

GET NEXT WEEK'S "FREE GIFT" ISSUE

FOUR-ELECTRODE ONE-VALVER

Amateur Wireless

And Electrics

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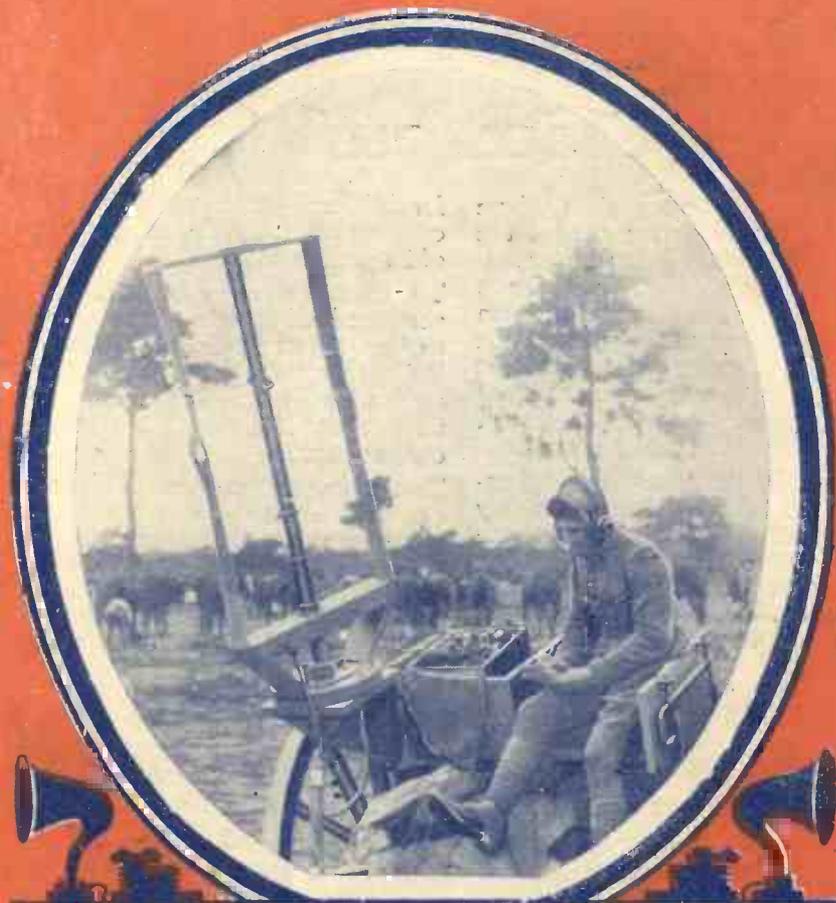
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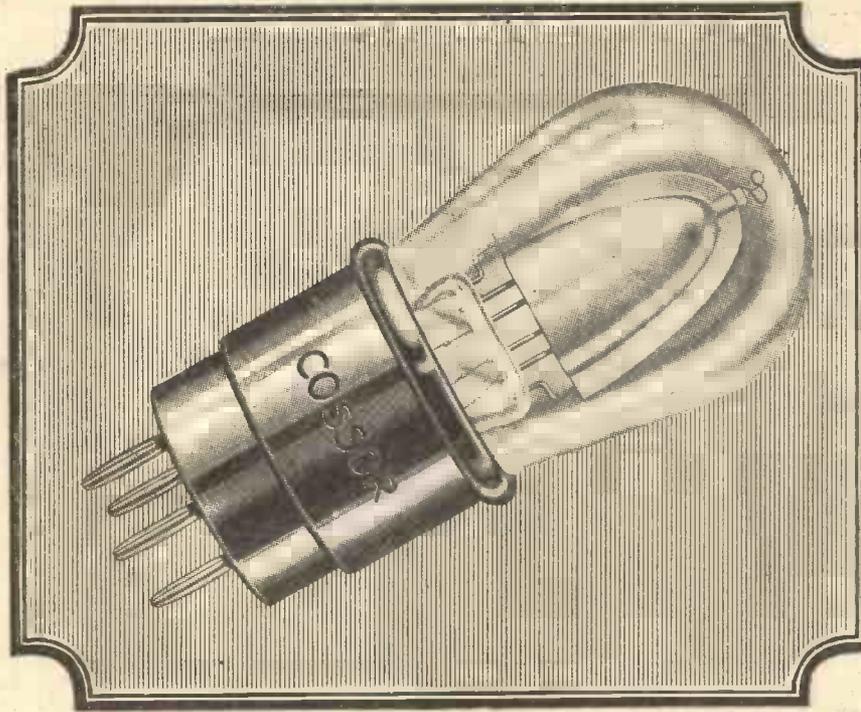
FREE REPLIES TO
READERS' QUERIES

WELL ILLUSTRATED

Registered at G.P.O. as a Newspaper.



The "War" at Aldershot: Receiving a message on
a frame aerial erected on a gun limber.



New!

from end to end

RATHER more than three years ago Cossor startled the world of Wireless by producing a valve which utilised almost the whole of the electron emission from the filament. Its unorthodox construction provoked astonishment amongst those who had accustomed themselves to the wastefulness of spiral grids and tubular anodes.

But despite the unconventional appearance of the P1 an amazingly large number of wireless enthusiasts bought it—and, in so doing, discovered an easier way to better reception, to louder signals and to a greater economy in maintenance.

The success of the first Cossor Valve was never in doubt—in fact, the famous P1 is still the standard British Bright Emitter. And during the past three years Cossor has steadily

forged ahead—winning an ever-increasing public by the sheer merit of its products.

The culmination of many years experience and determination is about to be realised in the new Cossor Point One with its revolutionary system of Co-axial Mounting and its extraordinarily low current consumption.

To the huge army of staunch Cossor enthusiasts the opportunity of acquiring a valve exhibiting such an impressive list of improvements as those shown in the adjoining column will be quickly grasped. Others—who, perhaps, have but lately succumbed to the fascination of Radio—will be glad to read about a British Valve which worthily upholds the great traditions for fine workmanship which this country has built up among the nations of the world.

New Anode

The Anode of the Cossor Point One is deeper and permits a greater length of filament being used. This in turn obviously means that a greater emission surface is available. It is electrically welded to two short, stout electrodes. Movement is absolutely impossible.

New Grid

The Grid is wound around a very stout molybdenum support. Each turn of the wire is electrically welded in no fewer than 30 positions. This method of construction ensures absolute rigidity and ability to withstand the hardest shock.

New Filament

An exceptionally long filament is used which is secured in three distinct places. When the valve is operating it is hardly possible to discern any glow. Although rated at 1.8 volts this new valve will function satisfactorily at a voltage as low as 1.2. It can therefore be used, if required, with dry batteries. No other valve has such a wide range of working voltages.

New Bulb

Its handsome new pinless glass bulb is a further safeguard against accidental damage. Only glass of the finest quality is used on all Cossor valves.

New Base

The same exclusive low loss design of base which has proved so remarkably successful on all other Cossor valves is being retained on the new Cossor Point One. A wide flange is now incorporated to enable the user to withdraw the valve from the most stubborn socket without fear of harm.

New Pins

The new pins on the Cossor Point One is a further indication of Cossor's determination to "do the job properly." Instead of a single slot, each pin is now slotted in two intersecting positions. In addition the points of the pins are tapered. Because of these improvements the valve can be inserted easily and smoothly into any socket and, once in position, perfect electrical contact is ensured.

—and new methods of construction

The Cossor Point One is the only valve to be able to utilise the new patented system of Co-axial Mounting—whereby the Filament, Grid and Anode are rigidly secured to each other in their exact relative positions in permanent alignment at the top and at the bottom. As a result, absolute uniformity of characteristics is ensured throughout the whole life of the valve, whilst the filament is fully protected against damage by shocks.

Cossor Point One	
Red Band for H. F. use	
1.8 volts, .1 amp.	14/-
Black Band for Detector	
1.8 volts, .1 amp.	14/-
Cossor Stentor Two	
Green Band Power Valve	
1.8 volts, .15 amp.	18/6

The new Cossor Point One

grid circuit by means of the reaction coil in an endeavour to cancel out the damping that we have introduced. That is to say, by the use of reaction we increase the amount of distortion, since we feed into the grid circuit not faithfully amplified counterparts of the original impulses, but oscillations which have been amplified, rectified—and mutilated. A perfect vicious circle!

What are we to substitute for this inadequate and inefficient method of rectification? I venture to suggest that the circuit shown in Fig. 2 is well worth a trial. In this rectification is performed by what is known as the anode-bend method. By means of a potentiometer and of a small biasing battery the working point of the valve is set just above the lower bend of the characteristic curve. A positive half-cycle takes the working point up on to the straight portion of the curve, whilst the ensuing negative half-wave takes it down to the bend.

With a small anode voltage the bend is a pronounced one, with the result that effective rectification takes place; in fact, anode-bend rectification with a suitable valve may be described truthfully as being to all intents and purposes distortionless. Since the grid of the valve is negatively biased there is little or no grid current flowing through the coil L_2 ; it follows that there is little damping. What damping there is can be cancelled out by means of capacity reaction, which is controlled by the small condenser C_2 . As L_1 is but a small coil, little aerial damping is introduced to the grid circuit, and the result is an extremely selective combination.

Since the degree of damping present is small, no great amount of reaction would be needed were it not—I must admit this—that an anode-bend rectifier does not respond well to a very weak signal. This means quite simply that unless the applied voltage is sufficient to take the working point some little distance up the straight portion of the curve in the case of the positive half cycle, and well on to the bend when the negative half cycle follows, real rectification does not take place.

A single-valve set using anode-bend rectification may therefore suffer slightly in point of range in comparison with that which employs grid leak and condenser; but the difference will not be very great if the plate, filament and grid voltages are correctly adjusted, since the smoothness of the capacity reaction makes it easy to operate the set quite close to the oscillation point without risk of inadvertently causing interference by radiation.

In a multi-valve set I regard anode-bend rectification as the only possible system if selectivity and purity of reproduction are looked for. It happens only too often when grid and condenser rectification is used in a multi-valver that the efficiency of the high-frequency stages is seriously impaired by the damping introduced by the rectifier. If you substitute anode-bend rectification you will find that you can

introduce into the grid circuit of the rectifying valve quite a large resistance and still obtain just as good selectivity as was yours when the other method was employed.

Where the rectifier is followed by one or more stages of low-frequency amplification, as it must be if the set is to work a loud-speaker, the anode-bend rectifier makes an astonishing difference to the purity of the reproduction. Unless you have had practical experience of what a rectifier of this kind can do, it is hardly

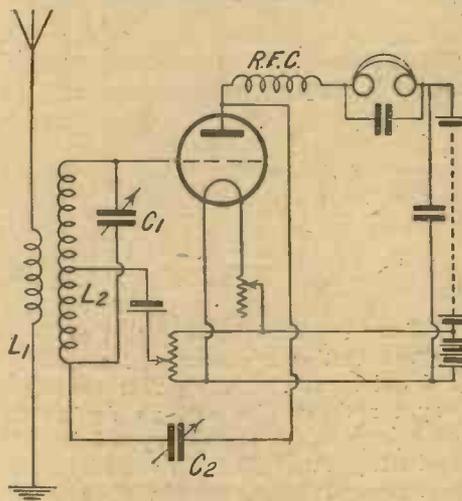


Fig. 2.—One-valver with Anode-bend Rectification.

possible for you to realise how faithful loud-speaker reproduction can be.

It has been suggested in some quarters that since the grid-leak-and-condenser rectifier is admittedly inefficient in a multi-valve set owing to the damping and the

distortion which it introduces, it might be better to use as rectifier a crystal instead of a valve. The purity of crystal reproduction is proverbial; further, it has been stated that the efficiency of the crystal detector increases as the square of the applied voltage. This last statement is perfectly true up to a point; the crystal, however, can deal with only small voltage variations. Apply to it impulses which have been magnified at high-frequency until their amplitude is considerable, and it functions in a most inefficient manner, giving rectification of a very imperfect kind. You will see why if you examine the curve of the average crystal.

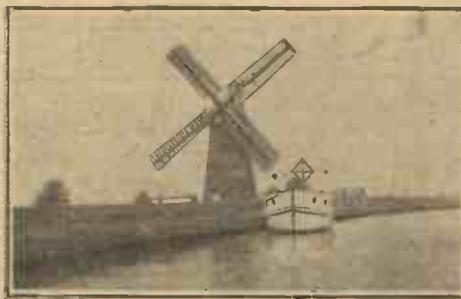
Further, a crystal detector introduces far more damping than even a valve rectifier with grid leak and condenser. The solution of the rectification problem, then, is not to be found in the use of the crystal detector preceded by high-frequency stages and followed by note-magnifiers. In the light of our present knowledge it seems to me that there remains only one system of rectification which introduces neither severe damping nor pronounced distortion. This is the anode-bend method, which, curiously enough, is the original system used with the three-electrode valve. It suffered a temporary eclipse with the introduction of the grid leak and condenser method, but I firmly believe that we shall surely return to it, and when we have done so we shall wonder why we ever thought of using anything else. The anode-bend rectifier will in time give way to something better, but in the meanwhile I make bold to say that it stands alone as the only really efficient and all-round satisfactory method known.

J. H. R.

WIRELESS ADVENTURES

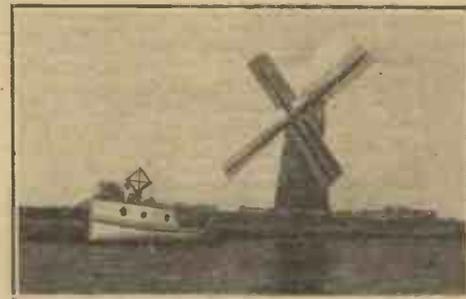
ON THE BROADS

(See article on opposite page)



The set was used on deck only for the reception of the afternoon programmes; at night it was taken down below—into the warm. Indeed, it was at night that the set was chiefly appreciated, as during the day there was so much to do that little time could be spared for listening. Magneto interference made reception impossible when the Snipe was under way.

