

HOW TO GET LOUD CRYSTAL RECEPTION

Amateur Wireless And Electrics

Vol. V. No. 119.

SATURDAY, SEPTEMBER 13, 1924

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DEVICE

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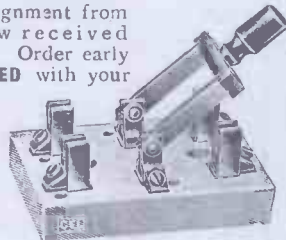
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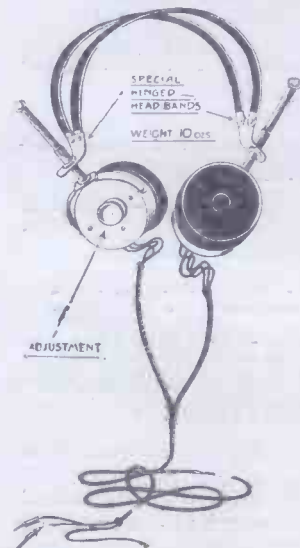
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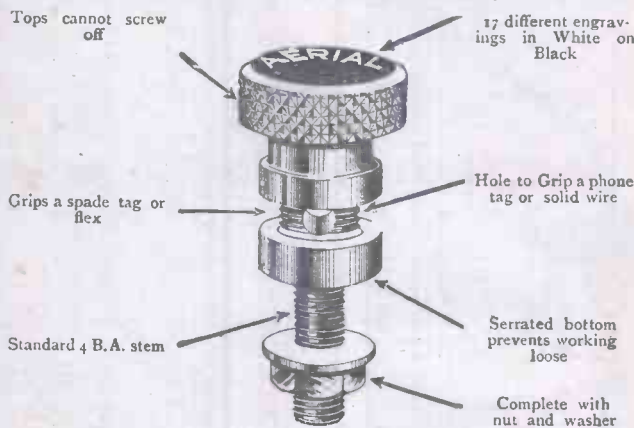
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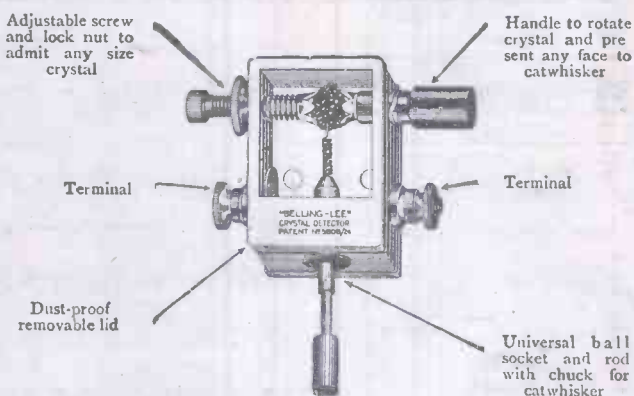
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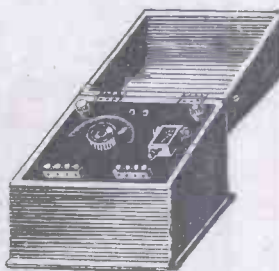
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Amateur Wireless

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Vol. V. No. 119

September 13, 1924

LOUDEST CRYSTAL RECEPTION

SOME HINTS ON HOW IT MAY BE OBTAINED

SO much interest is being shown at the present time in "loud" crystal reception that the following notes on some simple methods successfully used by the writer for increasing the efficiency of the average crystal set should prove of interest to possessors of these instruments.

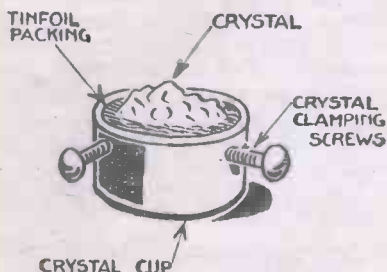


Fig. 2.—Packing the Crystal Cup.

Simple and Cheap

Perhaps the simplest and at the same time cheapest method of improving reception in the case of the slider or tapped-coil type of set, in which no variable tuning condenser is fitted or in which the condenser is shunted across the inductance, is to place a small fixed condenser of between .0002- and .0009-microfarad capacity in series with the aerial or earth as shown in Fig. 1. It will be found that a greater number of turns of the tuning-coil winding will have to be

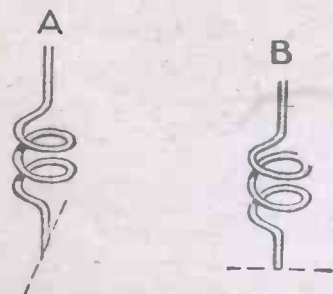


Fig. 3.—Improving the Catwhisker.

included in the circuit in order to bring in the local station than was formerly required, resulting in increased signal strength.

No "best" value for the series condenser can be definitely stated, as the capacity necessary for best results will

depend on the characteristics of the actual aerial and earth used, which, of course, vary considerably. Experiments should therefore be made with different values of condenser until the capacity most suited to the existing aerial and earth system is found. The use of a .001 variable condenser, if one can be obtained, will greatly facilitate the finding of the best value. Both positions—that is, in the earth as well as the aerial lead—should be tried, as it is sometimes found that the earth-lead position gives best results.

The Crystal

Having determined the foregoing, attention may be turned to the detector. If the crystal has been in use some considerable

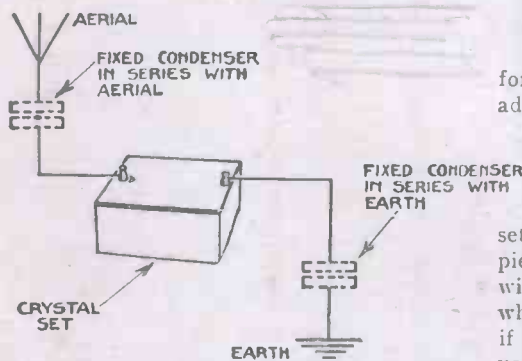


Fig. 1.—Condensers as an Aid to Efficiency.

time it is suggested that a fresh surface be obtained by breaking the crystal, or, if any doubt is felt as to the sensitiveness, a new crystal be obtained and fitted in the cup in the manner shown in Fig. 2—that is, by first carefully securing the crystal by means of the clamping screws and finally packing the empty spaces between crystal and cup with clean tinfoil.

The Catwhisker

The catwhisker may also be improved by cutting off the contact tip by means of a sharp pair of scissors, the cut being taken at an angle, resulting in a point as depicted in A (Fig. 3) and not in a blunt end as at B.

Fig. 4 shows a novel type of built-up catwhisker which the writer has found to give excellent results with most crystals

of the "ite" type; as will be seen from the diagram, a small sharp point cut from an aluminium condenser plate is clipped on to the end of the catwhisker as shown in Fig. 5.

The Phones

In many cases the phones are responsible

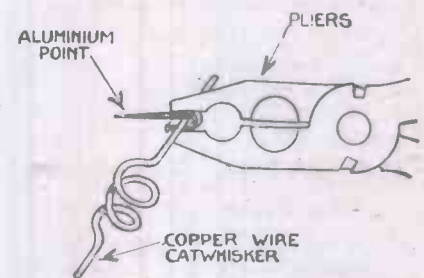


Fig. 5.—Making an Improved Catwhisker.

for poor results. Unless the magnets are adjustable, present-day headphones are adjusted by the manufacturers so that they may be used with valve or crystal sets with the result that the diaphragms in the majority of cases are set much too far away from the pole-pieces for maximum loudness when used with a crystal set. This is an adjustment which the crystal user must make himself if an ordinary fixed type of phones is used.

Special attention should be paid to the

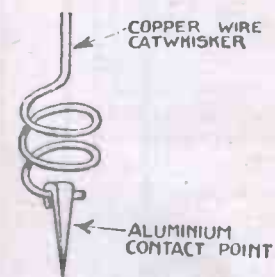


Fig. 4.—A Built-up Catwhisker.

insulation of the aerial lead-in and all joints not soldered should be well cleaned before being clamped together, as unsoldered joints, while of quite low resistance when newly made, soon become oxidised and of high resistance, and signal strength naturally suffers. C. A. L.

A NEW TUNING DEVICE

TO the serious experimenter the method of tuning described below will be of interest. A brief analysis of what takes place is as follows: A metal plate is brought within the influence of the magnetic flux of a coil through which a high-frequency current is passing (see Figs. 1

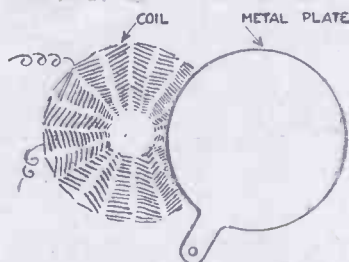


Fig. 1.—Arrangement of Damping Plate.

and 2). Eddy currents are set up in this plate, which damp the H.F. oscillations and cause the inductance value of the coil to fall. The proximity of the plate to the coil will control the tuning within certain

limits, depending upon the natural inductance value of the coil. If the plate is variable in respect to the coil, tuning can be varied as desired.

It will be found that the minimum wavelength is obtainable when the plate is close to the coil. After several months of experiment the usual parallel condenser tuning has been discarded by the writer in favour of this method, which is certainly a great improvement. When effecting the change a 35-turn coil had to be substituted for a 60-turn coil to cover wavelengths of 350 to 500 metres.

There are, of course, several methods of adapting this system to an existing set. These are: (1) By fixing the plate to a coil plug and using a two-way coil holder. (2) By securing the plate to a spindle and moving it across the face of the coil. (3) By moulding a plate to fit the inside of a tube upon which a coil is wound in a cylindrical form. (4) By using a tapped coil a variation over a wide range of wavelengths could be obtained.

The method is cheap and retains all the advantages of the usual parallel condenser tuning. After careful experiment copper sheet was found to give the best results. The shape of the plate does not

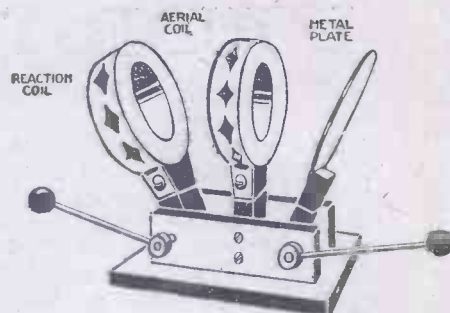


Fig. 2.—The Tuning Device.

affect the efficiency; those in use, however, are circular and of about 3 in. in diameter. The plate should always be earthed, as this adds to the stability of the circuit. A. B.

SOUND EFFECTS —AN IDEA

WHEN listening to a loud-speaker there is always a tendency to stare at the horn of the instrument. It is much more agreeable to have the music and speech diffused and not issuing noticeably from the depths of a trumpet.

With a small loud-speaker and a pair of headphones the writer has had great success in a medium-sized room in the following way: The earpieces of the phones were unscrewed and a lead was taken from the loud-speaker terminal by means of thin d.s.c. wire. This lead was taken behind the picture rail to one of the far corners of the room. If the telephone terminals are marked + and - it is an easy matter to connect up in the usual way and suspend the headphone on or from the picture rail in the corner of the room. The sides of the room act as a sound amplifier.

From the first corner a wire was led to the opposite corner—again behind the picture rail—and the other earpiece suspended in a like manner (see Figs. 1 and 2).

From the second earpiece the wire then returned via the picture rail to the receiving set, thus completing the circuit with the loud-speaker and the two phones in series as shown in Fig. 3.

The loud-speaker was placed behind the casement curtains in the window, and therefore did not attract attention.

When the receiver is switched on one can recline in an easy chair and enjoy the programme without looking at the

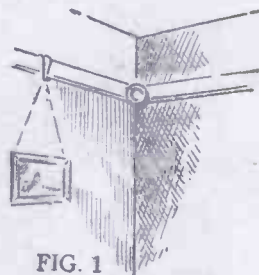


FIG. 1

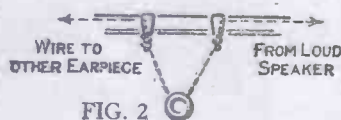


FIG. 2

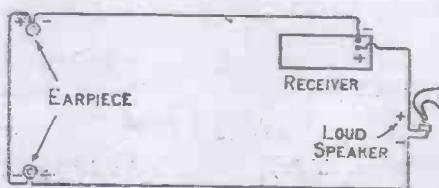


FIG. 3

Figs. 1 and 2.—Disposition of Earpieces.
Fig. 3.—Sketch of Arrangement.

horn of the loud-speaker, and one's thoughts are free to react on the charm of the sound with which the air is laden.

H. S. W.

CRYSTAL TRANSMITTERS

IT is reported that several Russian amateurs, using the regenerative crystal circuits invented by M. Lossev, of Nijni Novgorod, as recently described in AMATEUR WIRELESS, have actually succeeded in transmitting messages in this way across distances of over a mile. The power fed to the aerial is derived entirely from the continuous oscillations produced by a steel-zincite crystal combination.

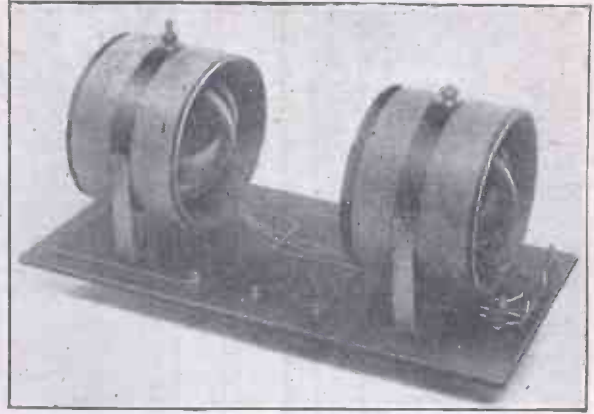
The only trouble in experimenting with these circuits, so far as the ordinary amateur is concerned, appears to lie in the difficulty of obtaining suitable specimens of sensitive zincite. Although it is definitely stated that certain pieces of the "native" crystal will produce regenerative action, the Russian inventor specially recommends the use of zincite which has first been fused in an electric-arc furnace.

The advent of the crystal "regenerator" may fairly be regarded as the most interesting development in wireless science since the discovery of the three-electrode valve. Whilst the accounts that have so far reached this country are somewhat meagre in detail, particularly as regards the actual circuits used, the underlying principle is clearly explained. The whole subject certainly deserves the earnest attention of all crystal users. M. A. L.



The Finished Set

A CRYSTAL SET FOR THE INDOOR AERIAL



Under Side of Panel

THE receiving set described in this article is of somewhat novel construction, and will be found to give considerably louder results than many employing the ordinary simple circuit. Either an indoor or outdoor aerial may be used, although the improvement in signal strength is most marked when a small indoor aerial is in use.

Materials

The following materials are required for the construction of the instrument: A wooden box of the dimensions shown in Fig. 1 (wood about 3/8 in. in thickness will be found suitable); one ebonite panel 12 in. by 6 in. by 1/8 in. thick; two cardboard or ebonite tubes 4 1/4 in. in diameter by 3 in. long for stator formers (Fig. 2); two tubes 3 in. in diameter by 2 in. long for the rotor formers (Fig. 3); one .0002-microfarad mica-dielectric fixed condenser; one glass-enclosed crystal detector; two No. 2 B.A. ebonite knobs; one foot of No. 2 B.A. threaded brass rod; 1/2 lb. No.

26 d.c.c. copper wire; No. 20 tinned-copper wire; systoflex or rubber tubing; terminals; ivory scales; ivory nameplates marked AERIAL, EARTH and PHONES; No. 2 B.A. brass nuts; spring washers; four No. 2 B.A. brass bushes complete with clamping nuts; two pointers; six No. 4 B.A. countersunk-head brass screws and nuts for securing variometer and condenser to panel; four brass strips, each 4 in. long by 1/2 in. wide by 1/8 in. thick for making angle brackets (Fig. 4).

After the construction of the box the ebonite panel should be trimmed to fit inside the top, the surface of the ebonite lying level with the edge of the wood. The ebonite is then to be marked out and drilled so that the components will be situated as shown in Fig. 5; the surface of the panel should be carefully cleaned with fine emery-paper and oil.

Preparation of the winding formers for the rotors and stators of the tuning variometers as shown in Figs. 2 and 3 can now be proceeded with. The walls of the

stator tubes should not be more than 1/8 in. in thickness or there will be a risk of fouling when the rotor is revolved during tuning operations. Figs. 6 and 7 give all details of the winding, while the actual order of the turns of the bank winding required on the rotor is given in Fig. 8.

Care should be taken to get the turns on each variometer identical both as regards number and direction.

Assembly

Assembly of the variometer parts is carried out as shown in Fig. 9. The spindles attached to the rotor should be made 1 3/4 in. and 2 3/4 in. long respectively, the longer one being placed at the top to carry an ebonite control knob and pointer, which are placed in position after securing the variometer to the back of the panel by means of the brass angle strips shown in Fig. 4.

Detector, terminals, variometer scales and the .0002-microfarad fixed condenser (Concluded at bottom of next page)

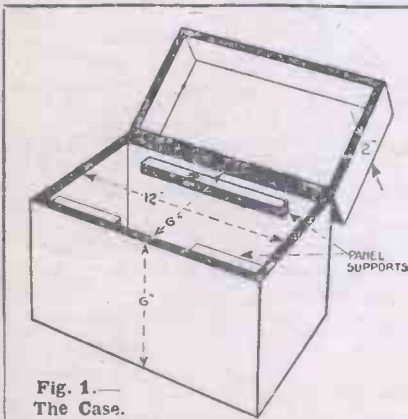


Fig. 1.—The Case.

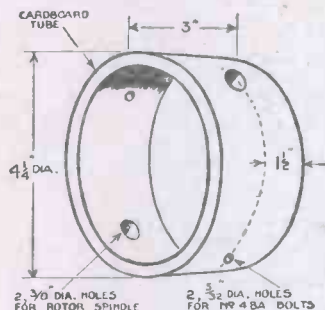


Fig. 2.—Stator Former.

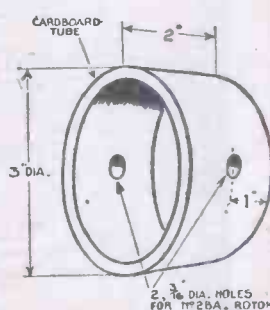


Fig. 3.—Rotor Former.

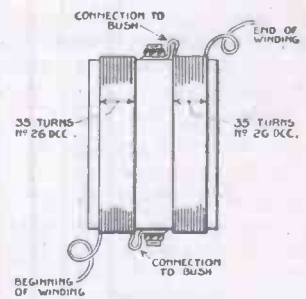


Fig. 7.—Wound Stator.

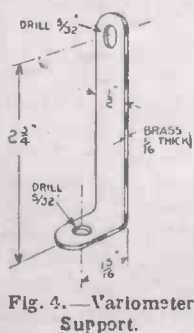


Fig. 4.—Variometer Support.

Figs. 6, 9 and 11 are on the next page.

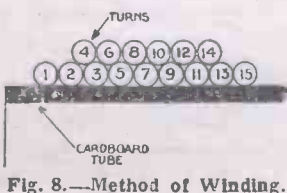


Fig. 8.—Method of Winding.

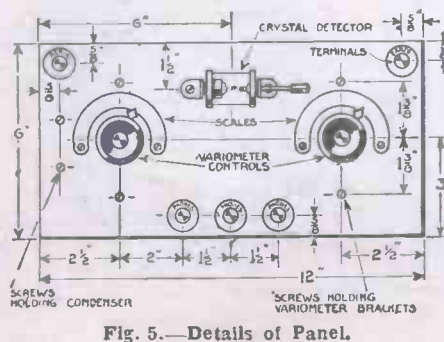


Fig. 5.—Details of Panel.

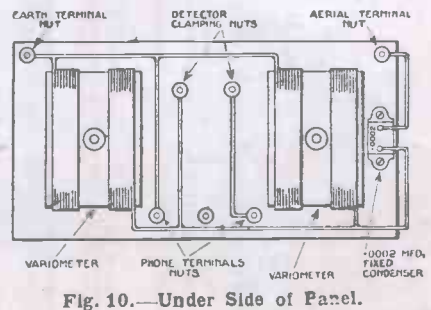


Fig. 10.—Under Side of Panel.

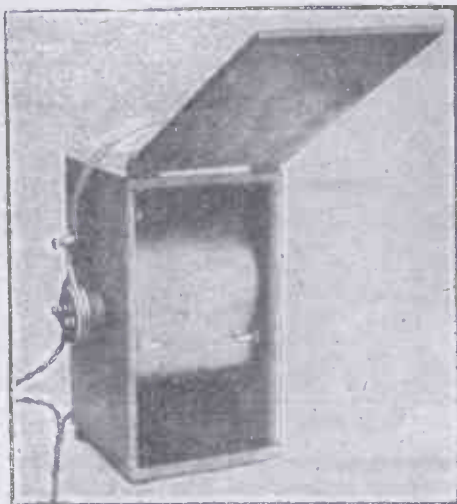


Fig. 1.—The Completed Loud-speaker!

To possess a loud-speaker is the ambition of a large number of amateurs of limited means. The one shown can be cheaply and easily made.

It will be seen from the photograph (Fig. 1) that the design is somewhat novel, the idea being that when suitable signals are received the phones may be transferred from the head and utilised in producing a loud-speaker effect without even adjusting the headbands.

Signals are amplified and of good quality, both speech and music being free from the "tinny" effect which might be expected when using metal for the horn.

A DIFFERENT LOUD-SPEAKER

The wood used should, if possible, be thin pine on account of its resonant qualities, but any wood not thicker than $\frac{1}{4}$ in. will answer the purpose.

Two pieces of this wood 8 in. long by $5\frac{1}{2}$ in. wide will be required for the sides, two pieces 6 in. by $5\frac{1}{2}$ in. for the top and bottom, and two pieces for the front and back, the exact dimensions of which will depend upon the thickness of the wood used.

A cylindrical piece of wood about $\frac{3}{4}$ in. in diameter and sufficiently long to fit between the sides when the box is assembled is also wanted.

In addition two pieces of fairly stout copper or brass foil 13 in. long and just wide enough to pass between the sides will be necessary.

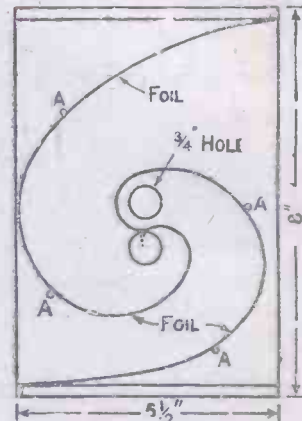


Fig. 2.—Arrangement of Internal Horn.

The wood having been cut to the required sizes, make a hole $\frac{3}{4}$ in. in diameter in the centre of each of the two side pieces.

Next fix the top and bottom in position with panel pins or fine nails. This will give a skeleton box.

Now take the cylindrical piece of wood and fasten one end of each piece of foil to it by means of small brads or tacks so that the foil will be exactly square with the wood.

The wood with the pieces of foil attached is next to be secured inside the skeleton box, by screws, to each of the sides just below the holes. One piece of foil is now to be taken to the top and fastened to the under side with brads, and the other piece secured to the bottom.

The arrangement should now appear as shown in Fig. 2.

