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Amateur Wireless

And Electrics

Vol. VI No. 136.

SATURDAY, JANUARY 10, 1925

Price 3d

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VALVER

THE CRYSTAL SET
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"MY HIGH-POWER
LOUD-SPEAKERSET"

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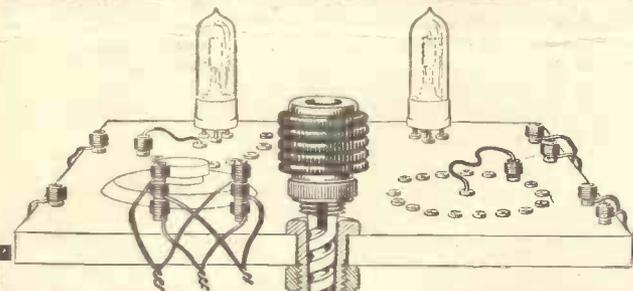
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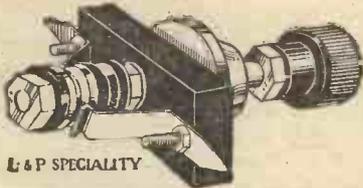
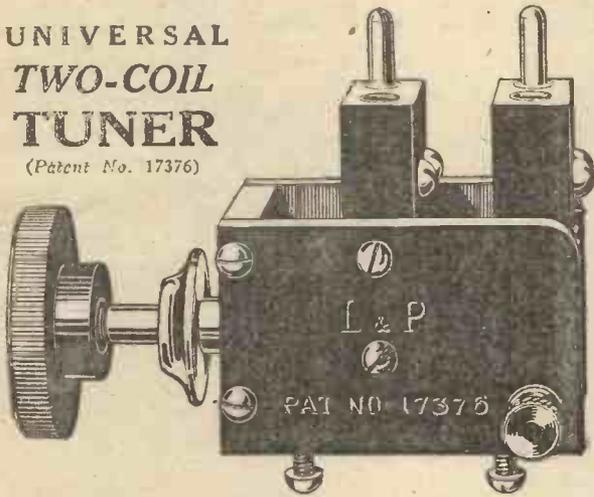


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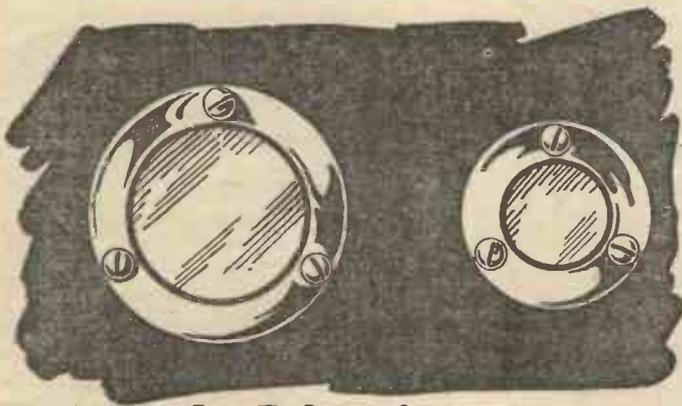
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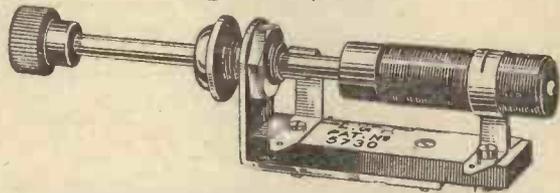
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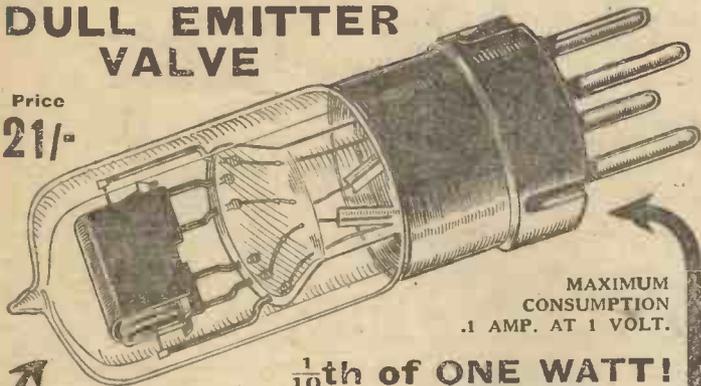
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A TUNGSTALITE
ENTHUSIAST

Felix stops perambulating !
Why stands he thus, hand elevating ?
—Pose emphatic, eyes ecstatic—
is that master mind debating
Schemes for which the world is waiting ?

Felix stops perambulating !
Why stands he thus, noise deprecating ?
Wreathed in smiles, forgetting tiles,
Are those active feet arrested
While some wondrous power is tested ?

Felix stops perambulating !
And the world, no longer waiting,
Shares the pleasure of a treasure.
See his hand an ear caressing,
And his whiskers crystal pressing !

Felix stops perambulating !
From waves ethereal emanating,
Sounds entrancing, joy enhancing,
A message clear proclaims with might
The wondrous power of Tungstalite !

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"The Finest Crystal in Existence!"

Amateur Wireless

and Electrics

Vol. VI. No. 136

January 10, 1925

WHAT YOUR CONDENSERS DO

WE have had to revise many of our ideas with regard to the working of wireless in recent times. In the infancy of the new science it was thought that as the currents operating the receiving set were electrical they must behave in all respects as other currents did. Experience, however, showed that many of the accepted laws were inapplicable to them.

What we may call ordinary currents may be divided roughly into two groups, those that flow always in one and the same direction, and those that reverse the direction of their flow at regular intervals. The latter are called alternating currents, their cycles or change of direction occurring from 30 to 200 times a second.

Wireless impulses are alternating currents in a sense, for they have regular cycles. Where they differ from ordinary currents is in the frequency of their changes of direction. The impulses produced by a wireless transmission on a wavelength of 1,000 metres surge up and down 300,000 times a second; if the wavelength is a short one the changes occur with far greater frequency; at 400 metres, for example, they take place 750,000 times a second. To distinguish them from their comparatively calm alternating brethren they have been named oscillating currents.

H.F. Currents

They have two main peculiarities so far as the amateur wireless man is concerned. The first is that they pass with the greatest ease through a condenser, which acts as a barrier to the flow of direct current. Hence if we wish to deliver oscillating impulses only through a lead which also carries a direct charge, we can do so by inserting a condenser in series, as in Fig. 1, which shows an ordinary rectifying circuit.

The condenser at A effectively bars the passage of currents from the low-tension battery, but allows oscillating impulses from the aerial-tuning inductance to reach the grid of the valve without let or hindrance. At B a variable condenser is

shown in series. This condenser, which tunes the inductance by varying the amount of capacity in the aerial circuit, also provides a free path for oscillations. What is the purpose of the condenser (C) which bridges the high-tension battery? In the first place, there are always a certain number of high-frequency impulses in the plate circuit, and if the

remove my phone condenser I can still hear signals and even speech?" By taking away the condenser you have not reduced to nothing the capacity in the telephone circuit. There is capacity between the terminals, between the flex leads, between the turns of the windings of the magnets, and even between the receivers and your head, which acts as an earthed plate!

And so long as there is capacity the by-pass effect will take place. The shunted condenser merely improves matters by adding the amount of capacity needed to give the best results.

Capacity in Parallel

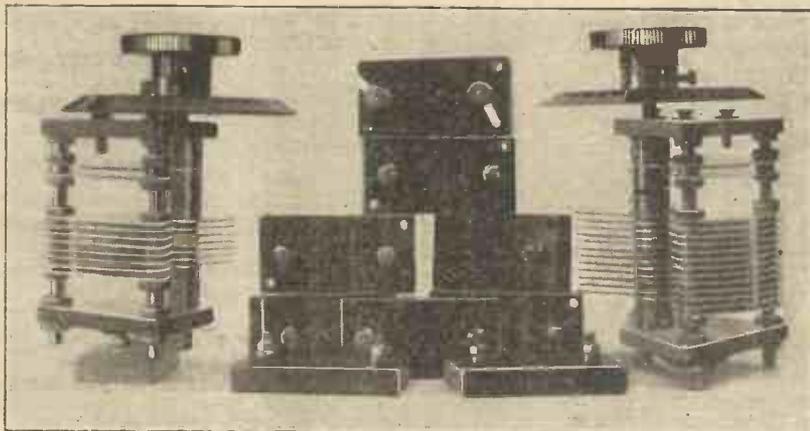
Any capacity placed in shunt or in parallel (the two terms are really identical) has a damping effect upon oscillating currents, an effect which increases in inverse proportion to the wavelength. It is for this reason that it is undesirable to have the

aerial-tuning condenser in parallel for short-wave reception. To wire it so damps the primary circuit and renders the whole set less responsive to the impulses brought in by the aerial.

Fig. 2 shows what happens when a large condenser and a very small inductance in parallel with it are placed between aerial and earth. Impulses find a much easier path to earth through the condenser than through the inductance, hence only a fraction of their full strength reaches the set. The bigger the condenser and the smaller the inductance, the greater will be the damping produced at a given frequency. The higher the frequency, the lower is the capacity of the condenser needed to pass it; hence on very short waves even a small condenser in parallel may seriously reduce signal strength.

We have made only the briefest mention of the grid condenser, merely showing that it is called upon to prevent the passing of potential direct from the battery to the grid of the detector valve. The exact way in which condenser rectification takes place is a vexed question about which there are

(Concluded in third column of next page)



A Group of Fixed and Variable Condensers.

battery were left unbridged its internal resistance would considerably impede their flow. In the second it is of great importance that the potential applied to the plate should be steady. The condenser acts somewhat like a reservoir, or the gas-bag of a gas-engine. Should there be any

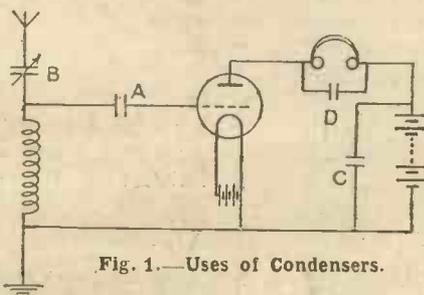


Fig. 1.—Uses of Condensers.

irregularity in the H.T. battery's discharge, the condenser "mops them up" and so smooths out the current.

The fourth condenser of interest is that shown at D, which is shunted across the telephones.

You may say, "Yes, that's all very well, but how do you explain the fact that if I

HOW TO SOLDER

The Process Defined

AS the constructor of wireless apparatus must early feel a need for a practical acquaintance with the operation of soft-soldering, consideration is here given to the tools required for and fundamentals of this really simple practice.

Soldering is a process of "making solid," from which phrase, it is said, the term "solder" is derived. By means of this process two pieces of the same or different metals may be united by the interposition of a softer metal known as solder, although there are some metals (such as aluminium) which cannot be soldered. It will thus easily be seen that solder must have a lower melting point than the metals being soldered. Soft soldering is distinct from hard soldering only because greater heat and different solder (known as spelter) is used; soft solder may be melted with an ordinary soldering-iron, whereas a brazing lamp or other high-temperature heating apparatus is necessary for brazing.

Composition of Solder

Soft solder is usually an alloy of tin and lead in varying proportions. The greater the percentage of lead the harder is the solder; for a very soft solder, such as is needed for electrical work, one in which tin predominates should be selected. The variety known as "blowpipe solder" will be found very suitable. It has a 95 per cent. tin content.

Sometimes bismuth, cadmium, zinc or aluminium are added to solder to give it certain properties, but there is no need to deal with that point here.

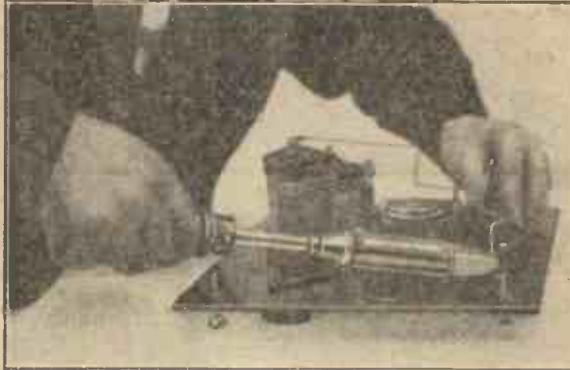
For certain purposes the paste solders (which do not need a flux) may be used.

Treatment of Surfaces to be Soldered

For solder to effect a thorough joint it should partly amalgamate with the edges or surfaces being soldered. To render this possible the latter must be free from grease, rust, etc., and they should therefore be scraped, filed, or cleaned with emery-cloth, so that they are quite bright. The importance of cleanliness cannot be over-emphasised.

Flux

The mechanical cleaning process has been dealt with. For a satisfactory joint to be made the contacting parts must be chemically clean, and for this purpose a flux is used. For ordinary purposes a flux consisting of hydrochloric acid, in which scraps of zinc have been dissolved, is chiefly used, but as in electrical work a non-corrosive flux must be used attention is here directed only to the latter. Any



Soldering the Internal Connections.

of the well-known commercial fluxes such as Fluxite are suitable, and so is tallow, olive oil, glycerine, or resin, the latter perhaps being the best.

The Soldering-bit

The soldering-iron, -bit or -bolt, by which term it is known, is merely a rod of iron into one end of which a piece of copper has been fixed, the other end having a handle. The photograph shows an electrically-heated bit of the straight type. The copper bit is the means by which the solder is melted. A bit about 1 oz. in weight is quite large enough for soldering wires and small parts, but for larger work a large bit, say 6 oz. or 7 oz. in weight, is necessary, so that the heat is not so rapidly dissipated. Very small sets are sold for use with tinol and similar paste solders, and these can be recommended for small work.

Tinning the Soldering-Bit

The point of the bit must be heated sufficiently to melt the solder. By experience the worker can instinctively tell when the bit is hot enough. When heated the point must be filed bright on the faces of its point, a stick of solder held on its point so that a bead adheres, and then each face rubbed vigorously on a piece of tinfoil on which some flux has been spread. It will now be noticed that the faces of the bit are covered with a thin coat of solder. This is known as "tinning" the bit.

It must not be presumed that this tinning is necessary every time a soldering job is to be done; one "tinning" will last for months, provided that the bit is not overheated.

Heating the Soldering Bit

A smoky fire is useless for heating the bit, as the point becomes coated with a tarry deposit. A clear fire should be used, and the whole bit just buried below the surface. On no account should the bit be made red hot, as the tinned face burns off. Even if this were not so, a red-hot bit oxidises the solder, rendering it pasty and a good joint impossible.

A gas-ring may be used for heating purposes, and if a great deal of soldering is to be done a special coke stove is advisable, so that one iron is getting hot while the other is in use.

Perhaps the cleanest and best method of heating is to have a special gas-heated or electrically-heated bit; these are obtainable in all sizes. Gas-heated bits are cleanly and expeditious in use, but, of course, entail a connection with the gas supply to a tubular extension of the handle. Petrol-heated soldering-bits are also obtainable.

Blowpipe Soldering

There is another method of soft soldering which must be dealt with—blowpipe soldering. This method dispenses with the use of a soldering-iron, the heat being supplied by a methylated spirit lamp boosted by a mouth blowpipe.

The work is cleaned and flux applied just as with ordinary soldering. F. C.

"WHAT YOUR CONDENSERS DO" (continued from preceding page)

many opinions. Were you to ask half a dozen experts for an explanation you would possibly receive as many varieties of answer.

The most common explanation of this

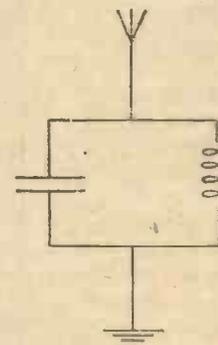


Fig. 2—
Action of
Condenser
in Aerial
Circuit.

condenser's functioning is that oscillations pass through it to the grid, which is charged by them first positively, then negatively. The positive charge aids the plate to draw electrons from the filament, whilst the negative counteracts the influence of the positive anode potential and dams back the flow of electrons. In time the grid becomes choked with electrons which pass away via the leak to the filament, thus clearing the way for a fresh train of oscillations.

This condenser, then, serves to insulate the grid from direct current and to provide an easy path for H.F. impulses.

MICROFARAD.

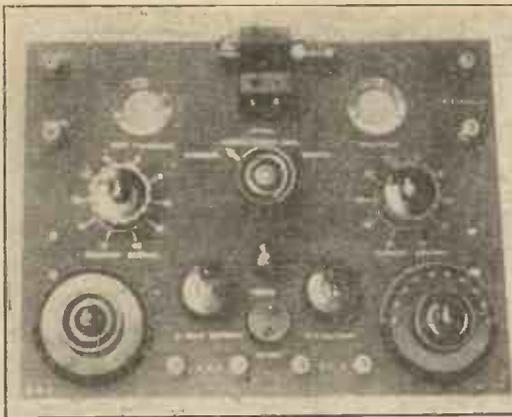


Fig. 1.—View of Top Side of Panel.

AN IDEAL TWO-VALVER

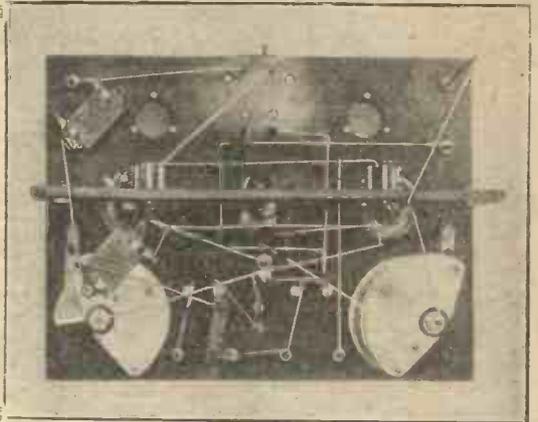


Fig. 2.—View of Under Side of Panel.

THE novice in wireless, after the successful handling of a crystal set, frequently desires to become a member of the valve fraternity, but hardly knows how to proceed. He is often tempted by one-valve "fancy circuits" with the idea of getting as much as possible out of one valve. For a beginner this is a serious mistake, and in time he will learn that experts recommend straight circuits for most purposes.

The particular two-valve set under consideration (see Fig. 1) comprises a high-frequency amplifier and a detector with tuned-anode and reaction on to the aerial coil. If desired a slight modification might be made and the reaction be coupled to the anode coil, but in the set about to be described this was not done, as it is probable that in future experiments will be made with resistance coupling.

Materials

The list of materials and components required is as follows: One ebonite panel, 9 in. by 12 in.; one strip of ebonite, 12 in. by 1½ in.; eight plated terminals; one .0003-microfarad variable condenser with vernier; one .0005-microfarad variable condenser with vernier; one Dubilier fixed condenser, type 600, .002 microfarad; one Dubilier fixed condenser, type 600, .0003 microfarad; one Mansbridge condenser, .05 microfarad; eight valve legs; one two-coil holder; one anode coil holder; one Bretwood variable grid leak; one series-parallel switch, drum pattern; two tumbler switches; two "Decko" valve windows; two "King" filament resistances with vernier (McMichael) (care must be taken that the resistances of these rheostats are suitable for the valves to be used); two brass brackets and sundries, comprising screws, nuts, wire, etc.

Construction

To proceed with the making of the set, first obtain the large sheet of ebonite, and if it is possible to get this matted so much the better. Should the ebonite be polished it will be necessary to rub this down with emery-cloth or some other abrasive material. Rubbed-down ebonite will have a brown appearance, and a

black surface may be obtained by treating the surface with oil sparingly applied.

Now mark out the panel to suit the components purchased. A great deal of work can be saved if the purchased components are adapted for one-hole fixing. An endeavour was made in the set herein described to arrange the components symmetrically about the panel, and yet ensure that the wiring at the back would not be too crowded and not unduly long. Mark out the panel with a steel rule and scriber on the face of the ebonite which is considered second best, the surface selected for the front being placed face downwards on a cloth or some similar surface to prevent it from becoming marked.

It will be possible to arrange on this panel all the components with the exception of the fixed condensers (which are held in position by convenient screws, as hereinafter described) and the valve legs. The latter are carried on the 1¼-in. ebonite strip, supported by the brackets mounted at the back of the panel.

The holes may now be drilled for the reception of the components. Definite dimensions have not been given, as they will obviously vary according to individual components employed.

Wiring

There does not appear much necessity for going fully into the matter of wiring, as the reader will be able to get a good idea of how this is carried out from the photograph (Fig. 2) and by means of the wiring diagram (Fig. 3). It is advisable for the constructor to sketch this out for himself on a sheet of paper and then redraw it on a second sheet, making any

modifications which may be necessary in reducing the length of wire. This should be repeated as often as required until the minimum length is found. It may be explained, however, that the busbar wiring is carried through holes drilled in the panel to the terminal screws of the fixed element of the coil holder.

The fixed condensers are held in position in various ways. One is held down by the nut of a terminal on the panel, another by a nut of a terminal on the condenser; if preferred this may be screwed direct to the panel.

Results

By means of a set such as that described it should be possible under favourable conditions and the use of correct coils to hear all the British broadcasting stations and many of the Continental stations. If a low-frequency amplifier be added it should be possible to hear the majority of these stations on a loud-speaker. For this purpose a three-valve resistance-coupled amplifier is recommended. H. J. H.

INTERFERENCE FROM LIGHTING PLANT

WHEN a sensitive multi-valve receiver is installed in a country house fitted with its own lighting plant serious interference may be caused, either by commutator sparking from the dynamo or from the ignition system of the gas-engine. It is frequently a matter of considerable difficulty to overcome this trouble. In the first place, the aerial and receiving set should be placed as far away as possible from the main lighting plant and supply leads. Commutator noise can usually be reduced by fitting a large blocking condenser across the dynamo brushes. The magneto leads should be cased in metal braiding, or sheathed with lead so as to minimise radiation. A metal sheet or screen near the ignition system will also serve as an additional safeguard. Finally the use of a counterpoise with the aerial instead of the usual earthing system will often eliminate the effects of local interference of this kind. M. A. L.

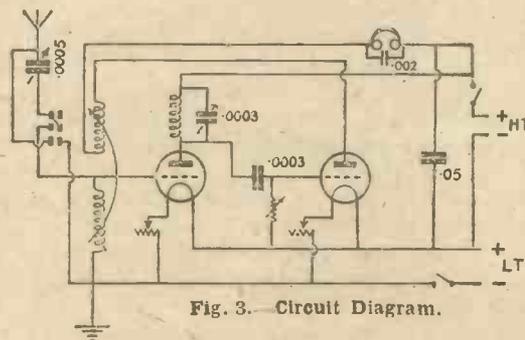
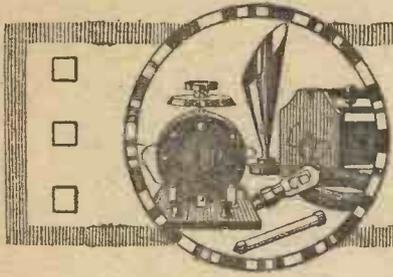


Fig. 3.—Circuit Diagram.