When these photographs were taken Bruffy was not trying to use the sails of the windmill as an aerial! "But, as a matter of fact, the wind was so strong at times that the B.T.H. frame aerial did try a little windmill act on its own and had to be kept in position by means of a piece of string," he says. See article on the page opposite.



WIRELESS ADVENTURES

ON THE BROADS

ALL four of them were inexorable—no holiday on the Norfolk Broads could be complete without a wireless set. Therefore as Bluffy was the only one of the party who knew anything about wireless at all (of course, he was not credited with knowing *too* much about it), Bluffy would have to produce the set.

the proper directional effect, a small compass is provided in the top of the first unit.

A cruise on the Broads does not leave one with much spare time on one's hands until late in the evening. Washing, shaving, shopping, cooking, eating, washing-up, "taking the wheel," map reading, and general clearing-up take up a surprising

extremely bright light in a cabin measuring 9 ft. 6 in. wide by about 14 ft. long—and dull-emitters are worse!) trying to make the night sweet with music. Sometimes he made it less sweet when someone (John was the chief offender in this respect) made a periodic exit from the cabin, and swung the frame aerial in the wrong direction while doing so.

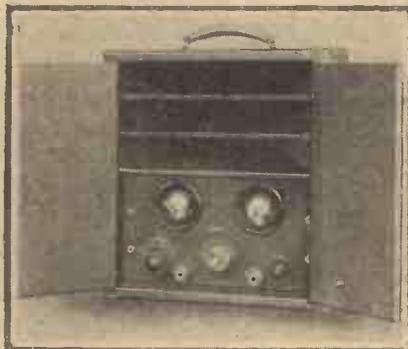
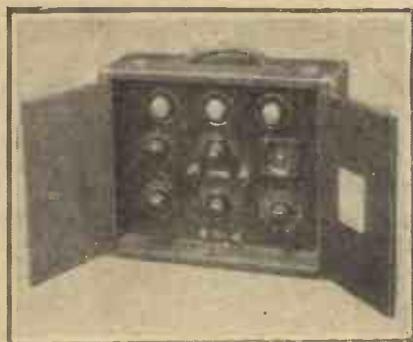
Apart from such minor disturbances, however, everything was peaceful enough, and the loud-speaker was able to give of its best without serious interruption. There was no interference, of course, from oscillating receivers in the neighbourhood.

It is undoubtedly under such circumstances that one does best appreciate wireless. One has been in the fresh air all day, and by about nine o'clock one is just beginning to feel pleasantly drowsy—and at peace with the world. (This must be so, or there would have been blue language in the foc's'le of the *Snipe* when a talk was announced!)

Few things can be better, on such a holiday, than to lie at full length on a comfortable bunk, smoke, and build castles in the air to the accompaniment of music that is not too loud.

All five of us were thankful that a set had been included in our kit. Heaven knows how the evenings would have dragged without one. Although we were approximately 120 miles away and were using only a frame aerial, Daventry came through at excellent strength on the loud-

(Continued on page 461)



Photographs of the B.T.H. portable units, which, as described in this article, gave such good results on the Broads. Each unit weighs approximately 25 lb. The first is a three-valve super-het, and the second a two-valve power amplifier and loud-speaker combined. On the first unit there are four controls apart from the filament resistance.

So when the time came to board the motor cruiser *Snipe* Bluffy brought along a set—and, my word, what a set!

Last year during a long week-end on the upper reaches of the Thames he had shown conclusively what he could *not* do with a soap box, four valves, and a fearsome collection of components connected up with No. 26 gauge d.c.c. wire.

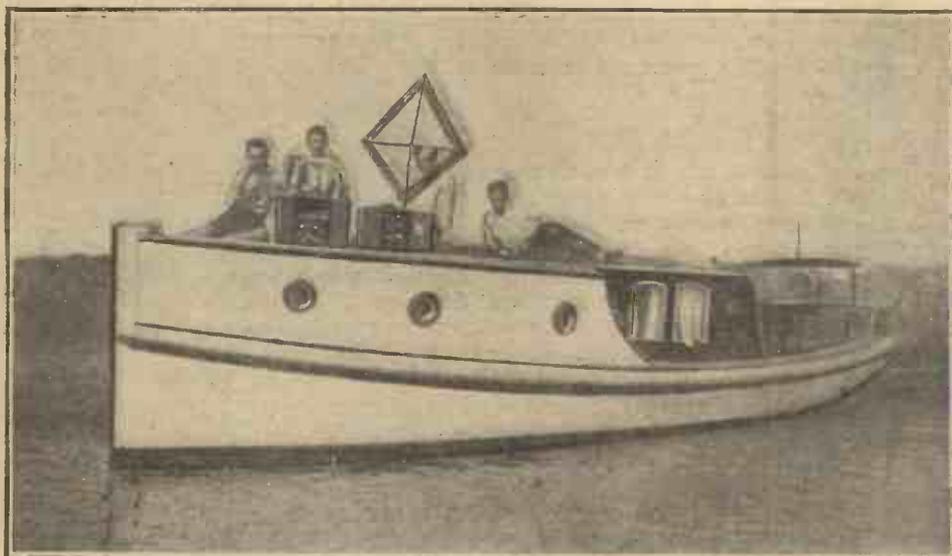
No wonder the other four were surprised when they saw the set that now graced the main cabin of the *Snipe*, for Bluffy had, by some means best known to himself, this time got hold of a real set—a complete B.T.H. portable super-het outfit.

Made in two separate units, each weighing about 25 lb., it is not pleasant to carry far; indeed, the B.T.H. people claim only that it is portable in the sense that it is self-contained. The first unit is a three-valve super-het, and the other a two-valve power amplifier complete with loud-speaker.

In order to get the very best results (as he took care to explain to his "shipmates"—John, Howard, Stanley and Curly) Bluffy had had the foresight to get with the set a large external frame aerial; this is the one you can see in the photograph. So that the aerial can be set easily to get

amount of time during the day, and it is not until after supper that one really has any leisure.

You can picture the scene that was enacted every evening: Bluffy would be crouching on the floor (electric lamps lit from a 6-volt accumulator do not give an



Enjoying an afternoon concert from Daventry on the motor cruiser *Snipe* on the Norfolk Broads.

EXPERIMENTING WITH EARTHS

THE importance of the earth connection is realised in a general sort of way by the majority of users of wireless sets. Most people, that is to say, admit the principle, though in some cases there is a failure to appreciate exactly what constitutes a good earth connection.

The part of the earth and the complexity of problems that may arise with regard to it was brought home to me rather strikingly the other day when a friend asked me to have a look at a crystal set which was not functioning as it should. The little town in which he and I live is some thirty miles north-west of London, and, except in one or two small areas where reception is bad, 2 L O's transmissions come in very strongly with the unaided crystal. I knew that my friend did not live in a blind spot, since reception in houses quite close to his was normal; yet when I came to test his set I found that signals were very much below par; 2 L O was, in fact, so faint that it was exceedingly difficult to follow speech.

The set was a perfectly straightforward one, all the components used being of good make, and no fault could be found with them when they were tested out. The aerial was also above reproach; the only thing that remained therefore to be suspected was the earth. The contact consisted of a pointed copper tube of large diameter driven about two and a half feet into the soil of a flower bed close to the window of the room in which the set was housed. Thoroughly wetting the soil with a couple of buckets of water produced a slight improvement, and the very fact that it did so proved that the earth was the source of all the trouble. This was curious, for in most places tubes of this kind prove very satisfactory. We decided to undertake digging operations in order to investigate.

Investigations

What we found is shown in the rough sketch, Fig. 1. Below the thin layer of surface soil came a stratum of gravel about two-and-a-half feet in thickness. Below this was a bed of clay; but the tube had failed to penetrate as far as the clay, and the gravel provided a contact of very high resistance. We now drove the tube in at the bottom of the hole made, so that it went deeply into the clay. There was an immediate improvement in results, signal strength becoming almost normal for the district.

In a peculiar case like this the best connection is usually one made to an ascending water main, but in this par-

ticular instance it was impossible to reach a water pipe without the use of a very long earth lead, which is usually undesirable. We decided in the end to use a whole sheet of corrugated iron, which we buried three feet down in the clay, arranging it so that it was right under the aerial, and the earth wire was soldered to this at

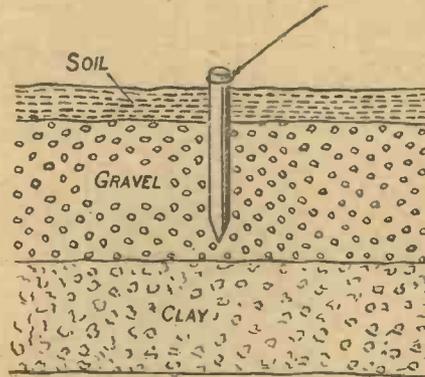


Fig. 1.—An Average Type of Earth.

Several points. When this was done reception was distinctly better than that obtained by the majority of crystal users in the locality.

There are many districts in the neighbourhood of London where a layer of gravel of varying depth underlies the thin surface soil. Should the gravel be only a few inches in thickness, then an earth tube would probably give quite good results, but where the depth is greater it is nearly always preferable to use a different form of contact. Even wet gravel makes a poor earth, and since water percolates through it very rapidly, an exceedingly

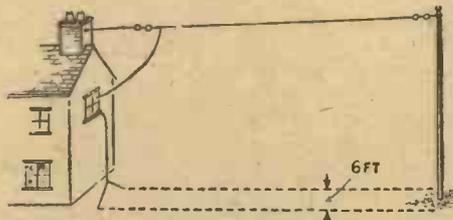


Fig. 2.—Efficient Counterpoise Earth.

high resistance may be set up in dry weather. I have come across not a few so-called blind spots which owed their unpleasant reputation, from a wireless point of view, simply to the use of unsuitable earth connections.

Where the gravel is very deep, or where the soil for several feet down is of a light, dry nature, I have found that an altogether different type of earth connection gives, speaking generally, the best results. This consists of two parallel wires, six feet

apart and each as long as the aerial itself, buried a few inches below the surface of the soil. Usually it gives excellent reception, and one great advantage about it is that the qualities of the earth are not affected in dry weather. If the resistance of the soil becomes very high as the result of a drought, the buried wires appear to act to some extent as a counterpoise.

It is often asked whether the earth lead should be insulated or not. If the user of the set goes in mainly for the reception of the local station, and lives in a locality where it comes in strongly, it probably makes little difference whether the earth lead is of plain or covered wire. For long-distance work, however, and in places just upon the fringe of the local station's range, when crystal sets are used for reception there may be a distinct loss of sensitiveness and of signal strength if a bare earth lead is allowed to come into contact with buildings, trees and other earthed objects on its way to the ground.

Insulated Earth Lead

In one case it is certainly most important to insulate the lead which goes to the earth terminal of the set; this is when a counterpoise is employed instead of a buried earth connection. If no kind of earth connection gives satisfactory results the counterpoise should certainly be tried. A good form consists of two wires, or lengths of copper aerial tape, suspended immediately under the aerial six feet or more above the ground (Fig. 2). The counterpoise must be thoroughly well insulated, connection to the set being made by means of heavy covered wire and a lead-in tube similar to that used for the aerial. The counterpoise generally leads to an increase in selectivity, though it is not to be recommended in the case of sets that are naturally unstable, since the damping introduced is much smaller than when an earth connection is used, with the result that the set may become completely uncontrollable.

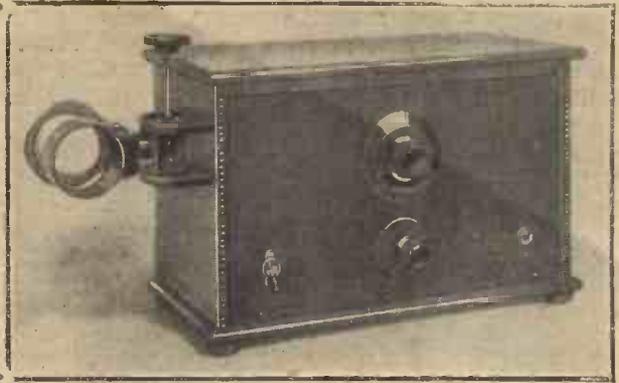
J. H. R.

The Radio Club de France recently voted a sum of money for the equipment of well-known mountaineers' huts with both transmitting and receiving wireless apparatus, in order that in the event of accidents, tourists may get into immediate touch with the outside world.

Wireless telephony will soon be introduced on Italian trains, according to an announcement by the Ministry of Communications. The first experiments will be made on the expresses running between Milan and Bologna, and Milan and Turin.

A FOUR-ELECTRODE ONE-VALVER

We give readers the long-asked-for loud-speaker set, using just one four-electrode valve



A Special Article by the "A.W." Technical Staff

SOME time ago we gave a test report of a four-electrode valve, in which we stated that a receiver incorporating this type of valve gave much better results than the ordinary three-electrode valve. Judging from the amount of correspondence and queries we have received concerning this report, it is obvious that a long overdue interest is being taken in

The four-electrode valve is usually associated with circuits in which the H.T. battery is reduced in size, if not eliminated, and these circuits have met with more or less successful results. In the particular circuit we are describing the H.T. battery is a necessary piece of apparatus, and is in no way different from that usually employed in standard three-electrode valve circuits.

One of the chief advantages of the double-grid valve is the very high amplification factor obtained. To understand the action of a four-electrode valve it may be considered as two valves in one, the filament and the two grids forming one valve which has a low amplification factor of, say, 4, while the filament outer grid and plate form another valve having an amplification factor of, say, 25. The total amplification factor is therefore $4 \times 25 = 100$, a figure which could only be obtained by using an ordinary three-electrode valve, the grid of which would have to be very close to the filament, and an excessively high anode voltage and negative grid bias to eliminate grid current would be necessary.

