. (800 w.). 14.00, lec. relayed from Sorbonne University (Thurs.); 15.00, outside relay (Sat., irr.); 15.45 and 17.00, lec. relayed from Sorbonne (Wed.); 16.00, outside relay (irr.); 20.00, Engl. talk (Tues.), children (Thurs.); 20.30, lec. or con., almost daily.

"Le Petit Parisien," 345 m. (500 w.). 21.30, con. (daily, exc. Wed., Fri.).

GERMANY.

Berlin (Vox Haus), 505 m. (1½ kw.). 09.00, sacred con. (Sun.); 10.00, markets, news, weather; 11.00, con. and tests; 11.30, lec. (Sun.); 12.00, educ. hour (Sun.); 12.15, Stock Ex.; 12.55, time sig., news, weather; 14.15, Stock Ex.; 15.00, educ. hour (Sun.), markets, time sig.; 15.30, children (Sun., Wed.); 15.35, Esperanto (Sat.); 16.30, orch., children (Sat.); 18.20, lec., women; 19.00, French (Mon.), lec.; 20.30,* con., weather, news, time sig.; 22.30, chess (Mon.), lec. (Tues.), dance (Thurs., Sat., Sun.).

* If operatic transmission, at 19.15. Will be increased to 81.10 kw.

Königswusterhausen (LP), 1,300 m. (6 kw.). 11.30-12.50, con. (Sun.); 20.30, relay of Vox Haus con. (irr.); 2,450 m. (5 kw.), Wolff's Buro Press Service: 07.30-21.00; 3,150 m.: Telegraphen Union: 07.45-19.45, news. 4,000 m. (10 kw.): 07.00-21.00, news.

Berlin (Witzleben), about 500 m. (10 kw.). Testing shortly.

Bremen, 330 m. (1 kw.). As Hamburg.

Breslau, 418 m. (1½ kw.). 11.15, Stock Ex., weather; 12.00, con. (daily); Divine Service (Sun.); 12.55, time sig. (Sun.), weather, Stock Ex.; 12.35, time sig. (weekdays), news, weather; 15.00, news; 16.00, children (Sun.); 17.00, con.; 19.00, lec.; 19.30, Engl. (Mon.), shorthand (Wed.), Italian (Thurs.); 20.30, con., weather, time sig., news; 21.45, dance (Sun., Thurs.).

Cassel, 288 m. (1½ kw.). Relay from Frankfort.

Dresden, 280 m. (1½ kw.). Relay from Leipzig.

Frankfort-on-Main, 470 m. (1½ kw.). 08.00, sacred con. (Sun.); 10.45, Stock Ex.; 11.55, time sig., news; 12.55, Nauen time sig.; 15.00, Stock Ex., markets; 16.00, con. (Sun.), children (Wed.), markets, news; 16.30, con.; 17.00, children (Sun.); 18.00, markets, lec.; 19.00, Esperanto (Fri.), con. (Wed.); 20.00, lec., con., news, weather; 22.00, con. or dance (almost daily).

Hamburg, 395 m. (1 kw.). Sundays: 08.25, time sig., weather, news, lec., women; 11.15, sacred con.; 12.15, chess; 13.15, lec., con.; 14.30, chess; 17.00, children, con.; 19.15, Engl., sport, weather; 20.00, con. or opera, news (in English), dance. Weekdays: 06.55, time sig.,

(Continued on page 908)

"BROADCAST TELEPHONY" (*cont. from page 906*)

news, weather, markets; 08.30, theatre news; 12.15, markets; 12.55, Nauen time sig., shipping news; 14.45, markets, police news; 16.30, con.; 18.00, children (Mon., Tues.); 19.00, lec., Spanish (Mon., Thurs.); 19.30, English (Tues., Fri.); 20.00, con. or opera; 22.00, markets, news (in English), dance.

Hanover, 296 m. (1½ kw.). As Hamburg.

Königsberg, 463 m. (1 kw.). 09.00, sacred con. (Sun.), markets (Wed., Sat.); 12.55, time sig., weather, news; 16.00, markets; 16.30, con.; 17.00, con. (Sun.); 19.30, lec.; 20.00, con. or opera, weather, news, dance (irr.).

Leipzig, 454 m. (700 w.). 08.30, sacred con. (Sun.); 10.00, markets, news; 11.00, educ. hour (Sun.); 12.00, con. (daily); 12.55, Nauen time sig., Stock Ex., news; 16.00, markets; 16.30, con., children (Wed.); 18.00, markets, Stock Ex., lec.; 19.00, lec.; 20.15, con. or opera, weather, news; 22.00, con., cabaret or dance (not daily).