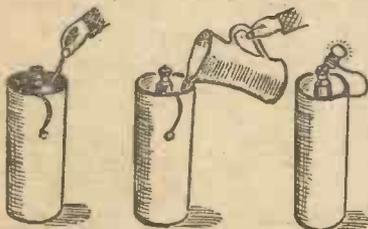


PRACTICAL ODDS AND ENDS

Reviving Dry Cells

A CONSIDERABLE extension of life can often be obtained from large dry cells of which the zinc cases are sound by carrying out the operations as shown in the diagram.

If at all possible, either rain or distilled



1. REMOVE PITCH FROM TOP
2. FILL UP WITH RAIN WATER
3. LEAVE FOR AN HOUR—THEN TEST

Method of Treating Dry Cells.

water should be used in preference to tap water, as the latter is likely to contain metallic impurities which would be injurious to the cell.

R. N. W.

Fixing Small Components

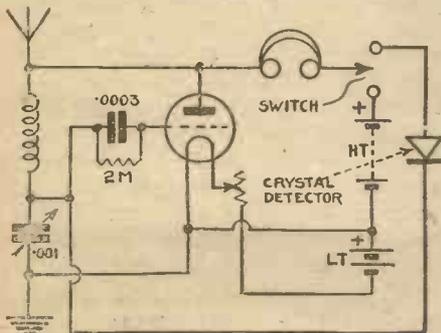
CONSTRUCTORS should remember that small components which cannot be easily screwed to a panel can be stuck in position quite rigidly with a little Chatterton's Compound.

S.

Valve or Crystal

MANY users of the ultra-audion one-valve circuit would doubtless like to be able to use the set as a crystal receiver without disturbing the valve connections.

This may be easily done by fitting a crystal detector and a single-pole double-throw switch as shown in the illustration.



Switching for Valve or Crystal.

With the switch arm on one contact the usual ultra-audion circuit is in use, while the other position of the arm gives a crystal circuit with the condenser in series with the earth lead.

N. R.

Stabilising the Valve

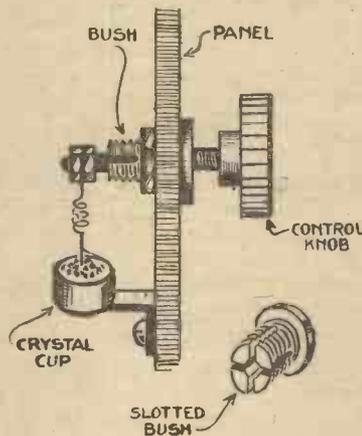
WHENEVER a valve is not functioning as a detector, the circuit can nearly always be stabilised by putting a negative bias on the grid. The value of this depends upon the valve and the amount of high-tension being used; it can best be determined by experiment.

D. S. R.

Back-of-panel Detector

A BUSH and a knob to match the remaining control knobs on the set are all that appears on the outside of the panel when using the type of detector shown by the illustration.

The bush should preferably be slotted and the sides sprung together in order to grip the spindle, while the crystal cup



Back-of-Panel Crystal Detector.

should be set at an angle in order that the catwhisker pressure on the crystal may be varied.

Clearance between the knob and the bush should be sufficient to enable the exposed surface of the crystal to be searched for sensitive spots.

W. R.

Novel Catwhisker

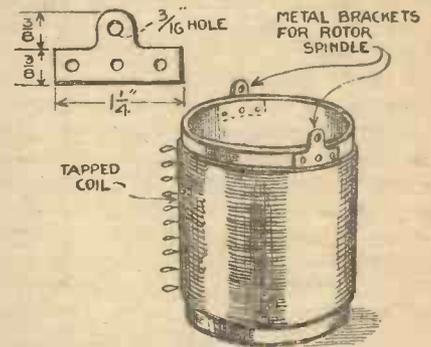
HERE is a method of making a novel form of catwhisker that has been found to give very good results when used with crystals of the artificial galena type. Obtain a length of No. 26 or 28 bare copper wire and make a kink about 3 in. from one end. Draw the wire tight and break it at the kink.

The 3-in. length should now be shaped into a spiral, or whatever form the whisker is to take, and mounted in the chuck of the detector arm so that the rough broken end can be brought into contact with the crystal.

C. A. L.

Simple Rotor Mounting

MUCH of the laborious work entailed in the construction of a tapped variometer or variocoupler for broadcast reception can be eliminated by purchasing



Simple Rotor Mounting.

an ordinary tapped cylindrical inductance coil having about 100 turns with a tapping every tenth turn and fitting the rotor spindle in two metal brackets fixed to the wound portion of the tube.

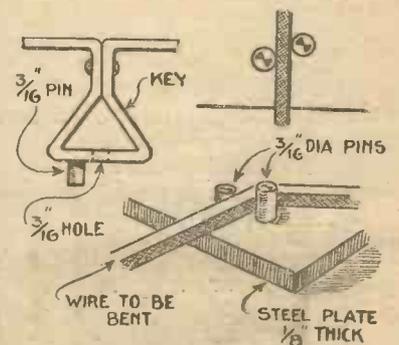
The device can also be successfully used for mounting the reaction coil in reaction or super-regenerative sets.

C.

Wire-bending Tool

THICK square- or round-section wire may be accurately shaped without the use of pliers by using the device shown in the illustration. A steel or iron plate in which two round-section steel pins are fitted forms the basis of the tool, the wire being inserted between the pins and bent to the required angle or made into a loop by means of the key shown at the top.

It should be noted that one of the pins



Details of Wire-Bending Tool.

in the plate protrudes a distance equal to the thickness of the wire, while the other is sufficiently long to be inserted in the swivel hole in the centre of the key.

C. A. L.

CRYSTAL TALKS.—VIII.

SELECTIVITY

A VERY useful unit which may be added to any type of receiver is a wave trap. This instrument enables the experimenter to cut out local interference and obtain stations on a near wavelength band. As an experimental unit it should prove of considerable interest, and should be made in such a way as to enable the operator to link it up with any existing receiver at a moment's notice. The following is a brief description of how such a unit may be constructed; it is designed to add to the crystal receiver described in "Crystal Talks V" (No. 130). The construction is comparatively simple, and the method of winding the coil original and highly efficient.

Construction

The materials required for construction will be one piece of ebonite, measuring 4 in. by 4 in. by $\frac{3}{16}$ in.; one piece of ebonite, measuring 2 in. by 2 in. by $\frac{3}{16}$ in.; two pieces of wood or ebonite, measuring 3 in. by $3\frac{5}{8}$ in. by $\frac{3}{16}$ in.; eight terminals, and some No. 22, 24, or 26 d.c.c. wire.

First construct the coil by preparing the wooden or ebonite pieces shown in Fig. 1. Two of these will be required. The best method of doing this is to first cut the pieces to the given dimensions and then clamp them securely together. Next cut the slot through both pieces in one operation, and while still clamped make forty sawcuts $\frac{1}{16}$ in. deep each side, as shown. Disengage the clamps, and after finishing and smoothing fit the two pieces together by inserting one slot into the other, thus forming a T-piece. Next cut a piece of ebonite 2 in. square and drill four holes to clear the terminal screws as shown in Fig. 2. This piece is screwed on to one end of the T-piece former, thus firmly securing the two pieces. Secure the four terminals T1-T4 in position on the ebonite.

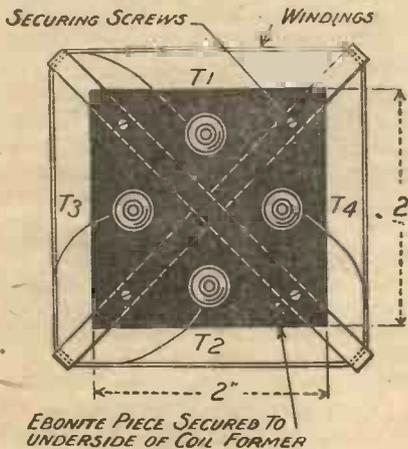


Fig. 2.—Constructional Details of Wave Trap.

To wind, commence at the first sawcut at the other end of the T-piece and travel round the sawcuts, making a square winding having forty turns in all. The beginning of the winding is carried to terminal T1 and the end of the winding T2.

A second winding is now made over the first. The beginning of this winding commences on the sixteenth sawcut, and is wound for ten complete turns. The beginning is connected to T3 and the end to T4. Next cut a piece of ebonite 4 in. square for the panel and secure the former to the

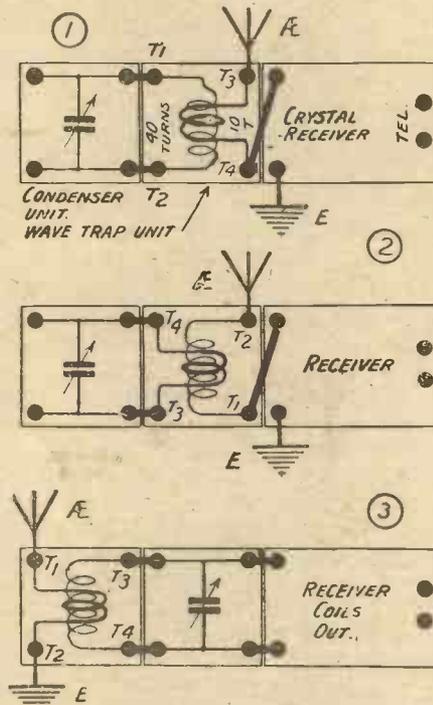
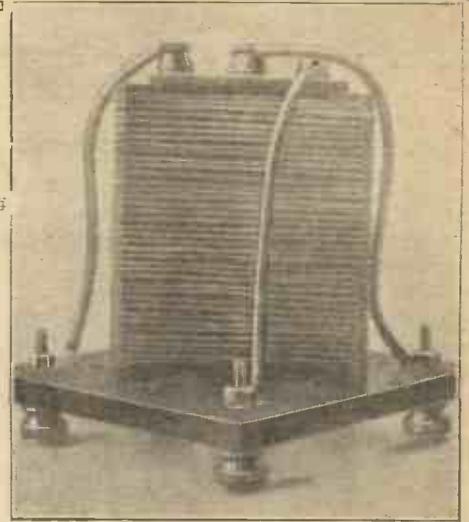


Fig. 3.—Methods of Using Wave Trap.

under side by means of four 6 B.A. screws. The panel should also be equipped with four terminals, one in each corner. Connection is then made from each of these terminals to a corresponding terminal on the under side of the former, T1 being the top left-hand terminal, T2 to the bottom left hand, T3 the top right hand and T4 the bottom right hand, looking from the top of the panel. This completes the construction of the wave trap unit. The wire is spaced wound for low capacity effects and on account of this should not be shellacked.

Operation

Various methods of operation are shown in Fig. 3. It will be seen that this unit is used in conjunction with the condenser units described in Crystal Talk No. VII (No. 133) which enables the experimenter



A Simple Wave Trap.

to try out different values of condenser, although those who so desire can embody the condenser in the unit itself, in which case a 0.0005-microfarad variable condenser should be used. The method described has, however, distinct advantages.

Some Examples

Example 1 shows the condenser linked across the large winding of the wave trap by connecting to terminals T1 and T2. The aerial is connected to T3 of the smaller winding, and T4 is connected to the aerial terminal of the existing receiver.

Example 2 shows the same principle reversed, the small winding being linked across the condenser, the aerial being connected to aerial terminal of the existing receiver, as before.

Example 3 shows how the unit may be made to act as the aerial tuning inductance in a simple crystal circuit. The aerial is connected to T4 and the earth to T3 of the smaller winding. The larger winding is connected across a condenser unit which in turn connects to detector on one side and phones on the other. Several different arrangements may be tried, and much experiment be carried out by the use of this one unit.

RADIO.

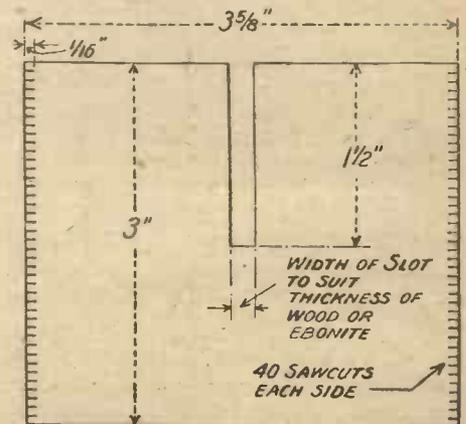


Fig. 1.—Former for Coil.

"MY HIGH-POWER LOUD-SPEAKER SET"

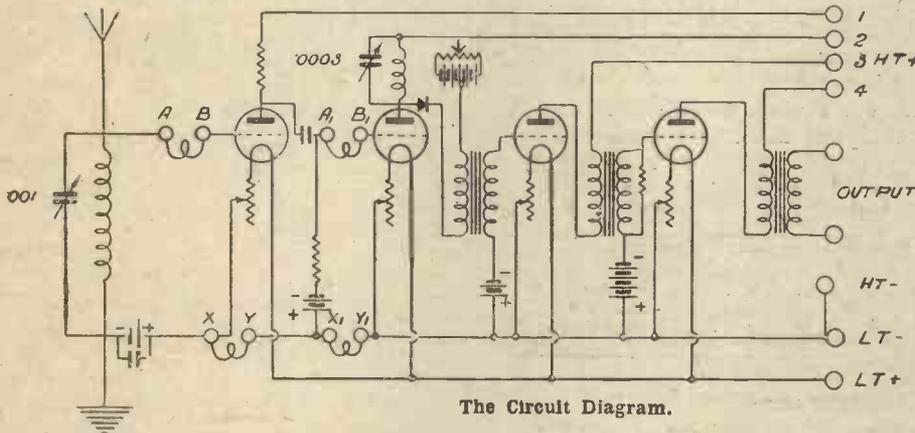
WITH the nearest 1½-kilowatt broadcasting station over thirty miles away, really good loud-speaker results are not easy to obtain. The essential "background of silence" is usually spoiled by "mush," and there is quite considerable interference from spark and C.W. stations. Four valves have to be used near the limit of their output and a certain amount

it is being adjusted are really dreadful. Therefore a carborundum-steel rectifier has been incorporated, with the usual means of applying potential. The carborundum rectifier is practically as little trouble as a valve and gives absolutely undistorted signals without any microphonic effects due to light contact between the metal and the crystal.

tions, followed by a DE6; but the ideal combination is two DE5 B valves for radio-frequency amplification, with two DE5s for audio-frequency amplification.

The power amplifier unit is so arranged that the first stage has not a large amplification factor; when less power is required the reduction is made by cutting out the first H.F. stage and not by switching out one L.F. valve, and this is done by means of the breaks at A, B, A1, B1 and X, Y, X1, Y1. These are bridged by short lengths of flex and Clix plugs. When the resistance-coupled stage is to be cut out these bridges are removed and connection made from A to B1 and from X to Y1.

VOLTA WATTS.



The Circuit Diagram.

of reaction is necessary. These things do not make for really good loud-speaker results.

The advent of the excellent high-power station, working on a wavelength singularly free from morse interference and also free from "mush," has given a chance to develop a set that would do justice to the really good B.B.C. transmission and programmes.

The Note Magnifier

The two-stage note magnifier was known to be above suspicion. Though it is transformer coupled, it really does not distort. The problem was to deliver to it undistorted speech and music of sufficient power to make possible the working of a loud-speaker so as to give the illusion of speakers and solo singers and instrumentalists actually in the room.

Distortion in front of the note-magnifier stages is known to be due, usually, to two causes. One is the use of reaction to boost signal strength and the other is the use of a valve, with grid condenser and leak, for rectification. Reaction, both designed and accidental, had to be cut out and a substitute found for the normal valve rectification. After considerable experiment crystal rectification was decided on, with two stages of high-frequency amplification, to deliver to the crystal signals of such amplitude that it would work really efficiently.

The Detector

The ordinary catwhisker type of crystal rectifier is an intolerable nuisance when used in a valve circuit. The noises whilst

Reference to the diagram will show that no attempt has been made to overcome the difficulties of using two tuned stages of high-frequency amplification. Resistance-coupled amplification is really quite efficient on 1,600 metres, and can be used in front of a tuned-anode stage with excellent results. Two resistance-coupled stages might have been used, but the tuned stage gives a considerable addition to signal strength. The anode coil must be kept well away from the aerial coil so that there is no possible chance of interaction between them.

Grid Bias

The one- or two-cell grid-bias batteries incorporated in the grid circuits of the two H.F. valves are to keep those valves from rectifying, which they will do if grid current is allowed to flow. Note that the grid-bias battery in the first valve circuit must be shunted by a condenser of fairly large capacity; .001 microfarad is suitable. As this circuit is not likely to appeal to the beginner no "layout" or wiring diagram has been given. A few details as to components may be useful, however, to save experimenting.

The anode resistance is a Dubilier of 70,000 ohms. The grid leak and condenser between the first and second valves are of the usual dimensions—that is, 2 megohms and .0003 microfarad. The potentiometer has a total resistance of 300 ohms. The battery shunted across it is made up of two flashlamp batteries—that is, 4 volts on each side of the connection to the transformer. The set works well with DER valves in the first three posi-

WINTER AND THE AERIAL

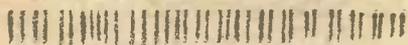
MOST aerials are erected during the warmer months, for few of us would choose a wet and cold winter's day for the outdoor work on a wireless installation.

For this reason it must be borne in mind that hot, cold, wet and dry weather all affect the length of the aerial wire, if not to a great extent, at least sufficient to bring it down if it was under strain at the time it was put up. On a standard aerial 100 ft. long a variation of about five degrees either way from freezing point may cause a contraction or expansion of as much as 2½ in., and if allowance is not made for such a contingency there is a danger of the aerial wire or its supporting mast suffering damage.

Beginners are frequently advised to run the supporting ropes through small pulleys and such cords to a cleat on the mast. By this method it is possible to slacken or tighten the aerial at will. Unfortunately, the precaution is not always taken.

In order to avoid any trouble, we can allow the aerial automatically to regulate its own tension, and this by means of a suitable weight fixed to one of the cords. The end bearing the weight must not be fastened to a cleat, but should be allowed to hang freely. If a suitable counterweight is selected it will counteract any tendency on the part of the aerial to sag, and in a high wind the weight will allow sufficient slackness to prevent the wire from snapping. A slack aerial sways with the wind and frequently causes variations in tuning.

Another point to watch is the lead-in. Where porcelain, ebonite or other insulated devices are used for conveying the aerial wire into the room it is essential that they should be efficiently protected from drops of moisture or rain. J. G. A.



Brandes

The name to know in Radio



All Brandes products carry our official money-back guarantee, enabling you to return them within 10 days if dissatisfied. This really constitutes a free trial. Brit. Manuf. (B.B.C. Stamp)

Grandpa's Choice

Grandpa now neglects his evening paper—a surprising fact, because with him it was almost a fetish. Someone brought home Brandes and the clarity with which he gets the broadcast programme, the melodious tones ensured by their *Matched Tone* feature, claim his fervid interest. There he sits, with a finger in the bowl of a half-filled and forgotten pipe, oblivious to our entreaties.

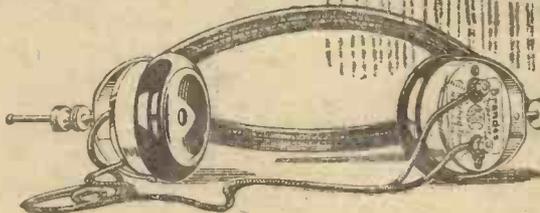
As soon as we are able to penetrate his intense interest, perhaps he will adjust the *Table-Talker* and the full, rich tones will fill the room. *Matched Tone* serves us all. Ask your Dealer for Brandes.

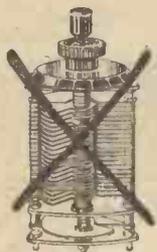
Tune the Table-Talker

42/-

— with the Matched Tone Headphones

25/-





The Old Order Changeth

Many wireless components, useful in their day, are now forgotten—superseded by others more scientific and efficient. THE LATEST TRIUMPH OF WIRELESS RESEARCH IS THE

PRICE
8'6
Postage
3d. extra

·001; ·0005
and ·0003 mfd.



VANELESS SQUARE-LAW CONDENSER

The RADIOVOX embodies extreme simplicity of design with robust construction and does not require verniers or fine tuning attachments.

It is superior to the ordinary condenser with its multiplicity of frail fixed and moving vanes.

IT GIVES THE SAME FINE TUNING IN ONE OPERATION AS IS POSSIBLE WITH THE BEST VERNIER CONDENSER, AND DISTANT STATIONS CAN BE TUNED IN WITH EASE.

The RADIOVOX has a minimum capacity so small as to be absolutely negligible, while the position of the fixed and moving electrodes is such that hand capacity effects are reduced to a smaller degree than is usual with other condensers.

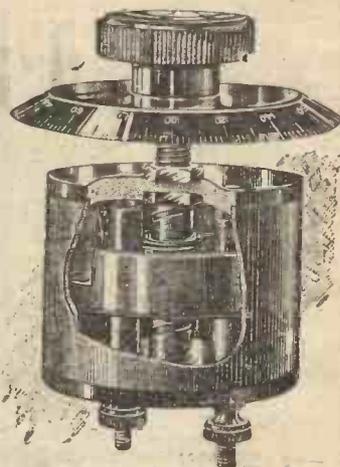
The RADIOVOX has an even scale of graduation throughout the whole of its range, and owing to

the small size of its electrodes, losses are reduced to a minimum.

The RADIOVOX Condenser has no vanes. It consists of two telescoping electrodes with a dielectric. The knob revolves twice round the circle and a vernier effect is obtainable over the whole range.

THAT IS WHY THE FINEST POSSIBLE TUNING IS SIMPLICITY ITSELF.

The RADIOVOX is encased in stout fibre, complete with dial and knob for panel mounting, strong and foolproof. It is highly polished and is an ornament to any set. One-hole fixing. In consequence of the enormous demand, orders, which must be accompanied by remittance and 3d. for postage, will be executed in rotation.



RADIOVOX LIMITED (A Dept.), 57, CHANCERY LANE, LONDON, W.C.

S.S.S.I.

HULLO!! C.Q., WILL DAY CALLING

FOR

Where there's a WILL there's a DAY

EBONITE

Many a good wireless set has been utterly ruined by being built up on a panel of cheap and faulty ebonite. Why risk a failure? Make a resolve to have your panel cut dead true to your own size from our famous Ebonite.

PRICE 4/6 per lb. ordinary finish, or 5/- per lb. Matt finish.

The new DAYZITE Variable Condensers fitted with Aluminium End Plates and both sets of Vanes adjustable.

·001, 7/9; ·0005, 5/8; ·0003, 5/1; ·0002, 4/7; Vernier, 3/11 each. Postage, 6d. each extra.

We have a complete range of **IGRANIC RADIO APPARATUS** always in stock.

No water-pipe handy? Why worry! Get a "CLIMAX" Earth Tube, 5/- each.

MAKE NO MISTAKE IN YOUR SELECTION. Do not keep wasting money on crystals of unknown repute.

GET A CRYSTAL THAT HAS STOOD THE TEST OF TIME

DAYZITE REGD.

Sold only boxed with Silver Cat's-whisker, 2/6 each, postage 3d. extra. Makes excellent contact with Zincite for a Perikon Detector.

Copy of letter recently received:—
Dear Sirs.—Will you please send me another "Dayzite" crystal. My last one must be getting on for nine months' wear and still going strong. My pal asked me to lend him my "Dayzite" which I did, and now I cannot get it back from him, so I must have one for my own set. I could not do without it. Send along early and oblige.
SHEPHERD'S BUSH.
JAMES SMITH.