If the circuit diagram is studied it will be seen that, apart from the inner grid, the remainder of the circuit is quite standard. The aerial is connected to one side of the aerial tuning coil and through the grid condenser to the *outer* grid of the valve. The plate of the valve is connected through the reaction coil and phones to the positive terminal of the H.T. battery.

The filament circuit is conventional, and the only difference between this circuit and a standard one-valver is the H.T. + tapping to the inner grid. Connection to the *inner* grid of the valve is made via the terminal on the side of the metal cap, whilst the outer grid is connected to the usual grid pin on the base of the valve.

Components required for the construction of this set are given in the following list. Those that were actually used in the original set are indicated first in the brackets, but other makes may be used, provided they have similar values and are of good quality.

Ebonite panel, 12 in. by 7 in. (Radion, Becol, St. Helens, Trelleborg).

Ebonite terminal strip, 9 in. by 2 in. (as above).

Variable condenser, .0005 microfarad (Raymond S.L.F., Ormond, Igranic, R.I., Dubilier).

Filament rheostat, 7 ohms approximately (Ella-Varic).

"On and off" switch for panel mounting (Trix).

Phone plug and jack (General Radio, Igranic, Bowyer-Lowe).

Valve holder, baseboard mounting (Aermonic, Lotus, Benjamin).

.001-microfarad fixed condenser (T.C.C.).

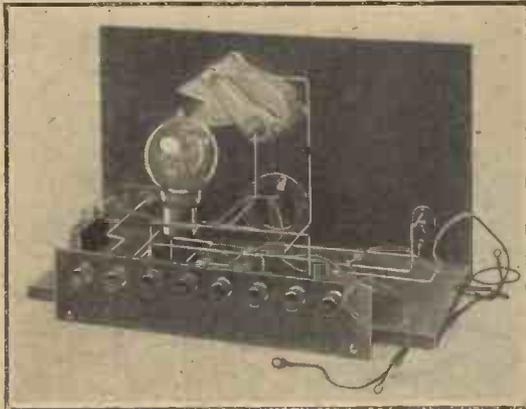
.0003-microfarad grid condenser and 2-megohm grid leak (T.C.C. and Ediswan, Dubilier, Mullard).

Eight engraved terminals (Belling and Lee).

Two-way coil holder (Lotus).

Baseboard, 12 in. by 5½ in. by ¾ in. thick, and cabinet (Unica Cabinet Co.).

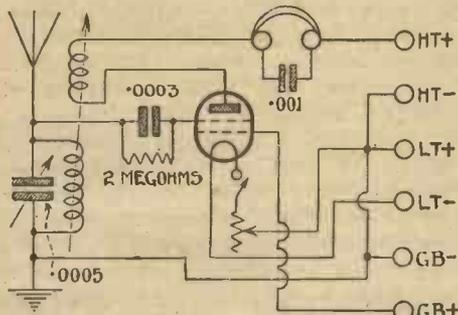
As all the components mounted on the panel possess a one-hole fixing device, there are only seven holes to be drilled, one for the condenser, rheostat, switch, jack, and three for fixing the panel to the baseboard. The positions and dimensions of these holes are clearly shown.



Photograph showing the Disposition of Components.

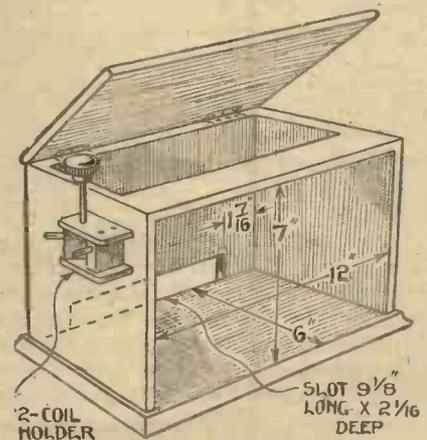
circuits using the four-electrode valve.

We are describing in this article a very simple circuit which does not possess the complications usually associated with valves of this type. Although simple in design, the results obtained are astonishing. At two miles from 2 LO this station



The Four-electrode One-valve Circuit Diagram.

was received at full loud-speaker strength, and at seven miles the diminution in volume, although noticeable, was not so great that a loud-speaker could not be used with sufficient volume to fill a small room.



Sketch showing Dimensions of Cabinet.

The variable condenser and rheostat are mounted centrally on the panel with the switch and the jack, on the left and right respectively of the rheostat. With the exception of the two-way coil holder the

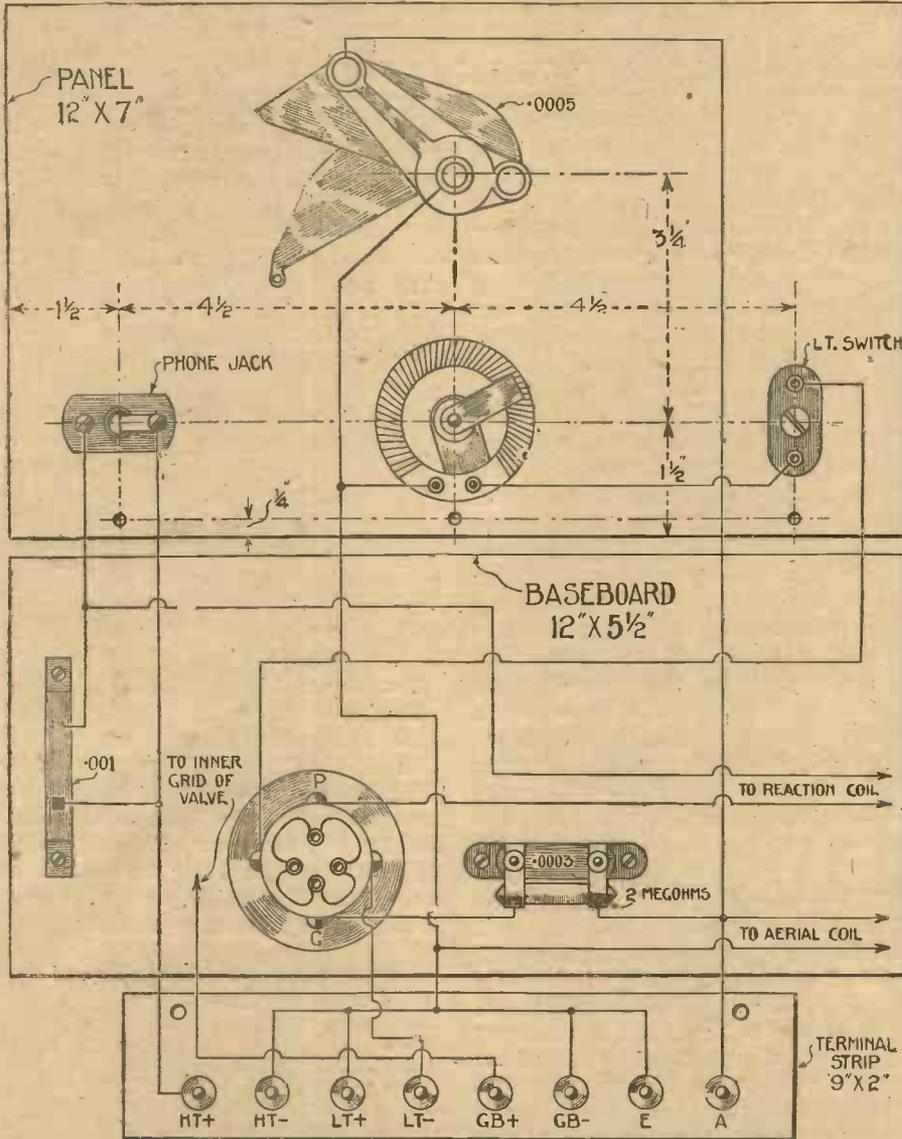
remainder of the components are mounted on the baseboard and, as there are only three components actually screwed to the baseboard, there is plenty of room for them.

To the back edge of the baseboard is screwed the terminal strip carrying the eight terminals. Looking from the back, and reading from left to right, these terminals should read in the following order: H.T.+, H.T.-, L.T.+, L.T.-, G.B.+, G.B.-, E and A.

side of the valve cap. G.B.- is joined to H.T.-. If desired, a separate battery can be used for connecting to G.B.+ and G.B.-, but it is more economical and quite as efficient to use the same battery for both purposes, in which case the full voltage of the battery is applied to the H.T.+ terminal and a tapping (not more than about 10 volts) to the G.B.+ terminal. In this case the G.B.- terminal can remain unconnected, for it is already joined to the H.T.- terminal:

on the panel. For ordinary broadcast wavelengths a No. 35 or 40, and a No. 60 should be plugged into the fixed and moving coil holders respectively. The size of the aerial coil (in the fixed holder) depends on the length of the aerial employed, but a No. 40 will be found approximately correct.

By bringing the reaction coil close up to the aerial coil the valve should begin to oscillate, but should this not be the case, reverse the two leads to the moving coil holder.



The Developed Wiring Diagram of the Four-electrode One-valver.

The wiring of the set is shown in the wiring diagram. It will be noticed that connections to the coil holder, which is mounted on the side of the cabinet, are made with pieces of flex passing through small holes drilled through the side of the cabinet. Connections to the reaction coil should be only of a temporary nature, for it may be found when the receiver is being tested that these connections need reversing.

A connection is made from the terminal marked G.B.+ to the inner grid of the valve, that is, to the terminal on the

The valve used in the set is a bright-emitter, and therefore a fairly high voltage can be applied to the plate without any damage. For loud reception the plate voltage should be about 100, but this voltage must not be applied to the inner grid. The valve is known as the Tetrode, obtained from Aneloy Products, Ltd., of Eton Works, S.E.22. The filament takes .5 ampere at 3.5 volts, so that a 4-volt accumulator is required.

Tuning is accomplished by plugging in suitable coils into the two-way coil holder and tuning with the variable condenser

PERIKON DETECTORS

THE perikon type of detector in which two crystals are used is very popular just now, owing to the ease with which it can be set and the way in which it "stays put" once a sensitive contact has been found. Most of the so-called permanent detectors are of this kind.

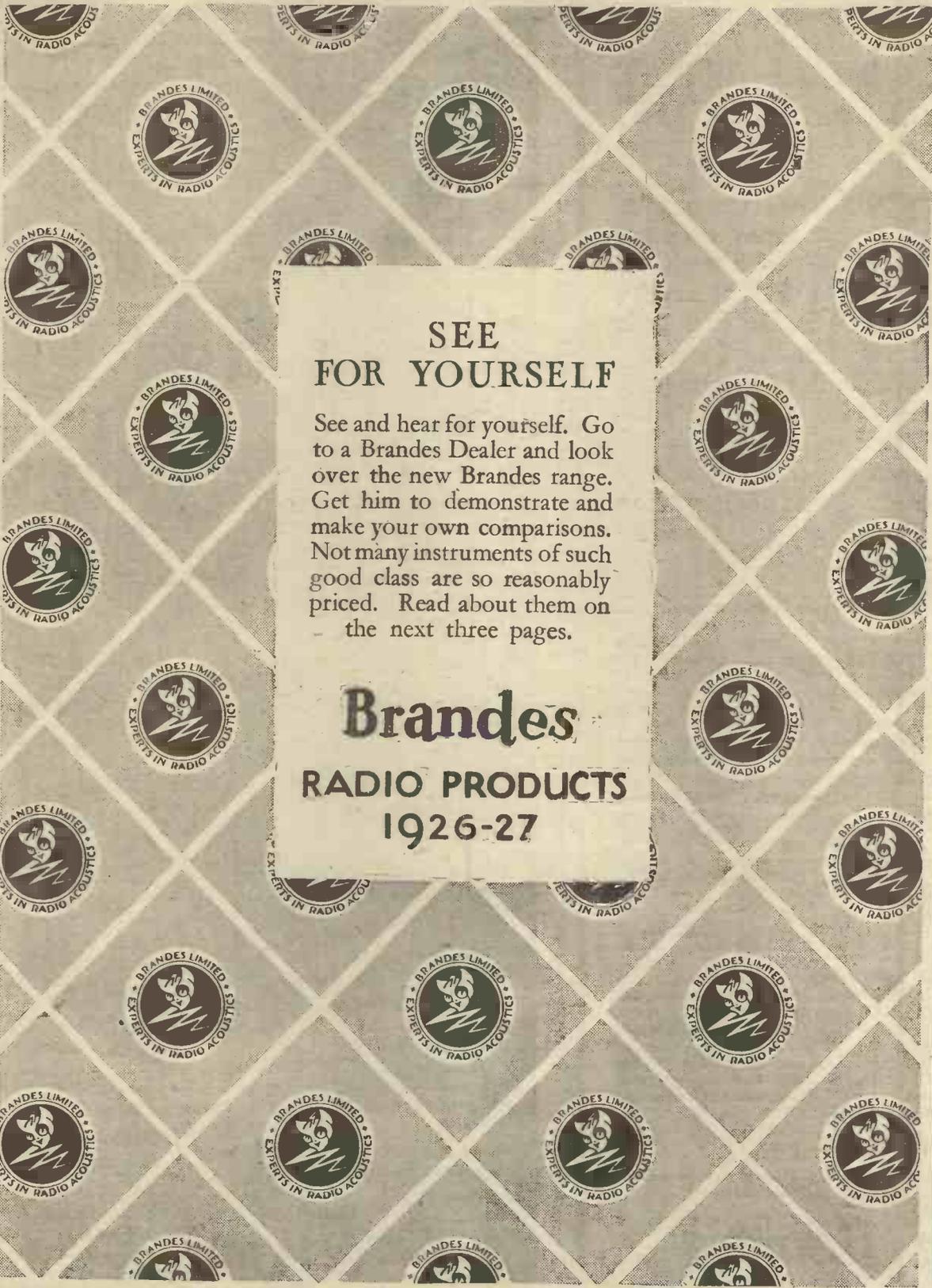
The perikon detector gives excellent service so long as it receives a little attention occasionally. When it has been in use for some time it may be found that signal strength is not quite what it was, and a most prolonged search may fail to discover a really sensitive spot. If the crystals are examined when this happens it will often be found that they are dull-looking owing to the effects of oxidation. The cure is simplicity itself: it consists merely in scraping the surfaces of the crystals. They will then regain all their old sensitiveness.