The front may next be placed in position and hinged from the top, a wood terminal being screwed into this piece and a second terminal screwed into the top of the box. These wood terminals are used to avoid having to tie string each time a different adjustment of the front is tried when it is acting as a sound reflector. With the terminals it is only necessary to use a length of wire and screw down on to it when a position is to be tested.

The back should now be placed in position temporarily and the device tested by placing the phones in position over the holes. It may be found that the foil requires adjustment to get the best results; the writer found photographic glass-headed pins very useful for temporarily adjusting the foil by lightly pushing the pins in the sides of the box where required, as shown in Fig. 1. When the best positions for the foil has been found, small panel pins may be partially driven into the sides in place of the photographic pins, as shown at A in Fig. 2.

The back may now be fixed permanently and the woodwork stained and polished.

When this has been done small rubber feet should be fastened to the bottom and large rubber washers fixed round the $\frac{3}{4}$ -in. holes to make a soundproof fit for the telephone earpieces.

A. W. X.

should now be attached to the panel and the wiring carried out as shown in the back of the panel diagram (Fig. 10) and the circuit diagram (Fig. 11).

Care should be taken that the direction of current through the stator windings is the same in each variometer, so that a current passing through the two windings tends to build up and not to neutralise the magnetic field.

Tuning is best carried out by moving the variometer controls simultaneously until signals are heard at good strength, final adjustments then being made with one variometer alone. Attention must, of course, be paid to the setting of the catwhisker of the crystal detector while tuning.

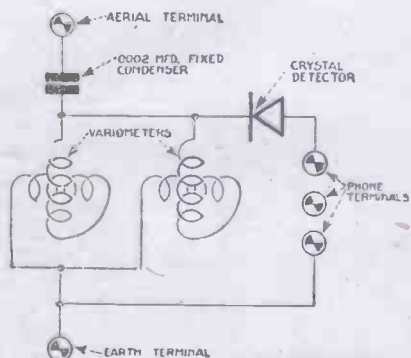


Fig. 11.—Circuit Diagram.

"A CRYSTAL SET FOR THE INDOOR AERIAL"

(Continued from preceding page)

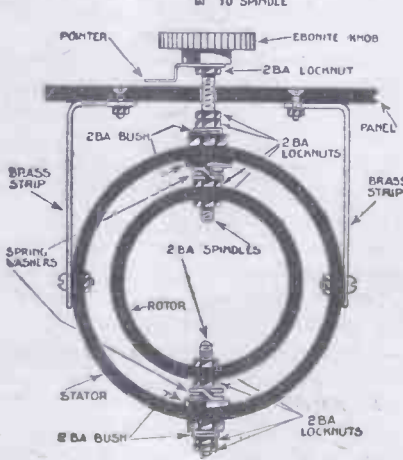
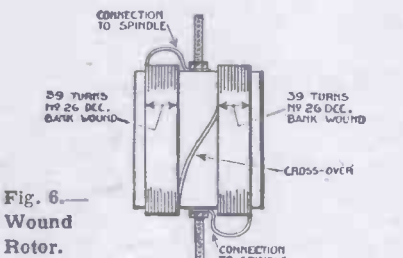
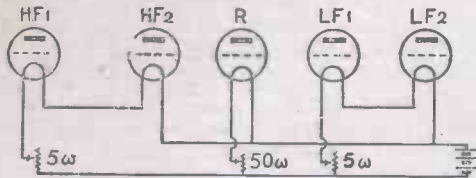


Fig. 9.—Details of Variometer.



Method of Using a 6-volt Accumulator with Dull-emitter Valves.

COMPONENTS YOU CAN RELY UPON

DULL-EMITTER VALVES.—I



The ARDE Valve.

TO use a 6-volt accumulator with dull-emitter valves is really an absurdity. Take the case of the "06" valve, which requires 60 milliamperes of current at less than 3 volts. The filament resistance of this valve is 50 ohms, and to reduce the voltage of a three-cell accumulator to the proper figure one must put into circuit a further 50 ohms of resistance in the form of a rheostat wound with very fine wire. In this case exactly half the output of the battery is going into the valve, whilst the other half is being wasted in the rheostat! Hence just twice the energy needed to heat the filament of the valve is being actually used.

Using a 6-volt Accumulator

The only way of using a 6-volt accumulator economically with valves requiring 3 volts or less is to wire pairs of valves in series as shown above. This method can be adopted, of course, only for pairs of valves which are doing the same work—that is, either high- or low-frequency amplification. It would not be satisfactory to have, say, the rectifier and a high-frequency valve in series. There is a very considerable gain in wiring a five-valve set in the way shown in the diagram. If five valves were placed in parallel in the usual way, each with a 50-ohm rheostat, the low-tension wattage would be 1.8. With the two H.F. valves and the two L.F. valves arranged as series pairs and the rectifier alone worked direct off the accumulator with a 50-ohm rheostat, the total wattage is only just over one. With a 4-volt battery the losses are very small, since only 1 volt has to be dropped by the rheostat.

The dull-emitter valve has the enormous advantage that it can be worked off dry cells. This brings the valve set within the range of those who live in out-of-the-way places where accumulator charging is a matter of extreme difficulty. If good dry cells are used and if proper care is taken of them excellent results can be obtained with any kind of dull-emitter whose current consumption does not exceed .25 ampere.

For valves of the "06" type bell cells will answer perfectly well for working sets containing from one to three valves. For valves whose current consumption is in the neighbourhood of .25 ampere, and for four- or five-valve sets provided with .06 valves it is desirable to use a larger type of cell. Use dry cells by all means if you cannot get accumulators charged; but if

you have no difficulty of this kind, then plump for the secondary battery for working dull-emitters even if their current requirements are of the smallest. The output of an accumulator is perfectly steady and the voltage does not begin to fall off until it is time for it to be recharged. Hence perfect results can always be obtained. It is desirable to use quite small accumulators for the purpose, but if you already have a big one continue to use it, exercising proper care. Though at the end of, say, three months the accumulator may still be up to its full voltage, it should be sent to the charging station, for the plates may be damaged by allowing it to go longer than this without a recharge.

We may divide dull-emitters into three classes, as under:

- (1) Those in which the current consumption is high and the voltage low.
- (2) Those in which both current and voltage are medium.
- (3) Those with medium voltage and low current consumption.

The DER

In the first class are several excellent valves which are not suitable for use with dry batteries, since they draw from .3 to .4 ampere. Used, however, with small accumulators they give first-rate results, and all of them are thoroughly reliable valves. The first of these is the M.O. DER, which was, I believe, the first dull-emitter valve to be placed on the market in this country. Though the shape has been altered, the DER of to-day is essentially the same valve, and those who fit it to their sets will have few faults to find. The price has come down now to a guinea, and at this figure the valve will pay for itself over and over again by the saving effected in accumulator charging expenses. It is a long-lived valve because it has a stout filament which works only at red heat. Besides the long life which it gives, the comparatively thick filament has one very distinct advantage: it enables dull-emitter valves of this class to be designed so that they are little or no more microphonic than the original type owing to the fact that plate, grid and filament are mounted upon very long supports. No trouble will be experienced from this source so long as the set stands upon a covered table.

The ARDE

Another very satisfactory valve belonging to the same class is the Ediswan ARDE, which consumes .3 ampere at about

1.6 volts. The maker's rating of this valve's filament E.M.F. is 1.8 volts, but I have always found that it works excellently with rather less, and the lower voltage has a beneficial effect upon its working life.

ARDE is a splendid valve in any part of the set, working with an entire absence of noises and giving very good amplification. Like the DER, it can be fitted to any existing set without any alteration in the wiring of the rheostats being made, provided that either a 2- or a 4-volt accumulator is used.

The L.F. Orzs

The Mullard Radio Valve Co. manufacture two dull-emitters of the low-voltage type suitable for accumulators only. These are the L.F. Ora B and C, both of which are priced at a guinea. The B valve takes .3 ampere at about 1.6 volts, whilst the C type consumes .4 ampere at the same voltage. Both of them are robust, quiet valves, working well either as amplifiers or rectifiers. A long working life is to be expected from either of these, though the C type is probably the stronger of the two owing to its slightly thicker filament.

J. H. R.

(To be continued)

DIAGRAMS AND WIRING

MOST amateurs when about to construct a new set first draw the diagram of the particular circuit they wish to employ.

A little thought will reveal the fact that when the panel is wired up the diagram will have to be reversed, and unless every precaution is taken a mistake will very easily be made.

To obviate this it is a good plan to lay a piece of carbon or copying paper, wrong way up, underneath the paper on which the diagram is to be drawn. By placing the copying paper the wrong way up the reversed drawing will be found on the under side of the original, and all is plain sailing.

A. L. B.

Please mention "AW" when you write to Advertisers.



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

GREAT BRITAIN

The times given are according to British Summer Time.

London (2LO), 365 m. 4-5 p.m., con.; 6-6.45 p.m., children; 7-7.30 p.m., time sig., news, talk; 8-10 p.m., music; 10-10.30 p.m., time sig., news, talk; 10.30-11 p.m., music. Mon. and Wed. the Savoy Bands are relayed until 11.30 p.m., and on Sat. until midnight. Sat. only, 4-6 p.m., con. Tues., Thurs. and Fri., 1-2 p.m., con.

Aberdeen (2BD), 495 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. Afternoon prog. from most stations, 3-30-4.30 p.m.; 6-6.45 p.m., children; 7-7.30 p.m., time sig., news, talk; 8-10 p.m., music; 10-10.30 p.m., time sig., news, talk; 10.30-11 p.m., music. Savoy Bands relayed as from 2LO.

Bradford (2LS), 310 m. **Edinburgh** (2EH), 325 m. **Hull** (6KH), 320 m. **Leeds** (2LS), 346 m. **Liverpool** (6LV), 315 m. **Plymouth** (5PY), 335 m. **Sheffield** (6FL), 301 m. Programmes relayed.

CONTINENT

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

AUSTRIA.

Vienna (RH),* 600 m. 16.30, con. (Wed. only); 20.00, con. (Wed. and Fri.); 21.10, dance (Mon.).

Vienna* (Stubenring), 780 m. 18.45, music, tests (Tues., Wed. and Sat.).

* Also transmissions at irregular times.

BELGIUM.

Brussels (SRB), 265 m. 17.00, orch.; 18.00, news; 20.00, lec. or children; 20.15, news and con.; 22.00, news.

Haeren (BAV), 1,100 m. 13.00, 14.00, 16.50, 18.50, weather; 19.00, con. (irr.); 22.00, con. (Tues. and Thurs., irr.).

CZECHO-SLOVAKIA.

Kbely (Radio Journal), 1,150 m. 10.00, 11.30, 13.30, 17.00, 18.00, Stock Ex. (weekdays only); 19.15, lec., news, weather, con. (Sun., Tues. and Sat.); 11.00, con. (Sun.).

Komarov (Brünn), 1,800 m. 14.30, Stock Ex., news (weekdays); 10.00, con. (Sun.).

Prague (PRG), 1,000 m. 19.00, weather, orch. (daily). 1,800 m. 08.00, 12.00, weather; 12.30, 16.00, news (daily). 4,500 m. 10.00, 15.00, 22.00, con. (irr.).

Straschnitz (near Prague), 500 m. Will shortly take over the Kbely programme.

DENMARK.

Lyngby (OXE), 2,400 m. Daily: 10.30, 16.50, 21.45, harvest weather; 19.20, 21.00, 22.00, news; 12.00 and 20.10, con. (Sun.).

Ryvang, 1,025 m. 20.00, con. Tues. and Fri.; 12.00, con. (Thurs. only).

Yorks Passage, 440 m. New station testing almost daily, 20.00-21.00.

Viborg, 1,400 m. 20.00, con. (irr.).

FRANCE.

Radio-Paris, 1,780 m. Sun., 12.45, orch.;

Compiled Exclusively for "Amateur Wireless" by J. GODCHIAUX ABRAHAM and Revised Each Week Up to the Time of Going to Press.

13.45, news; 16.45, con.; 17.45, news; 20.30, news; 21.00, con.; 22.00, dance. Weekdays, 12.30, Stock Ex.; 12.45, orch.; 16.30, markets; 16.45, con.; 17.45, exchange, news, women; 20.30, lec., news; 21.00, con.; 22.00, dance (not daily). Note.—On 2nd and 4th Sat. of the month a gala evening con. is provided by *Le Matin*, Paris, at 21.00.

Le Petit Parisien, 352 m. Music and lec., etc., 21.30 (Thurs. and Sun., other days irr.).

Lyons (PTT), 470 m. Daily, 10.30, news, con.; 11.30, 11.45, 12.15, 16.15, Stock Ex.; 20.00, news and con.

Nice (Radio), 360 m. 11.00, 17.00, con. and news; 21.00, con. (irr.).

GERMANY.

Berlin 1 (Vox Haus), 430 m. 10.00, markets; 10.15, news; 12.15, Stock Ex.; 12.55, time sig.; 13.05, news; 14.15, Stock Ex.; 17.30-19.00, orch. (17.30, 18.00 and 19.00, news, etc.); 19.00, children (Sun. and Wed.); 19.30, English lesson (Mon. and Thurs.), lec. other days; 20.00, lec. (daily, except Sun.); con. and dance (Sun.); 21.00, con., news, weather (daily, except Sun.); 22.15, dance (Thurs. and Sat.). Note.—Cons. from 19.00 are also relayed on 500 m. by Berlin 2.

Berlin (Telefunken Co.), 290 m. 20.00, tests (irr.). 750 m. and 850 m.: 19.30 or 20.00, opera (irr.).

Königswusterhausen (LP), 680 m., 10.50 con. (Sun.). 2,400 m. (Wolfs Büro), daily, 07.30, 08.10, 09.00, 10.00, 10.30, 11.15, 12.25, 13.30, 14.00, 15.00, 16.00, 17.00, 18.00, 19.15, 20.00, 20.40, news. 3,150 m. (Telegraphenunion), 07.00, 08.30, 09.15, 12.30, 14.30, 15.00, 16.00, 17.15, 18.30, news (weekdays). 4,000 m. Express news service throughout day.

Eberswalde (near Berlin), 2,800 and 2,930 m. Tests (irr.).

Breslau, 415 m. 12.55, time sig.; 13.00, weather and Stock Ex. news; 16.00, children (Sun.); 17.00, orch. (weekdays); 17.30 (Sun.); 19.30, lec. (irr.); Esperanto (Mon.); 20.00, con. or lec. (except Wed. and Sat.); 20.30, con.

Frankfurt-on-Main, 467 m. 08.00, service (Sun.); 11.55, time sig. and news (daily); 16.00, children (Sun.); 16.30, orch.; 19.30, Esperanto lesson (Fri.), lec., con. and news (Sun.); 20.30, con. and news; 22.00, late con. (daily, except Thurs. and Sun.), dance (Fri.). Note.—The *Frankfurter Zeitung* provides Sun. and Thurs. evening cons.

Hamburg, 392 m.* 06.55, time sig.; 09.30 (Sun.); 07.00, news, weather; 08.00, lec.; 10.00, con. (Sun.); 15.55, time sig.; 16.00, shipping and criminal news; 16.30, lec.; 17.00, children (Wed. and Sun.), women's hour (Mon.), con. and lec. (other days); 17.15, menus; 18.00, educational hour (Mon. Wed. and Fri.), lec. (Tues.); 19.00, co. and lec. (Sun.); 19.45, market; 20.00, lec., con., news (daily); 22.00, time sig., weather, news (daily).

* All weekdays unless otherwise stated.

Königsberg, 460 m. 08.10, market (Wed. and Sat.); 11.30, con., weather (Sun.); 12.55, time sig. (daily); 14.15, news, Stock Ex. (weekdays); 15.30, con., (Sun.), irr.; 16.30, orch. (weekdays); 20.00, con., weather, news (daily); 21.15, dance (Fri.).

Leipzig, 452 m. 10.30, markets (daily); 13.00, news, Stock Ex. (weekdays); 16.30, orch. (daily); 17.00, fiscal hour (Mon.), con. (daily); 19.30, lec. (weekdays); 20.15, con. and news (daily); 21.30, news (daily); 22.00, dance (Sat.).

Munich, 485 m. 14.00, time sig., news, weather (daily); 15.00, con. (Sun.); 16.30, con. (weekdays exc. Mon.); 17.00, children (Wed.), con. (Sun.); 18.00, news, time sig. (Sun.); 18.30, con. (weekdays); 19.45, lec. (Mon. Tues. and Wed.); 20.00, con. (Sun.); 21.00, con. (weekdays), dance (Sat.); 22.00, news; weather, time sig. (daily).

Munster, 407 m. New station now being tested. No fixed prog.

Nuremberg (relay), 340 m. Prog. relayed from Munich.

Stuttgart, 437 m. 16.30, con.; children (Sat.); 18.00, time sig., weather; 20.30, con.; 21.45, time sig., weather and con. (daily), dance (Sun.).

HOLLAND.

The Hague (PCGG), 1,070 m. 14.40, con. (Sun.); 20.10, con. (Mon. and Thurs.). (PCUU), 1,050 m. 10.40 and 21.40, con. (Sun.); 19.40, con. (Tues.) (PCKK), 1,050 m. 21.40, con. (Fri.).

Amsterdam (PA5), 1,050 m. 11.00, con. (daily); 19.40, con. (Wed.); 20.40, news; 21.10, con. (irr.). (PCFF), 2,000 m. 07.55, 08.50, 09.40, 10.55, 11.19, 11.25, 11.55, 12.45, 14.40, 15.55, news, etc.; 13.10, 13.25, 13.40 13.55, 14.10 and 14.55, Stock Ex. (weekdays).

Ymuiden (PCMM), 1,050 m. 20.10, con. (Sat.).

Hilversum (NSF), 1,050 m. 20.10, con. (Sun.); 20.40 (Fri.); 20.00, children (Mon.).

HUNGARY.

Buda Pesth (Osepel), 1,050 m. Daily 07.45, news; 18.30, lec. (Con. irr.).

ITALY.

Rome (Radioaraldo), 470 m. Daily: 11.30, news; 12.00, time sig., con. (latter irr.); 15.20, Stock Ex.; 16.30, con. 425 m. (Unione Radiofonica Italiana). Daily: 16.30, tests; 21.00, con. or opera. 540 m.: 18.00, con. (irr.). 1,800 m.: 15.00 and 19.30, orch. or con. 3,200 m.: 10.00, tests, etc. (irr.).

PORTUGAL.

Lisbon (Aero-Lisboa), 375-410 m. 22.00, tests (irr.).

SPAIN.

Madrid (Radio Iberica), 392 m. 22.00-24.00, con. (Wed. and Sun.; other days, 19.00-21.00). 480 m. (PTT): 18.00-20.00, con. (Sun.). 1,800 (about) m.: 13.00, lec.; 20.30, con. (irr.).

Cartagena (EBX), 1,200 m. 12.00-12.30 and 17.00-17.30, con. or lec. (irr.).

SWEDEN.

Gothenburg, 460 m. 19.00-21.00, con. (Tues., Fri. and Sat.). (Nya Varvet) 680 m.: 19.00-21.00, con. (Mon., Wed. and Thurs.).

Stockholm (Telegrafverket), 440 m. 11.00, service relayed from St. Jacob's Church, Stockholm (Sun. only); 12.45, weather, time sig.; 19.00, con., news (daily).

Stockholm (Radio Akt.), 470 m. Con. news (Sun., Tues., Thurs. and Sat.).

Boden, 2,500 m. 18.30, con. (Tues. and Fri.); 17.30, con. and news (Sun.).

SWITZERLAND.

Geneva (HB1) (Sté Romande), 1,100 m. 13.15, weather, Stock Ex., news, con. (irr.); 17.00, lec. (irr.); 20.00, weather; 20.30, lec. or con. (except Wed. and Thurs.).

Lausanne (HB2), 460 m. 18.00, con. (weekdays); 20.30, con. (Sun.). 850 m.: 08.00, 13.00, weather; 12.30, time sig.; 17.00, children (Thurs. only); 18.55, weather; 20.15, con. or lec. (daily), dance (Sat.). 1,080 m.: 10.50, weather; 13.00, con. or lec. (Tues., Thurs. and Sat.); 14.00, weather; 15.00, orch. (Tues., Thurs. and Sat.); 18.55, weather; 20.00, orch. (Tues., Thurs. and Sat.); 22.15, dance (almost daily). Note.—Prog. and times subject to alteration during summer months.

Zurich University, 500 m. 20.30-22.00, tests, lec., con. (Tues., other days irr.).

Zurich (Höngg). W.L. not definite, variable between 300-600 m.; usually about 335-345 m. Daily; 11.00, weather; 11.44, FL time sig. relayed; 13.00, Stock Ex.; 16.00, orch.; 17.15, weather; 18.00, news, lec.; 20.00, con.

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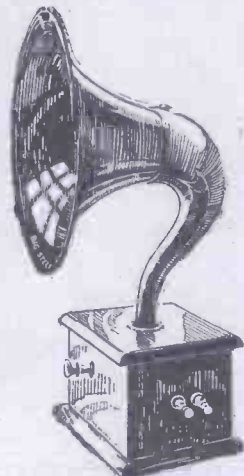
Other users of STELLA LOUDSPEAKERS say:—

"I have received your Loudspeaker quite safely, together with receipt for cheque. I am very pleased with same. The reproduction of speech and music is very fine, and I do not find the gramophone tinniness that I have heard so much talk of with Loudspeakers. The set I use is S.T.100 Circuit. I shall certainly let my friends hear this who are interested in Loudspeakers."

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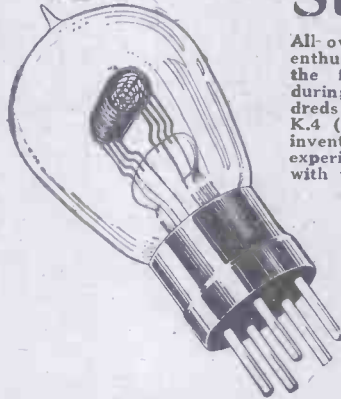
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Here are the First Details of the New Peto-Scott PANEL SCHEME

THE following Instruments are available under the Peto-Scott Pilot Panel Scheme. Each is supplied as a complete set of parts, with nothing further to buy in either Type A or B, or Panels and Cabinets will be supplied separately.

- The All-Britain Receiver.
- The "Popular Wireless" Combination Set.
- The Puriflex Receiver.
- The All-Concert-de-luxe Receiver.
- The Omni-Circuit Receiver.
- The Transatlantic Receiver.
- The 3-Valve Dual Receiver.
- The S.T.100.

Remember that all these Sets have been designed by experts.

EVERY experimenter—whether he be expert or novice—knows that the big bugbear in Set-building is drilling and engraving the panel and building the cabinet. Even if you possess all the tools it is quite a tricky operation to make a good job of it. The Pilot Panel scheme has been evolved to supply panels drilled and engraved, together with cabinets for all the principal Sets described from time to time in the Wireless Magazines.

These Receivers will be offered in a semi-manufactured state in two types. Type A will consist of panel, cabinet, and complete kit of components as specified and used by the author in his actual article. Type B is a Peto-Scott adaptation (guaranteed in every respect to be the equal of Type A) to use components of our own manufacture. Type B, by reason of standardisation and improved manufacturing facilities, will naturally show a big saving in cost.