Write at once for our new Catalogue. Post Free by mentioning this Paper.

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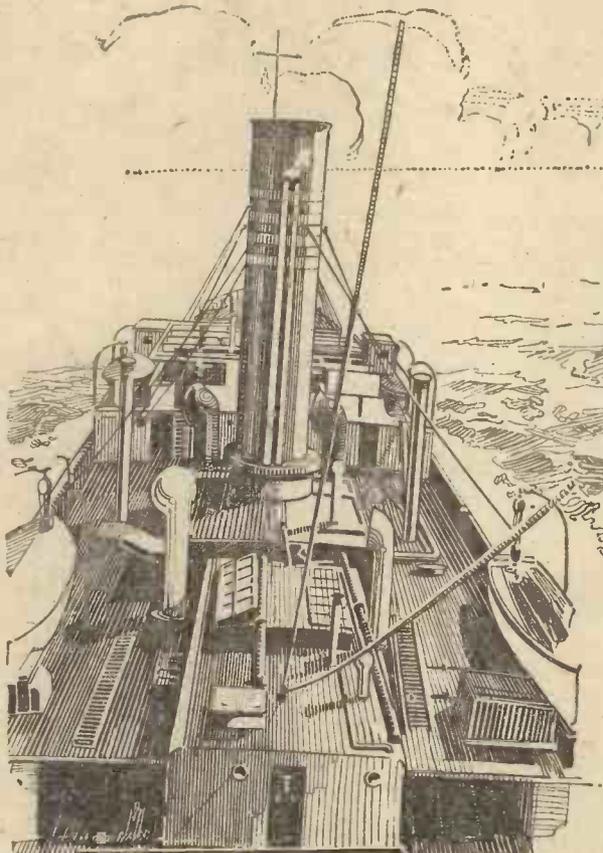
"Real pleasure"

ONE YEAR'S GUARANTEE

BETTER & COSTS LESS **12'6** PER PAIR

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“Act as judgment says is proper”

“If to my Starboard
 ..red appear,
 It is my duty to keep
 .. clear.
 To act as judgment
 .. says is proper
 To Port or Starboard.
 Back or Stop her-”

A rule of the road for preventing collision at sea.



THE “rule of the road” at sea calls upon the officer in charge of the ship in the foreground to “act as judgment says is proper” in avoiding collision with the approaching vessel.

To be able to form sound judgment and act on it promptly is one of the essential qualities of the sailor; and whether one is driving a car, playing billiards, or catching the morning train good judgment is equally necessary.

* * * *

Consider the components you fit to your wireless set.

Upon them depends not only the success of the whole set but also your reputation as a wireless expert.

Your judgment tells you that if you choose the products of a firm which has a long specialised experience and a reputation for “making a sound engineering job of things” you will have chosen wisely and well.

It is a mistake to suppose that one make of condenser is much the same as another, and it is a mistake to believe that your set can give the best results if your condensers and resistances are of the just-as-good variety.

Act as judgment says is proper—

Specify Dobilier.



Ducon Works, Victoria Rd., North Acton, London, W.3.



The advertisement features a central illustration of a man in a dark suit and tie, holding a small rectangular box labeled 'Cossor valve'. Above him is a large, stylized 'Cossor' logo with a decorative, grid-like pattern. A banner across the man's chest reads 'BE SURE THE SEAL IS NOT BROKEN' with the 'Cossor' logo in the center. Below the banner is a large, ornate frame containing text. The entire advertisement is enclosed in a decorative border.

Cossor

BE SURE THE SEAL IS NOT BROKEN

WHEN you choose a Cossor not only are you endorsing the judgment of the majority of wireless enthusiasts in this country, but you obtain a Valve guaranteed to be untouched from factory to user.

The ingenious and expensive method of swathing every Cossor Valve with cotton wool in a sealed carton permits the filament being tested by the Dealer *without breaking the seal.*

It is fully patented, and affords concrete evidence of our keen endeavours to prevent Cossor users from being sold Valves which may have been used for demonstration or other purposes.

It is in your own interests to see that this seal is intact.

On Your Wavelength!

An Oscillator in Trouble

RECENTLY I came across a little community which has cause to congratulate itself on tracking down an inveterate oscillator without calling in the aid of an expert or direction-finding apparatus. It appears that about last October terrific oscillations disturbed the sweetness of the broadcast programmes, and things went from bad to worse, so much so that on some nights reception became impossible.

Suspicion was directed against a new aerial which came into existence about that time, and the old men of the village put their heads together and arrived at a plan to track the offender down. There were about a dozen aerials surrounding the supposed offender, and no other aerial was to be seen for a mile or so, so that on a pre-arranged date all the receivers except one closed down for the evening. The owner of the new aerial was blissfully unconscious of the trap thus set for him and joyfully gave a beautiful illustration of "How not to do it."

In order to confirm this result the same arrangement was made for another night, and again the culprit obliged by giving forth some lusty shrieks.

The wise men felt that they had at last tracked down the villain; but the question which now arose was how to deal with him? A round-table conference resulted in a daring plan. On a certain evening three or four sets capable of emitting oscillations were plunged into oscillation throughout the evening. They could hear the struggles of the disturber of their peace as he strove to escape those screams and howls. For a second night the same thing happened, and one of them, deputised by the remainder, knocked at the front door of the house belonging to the villain of the piece and discovered the wretched fellow engaged in deadly combat with his condensers and reaction coil. There followed a little explanation (not altogether of an amiable nature), but after this peace reigned in that district.

That Earth!

Many times in these columns have I extolled the virtues of a good earth and just as many times have I advocated the water tap or pipe as being one of the best solutions to the problem. Similarly, many times have I read of insulating a long earth wire from earth until it reaches the point of entry into the ground, so that when recently I had occasion to rig up a temporary earth, and did so by connecting a copper gauze earth mat 15 ft. by 2 ft. 6 in. to a very long uninsulated wire laid directly on the soil immediately under the aerial, I had a doubt as to the

efficiency of the arrangement. When the arrangement was put on test, however, I found that results were just as good as those obtained under conditions which are generally considered the correct and only proper method to adopt, so that one more pet theory seems to have been exploded so far as reception is concerned.

The Amateurs

The DX work of this winter so far beats all records. 2NM has informed me that there are only two areas of the A.R.R.L. of America with which he has not yet worked, and 2SH has received 3NZ (New Zealand) without aerial or earth. 2SH has also been heard in New Zealand when transmitting with only 80 watts input.

My Belfast correspondent has received Australian 3BQ extremely well; this is the first time that an Australian amateur has been heard in Ireland. On the same night (which was an exceptionally good one for reception) he logged twenty-six Americans in less than fifty minutes. He tells me that they came in so well that he could not tell the difference between them and the British amateurs until he got the call signs. Similarly on another day thirty-one Americans were heard in daylight with the sun shining; this was at about nine o'clock in the morning. All this reception was carried out with a two-valve receiver!

An International Christmas

The Christmas of 1924 was perhaps the most international of all time. Wireless has played its own wonderful part, making nothing of a few thousand miles. During Christmas KDKA was, I believe, silent. But WBZ and WGY were on duty, the former especially being easy to receive. It is a long time since I heard this excellent station so well. The sensation of joining, as it were, in the happiness of friends a thousand or so miles away is one that must be known to be appreciated. If anything can possibly break down the barriers which separate nations from their neighbours it is wireless.

Can anyone inform me why that detestable habit of oscillating has so greatly increased in the past few weeks. Whether it is only local or not I do not know. Christmas inevitably brings into the field a number of new sets which, handled by beginners, are capable of causing a considerable amount of nuisance, but this business has been going on for some time.

Short Waves

Freak results are being obtained on wavelengths as low as a couple of metres.

Ladies' invisible hairpins and a certain amount of common sense will enable most listeners to get down to this wavelength. It would be interesting if two friends built themselves a transmitter and receiver capable of working on this wavelength. They could be certain that they would be subject to no interference, though a peculiar kind of static is sometimes encountered. An ordinary piece of glass tubing and a length of copper rod makes an excellent variable condenser, though extension handles of exceptional length are required. The size of an aerial appears to be immaterial if the variable condenser is in series with it. By exercising a reasonable amount of care a stage of high-frequency amplification may be employed. As the finished receiver will not bulk larger than an ordinary pocket-book, much interesting work can be done on these lines.

A Problem Solved

The officials of the B.B.C. have times out of number informed us that any reasonably selective set ought to be able to separate 5XX from Radio-Paris. We have even been informed what circuits to employ and what methods to use with this end in view. Some experts have written to the Press stating that they are able to receive both 5XX and Radio-Paris at the same time on one aerial and two different loud-speakers, using two sets with constant aerial tuning and half a million other gadgets. Yet for all this the Man in the Wireless Street has never succeeded in bringing in Radio-Paris while 5XX is working. It is all very strange and disquieting—or rather was. Now we know why we fail. The B.B.C. cannot do it either. On the occasion of the broadcasting from 5XX of the programme provided by the *Daily Express*, the announcer was kind enough to inform us that the original intention had been to relay Radio-Paris—until someone apparently discovered that one station would heterodyne the other with consequent chaos all round. So now we know.

Duanode Condensers

While on the question of selectivity it is interesting to dwell upon the problem concerning duanode condensers. When will someone produce an instrument of this type with a simultaneous vernier controlling both halves of the condenser from one vernier knob? Surely an engineer can manage to overcome the difficulties and the instrument is greatly needed in multi-stage H.F. sets. In the meantime we must content ourselves with square-law condensers. It is doubtful if many know the help these can be when real selectivity is

On Your Wavelength! (continued)

sought. The chief trouble with square-law condensers and, indeed, the majority of wireless instruments for mounting below the panel, is the method of fixing. Owing to the arbitrary manner in which the fixing holes are arranged, one is often compelled to choose between having one's dials askew on the surface of the panel or one's terminals below the panel in a position that may not be the best for wiring up.

It is also about time a carbon tablet rheostat be produced which will be strong enough to stand the finger dial being screwed tightly home in the inevitable effort to get the last ounce out of a run-down battery. If one is foolish enough to attempt this the usual result is to force the metal end plate away from the insulating cylinder which contains the resistance unit, with a consequent loss of anything from four to six shillings. Some of the newer types of carbon compression rheostat are excellent in every way and a decided improvement upon the older patterns, but they all seem to retain this inherent weakness. The rheostat, being behind the panel, is out of sight, and not everyone is gifted with sensitive fingers.

Short-wave Working

In wireless the wonder of yesterday is the commonplace of to-day. It does not seem so very long ago that I was struggling to get any sort of reception at all below 300 metres. I regarded with wonder, not unmingled with doubt, those skilled performers who told me that they could both transmit and receive on 200 metres. That is about two years ago. Now the experimenter who cannot go down to 100 metres is altogether outside the pale. In fact he isn't looked on as an experimenter at all.

Recently I have been spending my evenings in the good old game of "fishing." And the fishing has mostly been done between about 70 and 150 metres with occasional excursions into the shallower waters up to 200 metres. You notice I say the "shallower" waters. That is because as wavelength increases "frequency" decreases. On the lower wavelengths a crowd of French amateur transmitters operate night after night. Some of it is telephony—I have heard splendid work by 8RM on about 90 metres—but most of it is morse. Anybody with a slight knowledge of morse can enjoy the game, for the Frenchmen, and the Dutchmen also, repeat their call signs many times before they start work. If you don't get it the first time, you can the second or the third. And you needn't stop to hear what they have to say. Directly you have a bite and have landed your call sign you log him and cast again and try for another. I have had over fifty in the last month and

feel reasonably proud of myself. Of course an ordinary set will not do for this game. You need a little two-valver specially built for it.

Aerial Efficiency

Somehow I feel rather ashamed to be returning again to the theme of the aerial. But it has to be done. Thousands of newcomers are joining our ranks and the erection of aerials is going on apace. The majority of them are hopelessly inefficient. They are inefficient from a mechanical point of view at any rate, and they look as though they must be hopelessly inefficient from an electrical point of view. It is an economy to erect a good high aerial, because a good aerial means that you can use a crystal detector where you might have to use a valve, and you can certainly obtain effects with two valves that you would have to use three to get with a low, clothes-line aerial.

The main points of aerial efficiency are: (1) Height above the set. (2) Height above surrounding objects. (3) Efficient insulation, obtained if possible with insulators that have a portion of their length shielded from the effects of rain, mist and fog. (4) Down lead coming either from the electrical centre of the "roof" of the aerial or else from the very end, and kept well away from walls and guttering to the lead-in tube. (5) Mechanical efficiency, which means a stout or well-stayed mast and an aerial that will not sway much in a wind. (6) Trimness of appearance. To have a good-looking aerial is a duty to one's neighbours. Nothing looks worse than a row of houses with aerials leaning and swaying in all directions. It looks like a washing day without the washing!

Too Much Concert Party

In moderation I like the "mixed grill" of a concert party; it adds the *hors d'œuvres* to the menu, so to speak; but when you get the whole evening devoted to one long noisy riot and no chance of getting away from it—well, it gets just a little bit boring, don't you know.

The Success of the Double Programme

The dual programme from 2LO and 5XX has already again proved an indubitable success this week, and to-night, if anyone grumbles at the programmes I shall dub him a believer in W. S. Gilbert's dictum, "For isn't your life extremely flat when there's nothing whatever to grumble at?" Anyhow it won't be the fault of the B.B.C. if he goes outside his own house for entertainment. A thoroughly good selection of humour by artists (whose names shall remain a secret to you) comes from 2LO, while from 5XX is to be relayed Wallace's tuneful opera *Maritana*, played at the "Old Vic"

Theatre, London. I don't know any other opera, or opera house either, where the performance has to be stopped to allow of encores, and last time it was broadcast we all had to wait while we let the hero "like a soldier fall" at least twice.

Realism in Wireless

On Saturday I'm going to "plank" for Cardiff, via 5XX, for they're going to give us the real stuff. Hitherto, when we've been thrilled with water rushing into a coal-mine we've known it was only a piece of wood scratched by a sheet of sandpaper and that the runaway horse consists of a couple of bricks and a board; but to-morrow, my friends, you are going to have a Radio Pageant with the outdoor scenes transmitted from the outside while the play proceeds in the studio. In "The Pied Piper of Hamelin" there will be real water in the fountains, real horses galloping, and real crowds with real clogs. By the way, does my memory fail me, or isn't there something about rats in that story? But in that case I don't think realism will be carried thus far, not with a feminine "crowd." However, like every film, this is to be a super-show.

Stars of the Week

Miss Stella Hackman, who was the entertainer at 5XX on Tuesday, is one of the earliest of our wireless stars, for she was one of the first to speak from Marconi House.

Lovers of the "Doric" got "some mouthful" from Glasgow when Mr. Nian MacWhannell gave his lecture on "Scots Poets in the Vernacular." No; I did not hear him.

The famous Westminster Singers male voice quartet at 5XX contrasted well with the "Galloway Duo," Mr. Ian McRobert and Miss Marjorie Ford, who have specialised in their own arrangement of folk songs as duets.

Scotland was also ideally represented by the Scottish Co-operative Wholesale Society prize band, which has recently won the championship.

A Great Cross-word Puzzle

Last night, when tuning in my receiving set for a long-distance station, I inadvertently connected the leads of my H.T. battery to my L.T. terminals, with the inevitable result that four most cherished and expensive valves "went west." What cross-word did I use? There are no conditions of entry for this ingenious competition, and no prize. THERMION.

The Glasgow station had recently to suspend the evening programme as there was a danger of interference with an S.O.S. call sent out by the Newcastle steamer *Marjorie Sced*.

AN EXTENSIBLE UNIT SET.—II

COMPLETING THE DETECTOR UNIT

Drilling the Panel

THE layout of the panel was shown by Fig. 9 (No. 134). The following is the key to the letters on the diagram:

A, 4 B.A. clearance and countersunk; B, 4 B.A. clearance; C, 2 B.A. clearance; D, 0 B.A. clearance; E, $\frac{1}{8}$ in.; F, 6 B.A. clearance and countersunk; G, 6 B.A.

When these have been drilled, place the condenser dial in position and mark and drill for fixing. It may then be permanently fixed with the screws provided.

Assembling

The components of the detector unit are shown in Fig. 10. Fig. 11 shows this unit with another, and Fig. 12 is a side view of the panel in the shell.

The first thing to be done is the fixing of the four coil holders which are to act as unit connectors. These go two on each side of the back of the panel and plug into aerial and earth on the left end and telephone terminals on the right end.

The easiest way of getting these holders in their correct positions is to fit the panel temporarily in place in the shell, and then by plugging the holders into the end connections and fixing each end to the shell alternately; the correct position for fixing screws can be marked through the appropriate hole in the panel on to the holder. When each of the four holders has been so marked they must be drilled and tapped 4 B.A., after which they may be fixed in position with $\frac{1}{2}$ -in. 4 B.A. countersunk-head screws.

Before the bottom plug (A, Fig. 9) is screwed up, the right switch stud (as seen from the back) must be countersunk and the stud, which is a dummy and not used for a contact, fixed with the countersunk nut, the protruding screw being then filed off. This is necessary, as the coil holder when in place covers it.

The remaining stud and pins, also the switch, can now be assembled. The switch consists of a suitable knob, contact spring, $1\frac{1}{2}$ in. 2 B.A. screwed rod, $\frac{3}{4}$ -in. diameter tapped bush (2 B.A.), spring washer and two nuts. The rod is screwed by the bush. The shaft is then inserted in its bearing in the panel and secured by the spring washer and two nuts. Fig. 13 gives

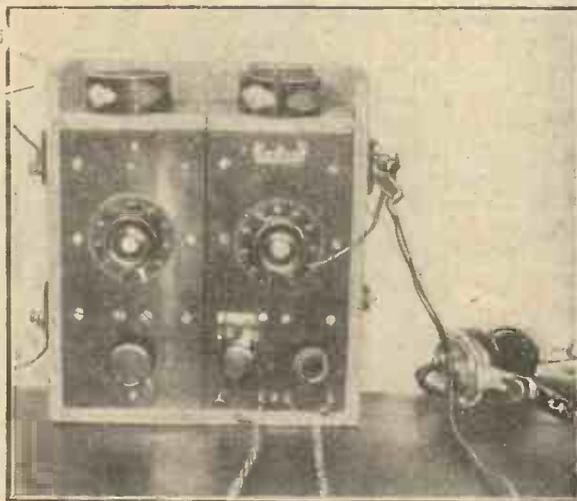


Fig. 11.—Two Assembled Units.

the dimensions of the spring contact.

Next fix the four Gibson plug sockets in the four holes at the base of the panel. The Gibson sockets may be replaced by suitable terminals if it is so desired. Two reaction terminals go at the top of the panel, as clearly shown in the photographs (see Fig. 8).

Following this, the Polar condenser must be fixed in place. This requires no explanation, as its position is clear in the photographs. The same remarks apply to the Lissenstat.

The valve-holder bracket is now secured in the position shown by Figs. 8 and 10. The bracket consists of an ebonite platform 3 in. by $1\frac{1}{4}$ in. by $\frac{1}{4}$ in., with valve sockets at one end and fixing screws $\frac{3}{4}$ in. apart in the opposite edge.

To accommodate the grid condenser and

leak below the valve bracket it is necessary to cut the upper fixing hole (see Fig. 7) completely away. The other fixing hole must be marked through on to the panel and a blind hole drilled and tapped 6 B.A. A 6 B.A. $\frac{1}{8}$ -in. cheese-head screw will hold the condenser quite firmly.

This completes the assembling except for the addition of a telephone condenser which is not shown, but is desirable and may be fixed across the two top connection holders. Also the aerial tuning-coil holder must be fixed to the back of the shell, as shown in the photographs.

There remains only the wiring up to complete the first unit.

Wiring the Detector Panel

Fig. 14 is a representative diagram of the set, as seen from the back with all the wiring shown, while Fig. 15 gives the theoretical circuit. Make quite certain that the wiring goes to the correct unit-connecting plugs, as one is inclined to be confused when reversing the panel from front to back. Viewed from the back, the battery terminals (left to right) are high-tension positive, high-tension negative, low-tension negative and low-tension positive. Left top connector, telephones, right plug H.T. positive, socket grid condenser and leak. The switch arm is connected to low-tension negative by a short piece of flex locked between the two nuts of the switch shaft. The stud connects to socket on right, filament and plug on left. The switch controls the current to all units, so that when the arm is on the left stud (as seen from the front) the whole set is not in a condition for use.

There remains only to fix the tuning-coil holder to the back of the shell as shown in the diagram; drill two holes in the top for systoflex-covered leads to the condenser terminals, connect these terminals to aerial and earth plugs on the left end by 12 in. of flex and assemble the panel in the case.

It must be left to individual cases to fix the holder, as these are sold for fixing in various ways, some with screws through the back,

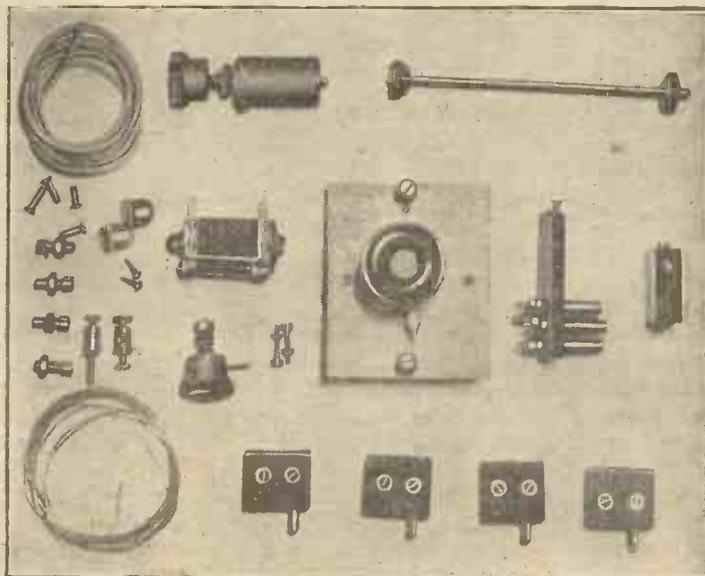


Fig. 10.—Component Parts for the Detector Unit.

while others have an ebonite base for fixing with four small wood screws. The latter have the better appearance. When this has been done, attach 1 ft. or so of flex to each terminal of the

valve glows. Watch the valve through the window above the condenser dial. Now turn the condenser through the scale slowly, and if your local station is working telephony will grow in strength as

the bulb again after the necessary repairs have been carried out.