There is another rather curious fault that is liable to occur in permanent detectors in which the crystals are out of sight. Some kinds of crystal are rather soft, and if frequent adjustments are made—for some reason no one can ever pick up the phones of a crystal set without trying to make things a little better!—a time may come when either signal strength falls off to something very small indeed, or nothing at all can be heard of what used to be a powerful station.

If the detector is taken to pieces it will probably be found that the crystals are worn down to such small stumps that the rims of the two cups come into contact. Here again the cure is easy. Hold the cups one by one in the flame of a spirit lamp until the metal in which the crystals are set is sufficiently melted to allow them to be withdrawn with a pair of pliers. A fresh pair of crystals (zincite and bornite is one of the best combinations) can be purchased quite cheaply from any wireless shop, and it is a simple business to mount them in the metal remaining in the cups.

K. B.

EXPERTS IN RADIO ACOUSTICS SINCE 1908



SEE FOR YOURSELF

See and hear for yourself. Go to a Brandes Dealer and look over the new Brandes range. Get him to demonstrate and make your own comparisons. Not many instruments of such good class are so reasonably priced. Read about them on the next three pages.

Brandes
RADIO PRODUCTS
1926-27

BRANDES LIMITED · 296 REGENT ST · LONDON · W.1

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Service Advertising

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

EXPERTS IN RADIO ACOUSTICS SINCE 1908

IS THIS WHAT YOU'RE LOOKING FOR

TESTING the new 2-valve receiver at our Works at Slough, on a standard P.M.G. aerial, we tuned in the two Paris stations, London, Daventry, Bournemouth, Birmingham and Newcastle on the loudspeaker. This despite bad screening set up by a large power station not more than 50 yards away. We were testing on 66 volts.

THE BRANDESET II.

The new Brandes 2-valve set features simplicity of control and ingenious compactness. Condenser dial, filament rheostat, reaction dial and "throw-over" switch for long or short wave tuning complete the panel controls. Straight line frequency condenser tuning and grid-bias is employed. The standard coil is suitable for Daventry and no "plug-in" coils need be purchased. The L.T., H.T., and grid-bias leads are plaited into one cable from rear of set

£6 10

(Exclusive of Marconi Royalty and Accessories.)

THE BRANDESET III.

The new Brandes 3-valve receiver employs the same ingenious characteristics as the Brandeset II., except that an extra stage of Audio Frequency is employed. It has straight line frequency condenser tuning, grid-bias and is adapted to long and short wave tuning. Both receivers give most excellent loudspeaker reproduction on a number of stations, and are specially designed for this purpose.

£8 10

(Exclusive of Marconi Royalty and Accessories.)

Brandes



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Service Advertising

You will Help Yourself and Help Us by Mentioning "A.W." to Advertisers

EXPERTS IN RADIO ACOUSTICS SINCE 1908

TWO NEW
CONE SPEAKERS



READ ABOUT
THESE TOO

THE Ellipticon has been described as "the best loudspeaker on the market" by one who is fully qualified to judge, and who has no personal interest in our success. And we honestly consider that it is one of the best instruments we have ever turned out. The Tablecone, too, can really be said to be superior to similarly priced Cones.

THE TABLECONE

Attractive cabinet of unique design, finished in dark walnut. The cone unit is fitted with a large magnet and the circular diaphragm has an extremely sensitive driving unit which provides plenty of volume with unblemished tone. Supplied complete with cord connection. It has a genuine claim to be superior to any similarly priced cone speaker.

Height 10"
Depth (at base) 11 1/4"
Breadth 9 1/4" **£2 15**

THE ELLIPTICON

(Registered Trade Mark)

The new Brandes Cone. Undoubtedly the best loudspeaker produced, it brings tone of great depth and sweetness. The cone has a large vibrating area and a driving unit of special design. The magnets in the unit are unusually large. There is no diaphragm but a small armature which, actuated on the "push-pull" principle, reacts to the faintest impulse. The specially designed cabinet "reflects" the sound in rich and mellowed tones.

Height 13 1/4"
Depth 7 1/4"
Width 10 1/2" **£5 10**

Brandes

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E3/647

Service Advertising

Don't Forget to Say That You Saw it in "A.W."

EXPERTS IN RADIO ACOUSTICS SINCE 1908

TEAR THIS PRICE LIST OUT

TEAR it out and keep it by you for reference. You may not need any of these excellent instruments at the moment. But the eventuality may crop up and we should hate you to be without the chance to consider the satisfaction of a really first class product at a most reasonable price.

THE BRANDOLA

Specially built to bring greater volume with minimum current input and exceptional clarity over the full frequency range. A large diaphragm gives new rounded fullness to the low registers and new clarified lightness to the high. Reproduction controlled by a thumb screw on the base. - Polished walnut plinth with electro-plated fittings. Height 26 ins., bell 12 ins. **75/-**

THE TABLE-TALKER

The new goose-neck design is the result of research in radio acoustics, which definitely establishes its value in relation to the diaphragm fitted. Patent material used in the construction of the horn eliminates metallic harshness. Volume and sensitivity controlled with small lever located at the rear of the base. Elegantly shaped, tasteful neutral brown finish, felt-padded base. Height 18 ins., bell 10 ins. **30/-**

AUDIO TRANSFORMERS

The Brandes 1st stage Transformer has a high voltage amplification ratio of 1.5. This, together with a straight line amplification curve, means that the amplification is constant over a wide band of frequencies, thus eliminating resonance. The 1-3 Transformer amplifies over speech, pianoforte and harmonic ranges equally well. Mechanically protected and shielded against interaction. Terminals and outside soldering tags. **17/6**

Ratio 1-5 (black case). Ratio 1-3 (brown case.)

MATCHED TONE HEADPHONES

The whole secret of Matched Tone is that one receiver refuses to have any quarrel with its twin. Aply schooled in these generous sentiments by our specially erected Matched Tone apparatus, their synchronised effort discovers greater sensitivity and volume and truer tone. There is no possibility of the sound from one earpiece being half a tone lower than its mate. **20/-**

Brandes

OLD FRIENDS



BRANDES LIMITED · 296 REGENT ST · LONDON · W.1 · WORKS · SLOUGH · BUCKS

53/647

Service Advertising

On Your Wavelength!

A Sound Scheme

THE Radio Society of Great Britain and the Wireless League have just announced a big scheme for the registration of radio repairers. This seems to be a most promising idea provided that it can be put into operation effectively. Too many of those who at the present undertake the charging of accumulators and the repairing of receiving sets know practically nothing about the business. I have had accumulators, both high and low tension, ruined by them, and so doubtless have you. I have also seen some perfectly ghastly repair work done by them to sets which friends have entrusted to their tender mercies.

The worst of the unskilled man is that he can never leave well alone; he is always wanting to "improve" any set that comes into his hands. Not long ago some friends of mine, who knew nothing about wireless, purchased a beautiful set which gave excellent results. A lead having come unstuck, it was sent to a repairer, who could have done the job in five minutes with a soldering iron. Instead, he kept the apparatus for a couple of days, and then reported that he could very much improve its results at small cost. In a rash moment he was given leave to proceed. When the set was returned to its owner its reproduction was frankly horrible, in addition to which it had become utterly unstable. After a lot of bother the set was eventually sent back to the makers, but the whole business from first to last cost my friends a good deal of money.

A Queer Incident

2 LO was nearly caught napping the other evening when the restaurant orchestra which was being relayed finished its performance a quarter of an hour ahead of scheduled time. In a sanguine moment the announcer told the world that we were to be taken over to Olympia, where the R.A.F. band was playing. There followed a click—and nothing more. It appears that the engineers at Olympia, who were naturally not expecting any such thing, had not connected up the bandstand microphone, and that it was found impossible to do so all in a moment. Luckily, Mr. Solloway, the violinist, who was due to broadcast half an hour later, had arrived before his time in the studio and was on the spot. He nobly volunteered to bridge the gap by playing some solos. This he did admirably, and afterwards gave us his own turn as well at its proper time. I am often amazed that little *contretemps* of this kind should be of such rare occurrence in broadcasting, for it is

not an easy matter to work exactly to a time-table, especially when you are dealing with outside broadcasts as well as those from the studios. Matters were much easier in the old days, when we used to have those hateful compulsory three-minute intervals at the end of every item.

Where We Fare Better

Long intervals between items are still the rule at many Continental stations, though in this country we seldom have to wait for more than a few seconds. Most of the B.B.C. stations have several studios, so that there is now no need for a pause to take place after a song to give the band time to get into place and so on.

NEXT WEEK'S NUMBER

of

"Amateur Wireless"

WITH FREE BOOKLET

entitled—

"A New Practical Guide to Wireless"

See announcement on p. 452

Abroad, however, many stations are not so well provided, and even where there is more than one studio quite lengthy intervals are frequent in many instances. When we had them in this country, they used to be the cause of an appalling amount of howling, since people, when they heard nothing, imagined that something had gone wrong with their tuning, and leaped to the knobs. Some of the German stations have apparently found the same thing, for a metronome or a clock with a loud tick is used to reassure listeners who fear the worst. One or two stations announce the length of the interval that is to follow by giving at the end of an item as many strokes on a bell or gong as the minutes of its expected duration. I know that when I am listening to foreign stations I find these intervals rather boring, especially if one is trying to get the call-sign of a station. One hangs on for three, six, or even ten minutes in the hope that the call-sign will precede the next item—only to find as often as not that it doesn't!

The Old Country

There is, I hear, a big demand both for super-hets and for big straight receivers by Britons dwelling in the Dominions and the Colonies who find that they can keep in touch with the Old Country by means of their wireless sets. It is not, I think, generally realised what enormous ranges some of the B.B.C. stations, and particularly 5 XX, have. Daventry is regularly heard as far away as India, whilst good reception of both this station and 2 LO and 6 BM is possible in South Africa. It is pretty wonderful, when you come to think of it, that the exiled Briton dwelling in some far-away corner of the earth can, by lighting up half a dozen little lamps, obtain his news direct from his native country, the speaker's words reaching him as quickly as they would if the two were standing with but a yard or two of air between them. Actually wireless waves reach Australia in just about the same time that sounds travelling through air take to pass between the wickets of a cricket pitch.

The Morning Programmes

A good deal of criticism has been levelled lately against the morning concerts from 5 XX. Though I am not myself in the habit of grousing about the programmes, which in general are excellent, I think that the criticism of these transmissions from Daventry is to a great extent justified, for the very good reason that salesmen have to make use of them when intending purchasers of receiving sets ask for demonstrations during the morning. Now the really good wireless set is very critical of imperfections. A wobbly singer or a poor instrumentalist have all their little defects brought out to the full by it. A musical person unfamiliar with wireless, hearing the reproduction of such an item, would very likely ascribe the poor quality to the receiving set rather than the performer. Now it does seem to me that these morning concerts are used too much for trying out inferior artistes, many of whom should not be allowed to broadcast at all. I have no doubt that money (or rather the lack of it) is at the root of this, as of most evils, but it would, I think, be better to even things up a bit possibly by spending a trifle less on the evening programmes and rather more on the morning ones. After all, first impressions account for a great deal, and those who have been put off in a sale-room by hearing a poor concert poorly reproduced may easily jump to the conclusion that what they have heard is a fair sample of a wireless concert, and

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On Your Wavelength! (continued)

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that the receiving set is not capable of reproducing real music.

Trains Run by Wireless

To me one of the most interesting exhibits at the Model Engineering Exhibition was that demonstrating the wireless control device for trains developed by Major Phillips. There is no doubt that there is something in the idea, which works perfectly on a small scale. With model trains complete control is possible at distances of twenty yards or so, operations such as starting, stopping, reversing and even shunting being carried out with ease. Some time ago Major Phillips actually built a short stretch of full-size railway, and experimented with the wireless control of big locomotives. He found then that he could run a train without any driver or signaller if—and it is a pretty big if—there were no atmospheric about and no jamming occurred from other transmissions. When a thunderstorm was about, almost anything might happen, trains going backwards or forwards, stopping and reversing, without apparent rhyme or reason; in fact, it appeared at times as if they were trying to go sideways! Atmospheric are, one must admit, the great “snag” in wireless. They make distant communication uncertain even with the finest instruments that we possess at the present time, they play havoc at times with television transmissions, and until we can eliminate their effects no kind of radio control of distant ships or trains can be thoroughly dependable. Jamming from other stations raises a further difficulty, though considerable progress has been made towards the elimination of this source of interference. Until we really conquer the atmospheric we shall be unable to make full use of the possibilities of wireless; when we have done so there is no saying what amazing developments may follow.

Daventry's New Aerial

It is now some weeks since the new permanent aerial was erected at Daventry, the work being done on a Sunday, when the relaying of the afternoon programme was omitted. The old aerial was regarded as a temporary one, and considerable improvement was expected from the new one. At forty-five miles as the wave waggles I can detect no difference whatever with either valve or crystal set, nor have I found anybody yet who has noticed either an improvement or the reverse. I wonder how readers situated a hundred miles or more from 5 XX are affected by the change? Sometimes the redesigning of an aerial has extraordinary effects; it had, if you remember, in the early days of both 5 IT and 2 Z Y. Again, when 2 L O's present transmitter was first erected in Oxford Street reception was

very poor over a large part of the south of London, a big improvement resulting when slight changes were made in the aerial. In other cases alterations in the aerial seem to have no effect at all. We have agreed, I believe, that there are still a few things about wireless that are beyond our comprehension!