Pilot Panels

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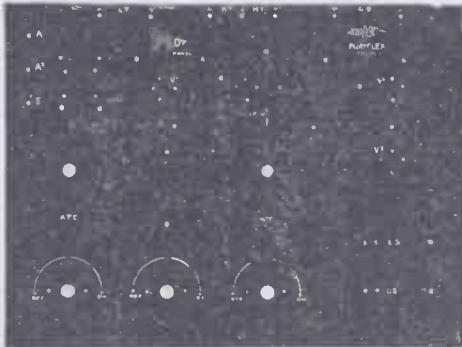


Illustration of Panel for "Puriflex" Set.

Pilot Panels make Set-building easy

Pilot Panels make Set-building so simple that even for a magnificent 5-Valve Set like the Transatlantic V the whole work can be done easily in a couple of evenings. All parts are guaranteed to fit together easily and accurately, so that all the experimenter has to do is to wire up according to the diagram. You know, too, that the

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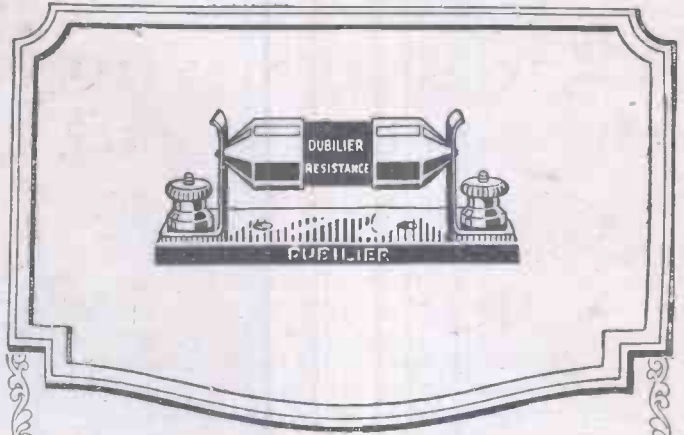
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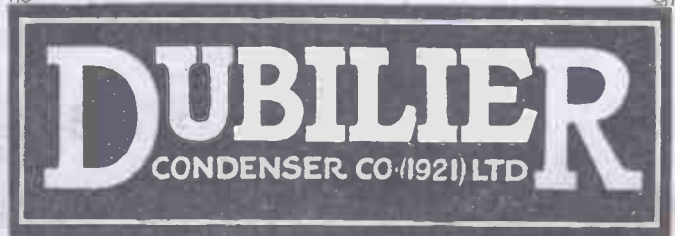
These problems were the subject of long experiment in our laboratories, and we finally placed on the market Anode Resistances in nine standard values from 20,000 to 100,000 ohms. Each resistance is tested during manufacture on a load of 200 volts D.C. and has to pass such stringent tests with honours before it is offered to you.

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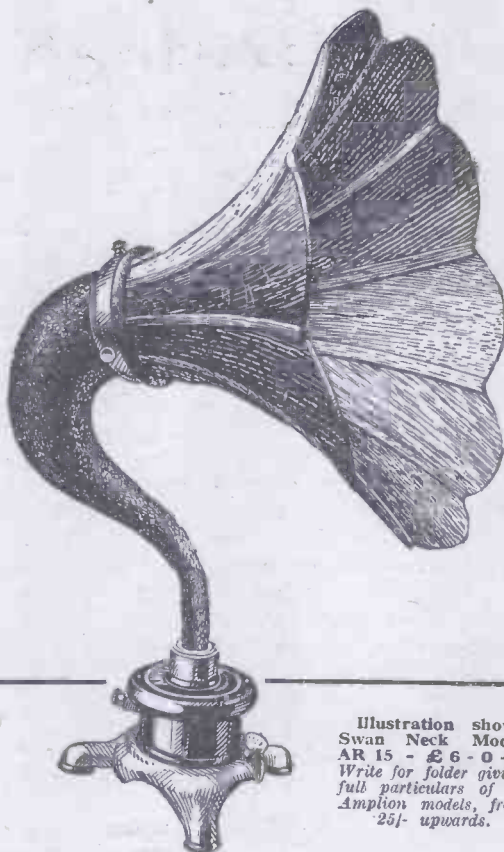


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On Your Wavelength!

Before the Microphone

I HAD the pleasure of being in the studio at 2LO recently. The precautions which are taken to prevent studio noises being broadcast are, to say the least of it, nerve-straining. During the transmission of the news bulletin and talks the utmost care is taken not to make a single movement which would create the slightest noise. Such things as the rustling of a piece of paper, the accidental knocking of a chair, or even a whisper are avoided. Everything in the nature of an instruction or signal is communicated by the flickering of the little red lamps over the doors or by gestures with the hand. The enforced silence was so oppressive that I drew a deep breath of relief when the red lamps went out. This signalled that the microphone was "dead." I understand that studio noises are to receive careful consideration in the near future.

Anti-oscillation

Captain P. P. Eckersley, chief engineer of the B.B.C., has prepared a useful pamphlet on the subject of anti-oscillation. Those readers who are in doubt on this subject may obtain a copy free of charge on writing to the company and enclosing a stamp. Those who are bothered by local oscillation should, I suggest, pass it on to the offenders.

As Captain Eckersley points out in the pamphlet, this obviously requires great tact. I think that a leaflet on the subject should be wrapped around each valve before it leaves the manufacturer's premises. As most or all British valve manufacturers are trade members of the B.B.C., this would ensure it getting into the hands of the right people.

An Aid to Tuning

Sometimes when searching for weak signals on short waves it is very difficult to judge by ear whether or not the set is oscillating. Moreover, if too much reaction is used on these wavelengths the carrier of a station is easily lost in the heterodyne owing to the sharpness of the tuning. The use of a milliamperemeter reading up to five milliamperes or a Weston galvanometer with a shunt of ten ohms resistance across its terminals would be found to assist matters considerably. The instrument is placed in the plate circuit of the rectifier between the primary of the transformer and the plate.

When the coupling is loose a steady plate current will be flowing, the value being between 2 and 3 milliamperes, but as soon as the set commences to oscillate the extra positive potential impressed on

the grid of the valve will cause the needle indicator to fall back to zero or in that direction. By this means one can see at a glance when searching whether or not the set is gently oscillating or violently howling outside. Moreover, when tuning in strong signals the eye can see when maximum sharpness of tuning has been obtained. At ten miles from 2LO the fall back of the needle on 2LO's carrier is approximately one-fifth of a milliampere when using a V24 valve as a detector.

Watching the Modulation

The same instrument may be used for observing the amount of current caused by the modulation of the carrier wave from a broadcasting station. A crystal detector and the instrument are connected in series across the secondary of a telephone transformer in the plate circuit of the last L.F. amplifying valve, and the strength of the speaker's voice or the tremolo effect of a violin may be closely observed if the instrument is of the dead-beat variety. A Weston relay, which may be purchased for a few shillings, may be used for this purpose in conjunction with a hertzite crystal detector, no shunt or other auxiliary resistance being required. It is not suitable for the tuning experiment referred to above, however, as it is too sensitive to put in the plate circuit of the valve.

Illegal Transmission

You have probably read reports of the proceedings taken recently against a man who had been transmitting though not in possession of the required licence. I followed them with considerable interest, for I happen to live within range of the offender's aerial, and on many occasions I have been bothered by his attentions. Perhaps some of you may remember that early in the year I wrote a note on a mysterious spark transmission sent out in slow and very defective Morse, which appeared to be absolutely untuned and came in on practically all wavelengths. I do not know whether it was the same person who was responsible for it, but I am quite sure that was an unauthorised station, for there is only one licenced transmitter in this neighbourhood and he uses very sharp tuning.

There have been many complaints of late from all over the country of unauthorised transmissions and of the misuse of other people's call-signs. It is to be hoped that now that one offender has been caught those who have been guilty of causing interference in this way will be warned in time. The fines inflicted in this case were quite light, though I believe that the maximum penalty imposable

under the Wireless Telegraphy Act is a fine of £100 or six months' imprisonment and the confiscation of all apparatus.

Personally I find it rather difficult to see how anybody can be so foolish as to transmit without a permit. Why this kind of thing has occurred is, I think, due to the fact that in the past few steps, if any, were taken to enforce broadcast regulations. People thought that as the threats were never backed up by action they could do as they liked. Now that something has been done it will, I expect, have a salutary effect, for they will realise that the Post Office really means business if it has a good case against any offender.

The Sceptical Friend

I have a friend who complains that too much is made of occasional interference to our broadcast reception by radiation. When we were talking about it last week I said that to my mind the man who pushed up his reaction coil and then searched round for carrier waves, afterwards tuning them in until signals were at their best, was either a bungler or a criminal. He agreed that this was so in a general way, but said that it was quite impossible, of course, to pick up very weak signals by any other method.

Now this, I find, is a conception held by quite a number of even expert wireless people. It is true possibly of very feeble transmissions, such as those which come from the other side of the Atlantic on short waves, but it is certainly not correct as regards British and European broadcasting stations. It is this wretched business of picking up carrier waves and resolving them which gives rise to the majority of the interference of which we all complain.

When Ham-handed Henry wants London he couples the reaction coil fairly close and then moves his A.T.C. until he gets a signal. He endeavours to continue the movement until he gets rid of the squeal and reaches the silent point, but usually he goes too far and starts it again. He then tries to improve his tuning, and in doing so produces squeals when he is either slightly above or slightly below the true wavelength. If he is trying to get really big signal strength the squealing may go on for some minutes until he is satisfied that he can get no greater volume of sound. To my sceptical friend I said: "If you care to come in this evening I will undertake to get you any broadcasting station British, French, Belgian, Dutch and the two German stations which are within my range, and you may fine me half-a-crown for any squeal, however small, that I cause." Thinking that he

:: :: *On Your Wavelength! (continued)* :: ::

had an easy source of income, he accepted with alacrity and duly turned up.

What Happened

We started, of course, with London just to let him see that a strong signal could be tuned-in without causing any interference. Then he suggested Cardiff. Now Cardiff, as you know, is not easy to separate from London; in fact it can be done only by the use of a very selective tuner and by careful employment of the reaction coil. I had Cardiff without a squeal in less than a minute. I followed that by getting, in turn, Manchester, Bournemouth, Newcastle, Birmingham and Aberdeen without the loss of a single half-crown. All these, I may say, we picked up as faint signals and tuned to big loud-speaker strength.

Feeling that his chances were slipping away, he next invited me to go abroad. Nothing loth, I tried first for Stuttgart, and got him successfully. I followed this by Breslau, L' Ecole Supérieure, Le Petit Parisien and Brussels.

And now you will ask what kind of set I was using. Well, I will tell you. It is a five-valver, consisting of two high-frequency stages, a valve rectifier and two note magnifiers. Ah, you say, of course you had some very stable form of high-frequency coupling. As a matter of fact, I was using what is generally supposed to be quite the most unstable form—the tuned-anode. Not one tuned-anode, but two tuned-anodes.

How Is It Done?

Now I suppose you will want to know the secret of doing it. In the first place, with two tuned-anodes you require no reaction of the magnetic kind provided by a coil coupled to A.T.I. or one of the anode inductances. The reason why you do not is that the coupling within the valve provides all the reaction that is necessary when the circuits are sharply tuned. You can stop reaction by introducing damping with the potentiometer. The potentiometer therefore takes the place of the reaction adjustment.

What I do is simply this: Before starting to search I adjust the potentiometer so that the grids of both H.F. valves are rather positive. This stops any tendency to howling. Then I search round with the A.T.C. and the two anode condensers, with or without the aid of a wavemeter—usually without. As soon as a faint signal is heard it is tuned in as strongly as possible with the three condensers, and then the potentiometer is worked carefully over towards the negative end. Whilst doing so one listens for the rustling noise which is characteristic of the approach of oscillation, and when it is heard the potentiometer is stopped and moved

slightly back. If you work in this way it is quite surprising how easy the set is to control.

With a set using a reaction coil the process is similar. Here the reaction coil is either short-circuited or moved as far away as possible from the inductance to which it is coupled. Searching is then done as before, and when a signal is found the coil is moved very gradually up. If you care to try this method of searching you will find that both from your own point of view and that of your neighbours it is a very great improvement. I do not say that you will be able to avoid all squeaks at the first shot, but a little practice should enable you to do so before long.

Where is Glasgow?

You will notice that the one station that I failed to get hold of was Glasgow. It was, as a matter of fact, a very bad night for reception (it usually is when a friend comes round!), but Glasgow has been very hard to get at all of late even though the other stations are coming in much more strongly than they did all through the summer. I cannot help thinking that some alteration must have been made either in the aerial or in the transmitter circuit, for 5 SC used to be one of the most powerful signals heard amongst stations other than London.

Stations have their ups and downs, as I have pointed out in previous notes, and Glasgow seems to be having one of his "downs" just now. Have others noticed the same thing with regard to the Scottish station?

Enter September

September made rather a noisy entry, for I have seldom known atmospherics worse than they were on the first night of the month. Though it was bad from a wireless point of view, I was rather pleased to hear them, for when they occur after several days of peace in the ether they generally mean that there is going to be a change in the weather. After what August did for us it was only to be hoped that there *would* be a change in September.

As I write (I am touching wood firmly) it looks as if the wireless set had once more proved a reliable barometer. There has been no rain all day, the sun has shone at intervals, and there are large patches of blue in the sky. Your wireless set will very often give you a pretty sure indication of the coming of some weather change. If you care to keep a simple record you will generally find that a particularly violent outburst of atmospherics usually means an alteration in conditions within twenty-four hours.

Television

Though television is not yet, I did see and hear John Henry at the same time,

or at least I saw him microscopically, if I may use that term, for when the clever humorist was twinkling in the sky on Tuesday week, just as he asked plaintively if he were near Bolingbroke Hospital his aeroplane came across the vista of my window. I got a double thrill, for I was almost nervous in case he should be brought literally, as well as metaphorically, to its doors. Bravo, John Henry, say I, and three cheers for Blossom.

The Children's Hour

One often wonders how many grown-ups pick up the headphones or switch on the loud-speaker at the time the uncles and aunts call up the kiddies?

Most of us are Peter Pans and, in some ways, never grow up. How many of us play with the clock-work trains we ourselves have bought for our little ones? Surely the uncles and aunts must include numberless adults in their unseen audience during the Children's Hour.

We can all remember the bed-time of our childhood, the last few moments graciously allowed us, and, when we had been specially good, the half-hour's fairy story. How times have changed.

To-day science has widened the child's horizon, broadcasting has brought the outside world to its nursery.

Consider the modern infant. To the wee ones the fairies, fostered by their imagination, have materialised in uncles and aunts with golden voices brought almost to every home.

That last hour before bed-time is the fitting end to a glorious day.

Do the children of to-day realise their luck, the many advantages they enjoy, or do they already take them as a matter of course?

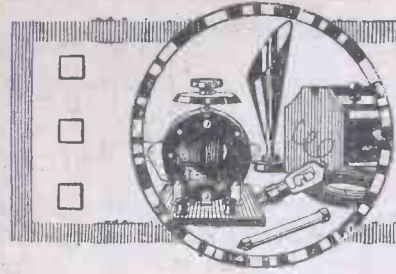
Yesterday's luxury has to-day become to-day's necessity. The child born in the new era looks upon the Children's Hour as part of the events of his daily life. The child of 1924 is much to be envied.

Too Much "Powder"

I have the greatest respect for Mr. Samuel Pepys and his famous diary, and admiration for "Bonnie Prince Charlie" too, but I do grudge a new valve "gone west" while listening-in to "Pictures from the Past" at 2 L.O. I consider it as an attempt to administer the "powder" of education when I am asking—and paying, too—for the "jam" of entertainment. Possibly if the valve had gone in the midst of a good night's music I might have been still more mad at the time, but, still, I should have had something. Still, I do think the educational policy is being rather overdone, and as the winter nights are coming on one looks to one's "set" to provide the pleasure the summer has denied us.

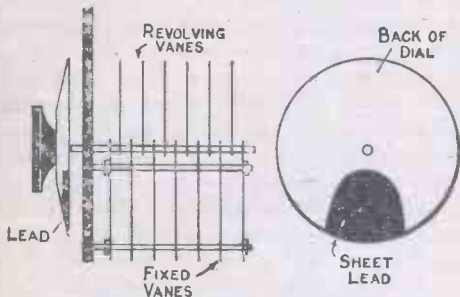
THERMION.

PRACTICAL ODDS AND ENDS



Balancing Condensers

WHEN variable condensers are mounted on vertical panels it is often noticed that the weight of the rotating vanes causes them to move immediately the operator's hand is removed



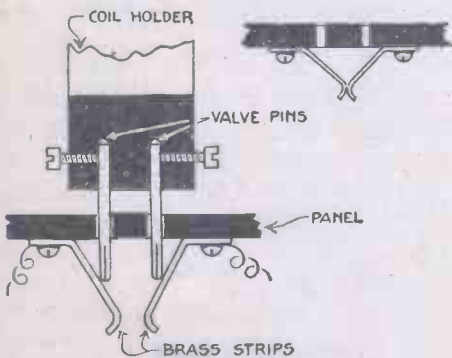
Method of Balancing Plates.

from the control handle. To counteract this, the indicator dial should be removed and a portion of the back filled with sheet-lead. The lead, of course, must be on the opposite side of the centre of the dial from the revolving vanes. F. C. L.

Loading Coil

THIS is a device by which a loading coil can be plugged in and out without having to short-circuit the terminals. Two pieces of springy brass are screwed, on either side of two holes, about 1 in. apart. The holes are 1/4 in. apart.

The coil holder consists of a block of



Arrangement of Loading Coil.

ebonite with two valve pins screwed into the bottom about 1/4 in. apart. Two screws make contact with the valve pins. It will be seen from the diagrams that when the coil is out the terminals are shorted and the circuit completed. R. N. W.

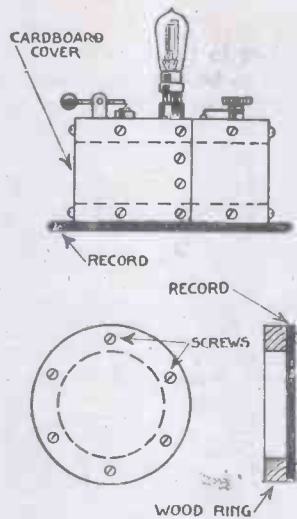
Detector Vibration

TO obviate the catwisher becoming displaced, it can be replaced by a small length of multi-stranded rubber-covered wire. This should be bared both ends, leaving only a very short portion of the rubber cover. The wires at one end are twisted round (or soldered) to the detector arm, and the wires at the other end bared to make contact with the crystal.

R. V. N.

Using Gramophone Records

WHEN gramophone records are employed for panels, the record should be thoroughly scrubbed with warm water and soap to remove any traces of metallic dust. If the grooves can be



Using Gramophone Records.

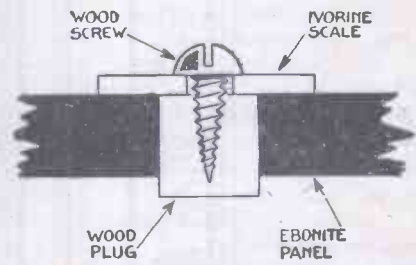
removed by the alternate use of fine and coarse glass-paper, so much the better. The record may be strengthened and stiffened up by screwing a ring of wood on the back. A suitable size is about 1 in. wide and 3/4 in. thick.

Besides strengthening the panel, the wood is useful for attaching a case to enclose components. A case might be good flexible cardboard bent into a short cylinder of a size corresponding with the record, and secured at the top edge by more round-headed brass screws, which are screwed into the wood. A bottom is simply made by using a second record, also fitted with wood ring. The wood rings may be easily cut out of a deal plank with a fret-saw. N. N.

Fixing Scales to Panel

ATTACHING ivory scales to an ebonite panel can be carried out quickly and neatly by the method shown in the illustration.

Small holes are drilled in the panel and then plugged with wood. In doing this care should be taken not to press the plug

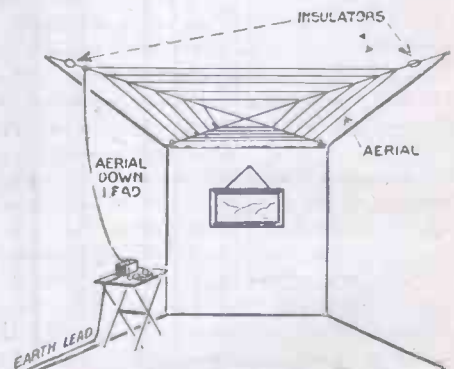


Fixing Scales to Panel.

in too tightly or there will be a risk of splitting the ebonite; finally, the scales are attached to the panel by means of small size wood screws. T. W.

Indoor Roof Aerial

THE indoor roof aerial shown by the diagram is easily constructed, and if well insulated should be very efficient in operation. The method of erection is clear from the sketch. Two ropes are slung from the four corners and the wire wound as in an ordinary frame. The ropes should be insulated at each end and the wires should also be insulated from the rope. This can be done by threading



Indoor Roof Aerial.

small egg insulators on the rope, making a knot after each is put on to prevent it from slipping. The wire can then be threaded through the other hole. In many cases this extra insulation could probably be dispensed with. R.

AERIALS I HAVE SAT UNDER

By *BOSPHOR PRONZ*

FIRST of all, of course, there is my own aerial, which, like myself, is of the single or blessed type. Most aerials are like expensive cork-tipped cigarettes. You can only take in off them at one end. My aerial, however, is similar to the cheaper cigarette—the Woodbine, for example. You can take in off it at either end. Let me explain a little more fully:

A Down Lead

At one end my aerial is attached to a chimney on the south or off side of the house as you approach from the front. The down-lead at the house end, like many a mosquito on a summer evening, goes in through the drawing-room window. The other end of the aerial is fastened to the elder elderberry tree at the bottom of the garden. At least, I judge it to be the elder of the two elderberry trees, for it is the taller by a foot and, what is perhaps a more certain indication of age, it is a little the stouter of the two. This elder elderberry end of the aerial is also provided with a down-lead, which comes down clear of the tree in the manner of a small boy descending an apple-tree when caught by the owner.

I have two earths, but, of course, they are the same earth really when you come to look into things properly. The earth near the house is a miscellaneous collection of metal buried under the drawing-room window. The earth at the bottom of the garden is an old pipe buried under the elderberry trees in the immediate vicinity of a one-time cat cemetery. You will see the ingenuity of my aerial system in a moment.

Its Dual Purpose

As far as my landlady is concerned, my aerial system works in the same way as one of those neat and infallible "weather-houses." When the weather is fine, the old woman comes out and listens-in in the garden. When the weather is languagable, the old woman stays in and listens-in in my sitting-room. It is an easy matter to adjust the aerial system for use at either end. If the house end is to be used, the down-lead at the elderberry end is allowed to hang freely. If the elderberry end of the aerial is to be used for reception, the down-lead at the house end is allowed to hang freely.

What do I do if there is a strong wind blowing? Easy enough. I get a small boy to hold on to the free down-lead, always taking the precaution, of course, to select a small boy with rubber shoes. It is worth noting in passing that the capacity of my aerial system is measured in feet.

A Wiry Chimney

A few yards along the road from where I live there is an end house with an end chimney with the ends of no less than four aerials attached to that chimney. On the same chimney, above the four aerials, there are two Post-office telephone lines. If there is an aerial anywhere in the neighbourhood with a loose end it is sure to get round that chimney.