The next step is to cut the bulb in two at a point half-way between the bottom and the broken tip. This is done by

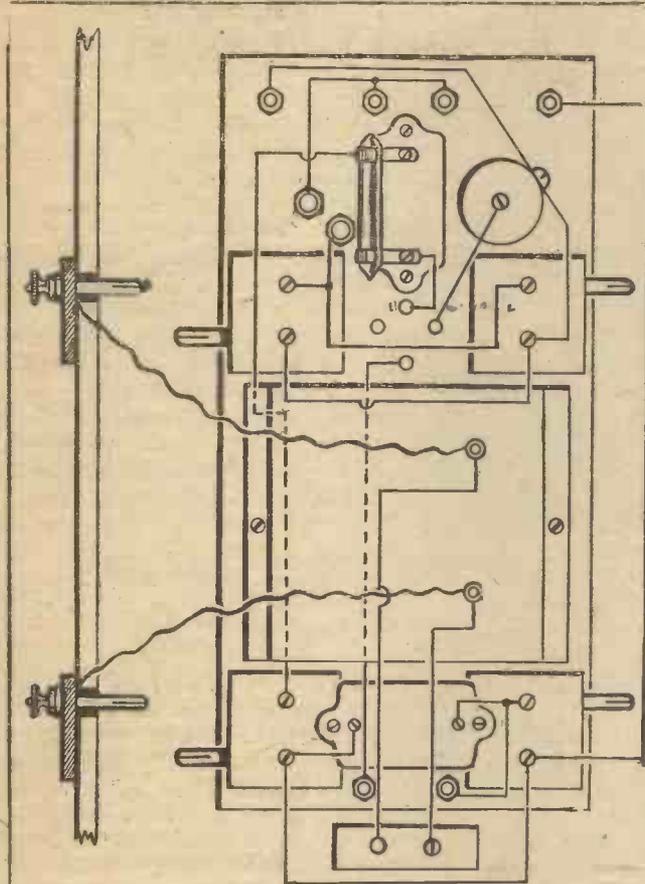


Fig. 14.—Wiring Diagram of Detector Panel.

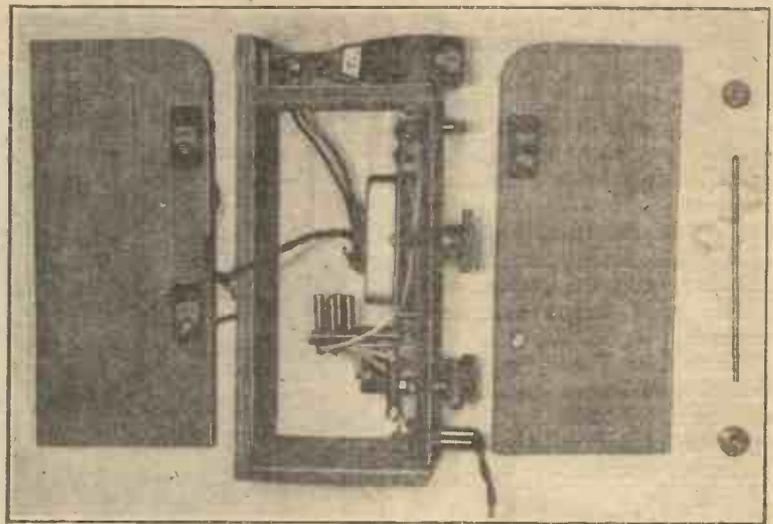


Fig. 12.—Side View of Detector Unit in Shell.

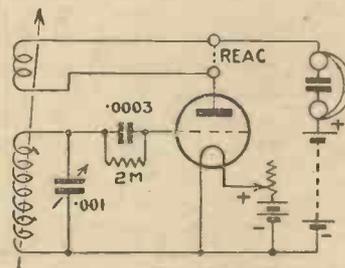


Fig. 15.—Circuit Diagram.

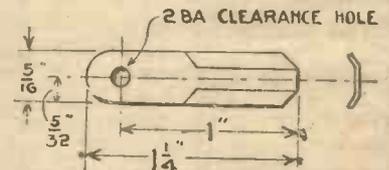


Fig. 13.—Switch Arm.

variable condenser. It is better to remove the cotton or silk covering from the flex, leaving only the rubber insulation. Now fasten the panel in its shell by two 6 B.A. countersunk screws and nuts through the brackets at the top and bottom. Connect up the tuning coil holder to the condenser, and flex to aerial and earth gripped between plugs and ebonite base. Bring both ends into position where they are held firmly by the 2 B.A. screwed brass rod $5\frac{1}{2}$ in. long passed through the holes H (see illustration of ends, Fig. 1), and drawn taut by milled nuts at each end. This completes the first unit.

Operation

Plug batteries in the sockets from left to right: low-tension positive, L.T. negative, high-tension negative, H.T. positive.

Notice that the switch is on the left-hand stud. Next bridge the reaction terminals with a short length of wire. In a later article the reaction unit and its use will be explained. Insert a valve, attach headphones to terminals on right end, and aerial and earth to those on the left end. Turn Lissenstat anti-clockwise. Plug in aerial-tuning coil No. 35. Switch over to right stud. Turn rheostat until the

the optimum point is reached. The greatest signal strength and distance will be attained by careful adjustment of the Lissenstat, which permits very fine tuning to be made. The set operates comfortably up to forty miles, while close to a station a loud-speaker can be worked with small volume.

D. G.

(To be continued)

HOW VALVES ARE REPAIRED

AN important branch of labour consequent on wireless is the repairing of thermionic valves.

Users of valves will realise in how many ways a valve can be broken or fail to function. Furthermore, there is a loss of valuable material each time a valve is placed out of commission. Happily, however, ingenious enthusiasts have attempted and succeeded in repairing valves.

The first step in repairing a valve is to knock off the sealed tip and allow the air to enter. A glass tube is then sealed in place of this point and fulfils a dual purpose in facilitating further operations and in providing a means of exhausting

mounting the valve in an upright position and rotating it, whilst a diamond makes a clean scratch round the middle. The tip of a long flame is made to play on this scratch, the operator holding the valve by the glass tube. The bulb cracks along the scratch and is separated into two halves. The whole interior of the bulb, grid, plate and filament is now readily accessible, so that the necessary repairs can be carried out. In the majority of cases a new filament is required to replace either a broken one or one which has sagged so much that it has come in contact with the grid.

The necessary repair effected, the two valve portions are handed over to a skilled glassblower, who seals them together. The next and last step is the evacuation and sealing of the bulb. The glass tube is connected to a pump for removing the air. This having been accomplished, a hot blowpipe flame is directed to that end of the tube nearest the bulb and the latter sealed again. A final process, termed "gettering," then removes the last traces of air, after which the valve is subjected to a thorough test, and if satisfactory passed out for a second spell of service.

W. M. C.



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. 80).

Trouble with Receiver

Q.—I possess a three-valve set with which I experience considerable trouble. Would you please tell me where the fault lies.—A. R. (Hammersmith.)

A.—If you care to send us full particulars of the trouble and the exact arrangement and make of your apparatus, and any special point you have noticed, we shall be pleased to advise you. Our readers' attention may be drawn opportunely to the fact that it is useless saying they have a set which does not work if complete details describing the apparatus and the results obtained are not supplied. All values should be clearly marked on the diagram.—D. C. R.

Variable or Fixed Grid Leaks

Q.—Is it advisable to use a variable grid leak in an ordinary single-valve circuit?—B. H. (Portsmouth.)

A.—It is certainly useful to have a variable grid leak in any circuit, but it is preferable to use a number of fixed leaks in conjunction with a variable condenser in the detector circuit.—U.

Crystal Combination

Q.—What crystal should be used with bornite?—W. S. (Barnet).

A.—Zincite should be used in conjunction with bornite if the best results are to be obtained.—L. C.

Current-carrying Capacity of Copper-Wire

Q.—Please tell me the current-carrying capacity in amps of standard wire gauges from 10 to 45.—L. J. (Hammersmith.)

A.—The following table has been compiled on the basis of 1,500 amps per square inch of sectional area of the wire.—F. J. C.

CURRENT-CARRYING CAPACITY OF WIRES

S. W. G.	Current Cap. (Amps.)	S. W. G.	Current Cap. (Amps.)
10	19.305	28	.258
11	15.855	29	.218
12	12.7425	30	.1812
13	9.872	31	.1586
14	7.5405	32	.1374
15	6.108	33	.1178
16	4.8255	34	.0998
17	3.6945	35	.0831
18	2.715	36	.0681
19	1.8855	37	.0545
20	1.527	38	.0425
21	1.206	39	.0318
22	.9237	40	.0272
23	.6786	41	.0228
24	.5702	42	.0189
25	.4703	43	.0153
26	.3818	44	.012
27	.3168	45	.0093

Capacity of Fixed Condensers

Q.—Please give a simple formula for finding the capacity of blocking condensers.—E. S. (S.W. 17).

A.—The capacity of a fixed condenser may be found from the formula C (microfarad.) = $\frac{A K N}{45,000,000 d}$ where A = area of overlap of one plate in square inches, K = a constant (7 to 8 for various kinds of mica), N = number of dielectrics, and d = thickness of dielectric in inches.—U.

Calculation of Wavelength of Frame Aerial

Q.—Please give the formula for calculating the wavelength of a frame aerial.—E. K. (Kensington).

A.—The formula is as follows:
Wavelength — $1885 \sqrt{LC}$
where L is the inductance of the frame in microhenrys, and C is the capacity of the condenser in microfarads. A more simple way of getting at the inductance of the frame is to tune in a station with a good variable condenser of .0005 mfd. across the ends, set at its maximum. The capacity of the circuit, as shown in the formula, will be .0005 microfarad. Find the wavelength of the station transmitting on this setting, and you then have all the factors in the formula except the inductance of the circuit. This can be easily calculated from the values of capacity and wavelength.—B.

WELL-KNOWN WIRELESS ARTISTS



Mr. Joseph Minter



Miss Irene Scharrer



Miss Cathleen Nesbitt

EXPERIMENTAL TRANSMISSION.—VII

THE CHOICE OF THE CIRCUIT

AS has been previously pointed out, the function of the grid circuit is to swing the plate current from zero to saturation; therefore all that is necessary in the grid circuit is a definite change of potential brought about by inductance or capacity

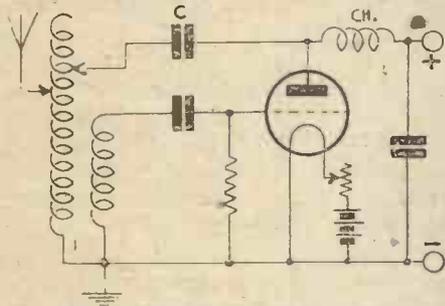


Fig. 22.—Reversed Feed-back Circuit.

coupling. Nothing is to be gained by a greater charge of grid potential, and the necessary change can be brought about by proper design of coils and coupling. Generally speaking, the grid coil should be aperiodic and should consist of about four times the number of aerial turns of fairly fine wire. Constructional details, however, are dealt with later.

So far nothing has been said about the instrument used to measure the aerial current. Until quite recently so-called "hot-wire" expansion types of ammeter were exclusively used for this purpose, but instruments of that type were most unsatisfactory because they were extremely sluggish in denoting any change in current strength and because they were subject to

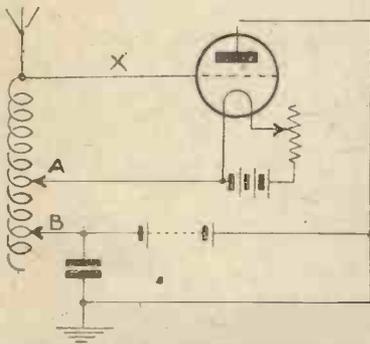


Fig. 24.—A Simple Circuit that Obviates the Use of a Reaction Coil.

serious temperature errors caused by changes of temperature of the atmosphere and also owing to the heating up of the instruments themselves. Expansion-type instruments also possess the very serious objection that their high resistance makes it impossible to obtain the proper degree of sharpness of tuning and at times the

resistance wire is liable to stretch so that it is always necessary to set the instruments to zero before making adjustments.

Several firms who deal in electrical measuring instruments have spent much time in perfecting other types of thermometers that have not the disadvantages referred to above, as they do not use expanding resistance wire as the recording element; any experimenter who intends to undertake any serious transmission work would do well to consider the purchase of such an instrument.

The ammeter, of whatever type, should be included in the aerial at the point of maximum current—that is, in the earth lead if a true reading is to be obtained.

Fig. 22 illustrates a circuit similar in principle to that shown in Fig. 21, only that the plate-tension supply goes directly

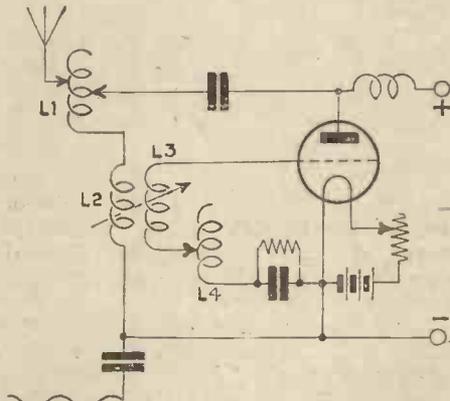


Fig. 23.—Diagram showing how the Grid Coil may be Tuned by Means of Tappings.

to the anode, and this latter is connected to the aerial coil through the anode-blocking condenser C. The value of the blocking condenser is immaterial, since its purpose is only to prevent a short circuit to the anode supply, and as long as its insulation is sufficient to withstand the greatest possible fluctuations of plate voltage its value may be anything from .001 to 1 microfarad.

A radio-frequency choke must be inserted in the anode lead in order to stop the radio-frequency energy from taking the easier path through the generator.

The choke CH in Fig. 22 must not be tuned to the working wavelength, otherwise a large current will oscillate in it and will tend to burn out the windings. It should be a coil having a high impedance to general radio frequencies, and its insulation must be very carefully attended to.

The grid circuit is in this instance untuned, but, as previously mentioned, if it is not convenient to couple it to the anode

coil, oscillations will be maintained if it is correctly tuned.

Fig. 23 illustrates a circuit similar in principle to that of Fig. 22, except that the grid and anode coils are separate and are separately tuned by means of tappings.

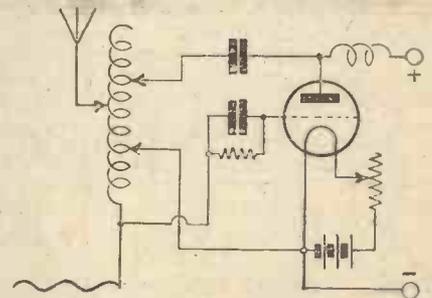


Fig. 26.—An Oscillatory Circuit with Plate and Grid Tappings.

Coupling is effected through a variocoupler connected to each part of the circuit. This arrangement is certainly conducive to simple wave changing, but could not be used on very short waves; it is obvious that L1 and L2 must each have an appreciable inductance in order to function correctly, and their combined wavelength may be higher than desired.

The grid leak and condenser are in parallel and are included in the negative side of the coil to minimise capacity effects.

A counterpoise earth is employed, and a series condenser used to lower the total wavelength.

In Fig. 24 we come to another circuit, still on the same principle as those preceding. The arrangement is slightly

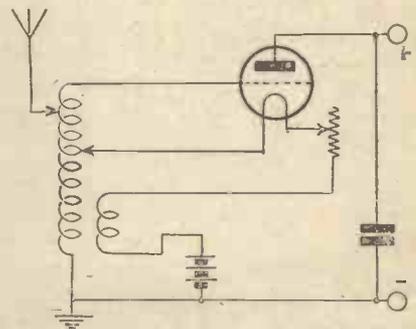
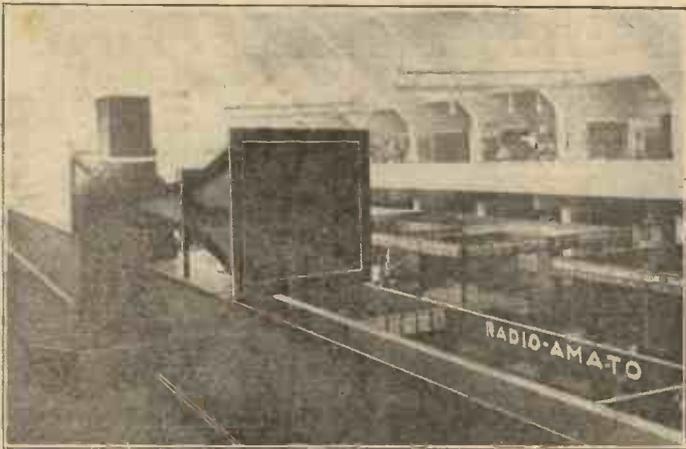


Fig. 25.—Method of Earthing Accumulator when a Grid Coil is not used.

different and it more nearly resembles that originally shown in Fig. 19.

The anode coil is now in the negative lead of the high-tension supply, and thus anode and grid coil sections may be tapped off the same coil without a power "short" occurring.

(Continued on page 68)



Two Photographs of the Berlin Wireless Exhibition.

A VISITOR'S IMPRESSIONS OF THE BERLIN EXHIBITION

SOME particulars of the wireless exhibition recently held in Berlin were given in No. 134, but as the show was such an unqualified success—in fact the most successful that has been held in Europe—it is felt that a few additional details will be welcome. Perhaps the example set by Germany will serve as a fillip to the organisers of wireless exhibitions in this country. The interest in wireless in Germany is so strong that immense crowds were daily drawn to the wonderful hall erected on the Kaiserdamm, and the exhibition gave a new impetus to wireless, as the sudden large increase in the number of subscribers to broadcasting proved.

Specially built for the purpose, the huge hall, splendidly illuminated, was a most imposing sight. On account of the dampening effect of metal, the building was constructed almost entirely of wood. Tapering upwards in several stages, it is a unique piece of engineering architecture. Included in the building scheme is a tower which is to serve as a support for the aerial of a large transmitting station; this, however, was not completed in time for the exhibition.

The hall itself, which is more than 400 ft. long and 120 ft. wide, has three aisles, and in addition a balcony, 35 ft. wide, running its entire length at both sides with transverse galleries at both ends. The building is constructed of masonry as far as the level of the floor, above which a timber framework with brick filling has been adopted. There are six flights of stairs outside and two inside staircases. A large number of sound-tight cabins were provided for the demonstration of loud-speakers and also administration and dwelling-rooms for the employees. The building has a spacious restaurant, as well as an amphitheatre capable of accommodating about 500,

destined to serve as a lecture and experimental hall.

The exhibition gave a comprehensive view of the present state of the wireless industry in Germany. Though Germany took up the construction of broadcast receivers at a comparatively late date, the strides made during the past year have been enormous. Numbers of mushroom concerns, which in the initial stage of German broadcasting sprang up everywhere, have not survived the financial strain, but the firms of good standing have

been able to extend their activities and to consolidate their positions.

A feature of the exhibition was the historical side of wireless. The first modest tests in bridging distances of a few kilometres were shown side by side with apparatus (in the form of models) which suffices for encompassing the globe. Other special attractions were the complete wireless plant of the steamship *Columbus*, the cabin of the *Los Angeles* (the late ZR III.), the installations of a mail aeroplane, and a full-size replica of the *Vox Haus*.

THE COUNTERPOISE EARTH

THE commonest form of earth connection among amateurs in this country is undoubtedly the water-pipe, which is closely followed in order of popularity by the bucket or plate buried in the ground outside the wireless-room. Now these may be quite good enough for ordinary purposes, such as the reception of the local broadcast, but the man who goes in for Transatlantic tests and other long-distance work will want the very best earth he can possibly obtain in order to make the most of the weak signals picked up by his aerial.

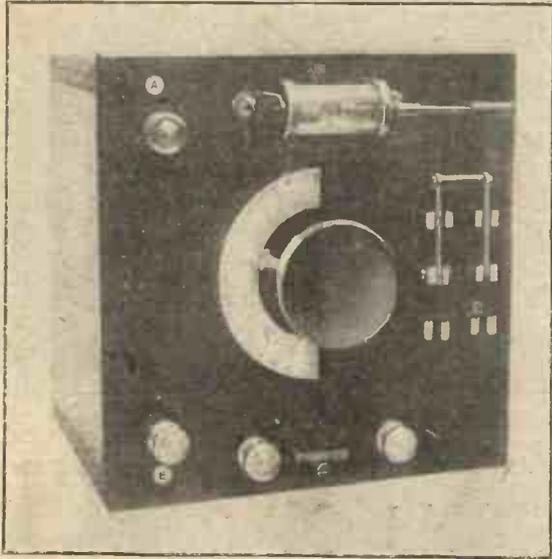
The time-honoured water-pipe is frequently unsuitable owing to the complicated route which the pipe takes before finally entering the ground. The bucket, on the other hand, is only efficient while the surrounding soil is fairly moist; during a dry spell the resistance goes up, and there is a very distinct falling off in signal strength.

One of the most satisfactory earths from the experimenter's point of view is the

counterpoise; this consists of one or more insulated wires slung directly beneath the aerial some 8 or 9 ft. above the ground. It must, of course, be clear of all trees and bushes, and as carefully insulated as the aerial itself. The wires should be spaced at least 9 in. apart from one another, and joined together at the house end by a common lead in. Copper tape will be found quite suitable owing to its wide surface area and consequent low resistance; it has also the merit of cheapness. Although the erection of a counterpoise involves a certain amount of trouble and expense, the owner will be more than repaid by the extra sensitivity of his aerial-earth system.

The counterpoise will give uniformly good results on nearly all wavelengths, but will be found especially useful on 100 metres and below, since it lowers the natural wavelength of the aerial system, and so obviates the use of a series condenser. It should be used for the reception of short-wave stations.

G. J. M.



Photograph showing Upper Side of Panel.

THE forthcoming removal of 5XX from Chelmsford to the Midlands will bring that station within crystal range of a much wider audience than at present. Given a standard P.O. aerial and a decent crystal set, clear reception should be possible anywhere inside a circle of 100 miles radius from Daventry, where the new site is expected to be.

The high-power station will continue to operate on 1,600 metres, but will transmit a programme of its own, instead of being relayed from London. As a result many thousands of crystal owners will be able for the first time to enjoy the privilege (usually confined to the valve aristocracy) of selecting one or other of at least two different programmes each night, one from

THE SI LONG- AND SHORT-W

This receiver will enable you to receive at will either the ordinary

5XX and the other from the nearest standard B.B.C. station on the lower wavelength.

The set described below has been specially designed to meet these circumstances. No separate plug-in coils are used, the change from 1,600 metres to the local-station wavelength being made by the movement of a single switch. In both positions of the

switch the full voltage of the whole of the circuit inductance is applied to the crystal and phones, whilst in the short-wave position the aerial condenser is automatically changed from parallel to series.

Materials

The following is a list of the necessary materials and components required for constructing the set: One fixed condenser, .0003 microfarad; one crystal detector, hertzite or perikon; four W.O. terminals; one D.P.D.T. switch; one 2 B.A. bush with nut; one 2 B.A. knob and pointer; one ebonite panel, 6½ in. square, ⅜ in. thick; one cardboard tube, 4 in. in diameter, 2 in. long (for stator); one cardboard tube, 2½ in. in diameter, 1¾ in. long (for rotor); 1 oz. No. 26-gauge enamelled or cotton-covered copper wire; 1 oz. No. 30-gauge single-cotton-covered wire; 6 in. 2 B.A. screwed rod; one valve socket; mahogany or walnut wood, about 10 in. by 15 in. by ⅜ in. thick, for the sides of the cabinet; three-ply wood for bottom of cabinet; sundry screws, cardboard, varnish, etc.

Next attach the three-ply bottom, which should measure 6½ in. square, so as to project a little around the base; this should have previously been smoothed with glass-paper.