A New Loud-speaker

The loud-speaker which was recently described by Dr. Maclachlan in AMATEUR WIRELESS was fully demonstrated at the Olympia Exhibition. Two or three of these instruments complete with wooden baffle were dotted about the large hall, and many visitors were greatly surprised at the marvellous purity of the results. Whilst the basic principle of the electromagnetic movement is old, the baffle system and the cone reproducer give wonderful reproduction, and there is no doubt, in the opinion of the writer, that this is the best type of loud-speaker which has yet been devised. Large hall reproduction is notoriously difficult, but this speaker seemed to cope with all the difficulties without exception. It was noticeable that the instruments were placed in corners of the hall with one exception, and there is probably some acoustic reason for this.

The Amateur as an All-round Scientist

The good all-round experimenter has to have more than a passing knowledge of electrics and science generally if he wishes to be a good worker. An intimate knowledge of the laws of acoustics is necessary should he want to give good loud-speaker demonstrations, and should he desire to make up his own gear he must have a fairly good knowledge of mechanics. It is rarely that we find any other subject in which such a wide general knowledge of things scientific is required, and the able experimenter is to be envied for his knowledge. The truth is, it takes years of practical experience and learning to produce the capable radio man, and he will find that the more he knows the more he will need to know as he progresses. Like many other sciences, the serious practitioner will need to keep in touch with every-day improvements through the medium of the Press and scientific bodies, and learning is never done.

A Strange Choice

I am still wondering why the *Rhesus* of Euripides was chosen as a sample Greek play for presentation to the public. To put on any sort of a Greek play is an interesting, if rather risky, experiment, for there is a considerable difference between the outlook upon life of the British public of to-day than that of Athens twenty-three hundred years ago. Still, there are several Greek plays which

are curiously modern in spirit and whose characters are much more “human” than those of others. Personally, I should not have selected *Rhesus* as a play likely to find instant favour with the radio public. I would have chosen, rather, the *Alcestis* of Euripides, or, better still, the *Antigone* of Sophocles, which is one of the simplest and most moving of all Greek tragedies. Other considerations apart, the Greek dramas ought to be suited for broadcasting in a rather special way, since they do not rely to anything like the same extent as modern plays upon scenic effects. Much the same may be said of Shakespeare, for when his plays were first put on at the Globe Theatre practically no scenery was used. A blackboard or some similar device informed the audience that the bare stage represented the seashore, or the deck of a ship, or a battlefield, and that was that.

An Old Friend

I was listening to an orchestral item from Cardiff the other night when right in the middle of it a sudden “fade-out” occurred. At first I thought that there must be something wrong at the transmitting end, but on twiddling my dials I found that I could pick up nothing at all. Since it seemed unlikely that every station had broken down simultaneously, I had a look round the receiving set. What I discovered was that my filament battery showed a voltage reading of 0.0000! I had been rather expecting something of the kind to happen for some little time, for lately this old and tried friend, who has four years' good service to his credit, has failed to hold his charge as he used to. His poor old plates were slowly falling to bits, and the “fade-out” effect was produced by a small piece of paste coming to rest between two of the positive and negative elements. I am replacing him with a glass-cased accumulator, and I would rather advise you to do the same when a new filament battery becomes necessary.

Celluloid makes for lightness, and it is sufficiently transparent to allow one to see the plates, but it has the great drawback that a certain slow chemical action always seems to occur when it is used and that accumulators gas badly when they are being charged. Celluloid-cased instruments also seem to “work” a little whilst discharge is going on, or even when they are standing idle, bubbles forming on the plates and rising to the surface. Since the presence of these bubbles must slightly affect the internal resistance and therefore the filament voltage, I have often wondered whether the little noises that we hear when our sets are in operation are not partly due to them.

THERMION.

A PORTABLE SET FOR THE CAR

A "Break-jack" Allows of Frame Aerial Being Used

THE receiver described below was originally intended for transportation on the running board of a motor-car, and this governed, to some extent, its shape and external dimensions.

It was also intended originally that use should be made of the car batteries for filament current, but as it was desired to use the receiver apart from the car at times, .06 valves with a 4-volt 10-ampere-hours unspillable accumulator were finally decided on.

The circuit is quite straight, and consists of a single-circuit tuner (parallel A.T.C.), with direct reaction (ball type), followed by a detector and one stage of low-frequency amplification. By using an alternative terminal a small fixed series aerial condenser of .0001-microfarad capacity can be introduced. The tuning range (100-700 metres) may not meet with the approval of everyone, but it was decided to sacrifice the Daventry way in order to make the receiver capable of dealing effectively with amateur band of 100-200 metres. Incidentally, it may be remarked that by a slight "wangle," Daventry may be received with moderate efficiency.

Although the circuit is quite orthodox it is thought advisable to give a theoretical diagram in order to illustrate one or two features introduced by the writer (see Fig. 1). The A.T.I. is wound with 24 d.c.c. wire on an ebonite former $3\frac{1}{4}$ in. diameter and $3\frac{1}{2}$ in. long. The total number of turns is 60, tapings being taken at the 10th, 17th, 26th, 40th and 60th turns.

The first 10 turns are spaced one diameter, the object being to obtain better coupling with the reaction winding. (It will be noticed that these turns are all on one side of the reaction ball spindle.) It is recommended that the above-mentioned tapings be adhered to, as the tuning condenser (.0005 microfarad square-law) covers them very satisfactorily.

In series with the A.T.I. is a "break-jack," which on insertion of the plug the circuit is broken, and whatever is connected to the plug is placed in series with the A.T.I. The object of this is to allow of the use of a frame aerial—the latter (of light construction) being mounted directly on a plug. This method of connecting a frame to a receiver dispenses with loose wires, and, moreover, allows of the frame being rotated during reception in a very convenient manner. Now, it is obvious that a loading coil may be mounted on a similar plug and used to load up the A.T.I. to the wavelength of 5 X X.

The reaction coil (36 turns of 30 d.s.c. wire on an ebonite ball which just clears the bore of the A.T.I. former) is not sufficiently large to obtain the full reaction effect on this wave, but it could not be made larger without the risk of losing smooth regeneration on the lower waves. No loss of efficiency (due to the construction of the plug and consequent stray capacity, etc.) is noticed. The jack in question will be seen in an upright position at the back of the panel in one of the



Photograph of Complete Receiver.

photographs. There is another jack (top right-hand corner of the front of the panel) for the telephones or loud-speaker. This jack contains additional springs which switch on the filament current on insertion of the plug.

The following is a list of components required: One ebonite panel, 5 in. by $6\frac{3}{16}$ in. by $\frac{1}{4}$ in.; one piece of ebonite, $6\frac{3}{16}$ in. by 2 in. by $\frac{1}{4}$ in.; one piece of ebonite or wood, $6\frac{3}{16}$ in. by $1\frac{1}{2}$ in. by $\frac{1}{4}$ in.; one .0005 microfarad square law variable condenser (Jackson Bros.); one telephone jack, with filament switch; one telephone jack, with shorting spring; one tapping switch, with studs and stops; one ebonite former, $3\frac{1}{4}$ in. diameter by $3\frac{1}{2}$ in. long; one ebonite ball (to just fit in bore of above); two anti-microphonic valve holders; one filament resistance, compression type (Oajah); one L.F. transformer

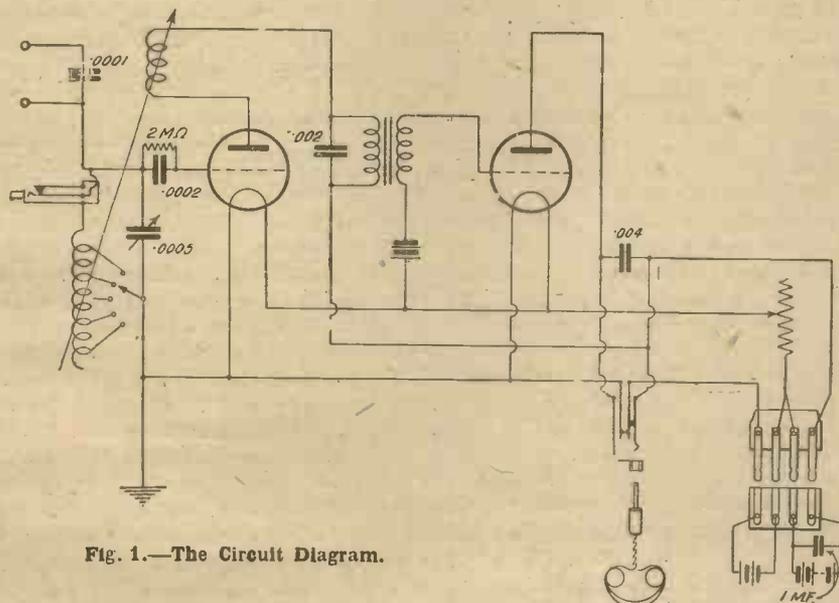


Fig. 1.—The Circuit Diagram.

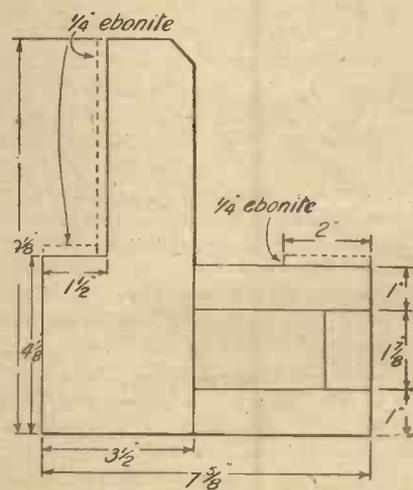


Fig. 2.—Measurements of Side Member.

(Lissen T.1); one fixed condenser, .0001 (Dubilier); one fixed condenser, .002 (Dubilier); one fixed condenser, .004 (Dubilier); one fixed condenser (with grid-leak clips), .0002 microfarad (Dubilier); one grid leak, 2 megohms (Dubilier); one 1-microfarad Mansbridge condenser; one

(Siemens); one 3-volt pocket flashlamp battery, 2½ in. by 1½ in. With regard to the construction of the receiver, the principal dimensions (internal) of the containing case are: Back to front, 13¼ in.; width, 6¼ in.; depth, 9¼ in. The division is 7¾ in. from the

(d) a wooden shelf (3½ in. wide by ¼ in. thick) holding the A.T.I. former and L.F. transformer. The side members are spaced just sufficiently wide apart to form a comfortable sliding fit into the container.

Reference to the photographs will show the positions of the components. The filament resistance (a carbon compression type) is mounted on the valve shelf between the valve holders, as apart from the fact of there being no room for it on the front panel it merely requires setting to adjust the filaments to the correct voltage and may then be forgotten.

The grid-bias battery (a 3-volt type, size 2½ in. by 1½ in.) is placed beneath the A.T.I. shelf.

The method of connecting the high- and low-tension batteries should be noted. For this use is

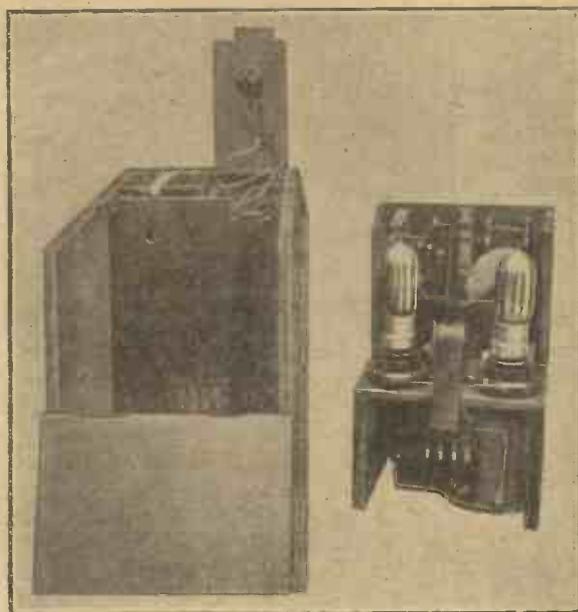
made of a four-pole telephone plug and socket. The socket half of this may be seen screwed to the battery division, while the plug portion is attached to the valve shelf at the back of the receiver.

As much of the wiring as possible should be carried out before finally screwing the panels in place, judicious use being made of insulating sleeving.

The performance of this receiver is extraordinarily good, its chief charm (considering the comparatively primitive tuning arrangements) being its selectivity.

J. B. P.

Leipzig and Dresden both broadcast news and a weather report in Esperanto on Mondays at 10.45 a.m.



Photograph showing Set Out of Case.

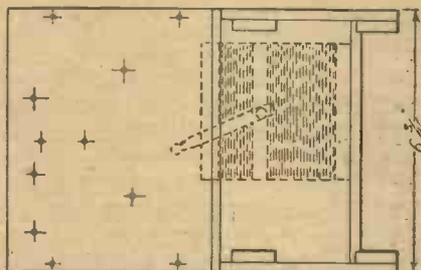


Fig. 3.—Measurements of Side Member (shown on its side).

front. The batteries are housed in the rear half of the case; a 60-volt block, with special short plugs, just fits together with a 4-volt 10-ampere-hour Exide accumulator.

The receiver proper is built on a framework of wood, stained black and varnished. Figs. 2 and 3 give the principal measurements of the two side members of this "skeleton,"

which are constructed of 3½-in. by ¼-in. and 1½-in. Hobbies strip-wood. The two sides are held together by (a) the valve shelf, (b) the front panel, (c) a small strip of ebonite (or wood) through which the crank lever of the reaction ball works,

four-pole telephone plug and socket; one 3-ft. length of 3½-in. by ¼-in. "strip-wood" (Hobbies); one 3-ft. length of 1-in. by ½-in. "strip-wood" (Hobbies); one 4-volt 10-ampere-hour unspillable accumulator (Exide); one 60-volt H.T. battery

THE MYTHICAL "S.L.F." CONDENSER

RADIO has its fashions much the same as does feminine apparel—with this distinction: that changes in the former are always dictated by common sense and a desire for improvement on the existing state of things.