Those Four Aerials

I have often sat under one or other of the four aerials suspended from that chimney. Starting from the road side, the first of those four aerials belongs to a man who has a gramophone, a car and a sundial. He also has an insulator which he borrowed from me when he first put up his aerial.

The second of those four aerials runs from the chimney to the house of a man who has a crystal set installed for the sole purpose of listening to the weather forecasts. He does not care for music, he detests John Henry, and he will not listen to plays. He is a golfer, and golf depends on weather and weather depends on the weather forecasts, and so he has a crystal set to listen-in to the weather forecasts.

The third of the four aerials runs from the chimney to the house of a neighbour of mine who has a fine valve set attached to a gramophone. He listens-in every night from seven till ten, except for a short period from nine to nine-fifteen when he goes out to have one.

The fourth aerial? I am afraid I cannot tell you much about number four on the chimney's list. The owner of this aerial, like the old loud-speaker on my junk shelf, is not on speaking terms with me.

The Eiffel Aerial

Now the Eiffel aerial which has just been erected in our suburban road is something of which we are really proud, and I must tell you how I came to sit under it. The man to whom the Eiffel aerial belongs is a beginner amongst the wireless enthusiasts in this neighbourhood. Being a man of high ambitions, he naturally decided to have an aerial mast a good 10 ft. higher than anybody else's aerial mast. To attain this high ideal, he had made a lattice-work mast modelled on the famous Eiffel Tower. This wonderful mast he planned to have fixed on a stout brick wall some 10 ft. high at the bottom of his garden.

When the time came to fix the mast he called in all the wireless enthusiasts he knew. Unluckily I was one of those called in to help. It fell to my lot to stand on

the shed roof at the side of the bracket which had been driven into the wall for the mast to rest on. Now when an aerial mast is going up I have always noticed that some one stalwart takes the whole of the weight of the mast. On this occasion I happened to be that stalwart.

For a good ten minutes I held on like grim death. Then I felt the thing begin to bend over out of the perpendicular and I had to let go. The mast hit me a nasty wallop on the back and swept me off that shed roof on to a hard footpath. Yes, I sat under that aerial all right. I think I sat under it a good ten minutes. By the time I came round (to the side of the shed where the work was being done) the mast was up. I shall not forget sitting under that Eiffel aerial. If I hear of another such mast going up in this neighbourhood I shall make a point of going into the country for a week or two.

THE HOLLWECK VALVE

THE original installation of this ingenious "everlasting" type of thermionic generator in the Eiffel Tower station has proved so successful in practice that an additional panel, comprising two further units, is being prepared, and will shortly be brought into operation.

The Hollweck tube is so designed that all the component parts (including the electrodes) are readily replaceable, so that the valve as a whole never wears out, or, more accurately, need never be out of commission for longer than the short time necessary to renew any existing part.

Perhaps its most interesting feature is the provision of a helical mercury pump, which is fitted to one end of the bulb and is kept constantly working whilst the valve is in operation so as to maintain the necessary degree of vacuum. The anode is in the form of a copper cylinder sealed into the glass bulb and surrounded by a water chamber through which a constant stream of cooling liquid flows. With a plate voltage of 5,000, the present installation, which has been in constant use since May, 1923, is capable of feeding 8 kilowatts to the aerial, although in practice the power output is generally restricted to between 5 and 6 kilowatts.

M. A. L.

Wireless sets have been banished from the Eastern State Penitentiary, Philadelphia, U.S.A., following a discovery that the convicts were utilising them to receive code messages explaining how narcotics would be smuggled into the prison.

CHOOSING A CONDENSER.—I

THERE is probably no component part over which the wireless public has been so badly let down as the variable condenser. When those of the rotary-vane type were first introduced, a good many years ago now, they were manufactured as precision instruments, every part being made and fitted with the utmost care.

In the Past

The rotary-vane condenser used to be one of the most expensive components; for example, a really good one which I purchased in 1920, though its maximum capacity was only .001 microfarad, ran to a few shillings less than £5. It was, of course, a beautiful thing, but I do not know that the results obtained with it are better than those obtained with a 1924 condenser, which costs only about one-tenth as much. The expensive one has had four years' wear and is as good as ever; whether the cheap model will be as efficient in four years time as it is to-day is another matter, though really I see no reason why it should not be, for it is a well-made instrument and, after all, a variable condenser does not get a very great deal of hard wear.

With the growing popularity of wireless as a hobby, which dates from the time when broadcasting began, all kinds of horrible contrivances calling themselves variable condensers were placed upon the market. The variable condenser must remain a precision instrument if it is to give anything like good results. You cannot simply take a set of fixed and a set of moving plates and mount them carelessly, being quite satisfied that there is no scraping noise when the spindle is rotated. There is very much more in a variable condenser than this. To begin with, the insulation between the two sets of plates must be as near perfection as possible, otherwise there will be very serious losses in the instrument, which will lead to a very big reduction in the signal strength in the set to which it is fitted. It must be remembered that in whatever part of the set the condenser is there is a difference of potential between the two sets of plates, and that high-frequency currents, which laugh at insulation which would defeat the staid direct currents, are being dealt with.

Insulation

Take, for example, the case of the condenser placed in parallel with the A.T.I. We wish to obtain the biggest possible potential difference across the coil. Obviously the plates which are connected to the aerial are at the same potential as the top of the coil, whilst the potential of the other set of plates is that of the

lower end of the coil. Now if there is any insulation leakage the inductance is short-circuited, partially at any rate, and cannot do its work properly. Current will pass to earth not by capacity or through the inductance, but by a direct leakage between the spindle of the moving plates and the frame of the condenser. It is just these little points that so often escape the amateur's attention. He may spend hours in perfecting the insulation of his aerial, of his lead-in and of various parts of his set, and yet take his condenser absolutely for granted.

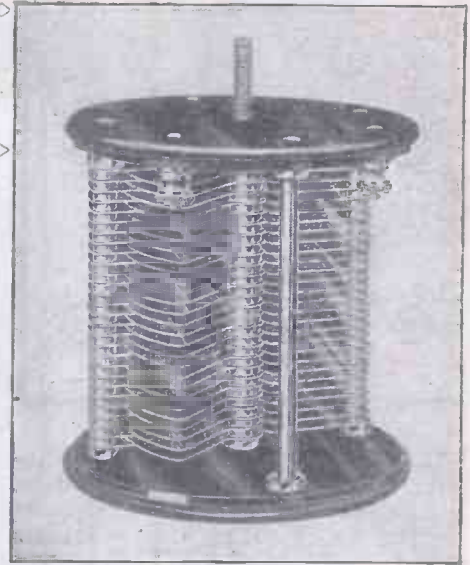
End Plates

An insulation breakdown is not likely to occur in those condensers which are made with top and bottom plates of good-quality ebonite. Metal top and bottom plates, however, are to be preferred in some respects; they act to a certain extent as a shield, so reducing capacity effects, and they are not liable to warp, but they introduce the difficulty of obtaining perfect insulation. When, therefore, you purchase a variable condenser with all-metal foundation, be careful to see that the insulating bushes in the top and bottom plates are large and that they are made of respectable material. Fibre is worse than useless, for owing to its hygroscopic qualities it attracts moisture and becomes a very poor insulator indeed in damp weather.

It is of the utmost importance that the moving plates should be properly centred and that there should be absolutely no wobble in them when the knob is rotated. If the spindle is not central, if it is bent and if the distance between the plates varies as it moves round, then anything like fine tuning will be impossible, for instead of a gradual increase in capacity from minimum to maximum as the setting is varied from 0 to 180, you will have a series of jumps and jerks and it may even happen that the capacity when the dial is set at, say, 120 degrees is less than what it is at 115 degrees.

Spacing

Another point which often escapes attention is the spacing of the plates. In a well-made condenser, at any setting of the scale, the moving plates when meshed with the fixed will exactly bisect the distance between them. When purchasing a condenser, hold it up to the light so that you can see between the plates and turn the knob slowly round. Examine it carefully at various settings, and note the relation between the spacing of plates. If there is more space above the fixed plates than below or vice versa, lay the condenser aside and try another one.



Here are a few further tests which the intending purchaser should make before he is satisfied: Pull and push the knob to see whether there is any shake in the spindle bearings. If there is you may be quite certain that such a condenser will treat whoever purchases it sooner or later to a varied selection of noises, which he will probably put down to atmospherics; in reality they are due to faulty contact. If the spindle of the condenser is mounted by means of a spring washer it may be possible to pull the knob up slightly. There is no harm in this, for the washer is there for the express purpose of taking up any play.

Contacts

The last test which can be carried out by inspection is to make sure that the contact between the spindle carrying the moving plates and the bush or other connection for the lead is a really good one. This contact must for obvious reasons be made at either top or bottom of the spindle. If it is of the former type there should be some kind of spring seating for the upper end of the spindle, or a tightly fitting collar engaging with a good shoulder on the spindle. When the contact is at the lower end of the spindle, see that the opposing surfaces are large, that there is no shake and that the spindle is forced downwards by means of a spring washer or other similar device.

One of the best of all contacts for moving plates is that made from a copper strip coiled like a watch-spring. One end is soldered to a terminal and the other to the spindle itself. Rotation of the knob simply coils the spiral up or uncoils it, and the contact always remains positive. The only drawback to this type of contact is that unless it is very carefully designed and unless proper stop pins are provided, to prevent the moving plates being turned too far in either direction, the strip is liable to give way in time, due to too great a strain being put on it.

M. A.

(To be continued)

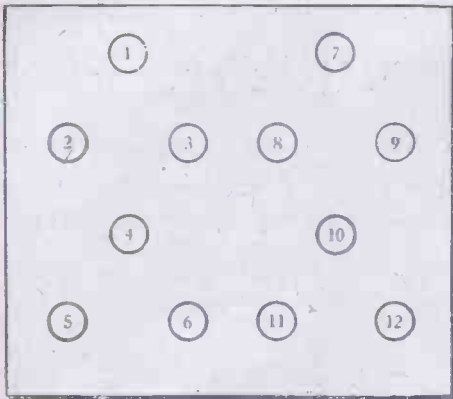


Fig. 2.—Lay-out of Panel.

A UNIFORM SIGNAL FOR TEST PURPOSES

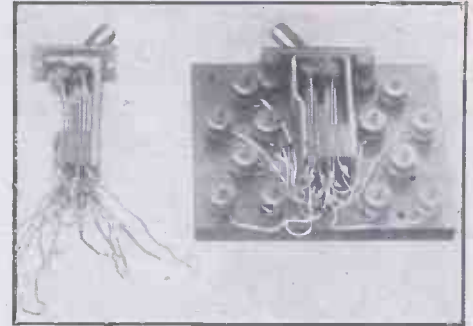


Fig. 1.—Unmounted and Mounted Switch.

THE wireless experimenter must often be at a loss for a uniform source of incoming radiation by means of which to compare the effects of various changes which he makes in his trial apparatus.

ZLO may, of course, be used by the experimenter for experimental receiving purposes, and he can rely upon a uniform wavelength at least, intensity of emission not so surely, non-interference between himself and the transmitting station less still.

Change of Apparatus

But after finding that a certain change of transformers or other apparatus makes all the difference in the reception of music, it is disconcerting to find that a speaker "swallows his words."

It is not necessary that the amateur should set up an expensive apparatus if he wants to talk to himself for experimental purposes. He can just put an ordinary receiver into the horn of a gramophone and it will generate a weak reproduction of the music.

This can be used direct for testing the sensitiveness of telephones or of a listener's hearing, or be amplified up to test valves, batteries, transformers or any other component.

This method of self-transmitting will be found to be of great use, and even beyond purely experimental purposes may be made the means of considerable entertainment to one's friends if properly stage-managed.

A Quick Change Device

A very convenient way of effecting a quick change is by means of a "Dewar" switch (twelve-point, two-position). These can now be procured for a shilling or two, and mounted upon ebonite with twelve terminals make quite an acquisition to any wireless amateur's bench.

In the photograph (Fig. 1) two Dewar switches are shown on the left unmounted, and on the right the frame of the other switch is attached by two No. 6 B.A. screws to two brass pillars screwed into the ebonite base.

Bare tinned-copper wires are soldered on to the "tags" of the switch and the other ends of the wires screwed down under the bases of the terminals.

The terminals are arranged in four groups of three, each (see Fig. 2), the

upper one of each group corresponding to the middle leaf of each triode of springs, and the shorter contact springs connected to the other terminal in such a way that with the switch lever over in the position shown the top terminal of each three is connected through the switch to the terminal to its left immediately below it. When the switch lever is thrown over to the other side, contact is broken with the left-hand lower terminals and made on the right-hand lower terminals, so the lever is always the index of the contacts which are being made.

It will be seen that a test like a rapid comparison of the performance of two low-frequency transformers can very easily be

arranged. To make it quite clear the terminals are numbered in the key plan.

Let the primary transformer leads to the set be connected to 1 and 4 and the secondary leads to the set to 7 and 10. Then the primary terminals of transformer A should be connected to terminals 2 and 5, and the secondary terminals of transformer A to terminals 8 and 11, the primary terminals of transformer B to terminals 3 and 6, and the secondary terminals of transformer B to terminals 9 and 11.

This example only indicates the method of use, but by no means suggests a limit to the uses to which such a switch can be put. G. S.

WATERING AN "EARTH"

DRY weather in summer will often cause a deterioration in the effectiveness of an earth connection which consists of a copper plate or a mass of metal buried in the ground. A common remedy for such deterioration is to throw a pail of water on the ground above the "earth."

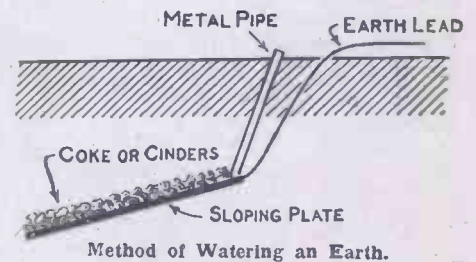
Water thrown on the ground in this way certainly disappears, but it is very problematical whether the water ever reaches the copper plate or metal underneath the surface. Indeed, it is most surprising how short a distance water penetrates into the ground during the summer months. Even after a heavy thunder shower the rain only penetrates to a depth of a few inches in some kinds of soil.

Where trouble is likely to be caused by dry ground around and above an "earth," the best plan is to place a length of metal piping in the ground so that the lower end of the pipe is just above the buried plate or metal and the upper end is at the surface. A small wooden plug placed in the top end of the pipe will prevent the pipe from getting clogged up.

The accompanying diagram shows how an earth connection may be made so that it may at any time be effectively damped by the simple expedient of pouring a pailful of water down the pipe. A garden

watering-can, nozzle removed, is perhaps the most-convenient thing to use.

With an "earth" constructed in this manner a number of experiments might



be made on the effect of various liquids, such as rain water, salt water, etc., on the earth connection. J. R.

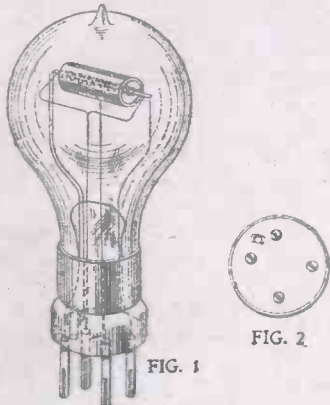
Le Petit Parisien criticises the work of Chelmsford (5XX) sharply, saying that for the last few days many complaints have come in to the paper regarding the exceptionally bad modulation, variations of signal strength, etc.

However, reports from the centre and west of France continue to appear announcing reception of 5XX on a crystal set with the greatest ease.

PROGRESS AND INVENTION

Double-filament Valves

ON valves that have two filaments it is usual to fit some kind of switch so that the second filament can be put in circuit when the first is damaged. Such switches must of necessity be small, and an ingenious arrangement on these lines is

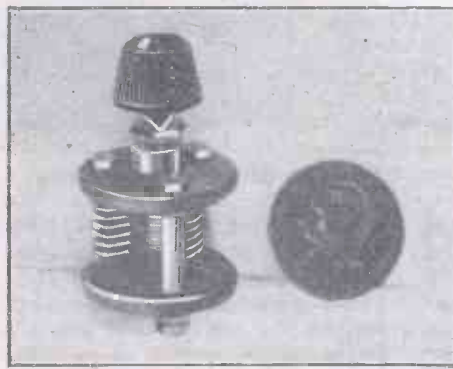


Figs. 1 and 2.—Double-filament Valves (214,694/24).

the subject of Patent No. 214,694/24 (W. A. Brady, of Forest Gate, E.7). As can be seen from Figs. 1 and 2; two small contacts are let in a hole in the base of the valve; when these are short-circuited the second filament is put in circuit.

Miniature Condenser

VERNIER condensers are usually simple enough in construction, but that shown by the photograph is a small scale model of the usual type of variable condenser.



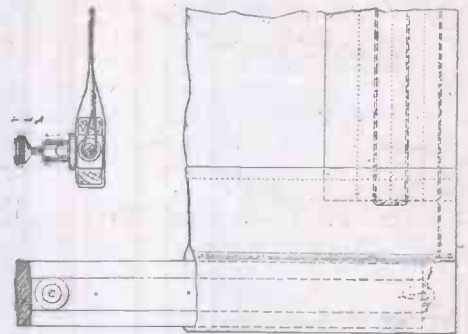
Miniature Variable Condenser.

Its size can best be judged by comparison with the penny shown alongside it. The construction of the condenser is very neat and complete in every detail. Mr. F. T. Carter, of "The Coombe," Rogate, Petersfield, Hants, would like to get in touch with any manufacturer who is interested in this condenser.

As can be seen from the photograph, the usual one-hole fixing is employed.

Roller-blind Aerial

ROLLER-BLIND aerials, on which the conductor takes the form of wire wound into a coil to make a loop aerial, have already been suggested. In a similar type of aerial, described in Patent No. 218,403/24 (W. G. Walter, A.M.I.E.E., of Carmyle, Lanarkshire), vertical wires or strips of foil are embedded in the hem as shown by the diagram.



Roller-blind Aerial (218,403,24).

The fabric of which the blind is made acts as an insulator. Any number of wires may be used, these being connected in parallel through a metal strip on the bottom lath. An end elevation of this is shown by the inset.

AROUND THE SHOWROOMS

Listoleon Transformer

IN outward appearance the new Listoleon low-frequency transformer looks a fine instrument, and its performance is no less satisfactory. I have found signals to be of good volume and first-rate quality. Mechanically the transformer is very robust, and the gauge of wire used will stand a current of twenty milliamperes continuously without breaking down. This means that it can safely be used with even the largest of power valves employed for broadcast reception. In fact each transformer is guaranteed for two years.

Each layer of wire is separately insulated, and the windings are tested with 2,500 volts between primary and secondary and windings and frame. Owing to these special features the transformer is higher priced than most, being sold at 30s. The makers are Radiophones, Ltd., of 4A, Savoy Street, Strand, W.C.2.

Marconiphone "Baby" Set

NOVEL in design and neat in appearance, the Marconiphone "Baby" crystal set is one of the most interesting I have come

across for some time. Variometer tuning is used, the flat coils being moved by the lever protruding from one side of the set, which measures only 5 in. by 4 in.

A switch is fitted so that the set can



Marconiphone "Baby" Crystal Set.

be used satisfactorily with either a long or a short aerial. Putting the switch in one position places a small coil in circuit to increase the inductance.

The crystal is of standard Marconiphone galena type and is set in a detachable cup, and the catwhisker is fitted at the end of a vertical holder contained in a glass cylinder. The price is only 26s. 6d.

Auto-broadcast System

I NOTE that Burndepts have developed an auto-broadcast system for use in hotels. A control unit is placed near the receiver and as many loud-speakers installed as may be required.

Presuming that the system is wired up and broadcasting is in progress, any person in the house who desires to listen to the programme has only to switch his or her particular loud-speaker on; the action of so doing instantaneously switches on the valves and brings the receiving set into operation. Other people in the house can also switch their loud-speakers on and off at will without in any way disturbing others who may be listening.

A special switch can be used where it is desired that certain irresponsible users shall not have the power of switching on at will.

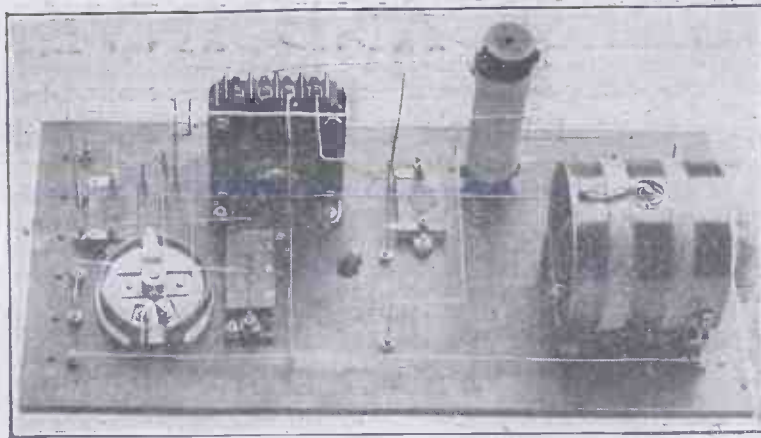
VANGUARD.

THE name which I have given to this set is not strictly an accurate one, for actually there are two knobs. The second, however, belongs to the filament rheostat, and all tuning is done by means of the variometer, which will be seen in the photographs on the left-hand side of the panel.

This set was designed to meet the requirements of some friends who were ignorant even of the elements of wireless and desired something which would enable them to obtain at good strength the transmissions from a relay station seven miles away, as well as those of a main station some sixty miles distant. One could, of course, have brought in the relay station quite well by using a crystal detector and two note magnifiers, but this combination would hardly have sufficed for the main station, since, though the crystal *may* give good results at this distance, it cannot be relied upon to do so, and if signals received by the detector are very weak, it takes a surprising amount of low-frequency amplification to bring them up to good strength in the receivers.

Aperiodic Coupling

For this reason it was decided that there should be one stage of high-frequency amplification and one note-magnifying valve with a crystal rectifier. Now when you come to add a stage of high-frequency amplification to any set you are at once met with a diversity of problems. You cannot use resistance-capacity coupling on the high-frequency side for broadcast reception, since it is most inefficient on short waves. This form of coupling, stable though it is, was thus ruled out. The tuned-anode, besides adding another knob, is not, I think, a circuit to put into the hands of absolute beginners, for unless one



View of Under Side of Panel.

weights it down, so to speak, by introducing heavy damping in the form of a strong positive potential on the grid of the first valve, or by adding resistance to the anode coil by the use of very fine wire, it is liable to cause a great deal of interference by radiation. The tuned transformer is open to precisely the same objections, and the only thing left seemed to be the aperiodic transformer as a coupling.