Apply a coating of mahogany varnish stain evenly all over. This is more easily done if the stain is first diluted slightly with methylated spirit. Let it dry thoroughly and smooth again with glasspaper. A final coat of good clear copal varnish is then applied with a soft brush, and the cabinet left to dry in a warm, dustless room for two days. The result should be a hard glossy surface.

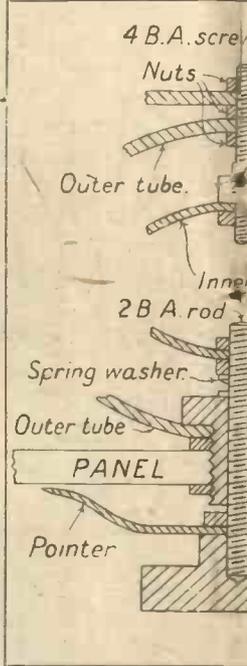


Fig. 2.—Constructional

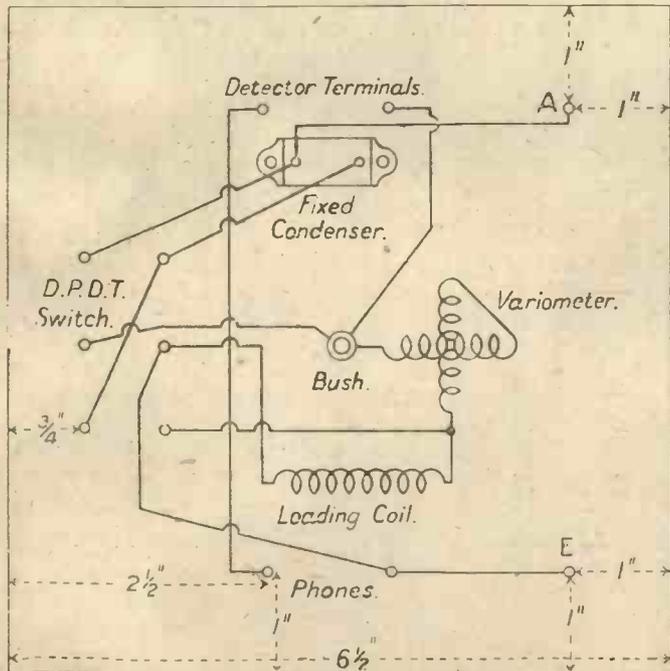


Fig. 1.—Wiring on Under Side of Panel.

Preparing the Panel

First see that the panel is truly square and fits the cabinet, and then round the edges with a rough file, finishing off with glasspaper. Referring to the diagram shown by Fig. 1, drill a centre hole to receive the 2 B.A. bush—probably ⅜ in. or ⅝ in. Drill and tap No. 4 B.A. holes for the aerial, earth and telephone terminals.

Next drill the necessary holes for the double-pole switch screws. The exact position of these depends upon the particular make of switch bought, and great care should be taken to drill them correctly so that the switch may work smoothly. Now drill the holes for the screws which secure the crystal holder.

The fixed .0003-microfarad condenser for the aerial should be secured to the back of the panel, in the position shown in the drawing and photograph, by a couple of No. 5 or 6 B.A. screws entering blind tapped holes in the panel, care being taken to leave room for the cardboard tube carrying the fixed coils of the variometer.

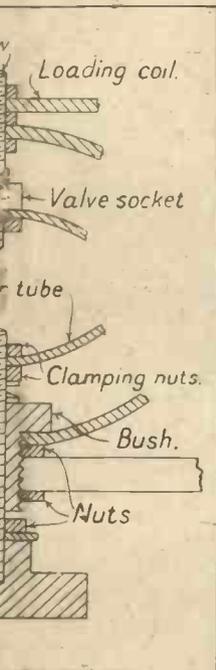
At this stage it is well to apply the

Making the Cabinet

Cut two pieces of mahogany 6¼ in. by 4½ in. for the sides and two more pieces 5½ in. by 4½ in. for the front and back. Join these by wood screws so as to form a box 5½ in. square inside. Smooth the surface with glass-paper.

COMPLEX WAVE CRYSTAL SET

broadcasting stations or the new high-power station; note the switch.



transfers or labels marking the various terminals, etc. If this operation is delayed until after the knobs and terminals have been fixed in position the job becomes more troublesome. When the marking has been completed, the terminals, switch components and detector are fitted to the panel and firmly clamped, as shown in the photograph.

The Variometer and Loading Coil

The variometer stator, or fixed outer member, is made from the larger of the two cardboard tubes by winding two coils (one on each side with a space between them) of No. 26-gauge insulated wire, each coil having twenty turns. Secure the ends by looping them twice through small holes pierced in the cardboard.

The rotor (or inner member) is similarly wound with two twenty-turn windings of the same gauge wire, spaced apart sufficiently in the centre to leave room for the pivots. The ends are first looped through holes in the former and then secured by the clamping nuts of the pivots.

The flat basket coil is wound with the 30-gauge wire on a cardboard disc of 5-in. outer diameter, with nine slots radiating from a central circle $1\frac{3}{4}$ in. in diameter; 110 turns of No. 30-gauge s.c.c. or No. 28-gauge enamelled wire will be sufficient (when used with a standard P.O. aerial) to bring in the 1,600-metre transmission. The ends of the wire are secured by passing them through holes in the card.

The flat coil (card and all) should next be immersed for a few minutes in melted paraffin-wax and then taken out and allowed to set hard. This treatment expels moisture and prevents its reabsorption. It also stiffens the coil.

Now make a hole in the cardboard rotor large enough to admit the 2 B.A. bush, and exactly opposite make a second hole

to receive the 4 B.A. pivot screw. Next make similar holes $\frac{1}{16}$ in. and $\frac{1}{8}$ in. in diameter in the rotor to receive the 2 B.A. screwed rod and the stem of the pivot socket, which is made by cutting short an ordinary valve socket.

Connect the ends of the rotor winding to the 2 B.A. rod and to the valve socket. It does not matter which way round these connections are made. Then assemble the variometer parts as shown clearly in Fig. 2, and clamp one end of the stator winding to the pivot screw which enters the valve socket.

Final Assembly of Parts

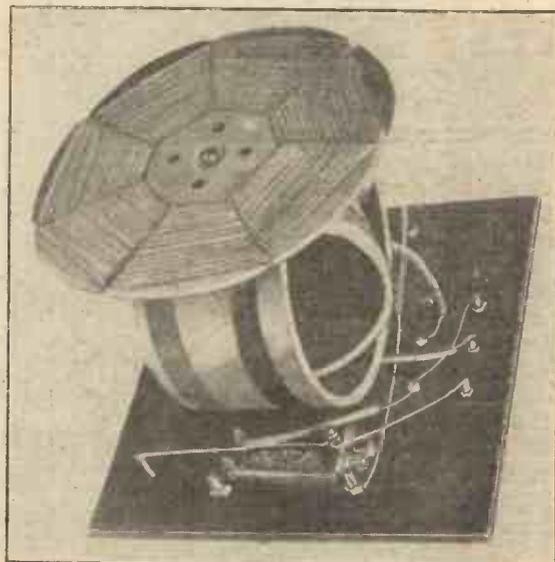
Place the variometer in position behind the panel and lock it in place by means of the nut on the central bush. Clamp the pointer at zero on the scale when the variometer windings are opposed to one another. The various connections should now be made by means of stout bare wire covered with sleeving wherever there is any danger of contact.

The inner end of the flat coil must be connected to the free end of the stator winding and also to the right-hand bottom switch screw. The outer end of the same coil goes to the centre inner switch screw, and from thence to phones and earth. The central bush must be connected to one of the detector terminals and also to the outer central switch screw.

The remaining connections are clearly shown in the wiring diagram, Fig. 2, and need no further explanation.

Operation

When the switch is in the upper position the set is ready for tuning-in on the long-wave station. As shown in the circuit diagram,



Photograph of Under Side of Panel.

Fig. 3, the energy from the aerial A splits at the point 1, one part flowing via the stud 2, through the whole of the variometer and loading coil in series, to earth, the other part passing via the stud 1, condenser C in parallel, and studs 3 and 7 of the switch to earth. It will be noticed that the crystal and phones are across the combined inductance of the variometer and loading coil, so that the full available signal energy is utilised.

With the switch in its lower position the set is adjusted for short-wave reception from the local B.B.C. station. The incoming energy now flows from the point 1 through the condenser C in series before reaching the stud 3. From here the only

(Concluded in third column of p. 66)

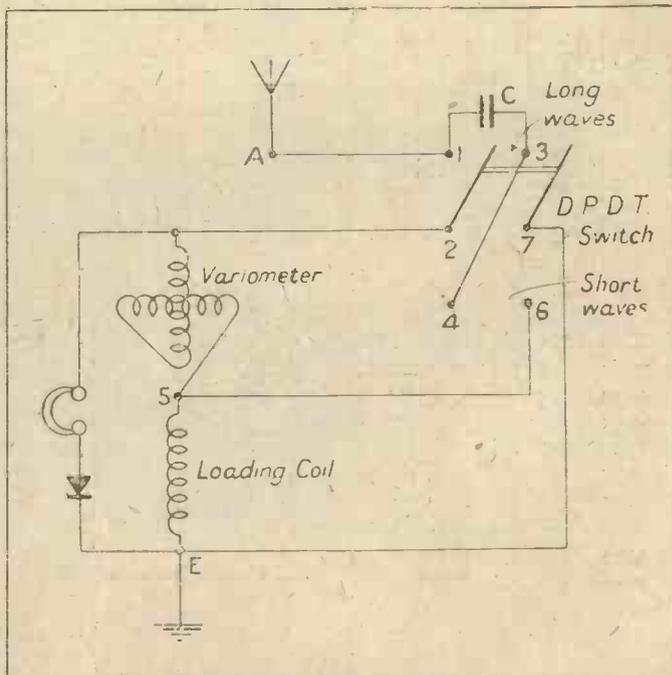
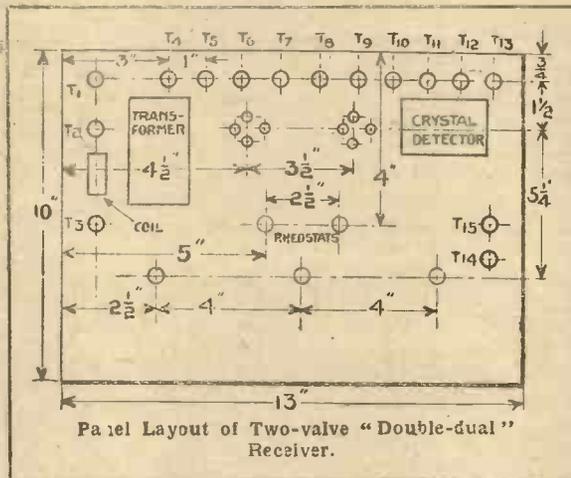


Fig. 3.—Circuit Diagram

THE "DOUBLE-DUAL" SET AS A TWO-VALVER



all the details of construction that have been dealt with in treating of the big set must be attended to, and in addition there are a few points peculiar to the small set. Firstly, the plug for the aerial coil may very conveniently be fixed to the panel by means of a pair of grid-leak clips, making the connections beneath the panel to the bolts that secure the plug. Secondly, two aerial terminals are provided on this set, with a small fixed condenser of .0002 microfarad capacity between them, so that when the aerial is connected to the upper terminal this condenser is in series with

the aerial, but is out of action when the aerial is connected to the lower terminal. The value of this arrangement has already been discussed in connection with the larger set. Then, thirdly, it would be advisable to choose a condenser of .0005-microfarad capacity for the aerial circuit, with a vernier incorporated, as has already been indicated in the notes of the list of components.

Nothing need be said about the method of handling this receiver, as its behaviour is absolutely identical with that of the large one. In fact after having had some experience with the small set, the writer was able to receive Birmingham on a loud-speaker, with a small indoor aerial, in London within a few minutes of finishing the construction of the big set.

In conclusion, remember not to allow the first valve of either set to oscillate, but be warned by the buzz that indicates that this is happening; then if the second valve oscillates you need not worry, as no appreciable amount of energy can get back to the aerial owing to the loose coupling of the first transformer, and no interference will be caused. A. L. M. S.

A VERY similar set to the three-valve "double-dual" or duplex-reflex receiver described in Nos. 131-135 for use with headphones only or for loud-speaker work from the nearest station, is quite easy to make up using only two valves and the circuit of Fig. 4 (No. 131, page 888). This set can be made up upon a panel size 13 in. by 10 in., as indicated in the panel sketch shown, which will be recognised as being but a small departure in arrangement from the larger size already described. The only differences lies in the elimination of all switches and the omission of the double-circuit tuner and the final note magnifier.

The writer made up this set in the past, and the drawing is a copy of the panel; unfortunately the set has been dismantled and it is therefore not possible to give a photograph of it. This set was, in fact, the experimental apparatus already described as the original of the later set, and may be relied upon, of course, to bring in at really good telephone strength all the stations that the larger set brings in on the loud-speaker.

If it is decided to build this smaller set,

SELECTIVE RECEIVER FOR THE SUDAN GOVERNMENT

THE photograph shows a valve receiver which contains a number of novel features. It was one of a batch specially designed for the Sudan Government. The instrument comprises a heterodyne unit and an electrostatic-coupled receiver.

As the receivers are for use in a tropical climate the panels are of paxolin instead of ebonite, and instead of wooden cases welded steel boxes are used.

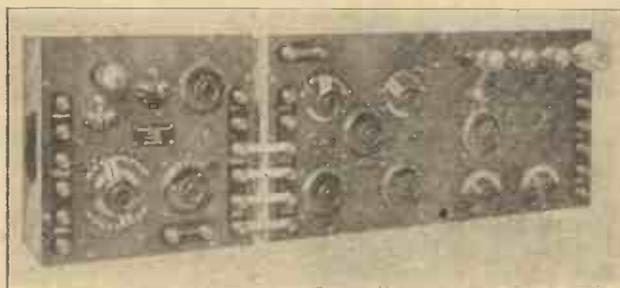
The wave-meter unit, or heterodyne, is fitted with a fine tuning condenser, situated on the lower right-hand side of the panel. This has a bevel wheel, in a spring-adjusted bearing, and another bevel wheel under the dial of the variable condenser.

Electrostatic coupling has been adopted to ensure extreme selectivity and to enable a wide range of wavelengths to be covered (300 to 24,000 metres) without the use of

additional plug-in coils. A further advantage of this method of coupling is that for a given scale reading the degree of coupling is about the same over the whole

metres, with suitable tapping points, while the latter is used for wavelengths from 5,000 up to 24,000 metres.

The first batch of these instruments was designed by Radio Instruments, Ltd., for use by the Sudan Government some twelve months ago, and on account of their great success, both as regards selectivity, sensitivity and freedom from atmospheric troubles, a further order has been placed for the same type of instrument.



A Selective Receiver Designed for the Sudan Government.

range of wavelengths the receiver covers. The high-frequency system used is a combination of anode reactance and resistance-capacity coupling, the former being employed for wavelengths up to 5,000

N K F, the Washington naval station, is an excellent transmitter for short-wave experimenters. It transmits at the following times: Mondays, Wednesdays and Fridays, 8-8.10 p.m. and 9-9.10 p.m. on 54.3 metres; 8.30-8.40 p.m. and 9.30-9.40 p.m. between 72 and 82 metres. The times are Eastern Standard, five hours behind G.M.T.

AROUND THE SHOWROOMS

Repaired Valves

NOT many months ago if you burnt out a valve the only thing left to do was to throw it away and buy a new one; this drastic course is no longer necessary, for there are many firms specialising in the renewing of valve filaments.

Even dull-emitters can be repaired by Radions, Ltd., of Bollington, near Macclesfield. A filament that consumes .06 ampere at 3 volts costs 12s. 6d., and other high-consumption filaments are cheaper in proportion.

Klutch Terminals

THERE is always a danger, especially when youngsters are about, that somebody will move quickly away from the set with the phones still on, and pull everything on to the floor.

By using Klutch terminals, however, this danger is obviated, as the leads will simply be pulled away and the set left in its proper place. These terminals have a spring grip action, not too rigid, and will accommodate two phone tags if desired. They are made by Henry Joseph and Co., Ltd., of 96 and 100, Victoria Street, S.W.1.

Behind-panel Coil Holder

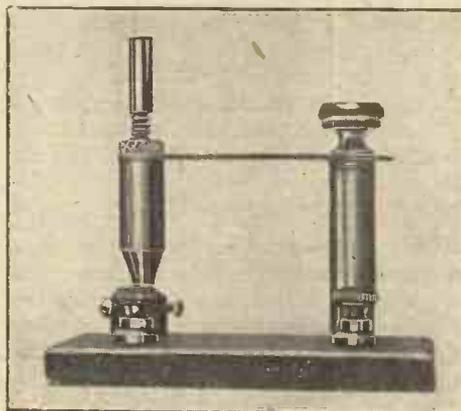
A SPECIAL coil holder, with a reduction gear for fine adjustments, that can be mounted behind a panel (with the control knob in front) is being made by the Peto-Scott Co., of 77, City Road, E.C.2.

All that appears on the surface of the panel are a control knob and a small indicating dial less than 1 in. in diameter.

"Stylographic" Detector

ALTHOUGH very fine-wire catwhiskers give the best results with most crystals, they have one great disadvantage—they are hardly thick enough to be self-supporting and easily become damaged.

This difficulty is overcome in the detector shown in the photograph by leading



"Stylographic" Detector.

the catwhisker through a small hole at the end of a pointed ebonite tube. The principle is similar to a stylographic pen.

Coarse adjustments of this detector (which is made by Mr. M. A. Ward, of Werndee Road, South Norwood, S.E.) are made by lifting the whole ebonite tube and moving it over the crystal. Fine adjustments are made by rotating the knob at the top.

Battery Service

IN a search for an efficient accumulator-charging station I have come across what is, I think, a unique battery service. It might with advantage be copied by many local agents.

Anywhere within about two miles of West Kensington station you can phone Western 4164 (the number of the Battery and Dynamo Co., of 124, North End Road, W.14) and order a spare accumulator to be delivered or your own to be collected for recharging.

For this service the charges are quite moderate; for example, you can hire any size of accumulator for 6d. a day (with a minimum charge of 1s.). When you run one battery out you can get another, still at the same charge.

Holtite Catwhisker

WHEN using the ordinary type of catwhisker one can never be certain that it will not slip just at the critical moment.

If, however, a small metal tube were used instead of a point, the end would surround a sensitive spot with a comparatively strong grip. This is the principle of the Holtite catwhisker.

It consists of a closely-wound brass spiral soldered to a wire shank. The end that makes contact with the crystal is in the form of a tube having walls less than $\frac{1}{32}$ in. thick.

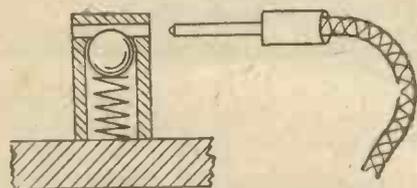
Holtite catwhiskers (price 6d. each in a glass tube) can be obtained from Mr. J. R. Holt, of 76, Waterloo Road, Widnes, Lancs. VANGUARD.

PROGRESS AND INVENTION

Telephone Terminals

A NEAT type of terminal that permits of a very quick grip and release action is the subject of Patent No. 224,996/24 (G. Evans, Hornsey, Middlesex).

This type of terminal possesses the dis-



Telephone Terminal (224996/24)

advantage that it is impossible to obtain a tight grip on the inserted connector, for if the spring were made too strong it would not be possible to insert small-

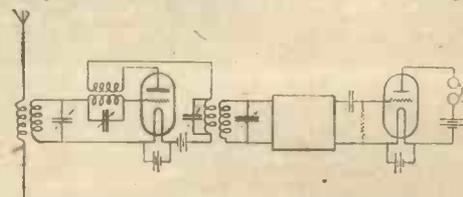
gauge wires. It should, however, prove useful as a connecting medium for telephone tags and other connectors that have heavy-gauge ends.

Super-heterodyne Circuit

A CIRCUIT which is claimed to produce an efficient and stable self-heterodyne system and to enable more reliable reception of signals is described at length in Patent No. 224,817/24 (Westinghouse Electric Co., Pittsburgh, Pa., U.S.A.).

As is well known, the super-heterodyne system depends on the conversion of short-wave signals (which are difficult to amplify) down to some readily amplifiable frequency. The conversion is generally accomplished by the heterodyne method, but both the heterodyne and self-heterodyne have disadvantages.

The circuit diagram is shown in the figure, and it will be seen that the difficulty arising out of mistuning a self-heterodyne system is eliminated by providing two circuits tuned, one to the frequency of the incoming signal and the other to a fundamental frequency which differs by a large amount from the sig-



Super-heterodyne Circuit (224,817/24).

nalling frequency. Regeneration is provided by means of a coil in the plate circuit coupled to the grid coil in the usual way.



A CHINESE broadcasting station is now in operation at Pu-Nan-Fu on a wavelength of 10,000 metres.

Half an hour's entertainment will be provided by "Us" (a pierrot troupe) at 7 p.m. on Thursday, January 8.

The Northampton Education Committee has decided to make grants of £5 for wireless sets in schools.

Microphones and loud-speakers have been installed in Westminster Abbey, as experiments in voice amplification are being carried out.

A popular orchestral programme to be given on January 9 will include items by Andrew Shanks, Kathleen Thomson and Mona Grey, the entertainer.

A wireless set has been provided for members of the Bath Fire Brigade to relieve the monotony of the long watches the firemen have to keep.

New broadcasting relay stations are to be established in Germany at Dortmund, Cologne and Gleiwitz.

A military band programme will be given on January 10 by the 2 L O Military Band under Dan Godfrey, junr.

Wireless once more proved its value as a life-saver when a small collier, the *Deloraine*, of Glasgow, was left stranded in a heavy sea. An S.O.S. message speedily brought help from the mail-boat *Hibernia* and no lives were lost.

A special programme of "Ballads of Long Ago" will be given on January 12.

The P.M.G. has forbidden the wireless chess match that was to have been held between Oxford University and Haverford University, U.S.A., as the chess match cannot be regarded as a *bonâ-fide* experiment in wireless.

A musical comedy programme S.B. to all stations will be given on January 13.

"John Henry," "Blossom" and "Erbert," of 2 L O, have been filmed. Pathé Frères will be releasing the film in about three weeks' time.

Dublin has been proposed as the site for a new broadcasting station in Ireland.

The second of the International Symphony concerts will be relayed from the Royal Opera House, Covent Garden, on January 15.

New Year greetings were broadcast from America on December 31. The Consul-General of each foreign Power represented in America delivered a mes-

sage to his countrymen, followed by the country's National Anthem.

A special appeal was made in English from the Eiffel Tower on December 28. After expressing satisfaction at the pleasure their transmissions were apparently giving in England, the announcer went on to ask for post-cards criticising the transmissions. These are to be sent to the Radio Services, at 23, Devonshire Street, London, or to the Eiffel Tower, and will be greatly appreciated.

Among curious aerials used successfully by experimenters in Scotland recently were a piano's iron framework, a brass parrot-cage and a metal candlestick. In each case excellent results were obtained from the Glasgow broadcasting station about one hundred miles away.

"As English manufacturers we have nothing to fear from German competition," stated a prominent English manufacturer after the Berlin exhibition.