About two years ago radio fashion decreed that the old-type variable condenser was *de trop* and the day of the "square-law" began. Now he is very much behind the times who does not use the newer "straight-line-frequency" condenser—so called.

The latter qualification is a necessary one, since there is not at present, and probably never will be, any such instrument. This is because it is impossible to construct a variable condenser which will give an absolutely straight-line reading with all the types of coils used in wireless. Once upon a time, when the term "coil" meant a solenoid and nothing else, it might have been possible, but the amateur of to-day works in a perfect bewilderment of coils of all shapes and characteristics.

All coils used in wireless have some dis-

tributed capacity, varying according to their forms from a relatively small amount to quite a large value, and this fixed-shunt capacity across the variable condenser shifts the capacity across the circuit and bends the frequency curve from a straight-line characteristic. Therefore, even a condenser specially designed for use with a theoretically perfect coil having a zero distributed capacity would not give a straight-line frequency reading with any type of coil now on the market.

It comes to this: that when a maker claims a specific instrument to be a straight-line-frequency condenser he will have to design a coil to operate in conjunction with it to substantiate his claim, and he must also make the proviso, "when used with the specific coil." Otherwise, when used with a coil of different distributed capacity, this same condenser will show a curve—however slight it may be—for the frequency characteristic instead of a perfectly straight line.

To the great majority of amateurs, of course, such slight deviations are trifling

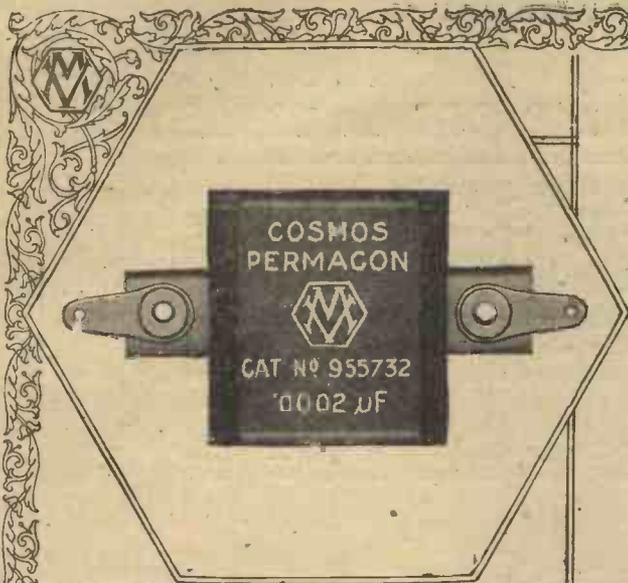
and of small importance, but radio is an exact and precise science, and in laboratory work, at least, the margin of error must be reduced to its narrowest possible limits.

A. J. B.

FAULTY LOUD-SPEAKERS

WITH certain types of loud-speaker a rattling noise is often observed after a certain amount of use. This may be due to many causes, the most common being as follows: At some time or other the loud-speaker may have been overloaded, which causes the diaphragm to become either loosened or distorted. The diaphragm should therefore receive attention first. If it has merely worked loose, the securing cap should be tightened up. If, on the other hand, it has become distorted or bent, the difficulty is easily overcome by reversing the diaphragm.

Other causes for rattling are to be found from weak joints between the base and flare of the loud-speaker, or from loose or faulty connections in the receiver. H. B.



"the best English fixed condenser in the Country"

Such is the opinion of a London Wireless firm after subjecting the "Cosmos" Permacon to a rigid test for insulation and capacity.

The "Cosmos" Permacon is an ideal fixed condenser, being light in weight, of guaranteed accurate capacity, and having the lowest possible losses.

The dielectric is mica, and each condenser is tested at 500 volts during inspection. Nickel-plated cases give them a particularly neat appearance.

Prices are given below :

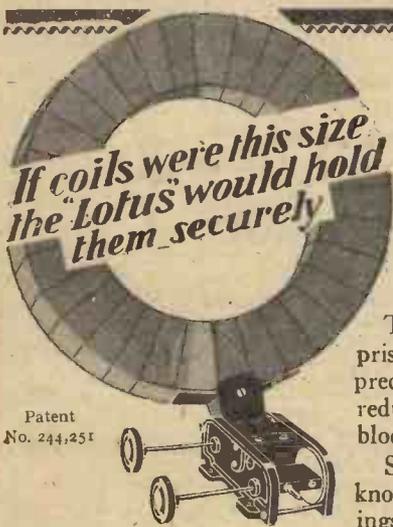
Ask for copy of the "Cosmos" Components Brochure:
METRO-VICK SUPPLIES LTD.
 (Proprietors: Metropolitan-Vickers Electrical Co., Ltd.)
 Metro-Vick House, 145 Charing Cross Road, LONDON, W.C.2

.0001 mfd	...	...	...	1/6
.0002 "	...	...	...	1/6
.0005 "	...	...	...	1/6
.0003 "	(with clip for grid leak)	...	...	1/8
.001 "	...	...	...	1/8
.002 "	...	...	...	1/10
.005 "	...	...	...	2/8
.01 "	...	...	...	3/9

"COSMOS" GRID LEAKS
 are uniform and permanent.
 1, 1, 2 and 3 megohms, each 1/6

Cosmos
 RADIO COMPONENTS

R
P42



Patent No. 244,251

The Moving Block Cannot Fall

The vernier movement comprises three sets of enclosed precision machine-cut gears, and reduces the speed of the moving block by eight times.

Side plates, coil blocks, and knobs in artistic bakelite mouldings. All metal parts heavily nickel plated. Made for left as well as right hand.

LOTUS
 VERNIER
COIL HOLDERS

PRICES :

Two Types :

For outside panel mounting:	
Two-way	7/-
Three-way	10/6
For inside baseboard mounting, with 6-in. handle:	
Two-way	8/-
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Made by the makers of the famous Lotus Buoyancy Valve Holder.

GARNETT, WHITELEY & CO., LTD.
 Lotus Works, Broadgreen Rd., LIVERPOOL.

First and third prizes in American Amateur Competition won by users of Copex Copper Coil Screens and COPEX "O. C." COILS



In the recent American Amateur Competition, the 3rd Prize was awarded to a set using **COPEX "O. C." COILS** and **COPPER SHIELDS**. This was the highest award given to any European entry. Also 1st Prize awarded to the "Mewflex" III. (section for entrants under 16 years of age) using **COPEX COPPER SHIELDS & COPEX COILS**.

The principal advantages of COPEX "O. C." COILS over all other screened coils are :-

1. Oscillation is rendered perfectly under control.
2. High Amplification. These factors are due to an improved and patented method of construction.

Here are the prices of COPEX COILS:
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 COPEX "O. C." Type Split Secondary Transformer, 250/550 N. **10/6**

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A Useful Series for Wireless Amateurs

Simple Valve Receiving Sets and How to Make Them

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

Crystal Receiving Sets and How to Make Them

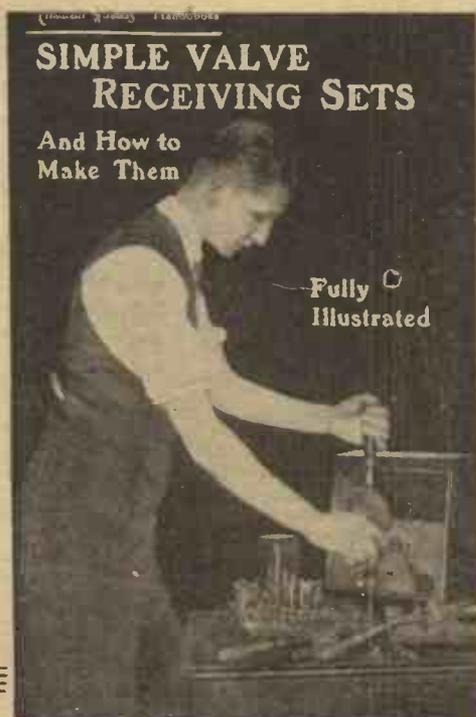
Compiled from the pages of "Amateur Wireless," this handbook deals in a simple, straightforward manner with the making of a number of crystal sets. With 114 illustrations.

Wireless Component Parts and How to Make Them

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

Wireless Telegraphy and Telephony and How to Make the Apparatus

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



Wireless Telephony Explained

CONTENTS: The Electron; Induction and Electro Magnetism; 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.

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La Belle
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"A.W." TESTS OF APPARATUS

Conducted in the "Amateur Wireless" Research and Test Department

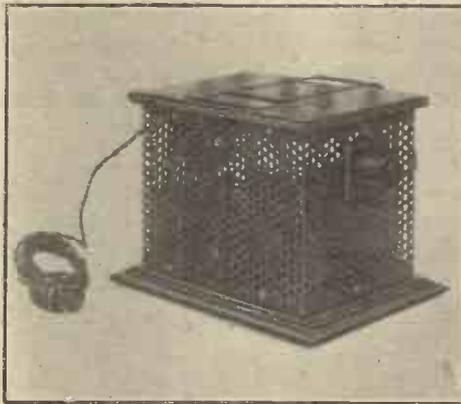
A New Lissen Transformer

ALL the older types of Lissen low-frequency transformer have been superseded by the new type which is illustrated in the accompanying photograph. The instrument has a very handsome appearance with its beautifully moulded case, and its performance is in keeping with its appearance.

At the price which this transformer is sold it compares very favourably with others of even higher price. The primary and secondary coils are wound on a hedgehog core of iron wires, the whole being enclosed inside the moulded case, which is then filled up with a black insulating compound effectively preventing the intrusion of moisture.

Two of these transformers coupled in the usual way, using two P.M. L.F. amplifying valves, gave a good amplification with very little distortion. No very resonant

For some time we have been using this unit, and the results obtained are exceptionally good. Two Burndept valves, type HL525, were used as rectifying valves.



Wearite H.T. Battery Eliminator.

Absolutely no hum could be heard on the loud-speaker even when the transmitting station closed down for an interval. The unit has our thorough recommendation.

The Darimont Primary Cell

We have recently tested the Darimont Home-Service Battery manufactured by Darimont Electric Batteries, Ltd., of Darimont Works, Abbey Road, Park Royal, London, N.W.10.

The tests were carried out on a No. 5



The Darimont Primary Cell.

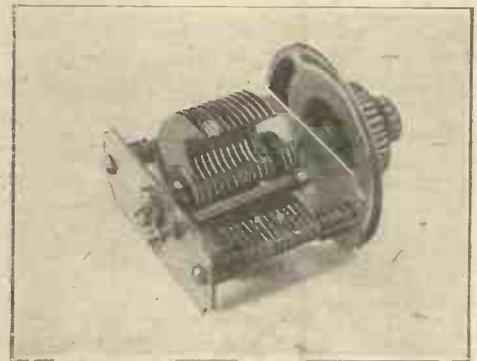
cell, which is officially rated as having an actual capacity of 22 to 24 ampere-hours and a maximum discharge rate of .5 ampere. The dimensions of this cell are

3 $\frac{3}{8}$ in. by 4 $\frac{1}{4}$ in. by 7 $\frac{1}{2}$ in. high, and each cell on a closed circuit of 10 ohms gave an average reading over 100 hours of 1.4 volts. The cell discharged through the 10-ohm resistance for 160 hours before the voltage dropped to 1 volt. At the end of that period the internal resistance had risen from .7 ohm to .9 ohm. These figures show a remarkable performance.

When the cells are run down they may be recharged by renewing the elements supplied.

Raymond S.L.F. Condenser

K. RAYMOND, of 27, Lisle Street, Leicester Square, London, W.C., are producing a variable condenser of the square-law type having a quick- and slow-motion control operated by friction cones and discs. The moving plates are electrically connected to the frame, and to ensure quiet operation a pigtail connection in the form of a flexible



Raymond S.L.F. Variable Condenser.

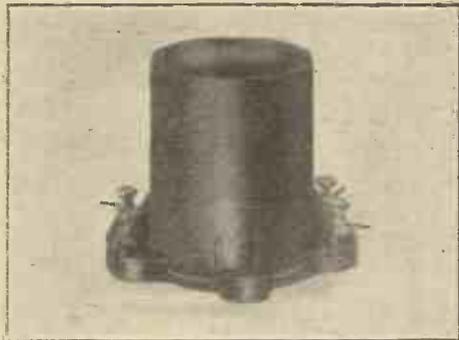
copper strip is provided. Both sets of plates are made of brass, and a minimum of insulating material is used to separate the fixed and moving plates.

The motion of the condenser is smooth, the slow-motion mechanism giving a 10 to 1 ratio. At its low price the instrument is a first-rate job.

Superial Simple Strip

We have received a sample of the special connecting wire called the Superial Simple-strip produced by The New London Electron Works, Ltd., of London. This wire is made in the form of a flat perforated strip about $\frac{1}{4}$ in. wide with elongated perforations through which the terminal shanks of the components can be passed and clamped by a nut.

The resistance of the wire, of course, is small, but care should be taken—especially in the H.F. portions of the circuit—that the connections are so made that the flat surface of one lead is close and parallel to the flat surface of another.



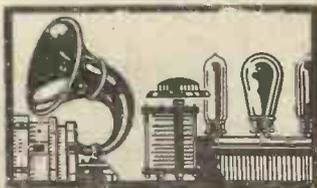
The New Lissen Transformer.

peaks were noticed, although, as is usual with nearly all transformers, the higher notes were given more prominence than the lower notes.

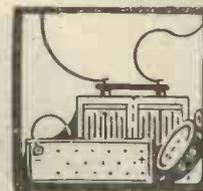
An H.T. Battery Eliminator

THE photograph illustrates an H.T. supply unit for use in conjunction with A.C. electric-lighting mains, obtainable from Wright and Weaire, Ltd., of 740, High Road, Tottenham, London, N.7.