Münich, 485 m. (1 kw.). 11.30, lec., con. (Sun.); 14.00, time sig., news, weather; 15.30, markets; 16.00, orch. (Sun.); 16.30, con. (weekdays); 17.00, children (Wed.); 18.30, con. (weekdays); 19.15, lec.; 19.45, Engl. (Fri.); 19.30, con. (Sun.); 20.00, Italian (Mon.); 20.30, con., news, weather, time sig.; 22.00, late con. (irr.).

Munster, 410 m. (2½ kw.). 11.45, Radio talk, Divine Serv.; 12.00, news (Sun.); 12.30, news (weekdays); 12.55, Nauen time sig.; 15.30, news, time sig.; 16.00, con.; 17.00, children (Sat.); 19.40, news, weather, time sig., lec.; 20.25, women (Mon.); 20.30, con.; 22.00, Engl. (Tues., Fri.), Spanish (Mon., Thurs.), Esperanto (Wed.).

Nuremberg, 340 m. (800 w.). Relay from Munich.

Stuttgart, 443 m. (1½ kw.). 11.30, con. (Sun.); 16.30, con. (weekdays); 17.00, con. (Sun.), children (Wed., Sat.); 18.30, time sig., news; 19.00, lec.; 19.30, Esperanto (Thurs.), Engl. (Wed.); 20.00, con. (daily); 21.15, time sig., late con. or cabaret.

ESTHONIA.

Reval, 350 m. Testing.

FINLAND.

Helsingfors, 370 m. 09.00, sacred service (Sun.); 18.00, time sig., weather, news, opera (daily).

HOLLAND.

Amsterdam (PCFF), 2,125 m. (1 kw.). Daily: 08.35-16.50 (exc. Mon. and Sat., when 10.50-11.50), news, Stock Ex. (PX9), 1,070 m. (400 w.), 21.20, con. (Mon.). (PA5), 1,050 m., 20.20, con. (Wed.).

Hilversum (HDO), 1,060 m. (2½ kw.). 10.40, sacred service (Sun.); 12.20, news; 14.50, con. (Sat. and Sun.); 18.20, children (Mon.); 20.20, con. or lec. (Wed., Fri.), relay of Mandelberg con., Amsterdam (Thurs.), opera or con. (Sat.).

Bloemendaal, 345 m. 10.20 and 17.20, Divine service (Sun.).

HUNGARY.

Buda-Pesth (Csepel), 565 m. (2 kw.). 20.00, con. (Tues., Thurs., Sat.).

ITALY.

Rome (1RO), 425 m. (2½ kw.). 10.30, sacred service (Sun.); 13.00, news (irr.); 16.00, children, Stock Ex., orch. relayed, news; 20.45, con., news, dance; 21.15, Esperanto (Mon.).

Milan (SITI), 545 m. (500 w.). 17.30, news, con.

JUGO-SLAVIA.

Belgrade, 1,650 m. (2 kw.). 18.30, con., news, weather (daily).

NORWAY.

Oslo, 380 m. (500 w.). Con., daily, about 20.30. **Aalesund,** 515 m. Testing.

POLAND.

Warsaw (PTR), 385 m. (½ kw.). 18.00; 20.00 (irr.).

RUSSIA.

Moscow (Central Wireless Station), 1,450 m. Sundays: 13.45, lec.; 16.30, news and con. Weekdays: 14.00, markets; 16.30, news or con.

(Sokolniki Station), 1,010 m. Sundays: 15.30, con.; 18.00, lec. and con. (Tues., Thurs., Fri.).

(Trades Union Council Station), 450 m. 18.00, con. (Mon., Wed.).

SPAIN.

Madrid (R1), 392 m. (3 kw.). Sundays: 19.00, time sig., con., lec. Weekdays: 13.30, news, lec.; 19.00, *La Libertad* con. (Tues., Thurs., Sat.); 23.00-01.00, Radio-Madrid con., time sig., lec. (Mon., Wed., Fri.).

Madrid (ARE), 490 m. 4 p.m., con.

Barcelona (EAJ1), 325 m. (600 w.). 18.30, lec., markets, Stock Ex., con.

Bilbao (EAJ8), 415 m. (1 kw.). 20.00, con., news.

Seville (EAJ5), 350 m. (1 kw.). 19.30, con., news, weather.

Cartagena, 300 m. (500 w.). 18.00, tests.

Cadiz, abt. 300 m. Testing.

SWEDEN.

Stockholm (SASA), 427 m. (500 w.). Sundays: 10.55, sacred service; 17.00, children; 18.00, sacred service; 20.00, con.; 21.00, news, con., weather. Weekdays: 12.30, weather, Stock Ex., time sig. (12.55); 20.00, lec. (irr.), then same as Sun.; 22.00, dance (Wed., Sat.).

Gothenburg * (SASB), 290 m. (500 w.). 10.55, sacred con. (Sun.). From 12.30 onwards S.B. from Stockholm.