New Year greetings to all British stations were broadcast from the Cape Town broadcasting station.

H D O, the new high-power broadcasting station at Hilversum, Holland, was opened on January 4.

The management of the Canadian National Railways has established a chain of broadcasting stations in Canada, as wireless has proved to be a very effective means of reaching the public.

Special licences are issued by the G.P.O. for people in private vessels or for liners that receive broadcasting for the passengers.

A successful appeal has been made by Mr. E. Liveing, the manager of 5 N G, for headphones for inmates of the Nottingham General Hospital.

"Wireless" is more educative than anything that has happened for a long time, and is far superior in its educational effect to the picture palace."—*Sir James Voxall*.

A popular programme by the Royal Air Force Band will be broadcast from 5 X X on January 13.

The Lady Mayoress deputised for the Lord Mayor of London recently and broadcast an appeal on behalf of the Metropolitan Nurses' Home.

Complaints have been received of serious oscillation in the Leeds district during the Christmas week.

The programme broadcast from Birmingham on January 17 will be relayed from 5 X X in contrast to the light "query" programme to be given from 2 L O.

Signals on a wavelength of 90 metres have been exchanged between Nauen and Buenos Aires.

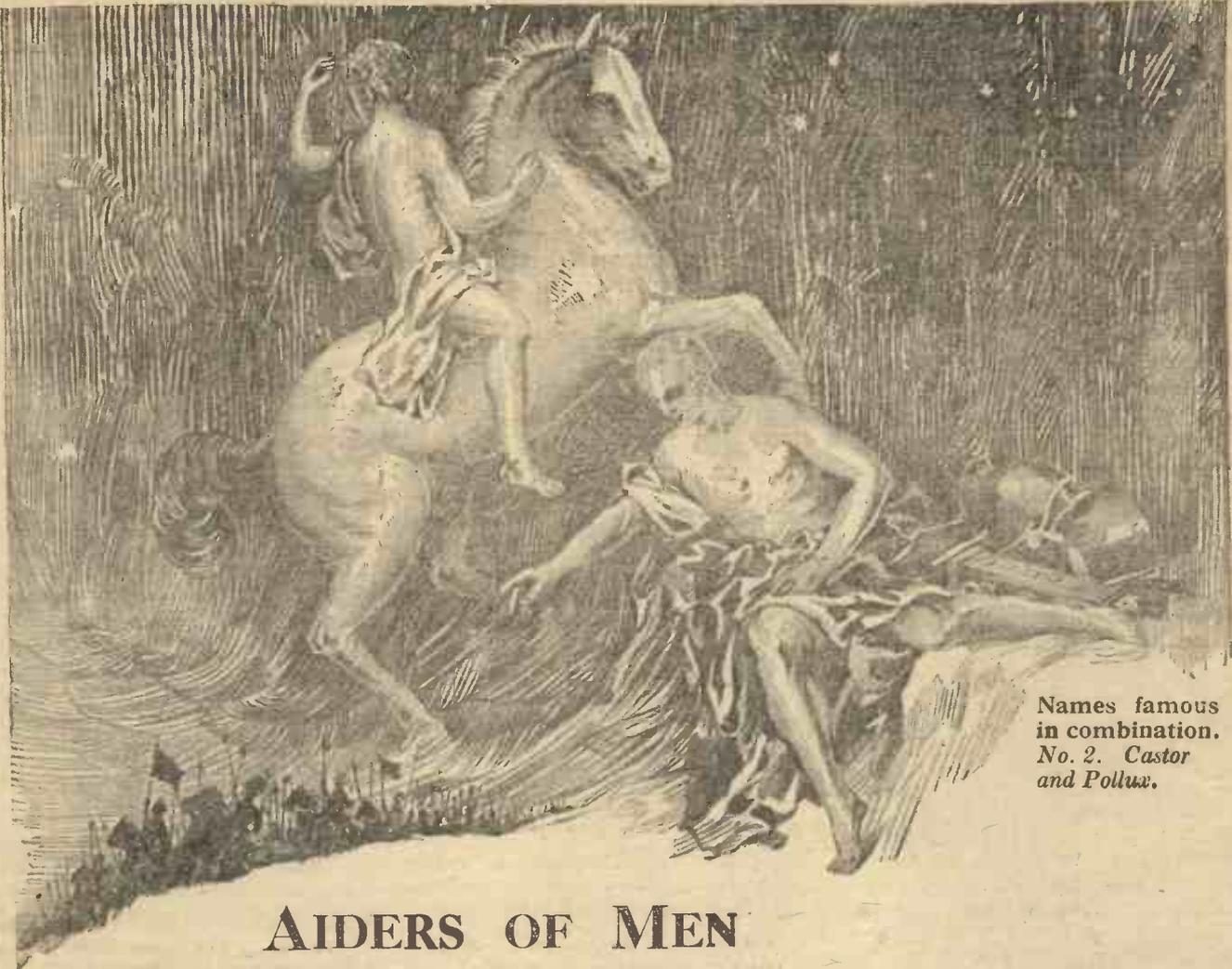
Most listeners will have noticed the improvement in the transmissions from the Eiffel Tower of late, which are now reach-

(Concluded on page 66)



BROADCASTING DICKENS

Miss Mary Angela Dickens, the granddaughter of Charles Dickens, broadcasting the Christmas story of the "Fat Boy" by Charles Dickens.



Names famous
in combination.
No. 2. Castor
and Pollux.

AIDERS OF MEN

CASTOR and POLLUX, twin sons of Zeus, were regarded as aiders of men, patrons of travellers and guardians of hospitality.

A more familiar conjunction of names, because they belong to our everyday life, is that of MARCONI and OSRAM—the names of the two famous organisations which have combined to produce wireless valves of unparalleled excellence—"The Valve in the Purple Box."

Read the 40-page wireless book, *The Book of M.O.V.*—Free from your dealer or The M.O. Valve Co., Ltd., Hammersmith, London, W.6

HOW TO ORDER YOUR VALVES.

For 2-volt Accumulators.

Purpose.	Type.	Price.
†G.P.	D.E.R.	21/-
†L.S.	D.E.G.	25/-

For 4-volt Accumulators.

G.P.	R.	12/6
G.P.	*D.E.3.	25/-
L.S.	D.E.4.	30/-

For 6-volt Accumulators.

G.P.	R.5.V.	12/6
L.S.	D.E.5.	35/-
L.S.	*D.E.5b.	35/-
L.S.	L.S.5.	65/-

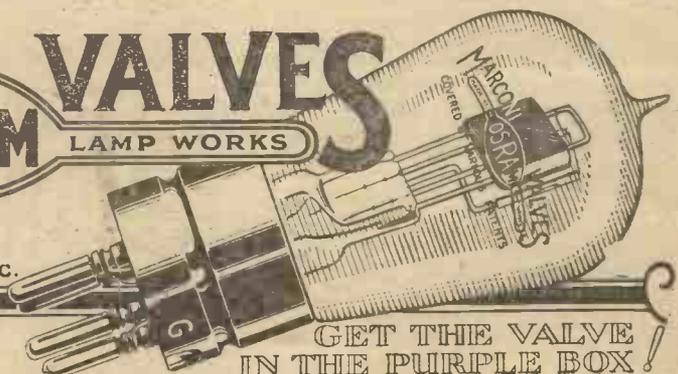
†G.P. = General Purpose.
 †L.S. = Specially suitable for low frequency amplification for Loud Speakers.
 *Can be used with Dry Batteries.
 ∴ For Resistance - capacity Amplification.

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RADIOGRAMS (continued from page 64)
ing England at greater strength and purity than ever before. This station is providing a very interesting programme which should be within the reach of almost any normally sensitive set.

Two secret broadcasting stations operated by Communists have been discovered at Vilna, Poland.

The Programme Correspondence Department of the B.B.C. reports that the general opinion amongst listeners seems to be increasingly favourable towards plays, particularly short ones.

Microphones, loud-speakers and sound-amplifiers were used in the filming of *The Hunchback of Notre Dame*, in which 3,500 people acted.

Over three thousand toys were received in London alone as a result of the appeal made by the B.B.C. for toys for poor children.

Four hundred accumulators belonging to wireless enthusiasts were damaged recently in a fire which broke out in a recharging depot in Stepney.

Since a new inmate of Leeds Workhouse brought with him a wireless set, other occupants are saving their Christmas boxes so that they can buy their own apparatus.

An international exhibition of hydraulic power and travel is being held at Grenoble (in the French Alps) between the months of May and October. A large

wireless section is included, and official participation has been obtained from Italy, Spain, Norway, Sweden, Germany and Yugo-Slavia.

The Municipality of Vienna has asked the management of the Vienna Broadcasting Company, to show cause why it should not be subject to the usual entertainment tax.

The Glasgow station will have a "query" programme on January 12 which will be S.B. to Edinburgh, Aberdeen and Dundee.

A Union of German Manufacturers of Wireless Components has been formed in Berlin to protect the interests of the trade, particularly from the point of view of patents.

London will have another "query" programme on January 17, and prizes are being offered to listeners who make a correct list of the items.

It can now be authoritatively stated that the fire which broke out in the works of Messrs. A. J. Stevens, Ltd. (the well-known manufacturers of motor-cycles, wireless apparatus, etc.), at Wolverhampton, on December 26, while causing considerable damage, will in no way affect the fulfilling of orders or make any material difference in production.

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

TRADE NOTES AND CATALOGUES

LITERATURE dealing with General radio sets and components has been sent us by the General Radio Co., Ltd., 235, Regent Street, W.1.

An illustrated price list of Refty spring terminals, crystal cups and the Reftone crystal has been sent up by Refty Electrical Appliances, Ltd., 2, Featherstone Buildings, Holborn, W.C.1.

From Siemens Brothers and Co., Ltd., Woodwich, we have received a copy of leaflet 2039, on ebonite for wireless apparatus.

From the Hart Accumulator Co., Ltd., Marshgate Lane, E.15, we have received a large office blotting pad.

"THE SIMPLEX LONG- AND SHORT-WAVE CRYSTAL SET" (continued from page 61.)
path available is across the wire bridging the studs 3 and 4, up the switch arm to the stud 2, and then through the variometer. At the point 5 the current flows to earth through a connecting wire to the stud 6 via the switch arm and the stud 7. The loading coil is effectively shorted by the path 5, 6, 7 to earth. In this case, of course, only the potential across the variometer is applied to the crystal and phones.
J. KNOX.

THE "ALTO"
SHROUDED TRANSFORMER

THIS TRANSFORMER represents the last word in efficiency for low frequency amplification. It embodies a patent winding process and is tested to withstand 500 volts between windings. Being shrouded, it may be guaranteed absolutely free from distortion when used either singly or in cascade.

The core is of finest Swedish transformer iron. Made in two ratios, for first and second stages of amplification, the "Alto" Shrouded Transformer is designed to meet the requirements of the discriminating buyer.



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1. Ample Volume with a low input.
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THE LOUDEST SET IT IS POSSIBLE TO BUILD.
4 000 MILES RANGE, PARIS, MADRID, BERLIN AND ROME, ANY TIME. AMERICA EVERY NIGHT.
No H.F. No CRYSTAL. No COMPLICATIONS.

80,000 sets now working. Thousands of testimonials have been received from delighted amateurs.

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In addition to this marked advantage, Mullard D.F.A. Master Valves consume LESS current than your present valves, giving longer life to your battery



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4-volt battery each

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Take greater care of your valves by using the Mullard Safety Disc, free on request from your dealer. Send us his name and address if you cannot get what you want, and we will send him the necessary supplies.

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THE MASTER VALVE

NEW RECEIVING LICENCES

FROM January 1 there will be only one type of receiving licence issued to the wireless amateur, and this will be obtainable from the Post Office on payment of 10s. per annum. The broadcast, or B.B.C. licence, which was issued as a temporary measure from every local post office, has been superseded by this new general licence, and the experimental licence which was issued from the General Post Office to wireless experimenters has also been cancelled. No would-be broadcast listener should have any difficulty in obtaining a licence now that this new step has been taken. It should be noted that the new licence does not contain the stipulation previously made on the B.B.C. licence that all apparatus should be of British manufacture.

"EXPERIMENTAL TRANSMISSION" (continued from page 53)

Tapping B alters the amount of inductance included in the aerial circuit, and hence the wavelength of transmission, while the centre tapping from the filament controls the size of anode or grid coil, and so alters the depth of oscillation.

A variable condenser may be inserted at X if desired in order to control oscillation, but for some unknown reason in practice it is not good to insert the usual grid condenser and leak at this point, as one would suppose.

Although this circuit is so extremely easy to work and so simple in theory, there is the obvious disadvantage that the filament battery is at a high potential to earth.

Fig. 25 illustrates an ingenious method employed by the French military service to overcome this defect. Plate and grid coils are tapped off one coil as before, and the whole of this enters into the calculation of the wavelength.

The filament current passes through the plate-circuit inductance and also through some turns of another coil wound over it; by this means high-frequency induction in the filament-lighting accumulator may be neutralised.

By means of a similar scheme to that shown in Fig. 22, we may have the anode coil in the positive side of the anode supply and yet maintain the essentials of the circuit in Fig. 24.

Fig. 26 illustrates such a scheme, and it will be seen that the anode coil is insulated from the anode (speaking in terms of D.C. current) by means of a blocking condenser and that, as before, a radiochoke prevents energy at high frequencies being by-passed to earth without affecting the aerial system.

The filament battery is connected to the negative low-tension leads, and as it is thus at earth potential there is no serious danger of capacity effects causing a stoppage of oscillations.

KENNETH ULLYETT.

(To be continued)

LIVERPOOL MODEL AND WIRELESS EXHIBITION

THE Wireless and Model Exhibition, held in Liverpool under the auspices of the Liverpool Wireless Society and the Model Engineering Society on Thursday, Friday and Saturday, commencing December 18, was a huge success. Over 5,000 people attended and both the wireless and model exhibits were well above the average. The leading feature of the society's stand was the six-valve set belonging to the society. This panel is arranged with a normal "straight" circuit but has excellent switching arrangements. The chairman of the society, Mr. E. B. Grindrod, exhibited a three-valve experimental set, set out in the well-known "thousand-circuit" method. Mr. H. J. Smith showed a five-valve supersonic-heterodyne set, and Mr. J. H. Swift a three-valve neutrodyne receiver arranged on the American system. Mr. E. G. Bush exhibited a two-valve set on which he regularly gets America. Several examples of coils and coil winders were on view. For exquisite workmanship the exhibits of Mr. H. P. Skeldon were very noteworthy.

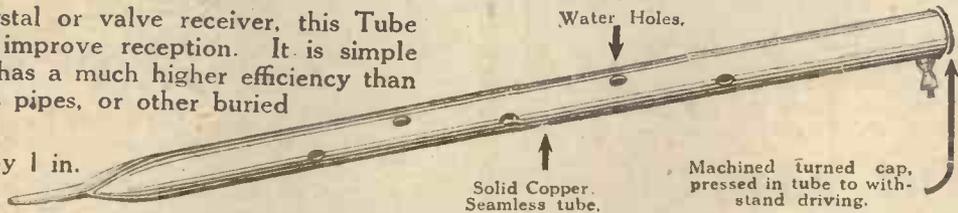
The society meets at the Royal Institution Building in Colquhoun Street, Liverpool, and those interested are always welcomed.

Shakespeare's fantasy, *The Tempest*, will be broadcast on January 16.

IMPROVED RECEPTION INSTANTLY OBTAINED BY USE OF THE KINGSWAY EARTHING TUBE

Whether crystal or valve receiver, this Tube will greatly improve reception. It is simple to use, and has a much higher efficiency than water or gas pipes, or other buried earths.

24 in. long by 1 in. in diameter.



Solid Copper Seamless tube.

Machined turned cap, pressed in tube to withstand driving.

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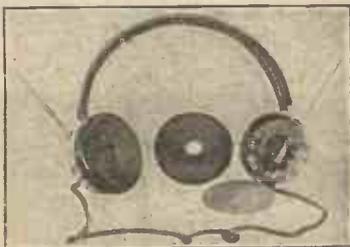
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CAUTION: Use only PURE Copper Tubes.

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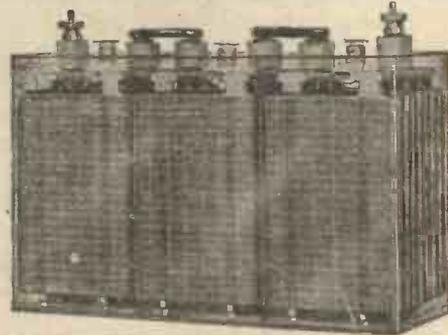
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18	1/11	2/11	3/5																																							
20	2/2	3/4	4/2																																							
22	2/6	3/8	4/7																																							
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26	3/4	4/2	5/8																																							
28	3/9	4/8	6/6																																							
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As yet the effect of a good filament control upon perfect reception is not fully appreciated. Try the difference between bad and good control by getting the SHIPTON,

THE MOST PERFECT RHEOSTAT YET INTRODUCED

A special tension spring fitted on the spindle ensures a good, smooth contact. It is silent in use. Three models are available so that whatever valves you may use there is a SHIPTON Rheostat to give you perfect filament control. Ask for it by name.

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PROTECTS YOUR VALVES.

However careful you may be an occasion will arise when the H.T. will short across the filament. Avoid accidents by fitting the SHIPTON 7 ohm model which is fitted with a fuse. A spare fuse is packed in every box.

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SHIPTON POTENTIOMETER 600 ohm .. 4/6

Packed in neat linen-tile boxes.

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Stands 12 in. high, Width 14 in., and 9 in. deep.

Every set is guaranteed in perfect condition.

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Specification—Mounted on Ebonite, in handsome polished Mahogany Cabinet, 14 in. by 12 in. by 9 in. British made. Complete with following accessories: 3 Valves, 4 volt. 40 amp. accumulator, H.T. battery, pair of 4,000 ohms head-phones, 100 ft. aerial wire, 25 ft. lead-in wire (insulated), plugs, insulators, etc.

Letters like these from purchasers reach us every day:—
"Very good results, every word of the sermon broadcasted from London was heard here as distinctly as if I were in church."
—A. G. (Fowey, Cornwall).
"Most satisfactory. It has a beautiful tone and a great volume of sound."
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Money willingly refunded if not satisfied.

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McDermott Road, Peckham, London, S.E.
S.S.A.



Wireless and the Child

SIR,—Articles recently published in the daily Press appear to have opened an interesting subject of discussion. The writers who, in their letters to the papers, have summed up to the effect that "Broadcasting is an evil which stands increasingly in the way of children's education" apparently look at the matter from a narrow point of view.

As listeners, children may be roughly divided into two groups: (1) Those whose interest in broadcasting is solely confined to the "Children's Hour"; and (2) those who, unless there happens to be something of special interest to them in the day's programme, utilise a portion of the broadcasting hours for the purpose of testing apparatus which they have constructed.

Taking the first group, as a whole it may be definitely stated that the children's hour, far from interfering with their education, has proved both to the youngsters and to their families an inestimable boon, inas-

much as the entertainment provided is sufficiently varied and well chosen to afford pleasure to the younger generation just at that particular hour of the day (before bedtime) when wholesome recreation is most beneficial.

It seems hardly likely that the custom of using a loud-speaker in a room where a child is doing his home lessons is a general one, as in most instances the time at which the family wish to enjoy broadcasting is long past the hour at which the younger members are working at their school tasks.

As to the second group, which obviously includes older children, were the boys and girls not devoting a part of their leisure hours to wireless, they would spend it on other hobbies, such as stamp collecting, fretwork, photography, etc., or, what is worse, would be playing in the streets.

It would be a great pity if parents were to discourage these mechanical or constructive hobbies. A child's inclination is satisfactorily demonstrated by the toys

with which he plays. Such a toy as wireless—if so disparaging a term may be used for a scientific discovery—can only educate.

The construction of wireless sets, be they ever so simple, must involve a certain amount of technical reading, which is all to the good. It is true that a hobby should not be allowed to interfere with the child's school work, but parents could lay down strict but reasonable rules which would limit the youngster's recreation to his leisure hours.—J. G. A. (London, N.W.).

An Appreciation

SIR,—At the termination of another most successful year of broadcasting we desire to express our gratitude and appreciation to the British Broadcasting Company, the Press, the progressive section of theatrical interests, the many excellent artistes and educationalists who have favoured us with such delightful entertainment, and the societies and associations. To all we wish a very happy and prosperous New Year. —AUTOVEYORS, LTD. (London, S.W.).

Wireless in Germany

SIR,—I have read with interest, although in almost entire disagreement, the short article on "The Berlin Exhibition" in No. 134.

From personal knowledge of the wireless industry in Germany, and from reports

(Continued on page 72)

LONG RANGE RECEPTION PURITY of SOUND

TWO BIG POINTS
on which

VALPO
(VALVE POWER)

IS THE CRYSTAL SUPREME

Put your faith in us and in our "Valpo" Crystal. We will not "let you down!" "Every Crystal has its day."—"Valpo" has 500! Broadcasting from Chelmsford is heard at Grampond, Cornwall, on a "Valpo" Crystal. In 36 laboratory tests "Valpo" gave 97% points of high sensitivity. We pledge our word that these statements are absolutely correct. The test report was made without our knowledge, from an ordinary sample of "Valpo."

Each "Valpo" Crystal is broadcast tested and sold in sealed box complete with Silver Cats-whisker. Of all Wireless Stores or post free from **1/6**

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SUPERIOR CRYSTAL RECEIVER

Long range, superb appearance and low price are the outstanding features of this efficient Crystal Set. Fitted with Loading Coil socket to take coils for Chelmsford, etc.

Price 17/9 Post 9d.

Adjustable Phones, highly sensitive. ... 11/9
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Complete Outfit, comprising Crystal Set, Phones and Aerial Wire as above ... 30/-
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MH CRYSTAL

A high grade crystal of Special Selectivity contained in dust tight metal box with glass top. A well made non-corrosive spear-point cats-whisker is included in each box.

It is so sensitive that a blind man can use it.

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SAFETY



FIRST

"LIBERTY" SAFETY WANDER PLUG

Passes sufficient current to supply valves, but not sufficient to damage or destroy valves, even if wrongly connected.



80% of valves burnt is caused by connecting H.T. current across filament.

No fuses or bulbs to renew.

Only ONE Plug required for each battery.

2/6 each

Special Plug for Dull Emitter Valves (.06 amps) **3/-**

Prov. Patent 18396/24.

A PERMANENT SAFEGUARD AGAINST UNTIMELY VALVE DESTRUCTION

If your dealer is out of stock, send P.O. to makers and Plug will be sent *post free*.

Sole Patentees and Manufacturers:

RADI-ARC ELECTRICAL CO., LTD.,

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Telephone: Chiswick 1834, Gerrard 17 6.

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Catwhiskerless, Batteryless, Worryless, Fuss - and - Botherless Wireless



No batteries; no fiddling with cat-whiskers and other delicate adjustments; no worry; no disappointment. Simple turn of milled screw and "Hovimo" Crystal Valve gives instant reception—uninterruptedly pure and bell-like tone. Can be easily adjusted to any set employing crystal detection or rectification.