Full-wave rectification is used, two thermionic valves being employed. A filter consisting of smoothing chokes and condensers eliminates all ripple, and the filaments of the two rectifying valves are supplied by a secondary winding on a power transformer, the primary of which is connected by a plug across the A.C. mains. Three output voltages are obtainable, giving 40, 80, and 120 volts, while the current given is anything up to 15 milliamps. on the 120 volt output. By a simple plug device the unit is adaptable to any A.C. mains.



PRACTICAL ODDS & ENDS



A Variable Grid Leak Note

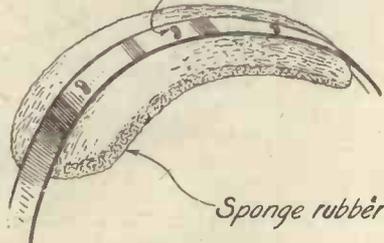
IT has been found from practical experience that when making connections from a grid leak of the variable type, it is better to take the connection which goes to the grid of the valve from the farthest terminal of the variable grid leak—that is to say, from the terminal at the opposite end of the leak to that which connects to the end which makes contact with the operating knob. If connection is made from this latter end, sundry noises are often set up in the receiver when the knob of the grid leak is being rotated. H. B.

Making Telephones Comfortable

HOWEVER light they may be, even the best of headphones are liable to cause discomfort if they are worn for long periods on end. A simple tip which entirely eliminates that unpleasant "telephone headache" is as follows:

From any chemist obtain a small rubber

Stitches through holes drilled in head band



Sponge rubber

Comfortable Telephones.

sponge measuring about 4 in. in length by 2 in. in width and 1 in. thick. With a large pair of scissors round off what is to be the upper surface until it is so shaped that it fits the curve of the telephone headband. In the latter drill three pairs of small holes, one pair at the mid-point of the band and the others about 1 in. away on either side. With a needle and some strong thread stitch the rubber sponge to the headband. It will be found that it forms a delightfully soft and springy pad which relieves the top of one's head of the pressure which gives rise to headaches.

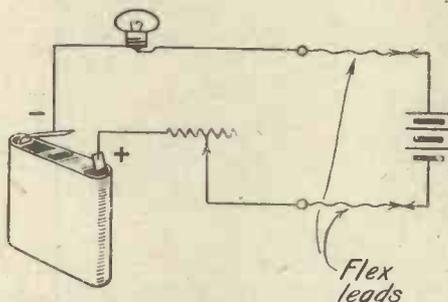
J. H. R.

Small-voltage Polarity Indicator

POLARITY indicators, although quite satisfactory in operation when the testing voltage is high, are rather difficult to bring into action when, say, the polarity of a single cell has to be found. Some

indicators are sluggish in action on low voltages, while others refuse to work below a certain value.

Here is a novel indicator for showing the polarity of small cells. Connect a small bulb to one side of a flash-lamp battery, and from the other side of this battery and the free contact on the bulb



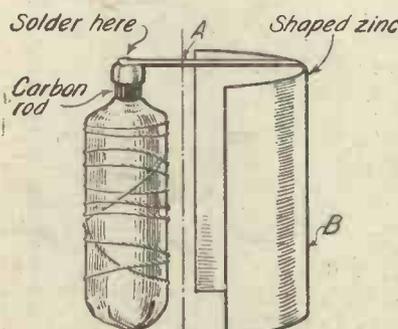
Simple Polarity Indicator.

take flex leads to the cell, the polarity of which it is desired to test. A rheostat should also be placed in circuit for the sake of safety. Touch the cell with the two flex leads, and note if the lamp glows dull or brightly. If only a feeble light is emitted, then the E.M.F. of the flash-lamp cell is in opposition to the other cell, and the polarity can easily be determined.

K. U.

Connecting "Wet" H.T. Electrodes

IF the carbon rods and zinc plates of home-made "wet" H.T. batteries are connected together with soldered wires, the business is somewhat tedious, especially in the case of, say, a 60-volt battery.



Connection for H.T. Electrodes.

Shown in the accompanying sketch is a simple hint which not only halves the soldering work to be done, but also increases the efficiency of the battery. It will be seen that shaped pieces of zinc are used, the length (B) of which varies ac-

ording to the carbon element used, while the length of the connecting piece (A) will depend on the distance apart of adjacent cells. The end of A is soldered to the brass cap of the carbon rod, and if the operation is carefully done, the result will be a firm inter-electrode connection, which also serves to support the electrodes in a vertical position.

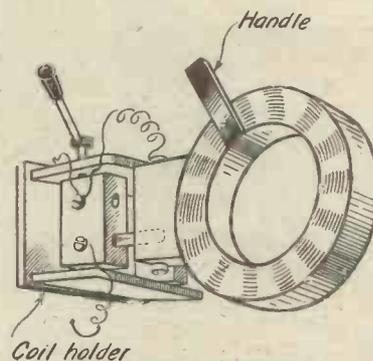
A. S. H.

Fine Reaction Control

FOR that large section of amateurs who still use "swinging coil" reaction the following will be of great help in obtaining delicate control of reaction coupling.

It will be seen from the sketch that the pin from the reaction-coil plug is removed and a flexible connection taken from one side of the coil plug to the coil holder.

When ordinary coarse adjustments have been made with the extension arm of the coil holder, the final vernier movement is carried out by a slight movement of the



A Fine Reaction Control.

ebonite handle which is fixed to the coil itself. It will be apparent that moving the reaction coil slightly out of the plane parallel to that of the fixed-coil will effect smaller variations of coupling than are obtained when the reaction coil is moved bodily away from the fixed coil.

O. B. R. W.

Useful Flexible Connections

IT is a distinct advantage to have certain leads in a receiver flexible instead of making them permanently with stiff wire. Such leads, for instance, as are taken to the terminals of an L.F. transformer should be of insulated flex, the ends being equipped with spade terminals. This enables the experimenter to change over the directions of his primary and secondary windings with ease, and also to make the necessary adjustments on transformers of the multi-ratio type.

H. B.

THE BRITISH AMATEUR CONVENTION, "T. & R."



I HAVE just returned from the first British Amateur Convention, which was held under the auspices of the T. and R. section of the Radio Society of Great Britain. Members from every part of the globe were present. On the first night several distinguished guests were in the body of the large lecture theatre of the Institute of Electrical Engineers, including Dr. Eccles, F.R.S., Captain Eckersley, Dr. Carpenter, of the National Physical Laboratory, and many other well-known radio scientists. There was one person who was absent and who some of us missed, but we know that Sir Oliver Lodge is a busy man these days. Mr. Kirk, of the British Broadcasting Company, gave a most interesting discourse on the future use of master oscillators in British broadcasting and the use of tuning-fork control in this connection; and since the amateurs present were obviously interested in this from a point of view of short-wave working, the discussion that

followed hinged on the use of harmonics of audio-frequencies as a means of stabilising radio-frequencies. The ultimate conclusion arrived at was that the tuning-fork method of control in conjunction with a master oscillator transmitter was likely to be very popular in the future.

"Domestic" Affairs

On the second day of the convention, which was devoted to the domestic affairs of the T. and R. section, one or two humorous incidents lightened the otherwise somewhat strenuous day. At the opening meeting in the morning the chairman, Mr. Bevan Swift, A.M.I.E.E., was presented with a "wand of office," which consisted of a heavy cherry-wood cudgel, which had only recently formed a portion of a tree which proved an obstruction to the erection of a counterpoise. The cudgel formed also a "table rapper," and was fitted with a chairman's hammer for restoring order. Thus this formidable-looking weapon

served the joint purpose of a moral and physical persuader for unruly conventionists.

A.A. of the Ether

On our return from an excellent luncheon given by the hon. secretary to committee members and visitors, at the Hotel Cecil, we were greeted by a veritable storm of "Q.R.M." in the vestibule of the institute. The conventionists had arranged a rag, and had raided all the shops in the immediate vicinity and bought up every tin whistle, toy trumpet or other musical instrument they could find. The net result of a few dozen members sounding V's and other ciphers of the morse code on these things can be better imagined than described. The "mace" before described came into operation from a moral point of view, and silence being restored the assembly proceeded with the preparation of a long series of traffic regulations, the aim of which is to protect the broadcast listener and amateurs in the use of the ether. When these rules come into force, which is almost at once, the T. and R. section will be the first A.A. of the ether. Other business which was transacted related to the Q.S.L. and Q.R.A. section, a very useful acquisition to amateurs, since it entails the free delivery of reports on transmissions overseas, and some discussion took place as to means of better co-operation between town and provincial amateurs. FAN.



This station is 5 U W, operated by Mr. F. J. Singleton, of Wellington Place, Penn Fields, Wolverhampton. A transmission with Z 4 A M was sustained for 25 minutes at 0435 G.M.T.

In view of the satisfactory results obtained by the 3-kilowatt short-wave telephony transmitter, which is now nightly relaying the broadcast concerts of the Berlin studio, the Viennese technical press is clamouring for a similar station to be erected outside the city. In support of the proposal, it is put forward that the U.S.A. short-wave transmissions are now regularly picked up in Central Russia on single-valve sets with reaction on aerial circuit.

IN the very early days of radio valve production the valve filaments were short, straight wires of pure tungsten, and the grids and anodes were of the most obvious form—cylindrical.

Even at this stage, however, it was realised that if the filament length could be increased, with a corresponding increase in effective length of grid and anode, a super valve would be produced capable of exceptional performance. Unfortunately, the filament length for a reasonable filament voltage was limited by the material of which the filament was made.

With the advent, though, of the dull-emitter, other filament materials than pure tungsten enabled the length to be increased, so much that the "cylindrical" construction was superseded by the "flat" or so-called "elliptical" type of grid and anode. Even with this improvement the most that could be done with a thoriated tungsten filament was to make a single loop.

The P.M. Series

In the P.M. series of valves, manufactured by the Mullard Radio Valve Company, the filament has as many as four "limbs," thus providing up to three times the normal length of filament, with a corresponding increase in performance compared with most modern dull-emitter types our photographic heading illustrates. Fig. 10 shows the general P.M. construction.

The amount of electron emission from

a valve will maintain its electrical characteristics at a constant value throughout its life, it is most important that the electrodes (grid, plate and filament) should be incapable of moving relatively to one another. With the "cantilever" system, in which all the electrodes are supported at the far end of the soft nickel rods secured into the glass pinch at one end, there is a danger that the whole system will bend over. This weakness is overcome in the P.M.

valves by mounting the electrodes horizontally. Both grid and anode are held rigidly and independently at both ends by short supports of hard nickel alloy. The rigidity and strength of the P.M. assembly are well illustrated by Figs. 2 and 5, which are photographs of standard assemblies. In Fig. 5 the anode is seen carrying a load of 24 oz. In Fig. 2 the filament of a P.M. valve, which has been run for 1,000 hours, is seen carrying a load of 6 oz. One filament support was merely detached from its glass foot and attached to the load; thus the filament which is taking the whole of the load is shown to be strong and ductile. After the equivalent of about 2,000 hours' normal use a P.M. filament can be knotted as shown in Fig. 3.

The filament of a valve will expand when heated to an extent depending upon the temperature, which in the case of the P.M. is so low that no sign of glow can be discerned. In addition, the filament is set around strong resilient hooks in a special way, so that it is entirely free from possibility of displacement during the long life of the valve. This effectively avoids the sagging of the filament towards the grid.

The uniformity of characteristics yielded by the application of the above-mentioned principles to the manufacture of the P.M. valve is well illustrated by the "target diagram" (Fig. 9, p. 450). These are the test results of a batch of valves taken quite at random from stock, and it is seen how



Fig. 2.—An Experiment in which the Filament of a P.M. Valve Supports a 6 oz. Load.

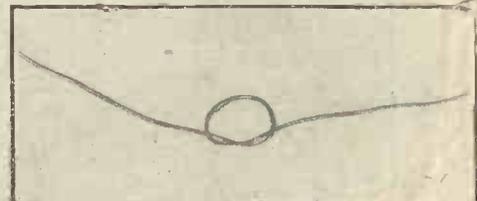


Fig. 3.—Knotting of P.M. Filament is Possible after 2,000 hours' Use.

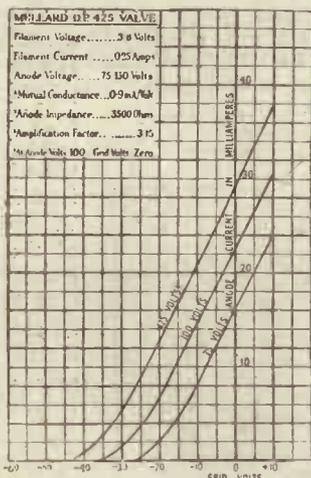
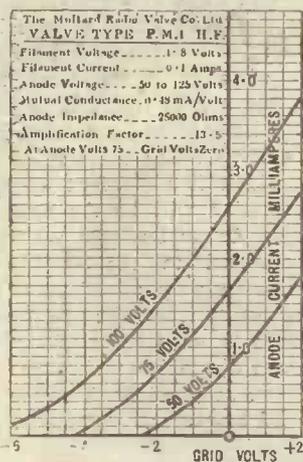


Fig. 1.—Characteristic Curves of Mullard Valves, the P.M.1 H.F. and D.P. 425.

such a filament as the P.M. is greatest from the centre portion of each "limb," and decreases towards the ends, somewhat as shown in Fig. 7 (p. 450).

If the centre portions of the filament are well covered by the grid few electrons will be able to pass from the filament to the anode without coming under the influence of the grid.