Malmoe * (SASC), 270 m. (500 w.). As Gothenburg.

Sundsvall * (SASD), 545 m. (500 w.). As Gothenburg.

Boden * (SASE), 2,500 m. (500 w.). As Gothenburg.

Falun (SMZK), 370 m. (250 w.). 20.00, S.B. from Stockholm thrice weekly.

Joenkoeping (SMZD), 265 m. (250 w.). See Falun.

Norrkoeping (SMVV), 260 m. (250 w.).

Karlstadt (SMX9), 370 m. (250 w.).

Trollaattan (SMXQ), 345 m. (250 w.). As Falun.

* Local programmés are also broadcast at times.

SWITZERLAND.

Lausanne (HB2), 850 m. (500 w.). 08.05, weather; 13.30, weather, markets, time sig., news; 17.00, children (Wed.); 18.55, weather, news; 21.15, con. (exc. Wed.), dance (Thurs. and Sat.).

Zurich (Höngg), 515 m. (500 w.). 12.00, weather; 12.55, Nauen time sig., weather, news, Stock Ex.; 13.30, piano soli; 17.00, con. (exc. Sun.); 18.15, children, women (Mon., Wed.); 19.00, weather, news (exc. Sun.); 20.15, lec., con., dance (Fri.); 21.45, news.

"A Garden Hammock-seat," a very useful and comfortable piece of garden furniture for the summer, is illustrated and described in the current issue of THE AMATEUR MECHANIC AND WORK (3d.). Other articles appearing in this number are: "A New Variable-speed Electric Motor," "Crumb-sweeper and Tray Combined," "Repairs to Motor-car Tanks," "A Single-valve Receiving Set: A Use for the Old Gramophone Case," "A Terminal Tip," "A Few Hints About Corks," "Tips for the House-builder," "An Easily-made Bunsen Burner," "Building a Flat-bottomed Dinghy."

Ask "A. W." for List of Technical Books

Crystal Sets in York

SIR,—I should be pleased to hear from anyone in York who has a crystal set and who can receive the Leeds relay station. Will they kindly give a description of the circuit they use and any information that will be helpful, as up to the present I have failed to get results.—A. G. GOODWILL (50, Stonegate, York).

Panel Transfers

SIR,—There have appeared recently letters on the subject of fixing panel transfers. These give various methods, from using methylated spirit to rubber solution. The fact is that all panel transfers can be firmly fixed with water only. I have tested this method many times, and the results are in every way as good as with a hot pad. The method is as follows: Strip the transfer from its backing, lay it face down on the panel, apply a damped cloth to the back, then dip a finger in some water and make the paper wet, dab the surplus moisture off and remove the paper, leaving the lettering fixed. If, as sometimes happens, the letters get moved out of their places when removing the paper from panels, they can be replaced with a pin.—N. S. (London, W.).

Appreciation from Australia

SIR,—I cannot let this opportunity pass of congratulating you upon your paper; it is indeed a boon to all inexperienced amateurs. In Australia it finds its way into every "corner," and I am sure every reader has always benefited by reading "A.W."

Wireless at present is booming in Australia, though the number of listeners-in cannot be compared with the number in your country.

In our town wireless took a long time to get a footing. A club was formed several years ago, but until about nine months ago they had to be content with the humble crystal set; but it now has its own club-room and a five-valve set.

The prices of material out here are simply abominable as compared with those in your country. The price of a crystal detector of any quality at all is 10s. 6d. —C. E. R. (Broken Hill, New South Wales).

Other Correspondence Summarised

H. L. Y. (Streatham), referring to the article entitled "Loud-speaker Work with Frame Aerial and Two Valves" in No. 154, states that he obtained excellent results when using a standard single-valve detector and note-magnifier in conjunction with a "shorted" frame aerial.

A. W. (Cornwall) wishes to express his appreciation of the generous and business-like treatment he received from Messrs. Accumulators, Ltd., of Woking. They exchanged a faulty 6-volt accumulator for a new one after it had been in use for nearly twelve months, and specially fitted wooden separators free of cost.

CHIEF EVENTS OF THE WEEK

SUNDAY, June 7

London	4.0	Organ Recital.
Birmingham	4.0	Chamber Music.
Manchester	4.0	Band of the Salford City Police.
Aberdeen	4.0	Chamber Music.

MONDAY

5 X X	8.0	Band of the Royal Air Force.
London	8.0	*The Song of Hiawatha* (Coleridge Taylor).
Cardiff	8.0	An Hour with Schumann.

TUESDAY

London	8.0	A Memory Test Programme.
Birmingham	8.0	Musical Comedy Programme.
Belfast	8.15	*Trilby* (George du Maurier).