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BRITISH MADE EVERY ONE GUARANTEED

"HOVIMO" CRYSTAL VALVE

REPLACES OLD-FASHIONED DETECTOR

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Specially recommended for Crystal loud speaker systems. An entirely new invention, and must not be confused with the ordinary "permanium" detector or confused with Silicon boronite or similar materials. Ask your dealer for it, or write to—

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If you wish to make Wireless Sets which are **UNBEATABLE in PRICE, QUALITY, or EFFICIENCY**, this is the book you must have. Everything is so clearly explained that an beginner, without previous experience, can make the most efficient receiving sets obtainable. Full instructions are given for making complete Crystal Sets, 1 and 2-valve Amplifiers, Dual Amplification Sets; also the very latest 2, 3 and 4-valve Tuned Anode Receivers. 160 pages. (28 DIAGRAMS) **1/3 POST SATISFACTION GUARANTEED or money returned.** **FREE SAXON RADIO CO. (DEPT. 12), SOUTH SHORE, BLACKPOOL.**



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This handbook, which is compiled from the writings of many contributors to "Amateur Wireless," seeks to show in close detail, and with the aid of 112 illustrations, how to make and operate about ten different types of valve sets.

Simple Crystal Receiving Sets and How to Make Them.

Compiled from the pages of "Amateur Wireless," this handbook deals in a simple, straightforward manner with the making of a number of crystal sets. With 114 illustrations.

Wireless Component Parts and How to Make Them.

Detailed instructions for making the various components forming parts of many kinds of wireless receiving sets. It does not describe the making of any one complete set, but just all the parts likely to be required. With over 200 illustrations.

Wireless Telegraphy and Telephony and How to Make the Apparatus.

This revised edition is by Mr. E. Redpath, the well-known writer on wireless. The explanations of principles are up to date, and there are directions for making apparatus, including detectors, amplifiers, single-circuit and complete short-wave receiving sets, a valve panel, and a five-valve amplifier.

Cassell's :: Publishers :: London



CORRESPONDENCE (continued from page 70)

received by representatives regarding it, I can say that conditions are nothing like what your contributor tries to make out. The part one objects to in his notes is the usual silly gibe at British manufacturers.

I have visited many countries where there is broadcasting, but in London not only is the trade better than anywhere else but it is under better control; incidentally far better value for money is given.

The wireless trade in Germany is in a disorganised state, and my company refused to do any business there. Even in America the trade is in a far more disorganised state than in this country.—
W. H. L. (London, S.E.).

Other Correspondence Summarised

E. E. T. (Friern Barnet) has back issues of "A.W." from No. 14, and would be pleased to send them to any reader on receipt of postage.

R. A. H. (Chippenham) has received signals from WBZ on a crystal set with two hole magnifiers. He has also picked up Radio-Iberica with only a crystal receiver.

C. P. (Catford) suggests that it should be necessary for wireless retailers to hold some certificate of qualification in technical matters.

H. K. M. (Stamford Hill) would like to know if it were the Zurich station which transmitted the "Volga Boatman" on Dec. 15.

J. B. H. (Edinburgh) and V. E. M. (Shrewsbury) both report the reception of signals from ss. *Leviathan*.

S. D. W. and S. W. W. (Burnham-on-Sea) have received WTAM, and find that WGY is more stable than KDKA on a two-valve set.

THE WIRELESS SYNCHRONISATION OF CLOCKS

EXPERIMENTS are being conducted with the wireless adjustment of clocks. The invention consists of mechanism which is fitted inside a clock, and which will pick up wireless time signals from observatories, and automatically adjust the clock to correct time.

S. W.

We are informed by Mr. J. T. Whitehurst, of Regent's Park, that on Sunday, December 28, he was successful in tuning WBZ, Springfield, Mass. The programme from the "Boston Herald Traveller's" studio, Hotel Brunswick, Boston, New England, from 1 a.m. until 3.30 a.m., was received on a Dragon-type Amplion at good strength and entirely untroubled by atmospherics. Fading was certainly present in a minor degree at times, but the concert was received clearly and easily.

"A Comfortable Fireside-seat" is not only an attractive feature in any living-room, but during the long winter evenings is most comfortable. The current issue of "The Amateur Mechanic and Work" (3d.) contains a well-illustrated article showing how such seats can be made. Other articles appearing in the same number are: "Liquid Glues: Their Advantages and Uses"; "Window Catches and an Anti-rattling Device"; "Cat-whisker Tips"; "The Construction of a Highly-sensitive Variometer"; "A Really Universal Coil-holder"; "A New Method of Mounting Coils"; "House Repairs: Broken Eaves Gutters"; "A Handy Cruet-tray"; "Photography: Fast Plates for Winter Work"; "A Useful Book-slide Substitute"; "Designing and Building A.C. Transformers"; "Home Repairs to Kitchen-range Covers"; "The Perpetual-motion Fiend."

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Glazite, the new coloured connecting wire, marks a new era in panel wiring. You can dispense with insulating sleeving entirely. Glazite is made of tinned copper wire and possesses exceptional insulating properties. It is damp-proof and flame-proof. Glazite cannot deteriorate in use. The simplicity of the W.P. Ezzi-wiring system can only be appreciated when used in conjunction with Glazite. Your Radio Dealer will tell you all about it.

Supplied in 10-ft. Coils.
PRICE 1/6 per Coil
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The producers of Neutron Radio Crystal now introduce to the market a series of Crystal Sets, each fitted with a Neutron Crystal. These are designed in accordance with the principles on which hundreds of long-distance records have been established; and each set represents, for its price, the highest possible efficiency in loud and clear reception.

No. 1 Enclosed detector with smooth movement, screw Crystal cup fitted with Neutron Crystal. Variometer tuning, covering 300 to 500 metres wave-length. Extra terminal for use with short aerial. Nickel-plated fittings, mounted on high grade matt ebonite with polished cabinet, Size 5 × 5 × 4½ in. **10/6**

No. 2 As above, but with lid to cabinet. Covered in brown crocodile-grained leather cloth. Also has provision for addition of loading coil, for Chelmsford, or other long-wave stations. Size 5 × 5 × 5 **12/6**

No. 3 A "de Luxe" modification of the above, exactly to same specification as No. 2, but in a larger size—7 × 5 × 5 **15/-**

Guaranteed Range—125 miles

No. 4 The last word in Crystal Receivers; guaranteed to receive telephony at 125 miles at least, with a good aerial. Fitted with special detector with newest improvements; tuned by low-loss coil and variable condenser, with knob and engraved dial. Fitted with plug and socket for long-wave coil. This set is exactly as used in regular reception over 200 miles. **32/6**



These sets owe their efficiency mainly to the fact that each of them is fitted with a Neutron Crystal, exactly similar to the Neutron you buy in the black-and-yellow tin. Your Radio Dealer can supply either Neutron Crystal or the Neutron complete Sets; but if you have difficulty send the price with Dealer's name direct to us, and receive the Set or the Crystal by return post.



Concert Tested & Guaranteed Radio Crystal

Stocked by the Best Radio Dealers. Packed in tins with silver cat's-whisker. Insist on Neutron in the Black-and-Yellow Tin— **1/6**

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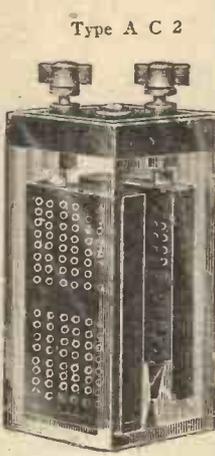
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12/-

NEW ZEALAND on a Single Valve—

A C & S DULL EMITTER OF COURSE! THE ONLY VALVE THAT GETS THE UTMOST OUT OF THE ETHER. A SAMPLE WILL CONVINCED YOU OF THE IMMENSE SUPERIORITY OF THIS VALVE OVER ALL OTHER TYPES.

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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 Greenwich Mean Time.

London (2LO), 365 m. 1-2 p.m., con.; 3.15-3.45 p.m., lec.; 4-5 p.m., con.; 5.30-6.15 p.m., children; 6.40 p.m. talk; 7-7.30 p.m., time sig., news, talk; 7.30-9.30 p.m., music; 9.30-10.0 p.m., time sig., news, talk; 10.0-10.30 p.m., music. Mon. and Wed. the Savoy Bands are relayed until 11.0 p.m., and on Sat. until midnight. Sat. only, 4-5.30 p.m., con.

Aberdeen (2BD), 495 m. Belfast (2BE), 435 m. Birmingham (5IT), 475 m. Bournemouth (6BM), 385 m. Cardiff (5WA), 351 m. Glasgow (5SC), 420 m. Manchester (2ZY), 375 m. Newcastle (5NO), 400 m. Much the same as London times.

Bradford (2LS), 310 m. Dundee (2DE), 331 m. Edinburgh (2EH), 328 m. Hull (6KH), 335 m. Leeds (2LS), 346 m. Liverpool (6LV), 315 m. Nottingham (5NG), 322 m. Plymouth (5PY), 335 m. Sheffield (6FL), 301 m. Stoke-on-Trent (6ST), 306 m. Swansea (5SX), 485 m.

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. (G.M.T.).

AUSTRIA.

Vienna (Ravag), 530 m. (1 kw.). 08.00,

markets; 10.00, con.; 12.05, time sig.; 12.20, weather; 14.30, Stock Ex.; 15.00, news, con.; 15.10, children (Wed.); 17.00, lec. (Mon., Tues., Wed., Sat.); 18.45, news, weather; 19.00, time sig., con., news; 21.00, dance (Tues., Wed., Sat.).

BELGIUM.

Brussels (SBR), 265 m. (1½ kw.). 17.00, orch., children (Wed. and Thurs.); dance (Tues. and Sat.); 18.00, news; 20.15, lec., con., news (opera, Mon. and Wed.).

Haeren (BAV), 1,100 m. 13.00, 14.00, 16.50, 18.50, weather.

CZECHO-SLOVAKIA.

Kbely (OKP), 1,160 m. (1 kw.). Weekdays: 09.00, 10.30, 12.30, 16.00 and 17.00, Stock Ex.; 18.30, lec., news, weather, con. (time sig., 19.00), daily; 10.00, con. (Sun.).

Komarov (OKB), 1,800 m. (1 kw.). Weekdays: 13.00, Stock Ex., weather, news; 09.00, con. (Sun.).

DENMARK.

Copenhagen (Kjobenhavns Radiofonistation), 470 m. 19.00, con. (Sun., Wed., Thurs.); also tests on 750/800 m. 20.00 almost daily.

Lyngby (DKE), 2,400 m. Week-days: 18.20, news and Stock Ex.; 20.00 and 21.00, news, weather and time sig.

Ryvang, 1,025 m. 18.30, Eng. lesson (Wed.); 19.00, con. (Tues. and Fri.).

FRANCE.

Eiffel Tower, 2,650 m. (5 kw.). 06.40, weather (exc. Sun.); 11.00, markets (exc. Sun. and Mon.); 11.15, time sig., weather; 14.45, 15.35, 16.30,* Stock Ex. (exc. Sun and Mon.); 18.00, con. (not daily); 19.00, weather; 22.10, weather (exc. Sun.).

* On 1st and 15th of each month at 16.45.

Radio-Paris (SFR), 1,780 m. (10 kw.). Sundays: 12.45, orch.; 13.45, news; 16.45, con.; 20.30, news, con.; 22.00, dance. 12.30, news, Stock Ex., orch.; 16.30, markets, Stock Ex., con.; 17.45, Stock Ex., news, women's hour;

20.30, lec., news, con.; 22.00, dance (not daily). Special con. by *Le Matin*, Paris, every 2nd and 4th Sat. in month at 22.00.

L'Ecole Sup. des Postes et Télégraphes (PTT), 450-458 m. (500 w.). 14.00, lec. (irr.); 16.00, lec. (irr.); 20.30, Eng. conv. and con. (Tues.), lec. or con. (almost daily). On 3rd Sun. of each month, organ recital, 20.45; 21.30, con. (Sun.).

"Le Petit Parisien," 345 m. (500 w.). 21.30, con. (Sun., Tues., Thurs.).

Lyons-la-Doua, 550 m., 10.30, gramophone con.; news, e.c. (irr.).

Radio-Lyon, 483 m. 12.00, 17.15, 20.30, news; con. (irr.).

Toulouse Aerodrome (MRD), 1,525 m. 09.42, 19.42, weather.

Agea, 340 m. Tests daily, 19.30.

GERMANY.

Berlin (2), 505 m. (1½ kw.). 08.00, sacred con. (Sun.); 09.00, markets, news, weather; 10.00, con. on 430 and 505 m. (irr.); 11.00, educat. hour (Sun.); 11.15, Stock Ex.; 12.00, time sig.; 13.15, Stock Ex.; 14.00, lec. (Sun.); 14.30, children (Sun., Wed.); 15.00, Esperanto (Sat.); 15.30, orch.; 17.30, lec., women; 19.00, French (Mon., other days irr.); 18.30, lec.; 19.30,* con., weather, news, time sig.; 21.30, chess (Mon.); dance until 23.00 (Sun., Tues.). * If opera relayed, at 18.30.

Berlin (Telefunken Co.), 750 m. (1 kw.). 10.30, 19.00, con., tests (irr.).

Eberswalde, 280 m. 22.15, con. (Mon.). 3,150 m.: Telegraphen Union, 06.45-18.45, news, con. (Fri., irr.).

Königswusterhausen (LP), 2,450 m. (5 kw.). Wolff's Buro. Press Service: 06.00, 20.00, 2,800 m. (5 kw.): 10.30, con. (Sun.). 4,000 m. (10 kw.): Express News Service, 06.00-20.00 (daily); lec. (Tues. and Fri., time irr.).

Bremen, 330 m. (1 kw.). Relay from Hamburg.

(Continued on page 76)

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SUPRA L.F. TRANSFORMER

Cannot be surpassed for clarity and volume, but extremely low in cost. Each layer of the windings has six insulated sections, cutting out distortion and giving great amplification. Ratio 5 : 1.

PRICE : : 12/6

"K" square law variable condensers

This variable condenser is of exclusive design, the minimum capacity being absolutely negligible. The aluminium vanes are 19 gauge—nearly double the usual thickness. Accurate spacing and rigid assembly is a leading feature. Ebonite end pieces, handsome Trolite knob and 3 in. graduated dial are standard.

.001 m.f. 9/- With Vernier 13/-
 .0005 " 7/9 " " 12/-
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 .0002 " 6/9 .0001 m.f. 5/9



"SUPRATONE" HEADPHONES

These featherweight headphones are remarkable for their rich, clear tone. Perfect comfort is assured for any length of time owing to the adjustable earpieces, which are carefully wound to 4,000 ohms. Only the finest materials are used throughout, and price includes best quality cords.

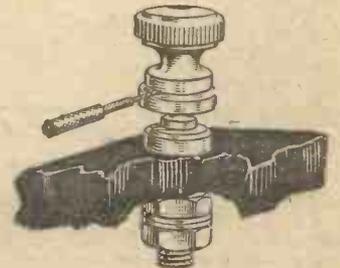
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Valve Pin with Collar	8d.
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New 3-pole Laminated Magnets, which ensure an even magnetic pull and still greater volume. Windings well insulated. Large size earpieces and leather head-bands of standard "N & K" comfortable design. Technically, "N & K" Head-phones represent the best word in Wireless Reception.

IMPOSSIBLE TO EQUAL FOR CRYSTAL SETS. Post 6d.

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Variable Grid Leak 2/6
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 T1 Transformers 30/-
 T2, 26/-; T3, 16/6; Coils: 25, 4/10; 30, 35, 40, 4/10, 50, 5/-; 60, 5/4; 75, 5/4; 100, 6/9.
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 Others not Obtainable.

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Sterling 25/-
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Var. Grid Leak to 10
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Coils: 25, 5/-; 35, 5/-; 50, 5/2; 75, 5/6; 100, 7/-; 150, 7/10; 200, 8/8; 250, 9/-; 300, 9/5; 400, 10/3; 500, 10/6
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Manufacturers of sets can be supplied with most proprietary lines at trade counter. NO TRADE ORDERS SENT BY POST.

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4000 ohms 17/11
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DR. NESPER (See Trademark) Genuine

4000 ohms 13/3
 Post 6d. pair.

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Sterling Dinkie 30/-
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(5 Pin valve holder 1/6)

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Shipton 30 or 60 ohms 3/6
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 13 g. ... 9d. 20 g. 9d.
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 Various 1/3, 1/6, 1/9, 1/11
 With Dial 1/11
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BROADCAST TELEPHONY (cont. from page 74)

Breslau, 418 m. (1½ kw.). 10.15, Stock Ex., weather; 11.05, factory con.; 12.25, time sig., weather, Stock Ex.; 15.00, children (Sun.); 16.00, orch., children (Fri.); 17.00, shorthand (Sat.); 18.30, Esperanto (Mon.), English (Sat.), lec. (other days); 19.30, con., weather, time sig., news, dance (not daily).

Frankfort-on-Main, 470 m. (1½ kw.). 07.30, sacred con. (Sun., Fri., irr.); 10.10, Stock Ex.; 10.55, time sig., news; 15.00, children (Sun.), Stock Ex. (weekdays); 15.30, con., women (Fri.); 16.00, con. (Sun., Wed. 17.00); 17.00, lec., opera (irr.); 18.00, lec. (daily), shorthand (irr.); 18.30, educat. hour, Esperanto (Fri.); 19.00, lec. (Sun.), English (Mon.); 19.00, lec. (Sun.), English (Mon.); 19.30, con. (daily); 20.30, time sig., weather, news.

Hamburg, 395 m. (1½ kw.). Sunday: 07.55, time sig., weather, news, lec., women; 10.00, sacred con.; 11.45, chess; 12.45, con.; 15.00, children; 16.00, con.; 17.45, English conv.; 19.00, sport, weather, news, con. or opera; 21.00 onwards, as weekdays. Weekdays: 06.25, time sig., news; 11.15, markets; 12.10, Spanish lesson; 13.45, markets; 14.15, news, markets, women; 15.30, lec.; 16.05, orch.; 17.00, educat. hour; 18.00, lec., English conv. (Wed.); 19.00, weather, con. or opera; 21.00, weather, markets, news; 21.50, news (in English), dance (not daily).

Hanover, 296 m. (1½ kw.). Relay from Hamburg.

Königsberg, 463 m. (1½ kw.). 08.00, sacred con. (Sun.); 10.15, markets; 11.55, time sig., weather; 13.00 and 15.00, markets; 15.30, orch., children (Wed.); 18.30, lec.; 19.00, con. or opera; 20.00, orch., lec., dance, weather, news.

Leipzig, 454 m. (1¼ kw.). 08.00, sacred con. (Sun.); 09.00, educat. hour (Sun.); 10.55, markets, orch., time sig.; 15.00, markets; 15.30, orch.; 16.30, lec. (Tues.), markets; 18.15, Esperanto (Mon.), chess (Tues.), lec.;

19.00, English humour (Tues.); 19.15, con., weather, news; 21.00, con. (not daily).

Münich, 485 m. (1½ kw.). 10.30, lec., con. (irr.); 13.00, news, weather, time sig.; 14.00, con., lec. (Sun.); 15.30, orch. (16.00 Sun.); 17.00, agric. talk (Mon.); 17.30, con. (daily); 18.00, lec., English (Mon.), Russian (Sat.); 19.30, con.; 20.30, news, weather, time sig.; 21.00, late con. (Sun. and Tues.).

Nuremberg, 340 m. Relay from Munich.
Munster, 410 m. (1½ kw.). 06.55, time sig., news (exc. Sun.); 11.00, sacred con. (Sun.); 11.55, time sig.; 14.30, markets (exc. Sun.); 15.00, children (Sat. and Sun.); 16.00, con.; 18.40, weather, lec., time sig.; 19.20, women, con. or opera, news, dance (Sat.); 21.00, English, Spanish or Esperanto, news.

Stuttgart, 443 m. (1½ kw.). 10.30, con. (Sun., other days irr.); 15.00, time sig., orch. (Sun.); 16.30, markets, time sig., weather, orch., children (Wed., Sat.); 18.00, news; 18.30, lec., English humour (Fri.); 19.00, con. or opera, time sig.; 20.15, late con.; 21.15, news, etc.

HOLLAND.

Amsterdam (PCFF), 2,125 m. Daily: 07.55-16.10 (exc. Mon. and Sat., when 10.10-11.10), news, Stock Ex., time sig., 09.55 and 16.10 (PX9), 1,070 m.: con., 20.40 (Mon.) (PA5), 1,050 m.: 19.40, con. (Wed.).

Hilversum (NSF), 1,060 m. 17.40, children (Mon.); 20.40, lec. (Fri.); 19.40, con. (Sun.).

Ymuiden (PCMM), 1,050 m. 19.40, con. (Sat.).

Vossegat (Bé), 1,050 m. 12.30 and 19.40, weather.

Socsterberg, 1,050 m. 19.26, weather.

HUNGARY.

Buda-Pesth (MT1), 950 m. Half-hourly from 06.45, news, Stock Ex.; 10.00, con.; 11.30 news (daily).

ITALY.

Rome (IRO), 425 m. (1½ kw.). 19.40 to 21.40, con.

Centocelle (ICD), 1,800 m. (6 kw.). 15.00 and 19.30, news.

JUGO-SLAVIA.

Belgrade, 1,650 m. (2 k.w.). 17.45, con. (Tues., Thurs., Sat.).

PORTUGAL.

Lisbon (Aero-Lisboa), 375-410 m. 20.30, tests, music, speech (irr.).

Monsanto (CTV), 2,450 m. (15 kw.). Tests, music (irr.); 13.00 and 23.00, weather.

RUSSIA.

Moscow, 3,200 m. 13.30, speech or lec. (Esperanto) on last day of each month.

SPAIN.

Madrid (EAJ2), Radio-España, 335 m. 18.00, con.

Madrid (Radio-Iberica), 392 m. 21.00, weather, Stock Ex., time sig., con., news.

Barcelona (EAJ1), 325 m. 17.00 and 21.00, con.

Seville (EAJ5), 350 m. 18.30, lec., con., news.

SWEDEN.

Stockholm (TV), 440 m. 10.00, sacred serv. (Sun.); 18.10, con. (Mon., Wed., Fri.; 18.50 Sat.).

Stockholm (Svenska Radio-Akt), 470 m. 18.50, con. (Tues. and Thurs.; 16.50 Sun.).

Gothenburg, 460 m. 17.50, con. (Tues., Fri., Sat., Sun.).

Boden, 2,500 m. 17.40, con. (Tues. and Fri.); 16.40, con, news. (Sun.).

(Continued on page 78)

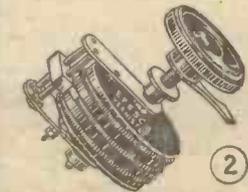
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EFESCA HIGH-FREQUENCY TRANSFORMER. Specially recommended where more than one stage of High-Frequency amplification is required. Wave-length range, 150-2,500 metres, complete as illustration, wound on absolute former. 21/-. Ditto, employing Grid Leak and (003) Condenser, for use as Transformer connected to Detector Valve, 2s.



EFESCA VERNISTAT (Pat. applied for). Of unique construction, the Vernistat gives extremely delicate control and is smooth and silent in operation, and is specially suited to High Frequency and Detector Valve filament control. Resistance 5 ohms, 6/- each, complete as illustrated.