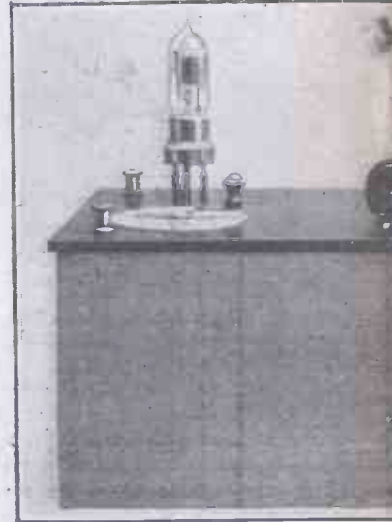
The Circuit

Fig. 1 shows the circuit which was finally decided upon after several trials. It will be seen that the first valve (V1) acts simply and solely as a high-frequency amplifier. Its grid circuit is tuned by the variometer, whilst the plate is merely partially tuned by the primary of the aperiodic high-frequency transformer. The crystal detector is placed between the secondary of this transformer and the primary of a low-frequency intervalve transformer. Impulses received by the aerial are therefore amplified at high frequency by V1 and passed on to the detector, which rectifies them. They then go by means of the low-frequency transformer to the second valve (V2), which functions as a note magnifier.

The type of high-frequency transformer selected is one that can be made by any

BUILDING A BROADCAST

A very simple but highly efficient two valves and a crystal detector set particularly to those who would like making numbers of fine adjustments will describe the operation.



The Complete Set

reader who is able to wind fine wire. Those who cannot tackle such flimsy stuff can get them made up quite cheaply by firms who specialise in components, and suitable aperiodic transformers can occasionally be picked up at shops which deal in ex-army surplus stores.

The whole principle of the aperiodic transformer is that it is wound to give its highest amplification at about the middle of the waveband which it is designed to cover, but owing to its special construction

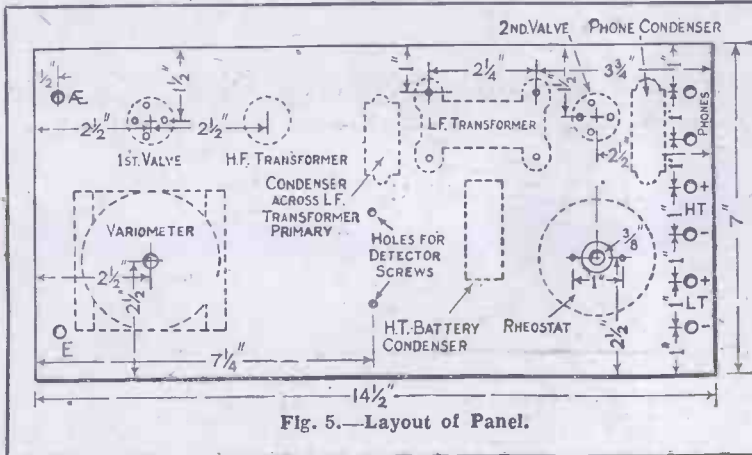


Fig. 5.—Layout of Panel.

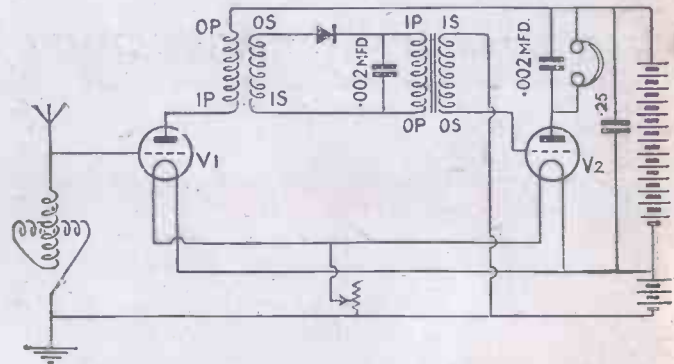
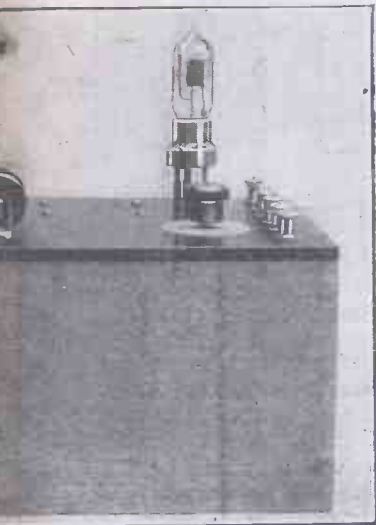


Fig. 1.—Circuit Diagram.

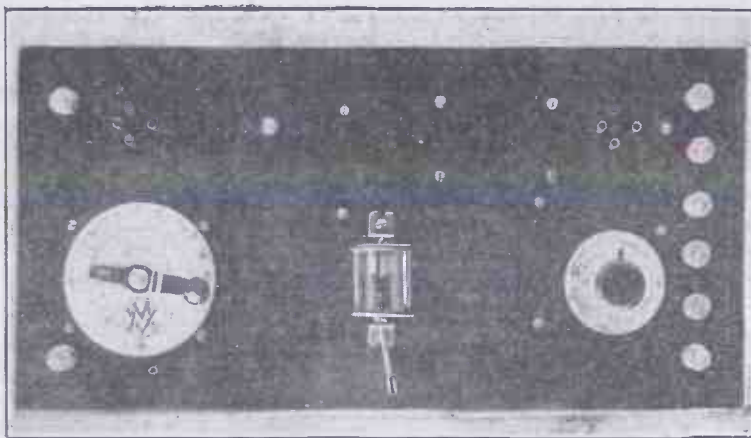
ONE-KNOB RECEIVER

efficient receiving set employing a transformer which will appeal particularly to be able to tune in without adjustments. A succeeding article will describe the operation of the set.



Receiver.

it gives almost as good results over its whole range. The difference between it and the copper-wound transformer is shown in Figs. 2 and 3. Suppose that we wind two transformers, one with copper wire and one with resistance wire, putting on the same number of turns and designing them to have an optimum wavelength of 400 metres. The performances of the copper-wound transformer will be something like what is shown in the curve in Fig. 3. There will be practically no



View of Top Side of Panel.

amplification at all, if it is untuned by a condenser, on 200 or 300 metres, but from about 375 metres upwards there will be a sharp rise in signal strength, which reaches its maximum at 400 metres. After this point a sharp fall follows until at 425 metres amplification is again very small indeed.

Resistance-wound Transformer

With the resistance-wound transformer we find that the peak of the curve does not rise so high at the optimum point; that is to say, it will never give quite the degree of amplification of the copper-wound transformer. At the same time, it is very efficient anywhere between 300 and 500 metres, and it will not give a bad degree of amplification even at 250 or 550 metres. It can therefore be used to cover the broadcast waveband and will give very satisfactory results.

In designing a resistance-wound high-frequency transformer several considerations come in. The finer the wire used—that is, the higher the resistance introduced—the flatter will be the efficiency curve of the transformer. This means that it will cover a larger waveband, but at the same time it will give smaller amplification over its whole range. If the resistance is small, we shall have higher ampli-

fication, but the range will be small and the most efficient point will be rather strongly marked.

We must therefore strike the happy mean between the two extremes, and I have found that it is most satisfactory to use double-silk-covered Eureka wire of No. 40 gauge. This wire looks expensive when you see its price per pound, but as the amount required for winding a transformer is only a small fraction of an ounce, there is no need to be frightened about the cost.

The best way to make this transformer is to use a former consisting of a 4-in. length of ebonite rod 1 in. in diameter. Then for both primary and secondary windings put on one turn of wire for each metre of the optimum wavelength desired. As our own broadcast waveband lies between 300 and 500 metres aperiodic transformers should be wound to an optimum wavelength of 400 metres, and this will be obtained by putting on 400 turns of wire for both primary and secondary. Make a 4 B.A. tapped hole at the centre of each end of the ebonite rod, and into these holes insert short lengths of studding. These will serve as centres, and by means of them the rod can be mounted for winding in the lathe, in the chuck, or the breast drill (the drill being fixed in the vice), or in a simple winding machine improvised from Meccano parts. Two little metal tags should be screwed to opposite ends of the rod to form the "in" and "out" contacts of the primary, and opposite them should be another pair for the contacts of the secondary winding.

Solder the end of your wire to the I.P. tag and start winding 1/2 in. from the end of the former. Put the turns on tightly and evenly side by side until all 400 are in place. As double-silk-covered No.

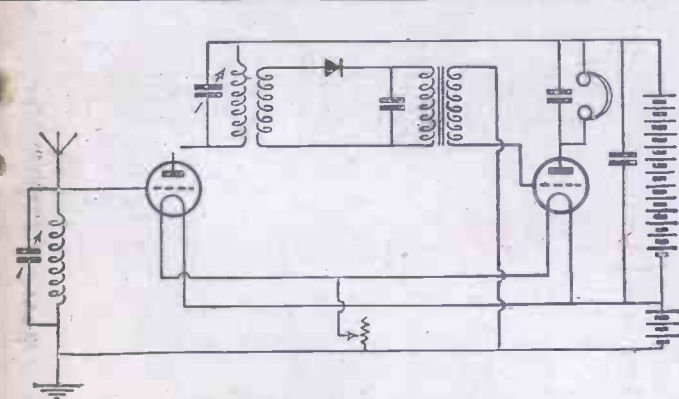


Fig. 7.—Circuit for All-wave Adaption.

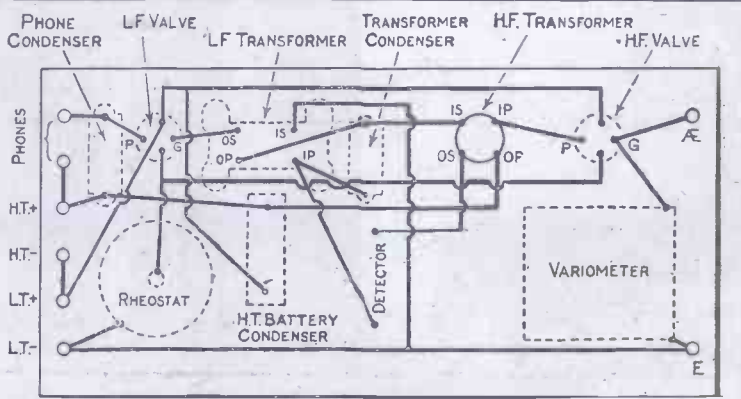


Fig. 6.—Under Side of Panel showing Connections.

40 wire makes 142 turns to the inch; the windings, if well put on, will occupy rather less than 3' in.

When the primary has been wound, cut the wire and solder to the O.P. tag. Then cover with a layer of thin mica or empire tape and wind the secondary in the same direction as the primary; that is to say, the I.S. tag will be at the same end of the former as I.P., and it must be turned in the same direction as before when the wire is put on. The secondary turns should exactly cover those of the primary.

Having put on the wire and soldered its end to the O.S. tag, cover the windings

earth. The centre of the first valve is immediately above that of the variometer. Both are 2½ in. from the left edge of the panel, 2½ in. from the valve, and level with it is drilled a 4 B.A. countersunk hole for the holding screw of the H.F. transformer.

Down the right-hand edge of the panel are six terminals spaced 1 in. apart. The first pair are for the telephones, the second for the high-tension connections, and the third for the filament-battery connections. The rheostat is mounted on the same level as the variometer, the centre of the ¾-in. hole drilled for its spindle being 2½ in.

As the photographs show, the wiring is extremely simple. Fig. 6 shows exactly the connections that have to be made between the various components. Bare wire was used throughout in the set and all joints were soldered. This is, of course, by far the best method of wiring, and it is not really difficult after a little practice. If, however, the reader does not feel that he is capable of tackling the task of bare wiring he can use covered wire, provided that he takes care on the high-frequency side of the set to keep the leads connected to the transformer and detector well separated. Joints may, of course, be made

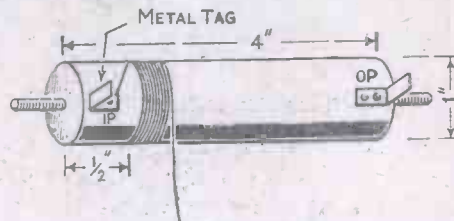
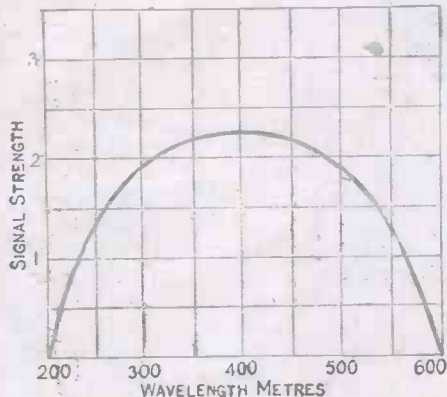
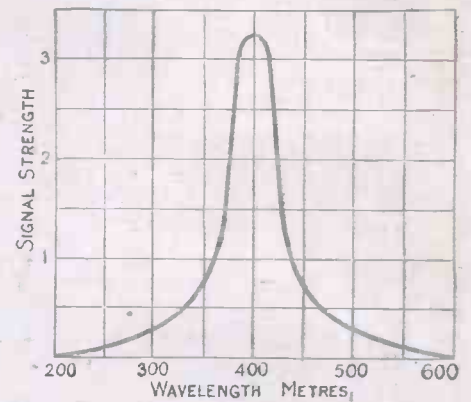


Fig. 2 (left).—Characteristic Curve of Resistance-wound H.F. Transformer.

Fig. 3 (right).—Characteristic Curve of Copper-wound H.F. Transformer.

Fig. 4 (above).—Resistance-wound H.F. Transformer.

Fig. 8 (below).—The Design Adapted for Sharp Tuning.



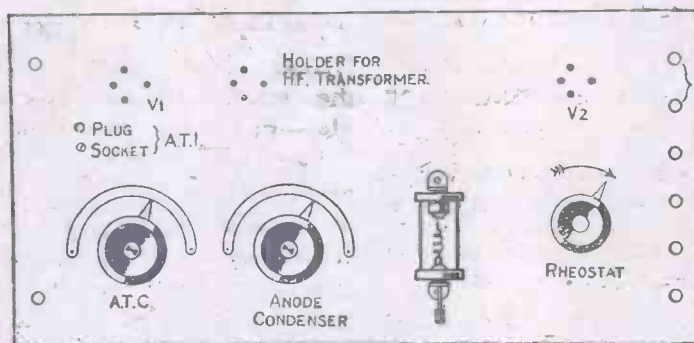
with a layer of insulating tape to protect them from damage. The pieces of studding should now be removed and the transformer is ready. It will be mounted on the set by means of a single screw passed through the panel into one of the tapped holes.

This particular set was designed for use with "06" valves, since there was likely to be some difficulty about getting accumulators charged. Even so the total cost was not high, as the figures which follow will show. It can be very considerably reduced if bright-emitter valves at 12s. 6d. apiece are employed. Here are the components required:

	£	s.	d.
Ebonite panel, 14½ in. by 7 in. by ½ in. ...	4	6	
Oak cabinet, 14½ in. by 7 in. by 5 in. ...	7	6	
L.F. transformer (shrouded Igranite) ...	1	1	0
Two "06" valves at £1 10s. ...	3	0	0
35-ohm rheostat (Metropolitan Vickers) ...	4	6	
Variometer (Metropolitan Vickers) ...	8	0	
Crystal detector ...	3	0	
Two 0.02-microfarad condensers (Edison-Bell) ...	4	0	
1 microfarad condenser (Mansbridge) ...	4	0	
Eight valve legs ...	1	0	
Eight terminals ...	1	0	
Materials for H.F. transformer, say ...	5	0	
Screws, nuts, wire ...	1	0	
66-volt H.T. battery ...	13	0	
Three bell cells ...	7	6	
Total ...	47	5	6

The addition of a good pair of telephones or an "Amplion Junior" loud-speaker brings the total for the set to about £8 10s.

The dimensions and drilling lay-out are shown in Fig. 5. At the left-hand edge of the panel are two terminals for aerial and



from the right-hand edge and 2½ in. from the bottom of the panel. The low-frequency transformer is arranged at the top of the panel, the first pair of holes for its retaining screws being drilled 1 in. from the top edge and 3¾ in. from the right-hand edge.

The detector comes in the middle of the panel between the variometer and the rheostat. The condensers may be placed as shown in the diagram, but the actual drilling holes are not shown, since these will depend upon the type of condenser used. Those employed in the set shown in the photographs were Edison-Bell across the primary of the low-frequency transformer and the telephones, and a W. and M. across the high-tension battery. This last condenser has a capacity of only .01 microfarad, and it would have been better to use a Mansbridge with a capacity of 1 microfarad. The reason why this was not done was that I could not obtain one locally and had no time to get one from London, since I wanted to get the set finished and tried out before going away for a holiday.

with nuts and screws without any marked loss in efficiency, so long as everything is well tightened down.

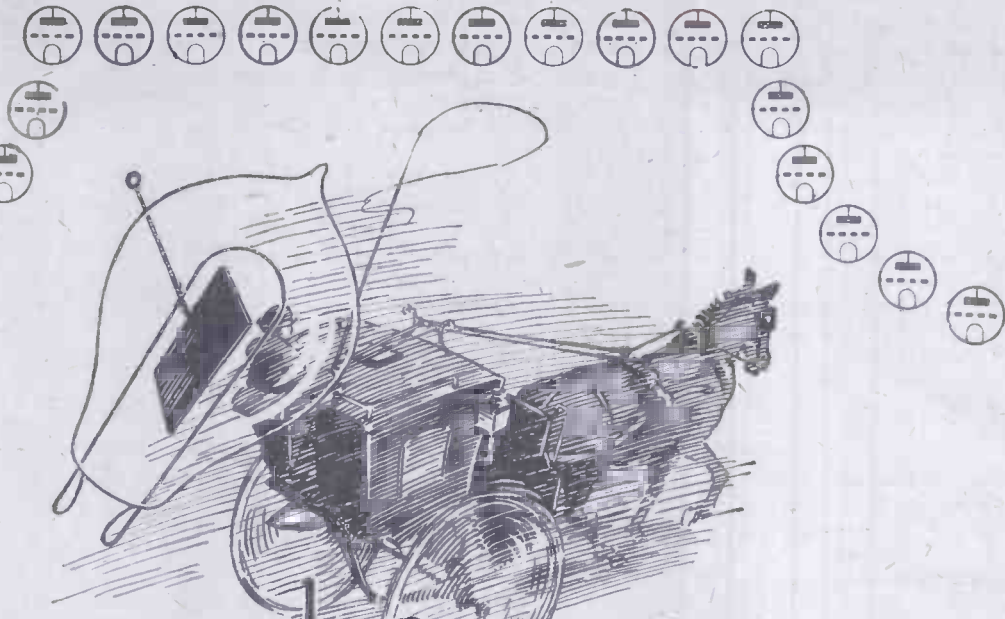
For the reception of 5XX or Radio-Paris the short-circuiting plug is removed and a coil inserted in its stead. The small high-frequency transformer is replaced with one wound with 1,800 turns of resistance wire for both primary and secondary.

Those who desire a set capable of rather sharper tuning which be used on all wavelengths can adapt the design in the way shown in Figs. 7 and 8. Here a variable condenser, the A.T.C., occupies the space previously assigned to the variometer, and a plug-in coil acts as A.T.I. The detector is mounted close to the rheostat, a second variable condenser for tuning the anode of the high-frequency valve being placed between it and the A.T.C.

Instead of aperiodic transformers, plug-in H.F. transformers of the mushroom type are used, the holder being mounted in the middle of the panel between the valves. Such a set is, of course, rather less stable than that employing resistance-wound H.F. transformers, and if carelessly used it can cause interference. Still, if proper care is exercised it is not likely to do so in the case of anyone who has had previous wireless experience. J. H. R.

[Some points in the operation of the set will be dealt with in a later article.]

Please Mention "A.W." when Corresponding with Advertisers



30 years before you had heard of Broadcasting

THIRTY years before you or anyone else had ever heard a "broadcast concert" an experimental lamp was causing a great deal of interest in the Ediswan laboratories. No one had ever seen a lamp quite like this. It had a platinum plate introduced between the legs of the filament. To-day, of course, "any schoolboy" — as Macaulay would have it — knows that this plate was really an anode. But that was

eighteen ninety and in those days not even the schoolboy—or anyone else—had ever heard of a "thermionic valve." That afternoon in the laboratory at Ponders End was the beginning of "broadcasting." Ediswan Valves, to-day, are later chapters of the story that started with Fleming's epoch-marking discovery.

Ediswan Valves will bring the best out of your wireless set—get some on the way home and enjoy better programmes from to-night onwards. All dealers sell them.

You will be interested in our booklet "The Thermionic Valve." It's free—send for a copy.

THE EDISON SWAN ELECTRIC CO., LTD.,
QUEEN VICTORIA ST., LONDON, E.C.4

EDISWAN VALVES

WIRED WIRELESS.—I

THE cost of erecting long-distance telephone lines is very heavy, and it is only, natural that telephone engineers have long been trying to devise some satisfactory means whereby several conversations could be carried on simultaneously over a single pair of wires.

As far back as the early 'nineties, long before wireless telegraphy had been



Fig. 1.—Simple Telephone Circuit.



Fig. 2.—Telephone Circuit with Transformer.

thought of, we find that currents of frequencies above the audible range were suggested as carriers for the comparatively low-frequency speech currents, the idea being to use different carrier frequencies and electrically to tune the receiving circuit to the particular frequency it was desired to select. It is, however, only within the last few years, following the rapid developments of wireless engineering, that the system has been put to practical use.

In 1910 and 1911 G. O. Squier, of the U.S. Signal Corps, carried out a series of experiments, and since then many people have been engaged in the development of the art. There have been a number of books and papers written on the subject, notable amongst the more recent contributions being a paper by Messrs. E. H. Colpitts (Western Electric Co.) and O. B. Blackwell (American Telephone and Telegraph Co.), read before the American Institute of Electrical Engineers.

Most of these books and papers are of a technical nature, and it is the object of

these waves act on the drum of the ear and produce the sensation which we know as sound. The object of telephony is to reproduce these sound waves many miles away.

The telephone transmitter or microphone consists of a thin carbon diaphragm A (Fig. 1), fixed a short distance from a carbon block B, the space between being loosely filled with carbon granules or shot. A slight pressure on the diaphragm alters the electrical resistance, and if the microphone is connected in series with a battery the current in the circuit is varied, the variation being roughly proportional to the change in pressure on the diaphragm. The receiver consists of a coil of fine wire wound round the soft iron pole-piece of a permanent magnet NS. Variations of current alter the pull on the ferrottype diaphragm C.

Rapid changes of air pressure due to the sound waves which enter the mouthpiece D cause a corresponding pressure on the

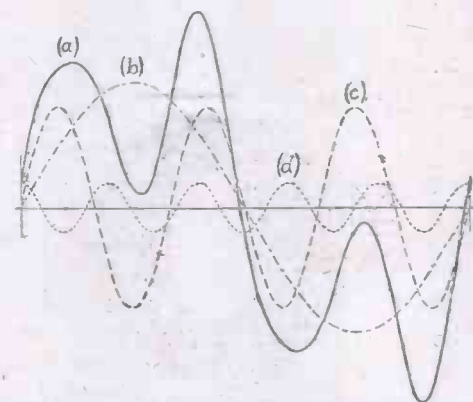


Fig. 5.—Resultant of Three Simple Sine Waves.

diaphragm A. The variations in the resistance of the microphone follow approximately the changes of air pressure; thus the sound waves are converted into waves of electric current. These current

circuits, the variations of resistance of the microphone would be only a very small percentage of the total resistance of a long telephone circuit. For all circuits except short local circuits in buildings a transformer is used, as shown in Fig. 2, so as to get a fairly large voltage variation on the line. The primary consists of



Fig. 3.—Two-way Telephone Circuit.