WEDNESDAY

Bournemouth	8.0	A Programme of Humour.
Manchester	8.0	Chamber Music.
Newcastle	8.0	Selections from Opera.
Glasgow	8.0	Operatic, Symphony and Ballad Concert.

THURSDAY

London	8.0	Chamber Music.
Birmingham	8.0	*La Fille de Madame Angot.*
Bournemouth	8.0	Concertos for the Piano, Violin, Violoncello and Clarinet.
Newcastle	8.0	Orchestral Concert, with songs and parts for 2 pianos.
Aberdeen	8.0	Scandinavian Night.
Liverpool	8.0	Birthday Programme.

FRIDAY

London	10.30	"My Adventure in Jermyn Street," by A. J. Alan.
Bournemouth	8.0	Military Band and Musical Comedy.
Cardiff	8.0	"Summer is Icumen in."
Belfast	7.30	Chamber Music.

SATURDAY

London	8.0	A Dance Evening.
Cardiff	8.0	Popular Music of the Moment—II.
Manchester	8.0	*Faust* (Gounod).
Newcastle	8.0	Popular Concert.
Glasgow	8.30	Scenes from Great Plays.
Belfast	7.30	"The Dance thro' the Ages.

AN INTERESTING TALK

MILITARY music appeals to listeners of every sort, and for that reason special interest centres in a feature of the London programme for the evening of Friday, June 19. There is to be a talk on British regimental marches by Mr. Walter Wood, and the 2 L O Military Band, with pipers and buglers, conducted by Mr. Dan Godfrey, Junr., will play some of the most famous of these exhilarating compositions. There are many stirring and romantic stories in connection with the origin and adoption of regimental marches, and Mr. Wood will tell a number. The subject has been a hobby with him for many years, and he possesses a good deal of remarkably interesting information relating to it. Of course only a selection of the tunes can be given, but it has been made as representative as possible, and includes several great favourites. The present arrangement is for the descriptive talk and the music to be given from eight to nine o'clock.

We are informed by the Radio Association, of Sentinel House, Southampton Row, W.C.1, that a limited number of copies of the Radio Association Handbook will be supplied gratis to the public upon application.

Club Doings: We regret that owing to the pressure upon our space we have been obliged to hold over the Club reports this week.

A WONDERFUL BIRTHDAY CLUB

HERE is a fine opportunity for boys and girls everywhere.

The *Daily Graphic* is organising a great Children's Birthday Club, which promises to be the most extensive of its kind ever attempted—in fact, the World's Greatest Birthday Club.

As a beginning some 25,000 handsome birthday gifts, of over £7,000 in value, will be presented to members. The scheme is making a fascinating appeal to boys and girls throughout the country, and thousands everywhere are becoming members. All are free to take part, and there are no irritating conditions such as entrance fees or time limits. Indeed, the scheme imposes no kind of special obligation upon readers who want to benefit by it other than the normal and regular purchase of the *Daily Graphic*. It is so simple that even a child of eight can participate in the scheme.

Enrolment of members of the Birthday Club will be followed by the presentation to each on his or her birthday of a splendid present of either a "Blackbird" fountain pen (value 6s.), made by Messrs. Mabie, Todd and Co., the manufacturers of the famous "Swan" pen, or a handsome presentation box of Cadbury's choicest chocolates.

Fellowship is one of the chief joys of old and young, and the aim of this great Birthday Club will be to unite in one "huge family" young readers of the *Daily Graphic*, and particularly readers of the merry adventures of that paper's famous pets—Poll, Jock and Valentine.

Have your children joined?

Give them the opportunity of becoming members of this novel Birthday Club now. Full particulars of the scheme appear in the *Daily Graphic*. Order its regular delivery by your newsagent *at once* to make sure of it.

From the Igranic Electric Co., Ltd., of 149, Queen Victoria Street, London, we have received a pamphlet illustrating the Radioloc, a novel dual-purpose switch for the master control of filament circuits and to prevent unauthorised persons from using the wireless set.

ANNOUNCEMENTS

"Amateur Wireless and Electrics." Edited by Bernard E. Jones. Price Threepence. Published on Thursdays and bearing the date of Saturday immediately following. It will be sent post free to any part of the world—3 months, 4s. 6d.; 6 months, 8s. 9d.; 12 months, 17s. 6d. Postal Orders, Post Office Orders, or Cheques should be made payable to the Proprietors, Cassell & Co., Ltd.

General Correspondence is to be brief and written on one side of the paper only. All sketches and drawings to be on separate sheets.

Contributions are always welcome, will be promptly considered, and if used will be paid for.

Queries should be addressed to the Editor, and the conditions printed at the head of "Our Information Bureau" should be closely observed.

Communications should be addressed, according to their nature, to The Editor, The Advertisement Manager, or The Publisher, "Amateur Wireless," La Belle Sauvage, London, E.C.4.

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