Extreme Simplicity and Reliability
—Instrument Precision—Ingenious Design
—these are the outstanding features of EFESCA Components

EFESCA COMPONENTS are mounted by our standard One-Hole Fixing, which greatly simplifies the amateur's task in panel-drilling. All parts are made with micrometer exactitude, ensuring that absolute accuracy and reliability which is so essential but so difficult for the amateur to attain.

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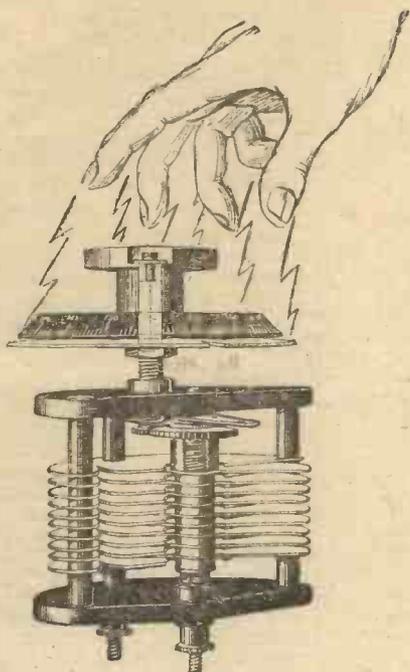


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Sold by all Wireless Dealers, Electricians and Stores.

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83/87, Farringdon Rd., London, E.C.1.
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Send P.C. to-day for Catalogue 522/8—it is free and full of interest.



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THERE are three main reasons why the "Fulstop" variable condenser gives fine tuning. First, as it is a square law condenser, the stations are spaced evenly round the dial with wide gaps between each station; second, because the dial is geared two to one to the moving plates and the dial turns completely round to move the plates 180°; and third, because with the "Fulstop" all hand capacity effects are completely eliminated.

The "Fulstop" variable condenser is the only one which actually *guarantees* the abolition of hand capacity.

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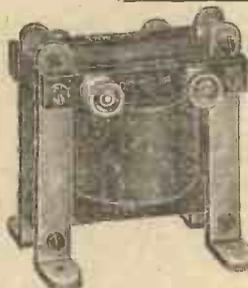
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Excelling in finish and design

The popularity which Woodhall Components have achieved is due to their careful workmanship and scientific design; it is a popularity that arises from "satisfaction" rather than from "cheapness."

The **WOODHALL** No. 1 L.F. Transformer.



Of massive construction, produced for high efficiency—it is one of the highest priced, because its production cost is heavy. It is wound with 42 gauge wire wound simultaneously with fine SILK. It shows most marked superiority on 2nd or 3rd stage of amplification, even on 200 or 300 volts pressure giving no trace of distortion, and its amplification factor is decidedly above the average of other good-class transformers. Insulation is perfect between P. and S. and between windings and frame, and the Transformer is one specially recommended for S.T.100 and other circuits of the "reflex" type **23/6**

The **WOODHALL** Vernier Rheostat.



Combined plunger and rotary movement. The exceedingly fine adjustments it gives enable you to get the most out of your valves. Push-pull movement for coarse setting; rotary for vernier. Wonderfully smooth movement; best ebonite former; one-hole fixing.

10 or 15 ohms for bright valves	30 ohms for dull emitters
2/6	3/-

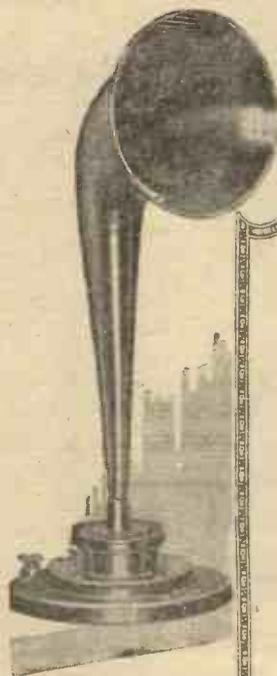
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Before you decide on the Loud-speaker for your Set, see, and listen to a TrueMusic Junior.

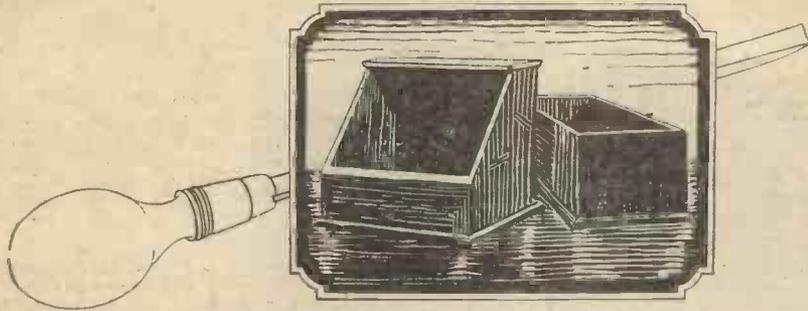
Its clear, pure tone is a revelation.

Reproduction of Broadcasting is so faithful, because the metal in the Horn is not stretched or twisted. It is made in one piece of electrolytically deposited copper.

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Build Beautiful Cabinets yourself

They come to you like this



Satisfaction Guaranteed or Money Back.

Your dealer can hand you a parcel like this, but if you have any difficulty write to us, enclosing remittance, and we'll see that you are supplied. Please add 6d. towards postage.

Trade enquiries invited for this and other attractive lines in wireless sets and components.

MORTONE Cabinets are supplied ready jointed and french-polished but not assembled. This gives two advantages. It enables us to supply first-class oak or mahogany cabinets of high-grade finish, and at a price that compares favourably with the cheap and nasty cabinets of stained canary wood so many dealers are now offering. A good cabinet trebles the value of your set, so ask your dealer for "Mortone." If you have any difficulty we will supply you direct. In ordering, simply give the number of the cabinet you want, and state whether you want oak or mahogany.

Prices for Box Type, Oak or Mahogany.

No.	Panel Size.	Depth.	Price.	Ebonite Panel.
No. 2	4 1/2 x 5	3	3/10	1/-
No. 5	7 x 5	5	5/-	2/3
No. 8	10 x 7	5	7/-	3/9
No. 11	12 x 12	5	8/9	7/-

Panels are of best quality British made Post Office ebonite matt finish, 1/4" thick.

Prices for Sloping Type, Oak or Mahogany.

4 inches back to front at top, 7 inches at bottom. To hold panels of sizes mentioned.

No.	Panel Size.	Price.	Ebonite, 1/2" Panel.
No. 41	12 x 8	13/6	5/6
No. 43	12 x 10	15/9	6/-
No. 46	16 x 12	21/-	9/6
No. 47	18 x 12	23/6	10/6

Same first-class quality ebonite as above, 1/4" thick.

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CABINETS OF DISTINCTION SUPPLIED IN PARTS READY FOR ASSEMBLY

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CHIEF EVENTS OF THE WEEK

SUNDAY, January 11.

London and 5 X X	3.0	Miscellaneous Musical Programme
London and 5 X X	9.0	Light French Programme.
Birmingham	3.0	A Programme of Favourites
Birmingham	9.0	Old Period Music.
Cardiff	9.0	Chamber Music.
Glasgow	3.0	Organ Recital.
Glasgow	9.0	Milton's Comus.

MONDAY

London and 5 X X	7.30	Ballads of Long Ago.
London and 5 X X	8.45	Recital.
Cardiff	8.30	Nos Ami.
Manchester	7.30	Arthur Sullivan and Edward German

TUESDAY

5 X X	7.30	Band of H.M. Royal Air Force.
London	7.30	Musical Comedy Night.
Glasgow	8.0	The Scottish Orchestra.

WEDNESDAY

London	7.30	Light British Music.
Birmingham	7.30	Cupid and the Ogre.
Bournemouth	8.0	Bournemouth Municipal Orchestra.
Manchester	7.30	Marches, Waltzes, Intermezzos, etc
Newcastle	7.35	Operatic Programme.
Aberdeen	7.30	Scottish Community Singing Concert.
Belfast	7.30	Russian Music.

THURSDAY

5 X X	7.30	"The Georgians."
London	8.0	Covent Garden Symphony Concert

FRIDAY!

London and 5 X X	7.30	The Tempest.
Birmingham	7.30	Light Orchestral Programme.
Bournemouth	7.30	"Pot Pourri."
Cardiff	7.30	Drama, Songs and Music.
Newcastle	7.35	Bach Festival.
Manchester	7.30	Symphony Concert.
Aberdeen	7.30	Drama and Music.
Belfast	7.30	Grand Opera.
Plymouth	7.30	Chamber Music.

SATURDAY

London	7.30	Fifth Query Programme.
Birmingham and 5 X X	7.30	Radio Fantasy, No. 3.
Bournemouth	7.30	Liza Lehmann Programme.
Newcastle	3.45	Bach Festival.

RADIO SOCIETY OF GREAT BRITAIN

READERS will be interested to hear that Sir Oliver Lodge, D.Sc., LL.D., F.R.S., has accepted the presidency of the Radio Society of Great Britain for 1925, and will deliver an address on "Matter and Radiation" before the society at a meeting to be held at the Institution of Electrical Engineers, at 6 p.m. on January 21. Tea will be served at 5.30 p.m.

RADIO "CROXSONIA" PANELS

Black matt finish, insulation perfect, rigid without being brittle, drills, cuts and taps perfect. 7" x 5", 11" x 6", 11" x 8", 12" x 7", 12" x 6", 12" x 8", 12" x 10", 12" x 12", 12" x 14", 12" x 16", 12" x 18", 12" x 20", 12" x 24", 12" x 28", 12" x 32", 12" x 36", 12" x 40", 12" x 44", 12" x 48", 12" x 52", 12" x 56", 12" x 60", 12" x 64", 12" x 68", 12" x 72", 12" x 76", 12" x 80", 12" x 84", 12" x 88", 12" x 92", 12" x 96", 12" x 100". Post free. Callers, cut any size, and quote by thick. Exceptional Terms to the Trade. Write for sample and Price. Trade only. To sole Manufacturers: CROXSONIA COMPANY, 10 South St., MOORGATE, E.C.2

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C.A.V. Fullers, etc. Guaranteed brand new and perfect but slightly soiled. We refund cash with carriage both ways if returned within 7 days.

2V-40a	...	8/6	2V-60a	...	11/8
1V-40a	...	17/-	6V 40a	...	25/-
4V-60a	...	21/9	6V 60a	...	32/6
4V-80a	...	27/6	6V 80a	...	40/-
4V-100a	...	32/8	6V 100a	...	47/8

Specialist Mfg. C.A.V., 2V-100a (actual) 27/6.
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The foremost experimenters use and recommend Bowyer-Lowe Components because they can rely on the efficiency of every one. Test before despatch is your protection. No set is better than its components. Order a make you can trust. List free.

BOWYER-LOWE CO. LTD. LEITCHWORTH.

REDGATE Regd. 705178 FLUSH-MOUNTING VALVE LEGS.

Beauty and Efficiency
1/- set of 4, Brass; 1/2 set, Nickel Plated. With drilling template. From all the best dealers.
REDGATE MFG. CO. 32a, Wheeler Gate, Nottingham.



"BROADCAST TELEPHONY" (cont. from page 76) SWITZERLAND.

Geneva (HB1), 1,100 m. (500 w.). 13.15, lec. No Sun. transmissions.
Lausanne (HB2), 780 m. (500 w.). 07.05, weather; 12.30, weather, markets, time sig., news; 16.00, children (Wed.); 17.55, weather, news; 20.15, con. (exc. Wed.), dance (Thurs. and Sat.).
Zurich (Höngg), 515 m. (500 w.). 11.00, weather; 11.55, time sig., weather, news, Stock Ex.; 15.00, con.; 17.15, children (Mon., Wed., Fri.); 18.00, weather, news; 19.15, con.; 21.00, news. Sundays: 15.00 and 19.15, con., news, weather.

The Amateur Wireless Competition at the White City.—The watch-case receiver, of which a photograph was shown on page 937 of No. 152, was constructed by Mr. A. J. Smith, of Richmond Road, Crewe.

LOEWE AUDION VALVES

LOEWE valves are of two types, the dull- and the bright-emitter. The dull-emitter requires a slightly lower filament wattage than the Marconi-Osram DER valve. The following are the essential details of these valves:

	Dull-emitter	Bright-emitter
Filament volts	1.8 to 2.3	3 to 3.5
Filament current	.15 to .17	.45 to .55
Plate volts	40 to 100	40 to 100
Amplification factor	10	10
Slope	.26 M/a per volt	.26 M/a per volt

In shape the valves are a smaller edition of the DER. They are general-purpose valves. When used in a standard set as detectors they worked extremely well, the bright emitter being slightly the better of the two. As L.F. amplifiers with 70 volts plate potential the amplification was excellent.

One thing the manufacturers seem to have tackled with extraordinary success is the problem of microphonic noises, which is the bug-bear of some dull-emitters.

The sample tested was entirely free from this disadvantage, and it did not even ring when a book was slammed down on the test table.

A. E. W.

A writer says that the transmission of wireless is affected by the sun. But surely that is a hypothetical difficulty to raise in this country!

A Book that will be useful to many readers is
"Dynamo Design and Construction."

By A. H. AVERY, A.M.I.E.E.

With 22 Illustrations. Price 6s. net.

CASSELL AND COMPANY, LIMITED, LONDON, E.C.4.

LOUD SPEAKERS

Any make. Your selection. Ampion, Brown, C.A.V., Sparta, Sterling, T.M.C. Easy payments.

Examples: Dragonfly 9/- deposit, 2 monthly payments 9/-
 Sterling Baby, 13/6 do. 6 do. do. 7/6
 Primax, 30/6 do. 6 do. do. 19/6

Other Models, Headphones, Parts, etc., similar terms.

ACCUMULATORS. Best quality. Guaranteed.

Three monthly payments		Cash		Three monthly payments		Cash	
4v. 40	17/-	6v. 40	25/-	9v. 40	25/-	9v. 40	25/-
4v. 60	22/6	6v. 60	32/-	9v. 60	32/-	9v. 60	32/-
4v. 80	27/-	6v. 80	38/6	9v. 80	38/6	9v. 80	38/6
4v. 100	32/-	6v. 100	45/-	9v. 100	45/-	9v. 100	45/-

Other sizes same terms. Carr. 1/6 any size

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BROWN A.

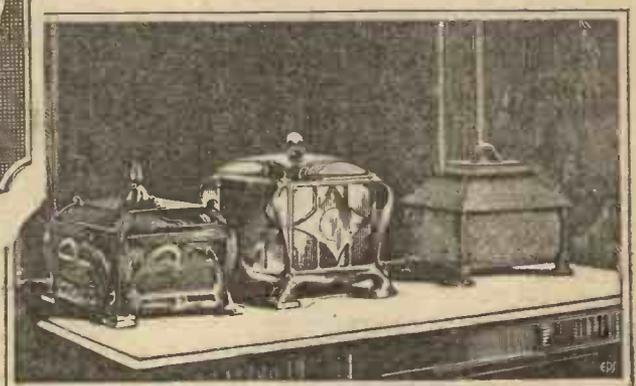
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 For PERFECT Reception



Louden



The three caskets

10/-

IT was not the Golden Casket that contained Portia's portrait, but the lead; and so it often happens that the most expensive article is not necessarily the one most to be desired. There are many valves more expensive than the Louden; yet there is not one of them that combines all its many advantages.

It uses considerably less current from the accumulators than is usual amongst valves of the bright filament type—a point which needs no labouring to those anxious to keep down costs.

It gives a reproduction full in volume and silver clear in quality, and it has a stout filament which is not readily broken. Further, it only costs 10/-.

Four months ago people had not heard of Loudens Valves; to-day they are demanding them at the rate of many thousands per week—which is, perhaps, the most striking testimony of all. See that your next valve is a Louden.

Louden VALVES



The plain Loudens for detecting and Low Frequency Amplifying. The Blue Loudens for H.F. Amplification. Filament Volts.. 4.2-5 Filament Amps. 0.4 Anode Volts 1.. 40-80

FELLOWS WIRELESS

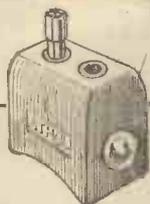
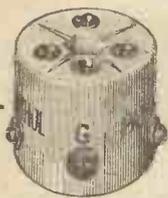
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Louden Valves, Silver Clear

ADVT. OF THE FELLOWS MAGNETO CO., LTD., PARK ROYAL, WILLESDEN, N.W.10.

E.P.S.7

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CLUB DOINGS

Kingston and District Radio Society

Hon. Sec.—MR. R. G. WILSON, 8, Bloomfield Road, Kingston-on-Thames.

INTENDING members will be welcomed by the above society and should communicate with the secretary.

Dublin Wireless Club

Hon. Sec.—MR. A. C. BRIDLE, Redan Lodge, 188, Rathgar Road, Dublin.

This annual general meeting was held on December 4. On December 18 Mr. A. C. Bridle delivered an interesting lecture on "Some Wireless Experiences."

Hackney and District Radio Society

Hon. Sec.—MR. G. E. SANDY, 70, Chisenhale Road, E.3.

An interesting meeting was held on December 15, when Mr. H. Boll gave a lecture on "Esperanto and Radio." He alluded to the International Radio Association, a body recently organised to facilitate relations between wireless users in all parts of the world.

Coventry and District Co-operative Radio Society

Hon. Sec.—MR. A. CURTIS, West Orchard Coventry. A good company of members and friends were present at the society's first social venture—a dinner and smoking concert—which took place on December 17, and it is hoped this will be an annual function.

"The Book of the Wireless Valve."

This handbook, published by the Mullard Radio Valve Co., Ltd., contains a great deal of information on the valve that will be found of interest to the wireless amateur. Wavelength tables, circuit diagrams and a complete list of Mullard valve products are given, together with several photographs illustrating the process of manufacture of modern valves. The price of the manual is 6d.

ANNOUNCEMENTS

"Amateur Wireless and Electric." Edited by Bernard E. Jones. Price Three pence. 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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Advertisements under this head are charged FOURPENCE PER WORD, minimum charge FOUR SHILLINGS.

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As the Publishers cannot accept responsibility for the bona fides of Advertisers in this publication they have introduced a system of deposit which it is recommended should be adopted by readers when dealing with persons with whom they are unacquainted. It is here explained.

Intending purchasers should forward to the Publishers the amount of the purchase money of the article advertised. This will be acknowledged to both the Depositor and the Vendor, whose names and addresses must necessarily be given. The Deposit is retained until advice is received of the completion of the purchase, or of the article having been returned to and accepted by the Vendor. In addition to the amount of the Deposit, a fee of 6d. for sums of £1 and under, and 1s. for amounts in excess of £1, to cover postage, etc., must be remitted at the same time. In cases of persons not resident within the United Kingdom, double fees are charged.

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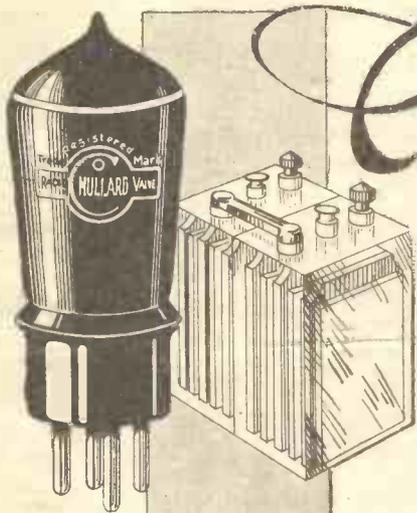
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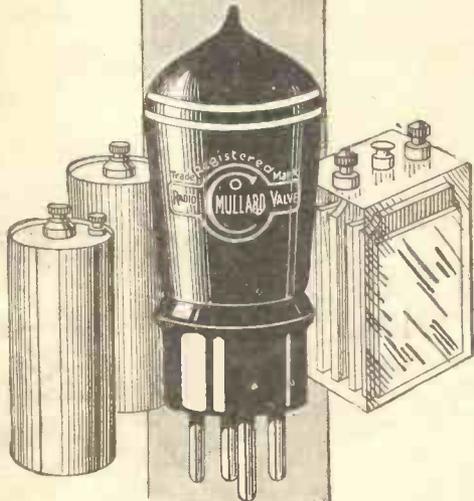
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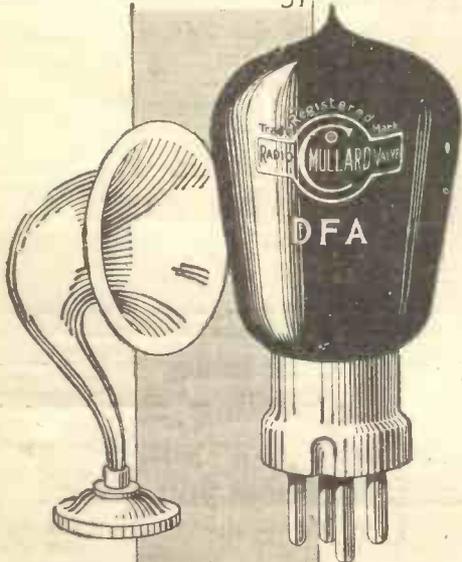
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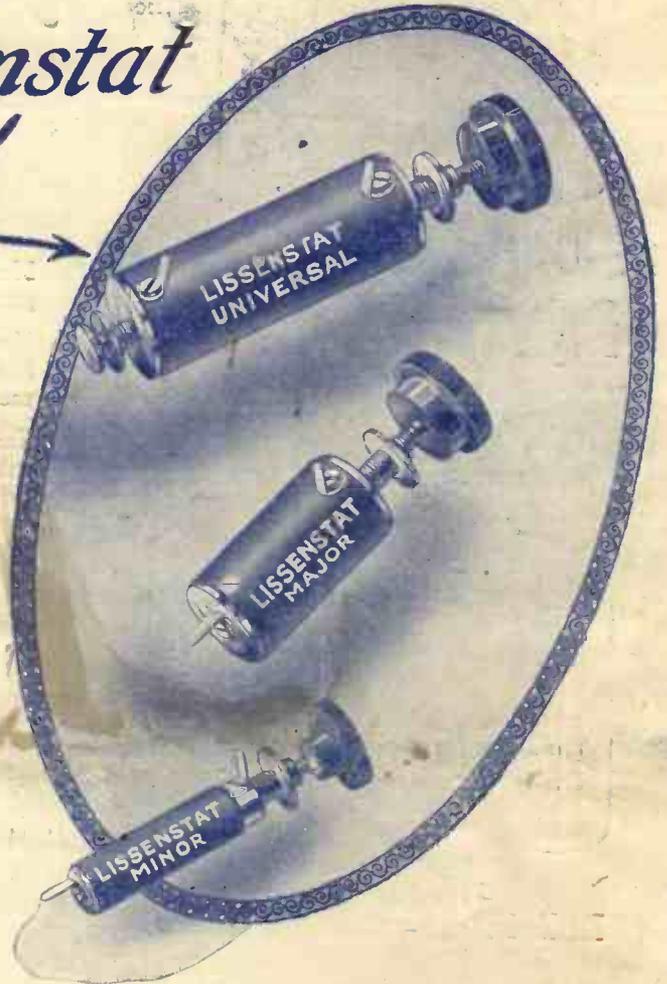
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