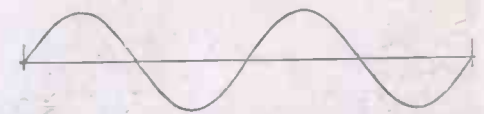


Fig. 4.—Simple Line Curve.

a few turns of wire, the resistance being usually about 1 ohm. The secondary consists of a much larger number of turns, and is usually about 20 ohms. The receiver is also wound to a higher resistance, the usual value being 120 ohms. The connections are shown in Fig. 3.

The Form of Sound Waves

The wave-form of a pure musical note is a simple periodic curve, the sine curve so familiar to the wireless experimenter, as in Fig. 4, where two complete cycles are shown. The number of cycles per second determines the pitch of the note, the greater the number the higher the pitch. The volume of sound is determined by the amplitude, that is, the height of the wave-crest. The vowel sounds are made up of sine waves of different frequencies and different amplitudes. For instance, the full line curve *a* in Fig. 5 is made up by adding together the ordinates of three simple periodic curves *b*, *c* and *d*, and might represent a vowel sound. Although this curve is very



Fig. 6.—Parallel Telephone and Telegraph Circuits.

the writer of this article to put before the readers of AMATEUR WIRELESS the principles of the simplest form of carrier telephone circuit.

The Principles of Telephony

Before the principles involved in carrier telephony can be considered it is necessary to understand something of the principles of ordinary telephony.

When anyone speaks, sound waves are set up in the air, and in the ordinary way

waves travel along the wires to the receiver, varying the pull on the diaphragm C and causing this diaphragm to vibrate. These vibrations follow very nearly the vibrations of the diaphragm A, and in turn set up vibrations of the air. The current waves are thus again converted into sound waves, which affect the ear just the same as though the sounds were heard direct.

Although the arrangement shown in Fig. 1 is satisfactory for very short cir-

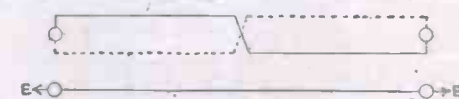


Fig. 7.—Cross Telephone Circuit.



Fig. 8.—“Revolved” Telephone Circuit.

irregular, it will be repeated at regular intervals so long as the particular sound is maintained. The quality of the sound is mainly dependent upon the relative amplitudes of the different harmonics, but it is generally held that the quality is also dependent to some extent on the phase difference. Consonantal sounds are simply modulations at the beginning or end of vowel sounds.

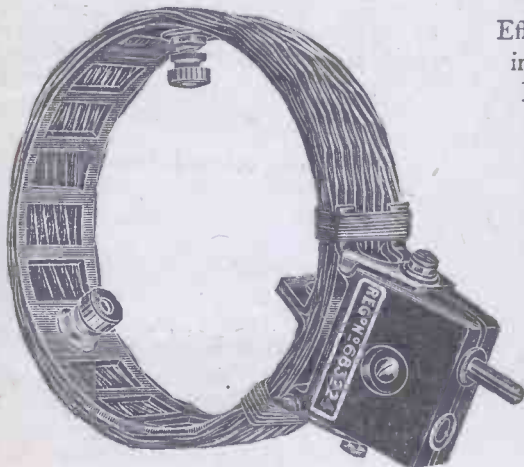
Generally speaking, frequencies below

(Continued on page 322)



A trio of IGRANIC components that make for perfect reception

Efficiency has always been our watchword in the design and construction of IGRANIC components. Those illustrated on this page will give perfect service and perfect results—because each is perfect in every part.



UNITUNE (Regd.) APERIODIC FIXED COUPLER

(De Forest Patent No. 141,344.) (Other patents pending).

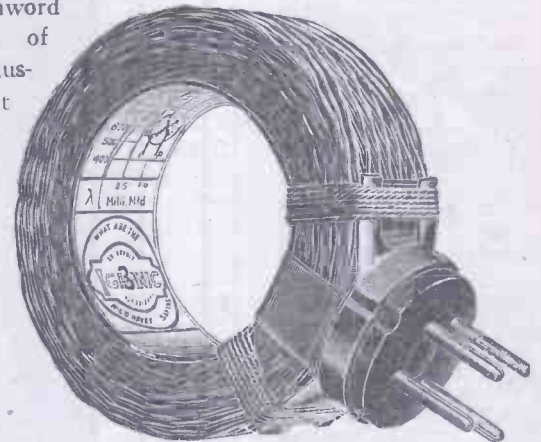
Ensures perfect reception on short wavelengths of 80 to 180 metres, and 300 to 600 metres.

The UNITUNE Aperiodic Fixed Coupler may be used in any receiving set employing standard coil holders without any alteration to internal wiring. You simply plug the Unitune Coupler into the A.T.I. socket, and, removing the aerial lead from the set, connect it to the top inside terminal of the coupler. The lower terminal should be connected to the "earth" terminal on the set and to earth.

Excellent results are easily obtained by using this coupler, and the difficulties usually encountered in short-wave reception are entirely eliminated. This form of coupling combines many of the advantages of both direct and loose coupling without their attendant disadvantages.

Both coils are of the Honeycomb Duolateral form of winding, giving maximum efficiency and possessing a minimum of self-capacity. The aerial coil is aperiodic, or untuned, and is responsive to all wavelengths within certain limits. The secondary winding is calibrated for various wavelengths with given values of capacity in shunt. These wavelengths remain constant, no matter what size of aerial is employed.

Type	Wavelength Range	Price
Unitune Minor	80-180 metres	7/6
Unitune Major	300-600 "	9-



HONEYCOMB HIGH-FREQUENCY TRANSFORMERS

(De Forest Patent No. 141,344.) (Other patents pending).

For perfect high-frequency coupling use these extremely efficient transformers.

They provide for a maximum transference of energy without distortion. The Honeycomb Duolateral method of winding in both primary and secondary coils results in a highly inductive coupling and small self-capacity between the windings. Easy to use, stable in operation, they reduce considerably the tendency of a receiver to burst into self-oscillation.

A four-pin plug is fitted for mounting purposes for use with any standard type of valve-holder. These plugs are secured to the transformers in such a manner as to give an angular setting of the coils when the valve-holders are mounted with their grid and anode sockets in a vertical line, thus reducing to a minimum any possible mutual coupling between two or more transformers.

Igranic Honeycomb H.F. Transformers should be tuned by means of a .0005 mfd. variable condenser across the secondary windings, and give the wave-lengths stated below, although a .001 mfd. condenser may be employed with No. 4 Transformer, adding considerably to the range given, without any appreciable decline of efficiency.

Two of these Transformers may be tuned by means of a double variable condenser of conventional pattern.

No.	Wavelengths obtainable when Shunted by .0005 mfd. Variable Condenser.	Secondary	Price
1	250-500 metres	...	8/-
2	450-880 "	...	9/6
3	800-1700 "	...	11/-
4	1500-3100 "	...	12/6



HONEYCOMB INDUCTANCE COILS

(De Forest Patent No. 141,344.)

For perfect reception on any wavelength from 100 to 25,000 metres.

Use the coil that gives maximum inductance when using the smallest possible condenser. Other coils may appear to possess a slightly larger wavelength than the Igranic Honeycomb type, but you will find that in almost every case a large condenser is employed. The first principle of efficient tuning is to use as much inductance with as little capacity as possible. That is why you should always specify Igranic Coils. Obtainable in 20 sizes, with plug-in or gimbal mounting.

Prices from 5/- to 15/- each.



GLASGOW 50, Wellington Street.
 MANCHESTER 30, Cross Street.
 BIRMINGHAM 73-74, Exchange Buildings

BRADFORD 18, Woodview Terrace, Manningham.
 NEWCASTLE 90, Pilgrim Street.
 CARDIFF "Western Mail" Chambers.

149, Queen Victoria Street, London. Works: BEDFORD.

"WIRED WIRELESS" (continued from page 320)
 10,000 cycles per second are audible, those above 10,000 being inaudible. Speech waves consist chiefly of combinations of simple periodic curves between about 200 and 2,000 cycles per second.

The Telephone Line

For the purpose of this article open lines only will be considered. These usually consist of copper wires attached to insulators spaced about a foot apart. The poles are spaced at different distances according to circumstances, the average being somewhere about 60 yd., or about 30 spans to a mile.

If the telephone lines run parallel to telegraph lines or other telephone circuits, it is necessary to either "cross" or "revolve" the telephone lines to avoid interference due to induction. The consideration of a very simple case will illustrate this.

In Fig. 6 is shown a telephone circuit running parallel to a telegraph circuit. At each make-and-break of the telegraph sending key currents will be induced in both the A line and the B line of the telephone circuit. These induced currents will be in the same direction in each line, but owing to the difference in the distance from the wire carrying the telegraph circuit the currents induced in the B line will be greater than those induced in the A line. Consequently when telegraphic

messages are being sent, induced currents will flow through the telephones and clicks will be heard in the receiver.

If the telephone circuit is a short one, a cross can be inserted in the centre as shown in Fig. 7. In this case the A and B lines will be at the same time average distance from the telegraph line, and the currents induced in the two lines will be equal and opposite. As the length of the circuit is increased the number of crosses will also have to be increased.

In this country the system of "revolving" or "twisting" is favoured. This will be understood by referring to Fig. 8. The circuit makes a complete revolution in four spans, and is, of course, repeated every four spans. This ensures that the two lines are at the same average distance from a straight line on the same poles throughout the entire length. The lines will not, however, be at the same average distance from other revolved lines on the same poles, and crosses have also to be inserted to remedy this. H. H. DYER.

(To be continued)

Prof. Peck, of the United States, has calculated that the voltage of an electric spark is 450,000 per metre of length. A spark large enough to leap from the clouds to the ground would require about 100,000,000 volts.

B.B.C. GARDEN PARTY

5 WA (the Cardiff broadcasting station) is giving a garden party to its hitherto invisible audience on Saturday, September 13, in the Sophia Gardens, Cardiff. The affair is to be made a true carnival of fairyland by a sprinkling of imagination on the wings of wireless. The whole programme will be given in the open air instead of in the usual studio, and the public will have an opportunity of watching broadcasting in progress. The famous "Besses o' th' Barn" band and 5 WA's orchestra will play to the guests during the afternoon and evening, John Henry, under the watchful eye of "Blossom," is to be let loose to show the folk just how it's done, and the whole of the station staff will be in attendance.

"Wafting" will commence at 2.15 p.m. with the opening ceremony by the Fairy Queen, followed by the dance of the nymphs, fancy dress competitions, folk plays, Grand Guignol, John Henry, banjo duettists, syncopated singers and other attractions until 10 p.m.

The entire profits from the party, which has been organised in conjunction with the Cardiff and South Wales Wireless Society, are to be devoted to the Cardiff Royal Infirmary for the furtherance of the violet-ray treatment.

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

AMATEUR WIRELESS HANDBOOKS

Each **1/6** Net

*A Useful Series for Wireless Amateurs
 Each Book being well Illustrated
 and thoroughly Practical.*

Each **1/6** Net

Wireless Telephony Explained

CONTENTS: The Electron; Induction and Electromagnetism; Waves and How They Travel; Inductance and Capacity; Rectification; Amplification; Reaction and Beat Reception; Aerials and Earths; Transmitting Systems; Receiving Sets; Useful Formulæ and Data; Index.

Crystal Receiving Sets

and How to Make Them

CONTENTS: A Simple and Efficient Receiving Set; A Single-slider Set; Set with Semicircular Tuner; Crystal Set with Tapped Single Coil; A Loose-coupled Set; Set with Plug-in Basket Coils; Combined Crystal and Valve Receiver; Some Miniature Receiving Sets; Crystal Circuits; How Crystals Work; Making a Buzzer; Receiving C.W. Signals on a Crystal Set; Converting Low-resistance Phones; The Morse Code; Index.

Simple Valve Receiving Sets

and How to Make Them

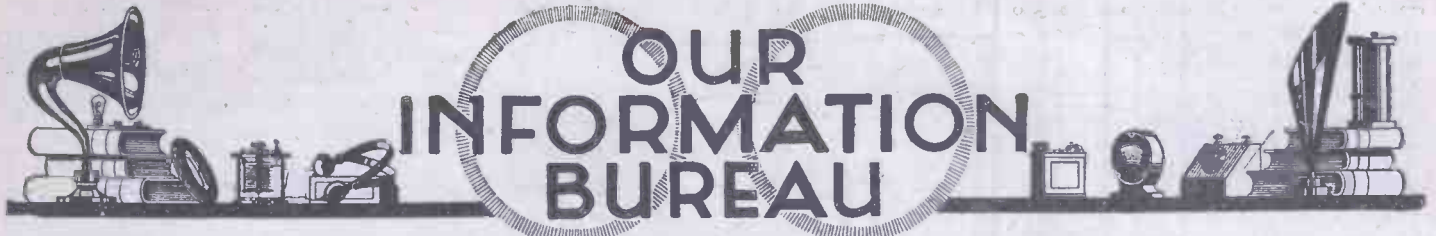
CONTENTS: A Single-valve Set with Basket-coil Tuner; A Single-valve Set with Slide Inductance; A Single-valve Autodyne Receiving Set; One-valve Variometer Set; A Portable Single-valve Set; Adding a Valve; A Two-valve Set; A Three-valve Amplifying and Detecting Unit; The "Amateur Wireless" Unit Set; An Improved Unit Set; Index.

Wireless Component Parts

and How to Make Them

CONTENTS: Components and Their Varied Purposes; Crystal Detectors; Coils, Making and Mounting; Condensers; Variometers and Vario-couplers; Resistances or Rheostats; Transformers; Making a Test Buzzer; Index.

CASELL'S, PUBLISHERS, LONDON



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. 335).

Crystals in Reflex Circuits

Q.—I have been trying several valve-crystal reflex circuits lately and cannot get as good results from them as from a straight valve-crystal circuit. Is there any particular crystal that should be used?—G. A. H. (Farnborough).

A.—For extreme sensitivity there is nothing to beat a galena crystal when used in conjunction with a fine copper catwhisker. Crystals marketed under various names ending in "ite" are, in the majority, galena. The old-fashioned perikon combination, although not quite so sensitive, is extremely stable and constant in action. The effective normal range of your circuit would be from 75 to 100 miles.—D.C.R.

H.T. from D.C. Mains

Q.—(1) How can I use D.C. mains to supply H.T. to my 3-valve receiver? (2) Would it be possible to vary the H.T. so supplied?—H. E. L. M. (Douglas).

A.—(1) H.T. may be obtained from D.C. mains by bridging the leads with two lamps of the supply voltage, connected in series. The necessary smoothing chokes and condensers should be joined to one of the mains and the junction between the lamps. (2) Interchanging various lamps will give different H.T. voltages.—D. C. R.

"The Loudest Crystal Set Yet"

Q.—I have started making the crystal set described in "A.W." No. 115, but there are one or two points about which I am not quite clear. (1) What are the connecting clips for? (2) How many turns of wire on outer coil and inner coil? (3) What is the method of tuning? (4) What type of aerial is that "previously referred to"?—E. C. R. (Glasgow).

A.—(1) The connecting clips are used for connecting the outer coil to the inner coil. Ordinary metal tie-clips may be used and these, of course, can be obtained from any draper. (2) There are 32 turns of wire on the outer coil and 28 on the inner coil. (3) Tuning is accomplished by varying the position of the inner coil in respect to the outer coil, just as in the case of the variometer. When the inner coil is pushed right inside the outer coil the mutual induction of the two coils is at a maximum. The effect of this mutual induction is to increase the self-inductance of the system and thus the wavelength to which the whole oscillatory system will respond is at a maximum. Similarly when the inner coil is right out of the outer coil the wavelength of the system is at a minimum. (4) The set described is suitable for a standard P.M.G. aerial.—D. C. R.

Capacities of Condensers

Q.—Please give the total number of copper-foil plates required, and their dimensions, to make fixed condensers of the following capacities: .0002, .0003, .001 and .002 microfarads. The dielectric to be used is mica, .002 in. thick.—A. B. (Clapham).

A.—For the .0002-microfarad condenser use 2 plates having an overlap of 2 cm. by 1 cm. Two plates 3 cm. by 1 cm. overlap will be required for the .0003 microfarad condenser. Six plates each will be necessary for the remaining condensers measuring 2 cm. by 1 cm. for .001 microfarad and 4 cm. by 1 cm. for .002 microfarad.—H. R.

"Crystal Set from Bought Components"

Q.—I find great difficulty in obtaining the parts for the construction of the "Crystal Set from Bought Components," described in the issue of July 5. Could you help me concerning this, giving the value of the blocking condenser?—J. B. (Crewe).

A.—No difficulty should be experienced in obtaining the variometer described in the article in question as it is a standard type and may be purchased at most electrical dealers in large towns. The one used in the writer's set was obtained from the Pewco Electric Co., 38, The Broadway, Tottenham Lane, Crouch End, London, N. A .002 blocking condenser will be found suitable.—A. H.

Charging Dynamo

Q.—I have in my possession an 8-slot laminated drum armature, 2 in. in diameter and 2 in. long. The commutator measures 1 1/4 in. in diameter by 3/4 in. length of brush face, and has eight segments. Please give dimensions of a suitable frame with necessary winding details. What speed will be necessary for an output of 5 amperes at 12 volts?—X. Y. Z. (Bolton).

A.—The overall dimensions of a suitable frame are as follows: 4 1/2 in. high, 6 in. wide, and 2 in. deep, the rectangular ironclad type being recommended. Other dimensions are: Yoke section, 2 in. by 1/4 in.; pole-pieces, 2 in. by 1 1/2 in. section and 1 1/4 in. long; and winding space, 1 in. long, 7/8 in. deep. The armature tunnel should be 2.05 in. in diameter, leaving an air gap of 1/8 in. all round. For an output of 5 amperes at 12 volts a speed of 2,500 revolutions per minute will be necessary.

The armature should be wound with 5 oz. of No. 22 s.w.g., d.s.c. copper wire, and the fields with 2 lb. of No. 21 s.w.g. s.c.c. copper wire, connected in shunt with the armature. Carbon brushes of EG grade and of 3/8 in. by 3/8 in. section will be necessary.—H.

Turns on Tuning Coils

Q.—In a recent article on the reception of Continental broadcasting I saw a list giving the numbers of coils necessary to receive on certain wavelengths. I do not understand the exact significance of these numbers. Will coils of different makes but of the same number tune to the same wavelengths?—J. R. M. (Broadstairs).

A.—The numbers given to various coils represent the number of turns that they contain: thus a No. 25 coil contains twenty-five turns of wire, and a No. 150 coil contains 150 turns. Either basket or honeycomb coils containing approximately the numbers of turns given in the table referred to will tune to the wavelengths shown. Slight differences are counterbalanced by the use of a variable condenser for final tuning.—D.

Frame Aerial for 5 X X

Q.—Please supply winding details for a frame aerial to receive the new high-power station.—J. V. R. (Highbury).

A.—Wind 40 turns of No. 22 s.w.g. enamelled copper wire on a square frame, each side of which measures 2 ft. The turns should be spaced 1/2 in. apart and a .0005 microfarad variable condenser should be placed in parallel. The complete frame aerial should be capable of rotating, so that full use of its directional properties may be obtained.—R. D. C.

WIRELESS TERMS TRAVESTIED



RESISTANCE-COUPLED.



BECAUSE they are jealous of one another, it may be said without offence that all the provincial centres want to relay the London programmes. This may be a mistaken policy on their part, as relaying over long distances may be marred by interference of various kinds. It is suggested that very often the relay stations would be well advised to take the programmes of the nearest main stations.

Arrangements for broadcasting advertisements are being made by the Berlin station. At least British listeners are spared this!

Talks by Mr. E. Kay Robinson on "Butterflies" and by Mr. C. W. Saleeby on "Sunlight" will be simultaneously broadcast on September 13.

So great is the hold of wireless in America that it is estimated there are fifty million "fans."

A number of railway coaches and hotels on the Canadian National Railways have been equipped with receiving sets.

Oscillation was not so bad last month, state the B.B.C., except at Harrow, where a good deal of annoyance has been caused by some thoughtless people.

For the present there will be no charge made for the erection of aerials, says the secretary of the Liverpool Property Owners' Association.

After the Rev. John McNeil (broadcast from the Metropolitan Tabernacle) the B.B.C. received a letter asking that he should be put down permanently on the list of entertainers!

Experiments carried out in Spain are supposed to have shown that the sense of direction of carrier pigeons is affected by the proximity of aerials. They are said to falter and wander, but resume their direct flight when they pass out of the area of "influence."

Men at the Royal Marine Barracks are not permitted to install sets in their rooms. Facilities for listening-in are provided in the canteen and recreation rooms.

Some interference from the station at Newhaven, which works on a wavelength of about 300 metres, is inevitable to broadcast listeners in the neighbourhood, but this could be largely reduced by the use of more selective receivers.

Living at Karachi (India), a listener reports the reception of a B.B.C. station on about 370 metres; the music was clear and the voice distinct. The same listener also receives Chelmsford well.

With regard to the recent action against an "amateur" who used an unlicensed transmitter, the B.B.C. state that there is a bad offender in the Kensington district who has not yet been tracked down. He has been sending out slow Morse.

Durban (South Africa) is to have a municipal broadcasting station.

Wireless-equipped vans are being used in the Unionist campaign. Loud-speakers will enable audiences to listen-in between political speeches, whilst gramophones will be used when no broadcasting is taking place.

Although the transmitter will remain for the present in Corporation Street, it is likely that the offices and studio of the Sheffield station will be moved to larger premises.

The total number of receiving licences issued already exceeds 900,000, and it is expected that the million mark will be reached shortly.

(Continued on page 326)

Charge your own ACCUMULATORS at home — FREE

Cut out the continual weekly expense of having your accumulators re-charged. Eliminate the annoyance of being left with accumulators run down just when you want them most, and the trouble of carrying them to the nearest garage for re-charging.

Do away with all this NOW by charging your own accumulators at home, and absolutely without cost.

If you have a Direct Current supply of electricity of any voltage in your house, either for lighting or heating purposes, all you need to charge your own accumulators at home is the

ULINKIN

PATENT No. 212391

THE D.C. HOME CHARGER

which charges your batteries automatically whenever you have lights, radiators, electric irons or vacuum cleaners in use in any part of your house, without consuming any extra current, and therefore free of cost.

PRICE £2:2:0 CARR. FREE

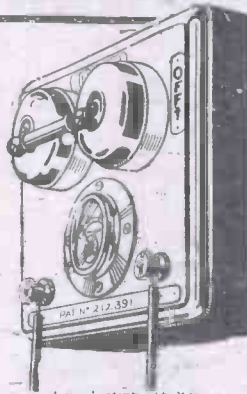
Complete with simple instructions.

Send 42/- for a ULINKIN To-day, or write for illustrated booklet and fuller particulars.

Trade Enquiries Invited.

The GRAN-GOLDMAN SERVICE,

(Dept. A2), 71, Fleet Street, London, E.C.4.



FOR DIRECT CURRENT ONLY.

An Electrical Engineer says:—"Please forward another of your 'Ulinkin' Chargers. The last one I installed gives every satisfaction. It has practically paid for itself already. A splendid little instrument."

AUTOMATIC IN ACTION

Requires no attention. Cannot go wrong.

BEST GOODS—LOWEST PRICES

We can supply all your WIRELESS NEEDS

This is the only house in London which supplies the Wonderful Crystal Set contained in a pair of Headphones. You get this Set with Aerial, Lead-in-tube, and Adapter for three pairs of extra phones for £2 2 0. Post 1/- extra.

POST FREE EXCEPT WHERE MARKED

S.P.D.T. Porcelain Switches.		FILAMENT RESISTANCES.		HEADPHONES.	
1/0	2/6	Igranite	each 4/6	N. & K. Pattern, 4,000 ohms.	pair 11/6
D.P.D.T. Porcelain Switches.	2/6, 3/-	Ormond	2/-	every pair guaranteed	13/6
S.P.D.T. Nickel Switches on Ebonite	2/6	T.C.B., 6, 13, 30 ohms.	4/-	Dr. Neper Adjustable	25/-
D.P.D.T. Nickel Switches on Ebonite	3/6	Microstat for D.E.R.	2/9	Brown's F Type	25/-
Electron Wire	1/8	French extra quality one hole fixing	2/-	Western Electric	25/-
7/22 Hard Drawn Copper	2/8	Special Line, well made	2/3	Sterling	25/-
Pulleys, cast	6d.	Igranite Pointometers	7/-	B.T.H.	25/-
Insulators, Egg	2d.	T.C.B. do.	5/-	B.T. BATTERIES. each	
Do. Reels	1d.	DUBILIER CONDENSERS (3/-)		B.B.C. 60-volt	11/6
Earth Wire	per yard 2d.	.001 to .005	2/6	Do. 35-volt	5/9
Earth Clips, fit any pipe	1/-	Grid Leaks, 1, 2, 3, 4, megs.	2/6	Do. 18.5-volt	2/9
EBONITE.		EDISON BELL	each 8d.	M.A.L. 60-volt	9/6
6 x 6	2/-	.002 to .006	2/-	4.5 B.B.C.	8d.
7 x 5	1/6	.001 to .0005	1/3	4.5 Other Makes	7d.
8 x 6	2/-	Other Makes	8d.	Shaw's Genuine Herizite	1/-
9 x 6	2/3	VALVES.		Gardiner Galite	1/-
10 x 8	3/6	Cosser, P.1 and P. 2	12/6	Middle	9d.
12 x 9	4/6	Mullard Ora	12/6	TRANSFORMERS. each	
12 x 12	6/-	Ediswan	12/6	Radio Instruments	25/-
18 x 8	6/-	Marconi R and R.5	12/6	Igranite Do. Shrouded	21/-
20 x 9	7/6	D.E.R.	21/-	Formo Do. do.	10/6
Brass Terminals with nut and Washer		D.E.3	30/-	The Energo Excellent value	12/6
Nickel do. do.	11d.	Thorpe K.4	17/6	ACCUMULATORS C.A.V. each	
Nickel Switch Arms, one hole fixing	1/3	Radion Valves	10/-	4 x 40	18/6
1 doz. Nickel Studs	1/-	(Consumption 1/2 ampere) Post 6d. extra.		4 x 60	21/-
Turned Ebonite Valve Holders	1/2	SOMETHING NEW IN LOUD SPEAKERS		4 x 80	24/6
Valve Sockets	1d.	THE MAGNORA, No Larger than a Wineglass, but Wonderful to Hear.		6 x 60	29/6
EBONITE COIL STANDS. each		No. 1 Model	22 2 0	6 x 80	35/6
Two Way	4/6, 5/6	No. 2 Do.	23 3 0	Enclosed Detectors, 1/6, 1/8, 2/3, 2/6.	
Three Way	5/6, 7/6	No. 3 Do.	23 4 0	Micrometer Detectors	2/9
Cam Vernier, Two Way, 9/6	9/6	Baby Sterling	22 15 0	Brass Honeycomb Formers, 23 spokes each side	4/-
Coil Plugs	9d., 1/-, 1/3	Amplion Junior	21 7 6	Spiders	1/-
				Crystal Set 12/6, 16/6, 18/6	21/-
				One Valve Amplifier	25/-
				Two Valve Set	23 10 0
				Three Do.	29 9 0
				Chelmsford Coils, with holder	3/3
				Basket Coils (7 in a set)	3/6

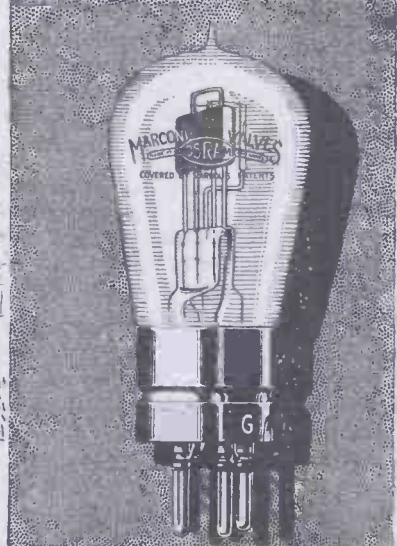
MAIL ORDERS DESPATCHED SAME DAY

NOTE NAME AND ADDRESS

T. WOOLLDRIE, Wireless Stores,

39, LISLE STREET, Leicester Square, London, W.C.2
Open Daily 9 a.m. to 8 p.m. (Phone Gerrard 7488). Sunday: 10-30 to 1-30.

MARCONI



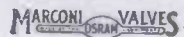
OSRAM



The Thoroughbred

Since family history has a direct bearing on individual performance, certain factors are wisely taken into consideration in the choice of a blood animal.

Analogous factors ought also to be borne in mind in your choice of a wireless valve. . . . *Look to its ancestry!*

Marconi and Osram—such is the pedigree of —the thoroughbreds of wireless valves.

Get the Valve in the Purple Box

MARCONI VALVES

MADE AT THE OSRAM LAMP WORKS

Sold by all Wireless and Electrical Dealers, Stores, etc.

ALL - BRITISH
RADIO
EXHIBITION
(Promoted by the
National Association of
Radio Manufacturers.)
ROYAL ALBERT
HALL
Sept. 27th to Oct. 8th.
THE
M.O. VALVE CO., Ltd.
STAND No. 21.

RADIOGRAMS (continued from page 324)

In the month following the opening of the Liverpool station 4,300 licences were issued.

A military band night will be given from 2 L O on September 12.

Although frequently used at dances, gramophones have a limited volume output, and it is suggested that valve amplifiers could be successfully used in conjunction with them.

John Henry's remarks broadcast whilst flying over London in an aeroplane were of interest to numerous listeners. The transmission was not so good as it might have been owing, it is understood, to the softening of a valve in the aeroplane's amplifier.

Newport (Mon.) Corporation Parks Committee are to install receiving apparatus in one of their parks.

In the little Lincolnshire town of Market Rasen wireless has almost entirely taken the place of the cinema orchestra.

The sudden stopping of musical transmissions from the Eiffel Tower and L'Ecole Supérieure des Postes and Télégraphes came as a blow to many listeners. It is understood that in future the stations will be used only for Government propaganda purposes.

Carolina Port is suggested as a suitable site for the Dundee relay station, which should open early in November.

In the Irish Free State the fee for a receiving licence is £1 a year—in return for which the Free States get British broadcasting!

Until the question of a permanent high-power station has been decided, the Post Office is permitting the Chelmsford experimental transmissions to continue.

Preparations for the Nottingham relay station have been proceeding apace, and the opening should take place on September 15. Items by the orchestra at the Scala Picture Theatre will be broadcast at least three times a week.

So valuable has the British system of direction-finding for aircraft become that it is to be extended to the airways covering Western Europe. In this service Great Britain, France, Belgium and Holland will co-operate.

During a journey from the City to Epping a wireless-equipped bus received the 2 L O concert with great success.

Answering continued complaints about the Edinburgh station, Captain Eckersley has stated that the B.B.C. will test for themselves whether with good apparatus it is possible to receive within a range of five miles on a crystal set.

An interesting experiment in the wireless control of an automatic sub-station was made last week, when a signal transmitted from Manchester set machinery in motion in the Palace of Engineering at Wembley.

In the Federal Parliament the Australian Labour Party have tried to overthrow the agreement for the erection of a beam station. So far they have not been successful.

Wireless has made great strides in Chili during the last two years. In Santiago there is a central broadcasting station, and it is estimated that up to the present 10,000 receiving sets have been sold throughout the country.

A ballot held in Wales shows that prospective listeners want Swansea (when it is opened) to relay the London programmes. Of 200 voters only four people want to hear Cardiff.

Lighthouses on the coast of Great Britain are to have transmitting apparatus installed so that they can better give warnings to ships. Four lightships have already been so fitted.

There has been a lot of talk lately about a permanent high-power station being situated in the Midlands. One important point has, however, been overlooked—an underground cable is only efficient for speech up to a distance of forty miles. If and when the permanent high-power station comes into being its studio will have to be in London, and it may be taken for granted that the B.B.C. would never risk using-overhead wires for relaying.

(Continued on page 328)

"SUCCESS" COMPONENTS

THE IMPORTANCE of AMPLIFICATION is not overlooked by the amateur—pure and undistorted reception with a volume phenomenal in power is achieved by using

THE NEW "SUPER-SUCCESS" L.F. TRANSFORMER This is not an expensive instrument but it embodies every feature contained by the most costly transformers and has many new ones of its own.

Test the primary impedance and then test the amplification ratio. The remarkably high value of both is a welcome surprise.

UNDOUBTEDLY THE TRANSFORMER FOR THE SCIENTIFIC AMATEUR WHO IS ABLE TO TEST AND APPRECIATE A TRULY EXTRAORDINARY ACHIEVEMENT.

HAVE YOU A POWER VALVE ?

The "SUPER-SUCCESS" will eliminate many of those little worries and troubles entailed in power amplification. 500 volts between windings, stout gauge wire and high primary impedance will give you confidence in your researches.

For first stage amplification in experimental work, reflex circuits or the super-set, here you have the opportunity of procuring a superlative transformer which will withstand any test.

For 1st STAGE and POWER USE THE

"SUPER-SUCCESS" (ALL BLACK) L.F. TRANSFORMER

Retail **21/-** each.

IS YOUR SET A "SUCCESS" ?

The wonderful clarity of tone and the amplification of the Standard "SUCCESS" L.F. Transformer needs no comment. The best instrument on the market for all-round use.

Retail **16/-** each.

"SUCCESS" (RATIO 10-1) L.F. Transformer

Retail **22/6** each.

Can you control your set for any station by the turn of a knob? **YOU CAN BY USING**

"SUCCESS" ANODE CAPACITY REACTANCE Retail **50/-** each

AND "SUCCESS" TUNER Retail **21/-** each.

All B.B.C. and Continental Stations.

CRYSTAL RECEPTION

The "SUCCESS" TUNER is the ideal for Amateurs who desire Chelmsford and all B.B.C. Stations on a Crystal Receiver. Eliminate loading coils or complicated coil changing.

BEARD & FITCH, Ltd.
WIRELESS COMPONENT MANUFACTURERS
34-36 Aylesbury Street, LONDON, E.C.1



Regd. No. 703507.

BRITISH MADE BY BRITISH LABOUR

"QUALITY AND LOW COST"



HEADPHONES

4,000 ohms.

12/6 per pair

POST FREE

Highly finished nickel earpieces (swivel action) strongly made with leather headbands, equal to the best on the market.

- | | |
|---|---|
| Terminals, assorted, 1/3 doz. | D.P.D.T. 2/- S.P.S.T. 1/3. D.P.S.T. 1/8. |
| Rheostats, 1'6 each | Switch arm (best) with 12 studs, nuts, and washers, 10d. each |
| Detector Parts complete on card 6d each | 100 ft. 7/22 Aerial Wire with four Insulators, 3/- each |
| Knife Switches on ebonite, 1/- " | |

Orders over 3/- Post Free.

Money returned if not satisfied in 3 days.

THE PRINCESS ELECTRICAL Co. Ltd.
(Dept. A1) 169 Princess St. MANCHESTER

ACCUMULATORS

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.

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

Special Line, Best English Make, 6v, 60 amp. hour, 22/9 each

MAUDE RUBBER CO., 58, Praed St., W.2.

MARVELLOUS EFFICIENCY
everywhere by use of the New Improved

CATSEYE

FIXED DETECTOR



PRICE **2/6**

Listen-in in comfort at once. No back-aching adjusting, no waiting. Order from your dealer, or send p.o. for 2/6 and 1 1/2d. stamp to: COMREX CO. (DEPT. 2), 119, FLEET ST., E.C.4

LOUD-SPEAKERS 8/-, 9/-, 10/6

120 ohms, 500 ohms and 8,000 ohms respectively, complete with Bialloy diaphragms and cord; fitted with flexible connection to fit any gramophone or horn. Guaranteed. Post 6d. See Rewinding advert. on page 88a.

JOHN W. MILLER.

MAKE YOUR SET 50% BETTER!

Send a Postcard for our Brochure which tells you how you can definitely increase the range and selectivity of any wireless set by fitting Bowyer-Lowe Square Law Condensers which have the highest capacity ratio and lowest edge effect losses of any yet made. Write now.

BOWYER-LOWE CO. LTD., LETCHWORTH

A BOOK BARGAIN

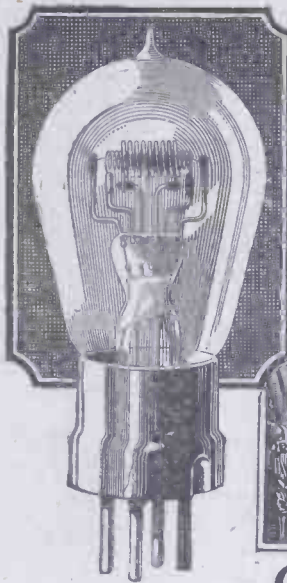
THE RADIO EXPERIMENTER'S HANDBOOK. By COURSEY. How to design your set to meet your own special requirements, and to plan the whole upon a sound scientific basis. Published 3/6, 1922. Offered, new, 1/9, post free. Mention offer 104.

FOYLES, 121, Charing Cross Road, London

HEADPHONES BY EASY PAYMENTS

"SENSIFONE" 4,000-ohm Double Headphones. The all-British 'Phone. Price 22/6 pair. Posted to your address upon receipt of 5/- deposit. Balance 5/- monthly. Money returned if not satisfied. Crystal Sets, Amplifiers, Valve Sets and Loud Speakers on similar terms.

Townsend's, Ltd., Ernest St., Birmingham



Louden



Columbus and the egg

Missing the obvious is a fault most of us are guilty of at some time or other and valve designers have proved no exception.

One of their chief aims has been to eliminate "mush," that roaring or hissing sound, which so often spoils what would otherwise be perfect reproduction.

It was found that "mush" was due to objectionable charges of electricity congregating near the anode and interfering with the electron stream.

All sorts of experiments were tried. Some increased the volume but at the expense of purity; others were free from distortion but still had "mush," and so on; and we seemed as far off as ever from our ideal valve, giving ample volume, no distortion and no "mush."

Then suddenly came the obvious solution. We simply made a way of escape for those objectionable charges—we made the anode like a spiral and immediately we got silver clear reproduction with plenty of volume.

It has been decided to put the Silver Clear Louden on the market at the extraordinarily low figure of 10/-. This represents a certain faith on our part. To justify it the Loudens must sell in enormous quantities.

But we cannot pretend to be taking much risk.

Once you have tried the Silver Clear Louden you will be satisfied with no other.

The Plain Louden for detecting and low Frequency amplifying.
Filament Volts 4.2-5.
Filament Amps. 0.4.
Anode Volts 40-80.

10/-

The Blue Louden for H.F. Amplification.
All Loudens are silver clear and free from "mush."
The current consumption is low and the life long.

Louden VALVES



Louden Valves - Silver Clear

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

E.P.S.1

Cossor



Wasted energy.

TO stand at the foot of a waterfall where thousands of tons of water come thundering down every hour—unchecked—is to realise that here is one of Nature's greatest gifts unused and unappreciated.

But the waterfall is not the only case of wasted energy—there is another just as serious in its way, although at first sight not quite so obvious. We refer to the ordinary Wireless Valve.

Every Valve makes use of the electron stream given off by the heated filament. This electron stream, flying off in every direction, is caught by the Grid and the Anode. Upon the strength of the emission and the proportion actually used the efficiency of the Valve depends.

In the ordinary Valve with the straight filament and tubular Anode, however, a very considerable proportion of the electron stream must leak away out of each end of the tube and strike the sides of the glass, only to be wasted.

In the Cossor Valve, on the other hand, the filament is almost entirely enclosed by the hood shaped Grid and Anode and none of the electron stream can escape. Obviously, this superior design prevents any wasted energy and is entirely responsible for high amplification without distortion, perfect long-distance reception, and a complete absence of microphonic noises.

See that your next Valve is a Cossor and obtain all these additional advantages at no extra cost.

P.1. (For
Detector and
L.F. use)

12/6



P.2. (with
Red. Top) for
H.F. use

12/6

A.C. COSSOR, Ltd., Highbury Grove, London, N.5.

Gilbert Ad. 1356.

RADIOGRAMS (continued from page 326)

That the recreational and educational value of broadcast programmes to some of the "high-grade" patients would justify the small financial outlay, was an argument used by the Board of Control in urging the Festiniog (Merionethshire) Guardians to install a receiver at the institution for mental defectives.

Mr. Jack Frost's yarns, which have been given from 2 L.O during the last year, are being published in book form in four or five parts. The first volume will appear about the middle of the month.

The Ancient Order of Druids have presented a four-valve set to St. James's Hospital, Balham.

The new Transcontinental and Transatlantic commercial station near Gothenburg, Sweden, is almost finished. The receiving station is, in fact, in operation.

Belgium is now going through the transitory period of readjustment in wireless legislation, in which the Postal Ministry is wavering between imposing absurd taxes on transmitting sets and not even granting licences for transmission.

A new broadcasting station near Copenhagen (Denmark) is soon to be opened. This station, under the Radio Club of Copenhagen, will start tests on wavelengths between 300 and 500 metres and also on 900 metres.

According to the *Journal Suisse d'Horlogerie* (Swiss clock-makers' journal), the first time signals sent out by wireless were in 1904 during tests between two Paris observatories. This was done by the French scientist, Bigourdan, president of the Academy of Sciences, using a Branly coherer.

The first aerial mast of the big station at Ruysselede, Belgium, has just been completed. It can be seen from a distance of nearly twenty miles.

In France an amateur can transmit at any time he wishes on wavelengths between 180 and 200 metres but is not allowed to work on anything below that until after midnight.

The most recent innovation in American broadcasting is that of a gigantic sham battle from WHAS (Louisville, Kentucky), working in conjunction with the U.S. Army Signal Corps. The 38th Division of the National Guard staged an attack under heavy cannon barrage, using machine-guns, rifles and hand-grenades. This is perhaps the first time that shots have been "heard around the world."

Another mystery transmitter has put in an appearance in France, this time talking in Italian. He is heard on about 392 metres, especially in the north of France.

STALLOY DIAPHRAGMS

Fitted with Nut for use with Skinderviken Button
1/- up to 2 1/2 in. 1/6 up to 4 in.

State size and whether aluminium or brass button when ordering
JOHN W. MILLER. (See preceding advert. on page 336)

Silvertown Intervalve Transformers

*Guaranteed
for 12 Months*

This transformer has been adopted by leading manufacturers of Wireless Receiving Sets and discriminating amateurs in all parts of the world.

High amplification without distortion and complete freedom from internal noises.

Correct design, high-class finish.

Excellent results have been obtained on tests carried out by the National Physical Laboratory. Copy of the curve can be had on application.

For more than 50 years we have been manufacturing electrical apparatus, a period of experience that guarantees consistently high quality in our wireless accessories. There can be no better assurance of reliability than the name "Silvertown."

Stocked by our Branches throughout the Country and by dealers in first-class Wireless Accessories.



B500

Price **21/-** each

OTHER SILVERTOWN WIRELESS ACCESSORIES

- Telephone Transformers
- Variable Condensers (all types)
- Telephone Headpieces
- Crystal Holders and Buzzers
- Fixed Mica Condensers
- Filament Rheostats
- Insulators, etc., etc.

**Makers:—THE SILVERTOWN COMPANY,
106, Cannon Street, London, E.C.4**

Works:—Silvertown, London, E.16.

HOME BRANCHES:—

BELFAST: 75, Ann Street.
 BIRMINGHAM: 15, Martineau Street.
 BRISTOL: 4, Victoria Street.
 CARDIFF: Pier Head Chambers, Bute
 Docks.
 DUBLIN: 15, St. Andrew Street.
 GLASGOW: 15, Royal Exchange Square.

LEEDS: 1, New York Road.
 LIVERPOOL: 54, Castle Street.
 LONDON: 100 & 102, Cannon Street.
 MANCHESTER: 16, John Dalton Street.
 NEWCASTLE-on-TYNE: 59, Westgate Road.
 PORTSMOUTH: 49, High Street.
 SHEFFIELD: 88/90, Queen Street.





5 XX and 2 LO

SIR,—On a crystal set I get 5XX very strongly here and also get 2LO very faintly, not loud enough to hurt 5XX's reception. I can hear 2LO on 1,760 metres when 5XX is silent. I can hear Radio-Paris on 1,760 metres only if 2LO is silent. When all is quiet I can hear Radio-Paris—very faintly, not quite loud enough to enjoy. I cannot get stations like Newcastle or Cardiff. Why is this? My crystal set is home-made.—A. W. B. (East Ham).

"An Interesting Field Day"

SIR,—With reference to the report in No. 116 of the field day held by the Golders Green and Hendon Radio Societies and during which my call-sign (2JB) was used, I should esteem it a favour if you would kindly draw readers' attention to the fact that the call-sign, 2JB, used by the Golders Green and Hendon Radio

Societies during the field day at Mill Hill was used by permission of Mr. John C. Bird, B.Sc., A.I.C., the owner and operator of the station allotted this call-sign. 2JB is normally situated at 72, Dyne Road, Brondesbury, London, N.W. The consent of the P.M.G. to the above was, of course, obtained.—J. C. B. (London, N.W.).

M.O. Valves

SIR,—In the article on bright-emitter valves in No. 117 there are one or two small errors which we trust you will allow us to point out.

The illustration on page 237 is that of the Q instead of the QX type. Also, in the paragraph "For the 6-volt man," you state that the original M.O. R valve was replaced by the R 5-volt, which might suggest that the 4-volt R is no longer on the market. In view of the continued popularity of the R type, we still supply the 4-volt R as well as the 5-volt valve.

Referring to page 244, we would point out that the LT₂ and LT₃ types mentioned in your list are no longer on the market, being superseded by the DE₃.—THE GENERAL ELECTRIC CO., LTD. (London).

Current for Valves

SIR,—In No. 117, under the heading "Components You Can Rely Upon," it is stated that "the Cossor P₂, however, needs more than four volts, and is therefore not suitable for the two-cell accumulator man."

I would state that I never had good results with my set until I plugged in a Cossor P₂ as H.F. amplifier, and now, with only 3½ volts on the filament (and I have never exceeded that amount), I receive all British broadcasting and several Continental stations regularly. I would also point out that the makers state that the working voltage is 3.7 to 4.

I can only suppose that your contributor has been working with an old and greedy valve.—G. E. B. (Wimbledon).

5 XX

SIR,—I have noticed lately a marked falling off of strength from 5XX. Recently I was able to tune-in Radio-Paris at about double the strength of 5XX, with scarcely any interference from the latter, this with the reaction coil wide open. When 5XX was

(Continued on page 332)

Straight from the Heart of Nature

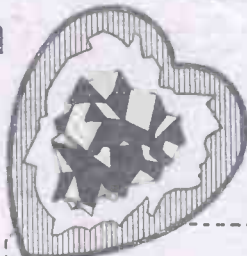
The magic of Wireless is made more wonderful by the introduction of a new crystal, "URALIUM" discovered in nature's wildest—the Ural Mountains.

Each crystal is tested and guaranteed, is consistently active, unaffected by atmosphere and gives perfect reception over the maximum range.

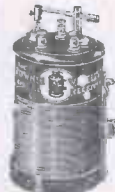
Uralium
NATURE'S WONDER CRYSTAL

Improve your Set and ensure perfect reception to-day by using "Uralium."

THE BOWER ELECTRIC LTD.
15, GRAPE ST., Shottesbury Avenue, W.C.2. Telephones Regent, 5182 and 5183



Obtainable in boxes including silver cat's whisker
1/3
of all dealers



7/6

Complete.
By Post
6d. extra.

It's surprising

that a crystal set so moderately priced should give such consistently good results. The latest model is even better than our early products—and these were favourably compared by Press and satisfied users to sets selling at twelve times the price. We want you to be a satisfied purchaser, that's why every outfit carries with it our Money-Back Guarantee.

THE J.W.B. WIRELESS Co.
310a/312a, EUSTON ROAD, N.W.1.

(Facing Warren St. Tube Station.) Telephone: Museum 3747.

A Money-Back Guarantee with Every Outfit

"CLEARTONE" VARIOMETERS

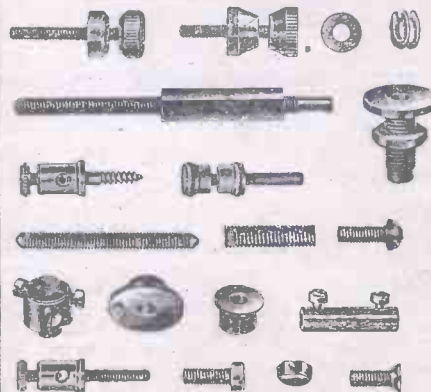
"Cleartone" Variometers are manufactured under a special process from Solid Ebonite which includes Stator, Ball-Rotor, Knob and Dial, and possesses a unique one-hole fixing which is perfectly rigid and cannot work loose. The winding is effected by patent machinery which keeps the wire to its position with no loose ends and only the best H.C. Enamelled Copper is used. Owing to its special construction the capacity effects are considerably reduced and an increase of signal strength equal to 50% is attained. PRICE, INCLUDING LOADING COIL—mounted on ebonite plug—to receive H.P. Broadcasting, 10/6 Post Free.

ALL "CLEARTONE" PARTS ARE GUARANTEED AND PATENTS FULLY PROTECTED. TRADE ENQUIRIES INVITED.

CLEARTONE MANUFACTURING CO.,
221, St. John Street, Clerkenwell, E.C.

Props.: F. H. Mills, H. J. Strickland.

TO THE TRADE



LONDON METAL WAREHOUSES Ltd.

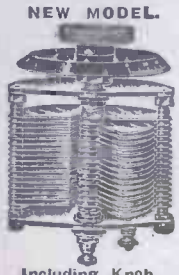
Brass Parts.
Aerial Wires.
D.C.C. and Enamelled Wires.
Write for Lists.

BRASS FOUNDRY,
Hill Street, 1
Blackfriars Rd., S.E.1

Telephones:
Hop 1913, 6196, 6658
Telegrams:
Stebraware, Sedist, London.

HULLO EVERYBODY!!

RAYMOND'S VARIABLE CONDENSERS



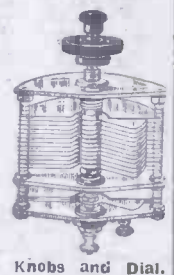
NEW MODEL	Cap.	Price	Height without connections.	ALL PARTS NICKELLED.
Nat. '001 ...	6/11	...	3 1/2 in.	One-hole Fixing
Phys. '00075 ...	5/11	...	2 3/4 in.	Narrowest Spacing.
Lab. '0005 ...	4/11	...	2 in.	Aluminium end plates.
Certificate for '00025 ...	4/6	...	1 3/4 in.	Accurate Capacity.
Guaranteed Capacity '0002 ...	4/-	...	1 1/2 in.	Constant Rigid Construction
'0001 ...	3/6	...	1 in.	Low Loss.
'00005 ...	2/6 (vernier)	...		Electrically and Mechanically Perfect.

Ebonite Dial 8d. extra
Post 6d. set.

NEW MODEL with 3 Plate Vernier at bottom. Specification as ordinary, but the Vernier allows absolutely the finest tuning possible. Very sharp and defined. They do not need varied long and technical words to recommend them. Satisfied users are the best recommendation. Assembled for panel mounting, and for a limited period. I will include FREE an EBONITE DIAL to retail customers only.

Height	Cap.	Price
4 in.001	8/11
2 3/4 in.0005	6/11
2 1/4 in.0003	6/6

POST 6d. PER SET. PLEASE. Complete with 2 Knobs and Dial.



POST FREE COLUMNS (except where marked)

GAUZE VALVE WINDOWS	VALVES.	LOUD SPEAKERS	ACCUMULATORS.
Double Phone Cords, 72 in. 1/11	Coasor P.1, P.2 12/6	27/6 Junior Amplion	Best Makes. Under My Own Label.
Porcelain S.P.D.T. Switch 1/11	Mullard Ora 12/6	42/- Junior de Luxe	4 v. 40 17/6
Battery Clips doz. 1/11	Ediswan 12/6	55/- Baby Sterling	4 v. 60 19/6
Ditto D.P.D.T. Switch 2/6	Marconi R. and R.5 12/6		4 v. 80 23/6
Ebonite Valve Holders Variometer 250/650 2/6	A.R.D.E. Ediswan 21/-		6 v. 60 28/6
Lead-in Wire 10 yds. 1/6	D.E.R. 21/-		6 v. 80 35/-
Twin Flex 12 yds. 1/11	D.E.3 30/-		Post 1/- each.
100 ft. 7/22 Aerial Wire with four insulators 3/9	All Valves stocked. Post 6d. each.		
Nugraving Titles ... 7 1/2 d.			
"R.I." Cheque Coll ... 10/-			
Watmel Var. Grid Leak 2/6			
Watmel Anode Resistance 3/6			
Nickel Panel Switches, D.P.D.T. 1/5			
Ditto, S.P.D.T. 1/2			
W.O. Pillar, large doz. 1/3			
Phone 4 B.A. ... doz. 1/1			
Phone 2 B.A. ... 6 for Med. Pillar 4 B.A. doz. 1/1			
Valve Sockets, plain 10d.			
Ditto with Shoulder 1/1			
(Above with Nut & Washer)			
Single Coil Plug on Stand 1/3			
Ditto Swivel 1/6			
Plug and Socket 6 pairs 10d.			
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CORRESPONDENCE (continued from page 330)
 testing as 2 BS it was, just the reverse, and the tuning was far sharper; there seems to have been a gradual flattening of the wavelength since then.

It is quite an easy matter to bring the carrier wave of Radio-Paris to such a state of oscillation that it produces the well-known canary noise, but I have the utmost difficulty in producing the same results with 5 XX.—A. J. W. (Bordon).

Aerial Efficiency

SIR,—I notice that you are repeating once again, in a recent issue of "A.W.," that old tale that an aerial supported 6 in. above the roof of a building is only equivalent to one placed 6 in. above the ground. Is it? I do not believe there is any truth in this statement at all, and I challenge you to erect an aerial 6 in. above the surface of the ground and listen-in on any crystal set connected to it, and then to do the same with an aerial erected 6 in. above an ordinary roof and see if you still maintain your statement.

If the capacity effect of a building is so great, how is it that inside aerials erected in the loft of a house, immediately under the roof, give such excellent results?

I have erected a good many aerials, both over roof tops and above open ground, and I have not yet found any difference caused by the building. In my experience an aerial erected 5 ft. above the roof of

a 30-ft. building will give as good results in reception as an aerial (of the same length) erected between poles 35 ft. high. Of course I exclude any great mass of metal—I should not expect to get good results a few feet above a gasometer, for instance—but above ordinary buildings I find no difference.—B. H. R. (Sale).

What was it?

SIR,—While listening-in on August 25 between 3 and 3.30 a.m. I heard what I took to be an American broadcast station on a wavelength of 400 metres. The item was an orchestral piece—Liszt's "Hungarian Rhapsody"—after which the title was announced. On the 26th, about 2.40 to 3 a.m., I heard another station; the items were two soprano songs, "Home, Sweet Home," followed by "Somewhere a Voice is Calling"; wavelength between 300 and 350 metres. If any of your readers were listening-in about those times perhaps they may be able to help me to identify these transmissions.—S. W. W. (Bebside).

Other Correspondence Summarised

E. R. (Binegar, nr. Bath) wishes to make it clear that the cleaning process for diaphragms, for use with the AMATEUR WIRELESS crystal loud-speaker, which he advocated on page 256 of No. 117, was merely for the preparation of the diaphragm previous to soldering a nut thereto.

"An Amateurs' Four - pole Electric Motor" is the title of an illustrated article appearing in the current issue of "Work" (3d.); it describes how to make a motor for which no castings are required. Other articles appearing in this issue are: "Twisted or Spiral Candlesticks," "Faults in Castings," "Building a Span-roof Greenhouse," "Securing Yard Gates," "Emery Sticks: Hints on Making and Using," "A Master Pendulum for Electric Clocks," "Side Screens for Motor-cars," "Bleaching and Waxing Ironwork," "Making Oval Tables," "A Home-made Bell Indicator," and "Two Metalworking Kinks."

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LEARNING by wireless, the newest form of education, will be tried seriously for the first time with the opening of the new school year. It will be the dawn of a new era in school life, and the introduction of the wireless loud-speaker as an aid to the teacher will be watched with the greatest interest.

The Board of Education have lent Mr. J. C. Stobart, one of the leading educational experts in this country, and he will have sole charge of the broadcasting of all lectures.

The school programme will begin on October 1. It will consist of half-an-hour's wireless lesson each day, from 3.15 p.m. to 3.45 p.m., and will be intended for children between the ages of twelve and fifteen. One of the vital things in education is to maintain a child's interest, and as in the past it has been proved that children need to see as well as to hear to learn, it has been decided to split the half-hour into two portions with a few minutes' music between, so that no child will be too bored to listen.

The lessons will be broadcast from London first of all, though each of the sixteen stations will make special arrangements. The wireless sets to receive the lessons have in some cases been made by the boys and girls themselves in the school workshops. The

number of school that will receive the lessons is not yet known, but schools in such distant towns as King's Lynn, Margate, Brighton, Eastbourne and Bristol are included. When the new Chelmsford station has perfected its arrangements no school throughout the whole country need be without its daily wireless lesson by the greatest teachers in the world.

W. M. C.

CATALOGUES

PARTICULARS of the Ethophone V (Mark IV) are given in publication No. 244, which may be obtained post free from Burndept, Ltd., of Aldine House, Bedford Street, Strand, W.C.2.

A new edition of "Honeycomb Duolateral Inductance Coils" has been received from the Igranic Electric Co., Ltd., of 149, Queen Victoria Street, E.C. It contains useful wavelength and tuning tables.

"Trix" components are described and illustrated in leaflets received from Mr. Eric J. Lever, of 33, Clerkenwell Green, E.C.1.

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LIQUID-FILLED VALVE

THE idea, proposed a year or more ago, of a detector valve filled with colloidal liquid has been revived by a recent German invention in which the "valve" contains a solution of the iron salt of gallic acid. This material is said to be the same as the compound formerly used in the old-fashioned black inks made of iron and oak gall.

The solution of iron and gallic acid is actually a colloidal solution, which means that it contains innumerable tiny particles finer than the smallest specks of dust. These particles are said to carry the currents through the valve just as the electrons do in the ordinary vacuum valve.

The valve contains three electrodes, corresponding to the filament, the grid and the anode. It is unnecessary, however, for the filament electrode of the new tube to be heated to serve as a source of electrons. No filament battery is needed, although the H.T. battery is used, as in ordinary valves.

It is said that the new solution of iron and gallic acid is a great improvement over the colloidal solutions used in previous liquid-filled valves, which solutions were mainly either silver or sulphur. German experimenters are reported as enthusiastic over the new detectors, it being claimed that they are especially efficient for the reception of local stations. W. H.

This new 84-strand aerial costs 9/6 and is worth every penny of it, whether you are beginner or expert

50% increase over 7/22s (regular-type aerial wire) both for reception and transmission.

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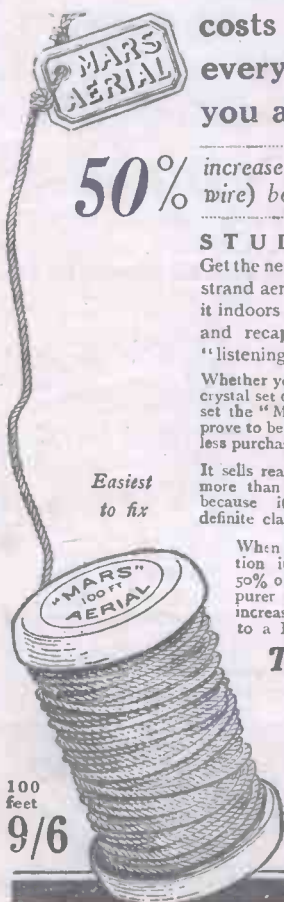
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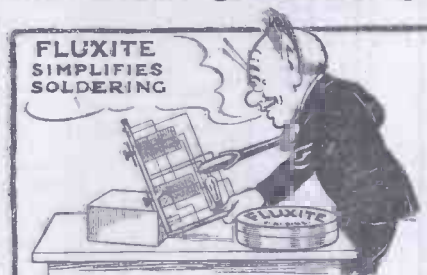
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CLUB DOINGS

Woking and District Radio Society

Hon. Sec.—Miss A. G. M. BRODERICK, Goldsworth School House, Woking.

A WIRELESS society was formed in Woking in April last, and from appearances at present should be a great success. There are a considerable number of people in the district who are interested in wireless, and the society seems to be very welcome to many. At the initial meeting over sixty people signified their wish to join the society.

The new season commences in September with the general meeting on September 18, at 7.30 p.m. On this occasion, at 8 p.m., a lecture will be given by Mr. F. W. Bishop, Assistant Chief Engineer to the British Broadcasting Company. Mr. Bishop will speak on the B.B.C., what it has done, what it hopes to do, and troubles that it has encountered.

The society will meet on the first and third Thursdays in each month, from October onwards.

Capt. E. H. Robinson (SYM), an author and lecturer on wireless matters, has kindly undertaken to give a course of six elementary progressive lectures on "The Theory and Practice of Wireless Transmission and Reception." These meetings will be of great value to novices in wireless work.

Any readers of "Amateur Wireless" who wish to join the society should send their names to the secretary. The subscription for the season is seven-and-sixpence, with an entrance fee of half-a-crown.

Lewisham and Gatford Radio Society

Hon. Sec.—MR. TYNAN, 62, Ringstead Road, Catford.

A MEETING of the above society was held on August 25, Mr. Tynan being in the chair. In the absence of a lecturer a novel competition was organised by one of the members. An attractive programme for the coming winter has been arranged, and new members will be cordially welcomed at 136, Bromley Road, Catford. Those desirous of becoming members should communicate with the secretary.

ANNOUNCEMENTS

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

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

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

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

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

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All standard types of valves at **6/6** carriage paid AND

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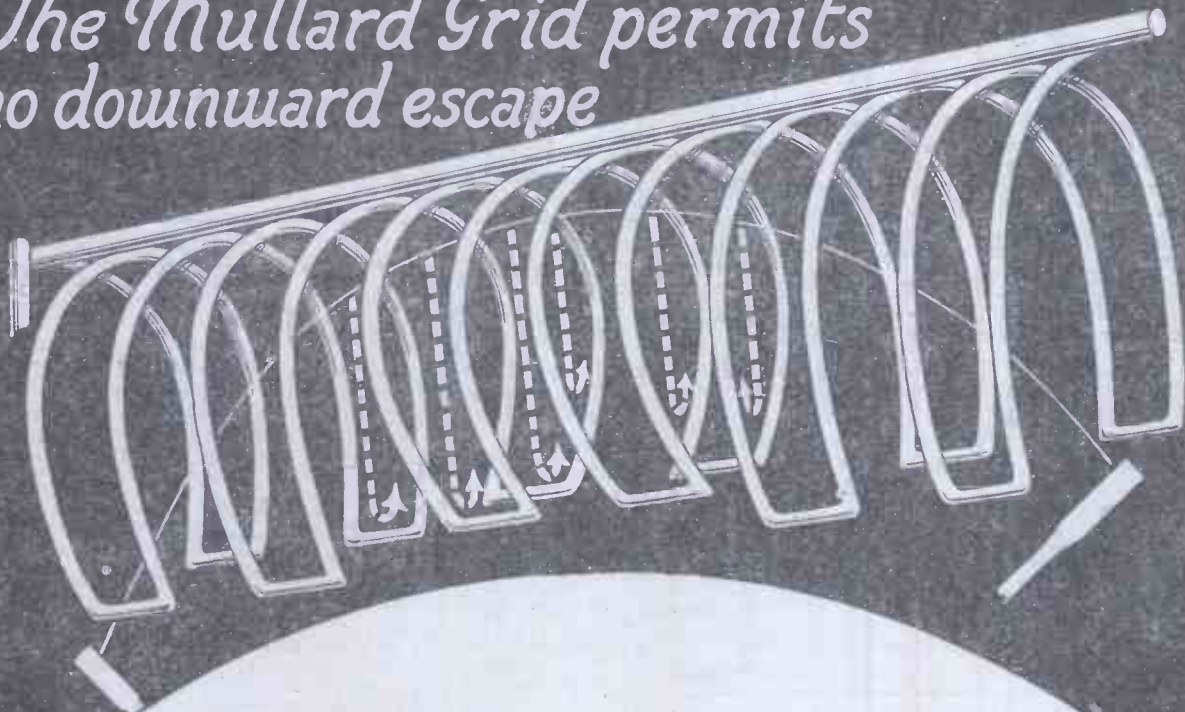
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Parts that pull together

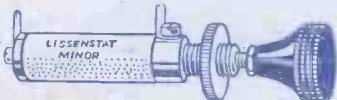
Sharply tuned Concerts from far away

Your valve can detect with extraordinary power—if properly controlled. An ordinary rheostat is quite inadequate for delicate tuning.

Only by accurate control of critical electron emission can success in distant telephony be achieved.

Fit Lissenstat Control—it will remove the handicap under which you have laboured. The first time you use it, it will seem a revelation.

Takes only a minute to fit—and all who value the importance of fine detection are fitting it.



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Specially introduced to give Lissenstat Control at a popular price. Is replacing thousands of inefficient rheostats 3/6

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Get more out of the valve by using unique control.

Is your leak resistance right?



With the Lissen Variable Grid Leak fitted a receiver is equipped to yield the utmost

sensitivity which correct grid potential under all conditions implies.

LISSEN One-hole fixing, of course, positive stops both ways 2/6

LISSEN Variable Anode Resistance, 20,000 to ohms, same outward appearance as the Lissen

Variable Grid Leak 2/6

Delivers all its stored up energy—

When a coupling condenser is leaky it makes the grid of the valve highly positive, due to the leaking of the H.T. Battery through the condenser to the grid, so eluding the purpose of the condenser which is to stop this voltage getting on to the grid.

Use LISSEN Fixed Condensers—made with scrupulous care—ACCURATE TO 6%—THEY NEVER LEAK—THEY NEVER VARY—THEY DELIVER ALL THEIR STORED UP ENERGY—ALL THE TIME.

Capacities .0001 to .0009 2/=

.001 to .003 2/6

.004 to .006 3/=

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LISSEN LINES—ready for delivery:

LISSEN L.F. Choke 10/0

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LISSEN LINES—nearly ready:

LISSEN Crystal Set, will sell for under

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DON'T MIX YOUR PARTS. A Receiver built with all LISSEN parts will give results which could never be obtained with mixed parts. USE A LISSEN PART WHEREVER YOU CAN.

With ordinary parts in your receiver, the first time you use the set you get the best results you will ever get.

When you buy LISSEN parts you have parts that you can put together knowing that your reception even first of all will be better than is possible with ordinary parts, but there is this difference too—the Receiver will yield continually improving results as your own skill improves—for there is a reserve of power in each essential part which outward appearance gives no indication of.

Are you using Radio Frequency Amplification?

Every set can be made much more powerful by fitting LISSEN Radio Frequency Amplification. Wave energy can be built up so that distant telephony is picked up with a certainty which was quite lacking—signals that may be deflected by “dead spots” are also built up so that any shielding effect is largely negated.

There are Three types of Lissen Radio Frequency parts—

LISSEN H.F. TRANSFORMER

There are some dual and reflex circuits where transformer coupling of H.F. valves is essential. Even where it is not essential, however, the LISSEN H.F. Transformer is very popular. It makes a receiver exceedingly sensitive, and is very stable—as many stages of H.F. as desired can be used. Blue print with each shows 19/6 easy connections. Range 150—4,000 metres 19/6

LISSEN ONE-HOLE FIXING, OF COURSE.

LISSEN REACTANCE

In addition to adding sensitivity, this will actually amplify even loud signals to a great degree. It differs from the LISSEN H.F. Transformer in that, although simple to use up to two stages, beyond this number it calls for some skill. It is a very widely used coupling. Should be introduced into the anode circuit. Blue print with each shows easy connections. Range 150—10,000 metres 19/6

LISSEN ONE-HOLE FIXING, OF COURSE.

LISSEN REGENERATIVE REACTANCE

This is an unequalled first stage Radio Frequency Amplifier. It provides fully variable reaction. It should be used in the anode circuit of the first valve—it takes the place of aerial reaction, or can be used with it—it is non-radiating—replaces plug-in coils—is lower in cost than a set of coils to cover the same wide range—easier to handle, one knob controls tuning and reaction—reception is often possible with both aerial and earth connections dispensed with—cuts out any nearby station, and tunes-in the others with full built-up strength—effective on both high and low wavelengths—unbroken regeneration over the whole range, 150—4,000 metres.



£2 12 6

Tune always with a Vernier, preferably use the LISSEN Vernier, which is specially designed for fine tuning in H.F. circuits. Price 12/6

NOTE.—LISSEN H.F. Transformer and LISSEN Reactance are self-tuned, but the aid of a Vernier is recommended and will oftentimes be found an advantage (the LISSEN Vernier is preferable).

All LISSEN Radio Frequency parts are complete with internally connected switch, so that drilling and soldering are avoided, and fitting is a matter of great ease.

LISSEN LIMITED,

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Telephones: 3380, 3381, 3382, 1072 Hammersmith.

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