For efficient working and in order that

closely the individual valves cluster around the standard values of "amplification factor" and impedance to which the valves are made. This uniformity of character-

nd DEVELOPMENT

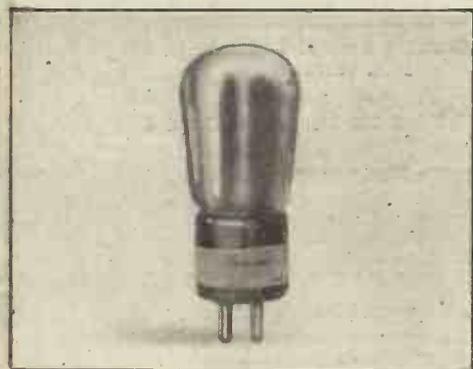
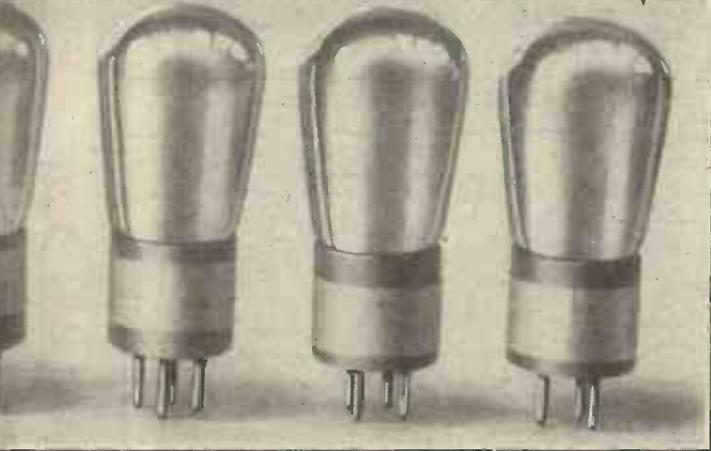


Fig. 4.—Photograph of D.P.425.



Fig. 5.—An Experiment in which the Anode of a P.M. Valve Sustained a Pressure of 24 oz.

istics is, of course, of great value when valves are required for superheterodyne and similar sets where formerly valves had to be specially matched.

Choice of Valves

There seems to be considerable doubt amongst amateurs as to what type of valve he should use for a particular purpose. One hears that such and such a valve, which is really intended for H.F. amplification, gives excellent results as a low-frequency amplifier, and in some cases it does, but not in all cases. This is apt to be confusing, and the following advice should help to clear matters up.

First of all we give a table showing the complete range

of P.M. valves (see Fig. 8), after which we will describe how some valves may be employed with advantage for other purposes than those for which they are principally intended.

Naturally, the standards of amplification factor and impedance are determined by the type of work which the valves will be called upon to do. In the case of high-frequency amplification the chief requirement is high amplification factor consistent with reasonable impedance, say 20,000 ohms.

By special design of grid, the amplification factor of the P.M.5 valve (intended for H.F. amplification) is made 17.5, while retaining the comparatively low impedance of 19,000 ohms. This valve is very efficient as an H.F. amplifier, an overall voltage magnification of 15 times per stage (which is good for H.F. amplification) being easily possible.

The P.M.6, on the other hand, which is designed primarily for power amplification and general L.F. transformer amplification where signal strength is considerable, has an impedance of 5,700 ohms, and will deal with signal amplitudes as great as 6 volts without distortion, which, combined with an amplification factor of over 7, enables the P.M.6 to give very considerable power output to a loud-speaker.

The factors deciding the choice of a valve for an L.F. transformer-coupled amplifier are the primary impedance of the transformer and the nature of the signal. In some cases it will pay to use a valve

like the P.M.5 for the first stage of an L.F. amplifier, as considerable voltage amplification will be obtained, but it must always be remembered that a valve with high amplification factor *cannot* deal effectively with loud signals, and disastrous distortion will result if any but comparatively feeble signals are applied to the grid of a valve like the P.M.5.

It is always safe to use the P.M.6 in an L.F. amplifier whatever the signal strength, a high ratio transformer (5:1) being employed with advantage with this valve. When a valve has to be selected for the function of detector in a set, then the presence or otherwise of H.F. amplifiers must be considered. If there is no H.F. amplification, or one stage only on a small aerial, then the signals passed to the detector will not be very strong, and the higher impedance valves will be more useful: P.M.5 (19,000 ohms), P.M.3 (16,000 ohms), P.M. (28,000 ohms); otherwise the P.M.6 (5,700 ohms), P.M.4 (7,000 ohms), or P.M.2 (8,750 ohms) should be used. In any case the grid leak should be connected directly to the filament *positive* for really efficient leaky-grid rectification.

With "resistance-capacity" coupling in either H.F. or L.F. amplifiers high impedance valves should *always* be used except for the last stage, which must be a low-impedance power amplifier.

Valve Developments

The development of the valve is never at a standstill. Even at the time of writing we are supplied with the latest

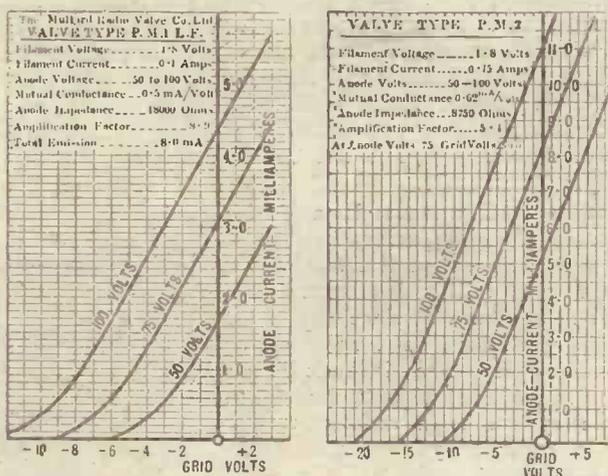


Fig. 6.—Characteristic Curves of Mullard Valves, the P.M.1 L.F. and P.M.2.

product of the Mullard factory, the new dull-emitter power valve named the D.P.425 (Fig. 4). This valve is designed for use with loud-speakers, and has a very low impedance—3,500 ohms—and a large "grid base." The "grid base" of a valve is indicated by the projected length of the straight portion of the characteristic curve to the left of the zero grid volts line.

To make this clear a glance at the

curves of the D.P.425 valve will show that the straight portion of the 125-volt curve to the left of the vertical zero grid voltage line lies between 0 and -30 grid volts. The "grid base" is therefore 30 volts. With a negative grid bias of 15 volts the voltage of the signals on the grid of the valve can swing 15 volts either side without producing distortion. It will thus be seen that the valve is capable of dealing with very strong signals, and is therefore very suitable as the last valve of a multi-valve receiver.

The improvement in purity of reproduction, due to the larger grid base of the

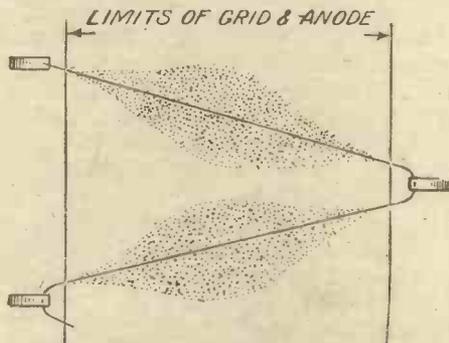


Fig. 7.—Diagram showing Distribution of Electron Emission.

Type.	Fil. Voltage.	Fil. Current.	Impedance.	Amp. Factor.	Mutual Conductance.	Purpose.
P.M.1. H.F.	1.8	.1	28,000	13.5	.48 ma/volt	H.F.
P.M.1. L.F.	1.8	.1	18,000	8.9	.5 ma/volt	L.F.
P.M.2	1.8	.16	8,750	5.4	.62 ma/volt	L.F.
P.M.3	3-4	.1	16,000	13.5	.86 ma/volt	H.F., L.F.
P.M.4	3-7	.1	7,000	7	1.0 ma/volt	L.F.
P.M.5	6	.1	19,000	17.5	.94 ma/volt	H.F.
P.M.6	6	.1	3,700	7.1	1.25 ma/volt	L.F.

Fig. 8.—Table showing Range of P.M. Valves.

D.P.425 than the average power valve, does not involve an excessive power in the filament, which requires only .25 amperes at 3.8 volts. The anode voltage required lies between 50 to 150 volts, the amplification factor 3.15, mutual conduct-

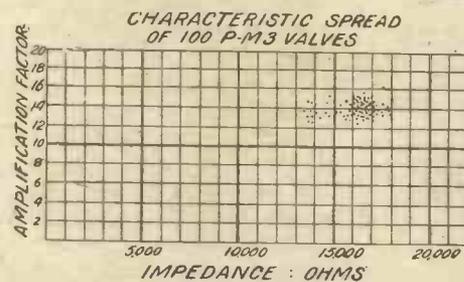


Fig. 9.—Target Diagram showing Test Results of Batch of P.M. Valves.

ance .9 milliamps per volt, and the total emission 50 milliamps.

The characteristic curves of the P.M.1 H.F. and D.P.425, the P.M.1 L.F. and P.M.2 are shown in Figs. 1 and 6 respectively.

In conclusion, we may add that for a considerable time we have been using some of the P.M. series of valves. We have found them to give excellent results, and they have the added advantage that their life is almost infinite. The external finish is all that could be desired.

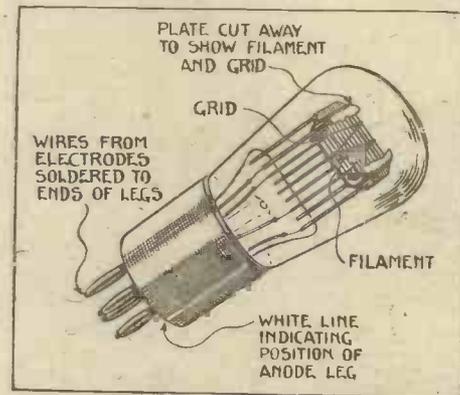


Fig. 10.—Showing General Construction of P.M. Valves.

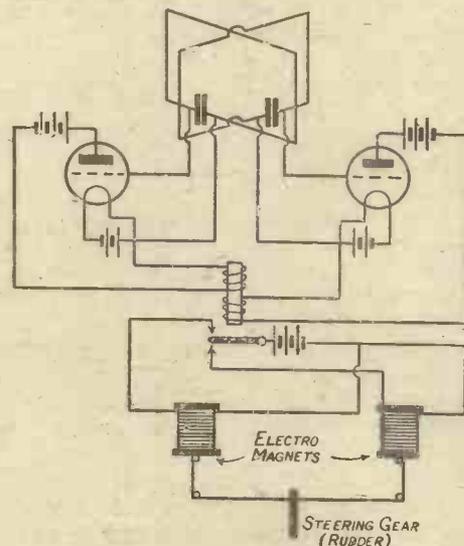
THE RADIO STATHMOMETER

POSSIBLY the greatest exponent of the science of radiodynamics is Mr. John Hayes Hammond, junr. Mr. Hammond holds more than two hundred patents for various wireless control systems, all of which show the imagination and foresight which he must possess. Radio control is a most interesting branch of wireless, and the system discussed here is one of Mr. John Hayes Hammond's.

The radio stathmometer is a device which would alarm an enemy in time of warfare to such an extent that they would very soon turn tail and retreat. The system is somewhat old, since the major part of the work done on it was eight or nine years ago. The invention was originally to fulfil two objects, namely, to apply the system to a radio-controlled torpedo in order to prevent the enemy from interfering (by radio) with the course of the torpedo. Should the enemy ship attempt to interfere, the torpedo would immediately turn round and face the source of interference and so destroy the enemy ship.

The other object was to effect the turning of the torpedo on to an enemy ship showing a searchlight at night. For example, suppose the beam of the searchlight strikes the torpedo, the latter will immediately turn and follow up the beam of light and eventually destroy its origin, namely, the enemy ship.

The apparatus consists of two frame aerials at right-angles to each other. The oscillations collected by the frame aerials from the controlling ship pass through two valves, which in turn actuate relays work-



Circuit Diagram of Stathmometer.

ing the steering gear. Now as the two frame aerials are at right angles to one another, it is evident that another radio wave, say on the right of the torpedo, would only have effect on one of the

frames. This would mean that only one valve would operate its relay, which in turn would affect the steering-gear in such a manner as to bring the torpedo round to the direction of its source. When the position was reached in which the torpedo was in direct line with the source of the interfering wave, the effect on the two frames would be equal, thereby equalising the controlling effect on both the relays, so the torpedo would go ahead in a straight line eventually to destroy the ship producing the interference.

Reference to the circuit diagram will render the explanation easier to understand. In the case of the system operating at night and responding to light rays, a somewhat different arrangement is used employing selenium cells. Such a device as this will possibly be one of the many wonderful electrical and mechanical contrivances that will be used in the wars to come.

D. B.

At a recent industrial exhibition held at Novisad (Neusatz, Hungary), situated about 50 miles north-west of Belgrade, a few enthusiastic amateurs erected a small temporary broadcasting station from which concerts were given and transmitted with a power of 15 watts on a wavelength of 520 metres. It is now proposed to erect a permanent station to serve that district.

HOW TO READ A CIRCUIT DIAGRAM

The "Wiring Diagram" and
"Circuit Diagram" Compared

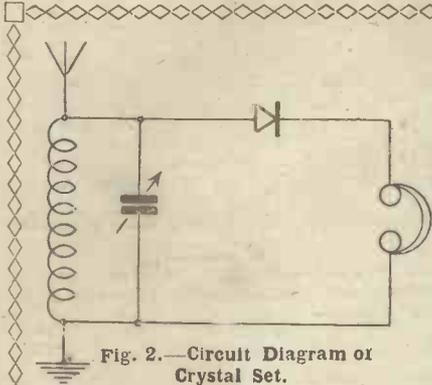


Fig. 2.—Circuit Diagram of Crystal Set.

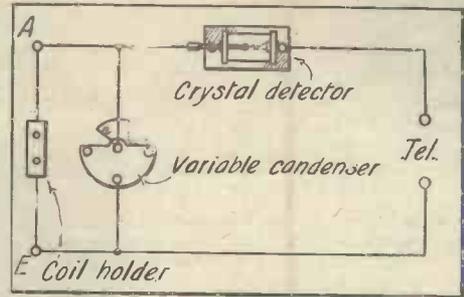


Fig. 1.—Crystal Set Back-of-panel Wiring.

THERE is a great dividing line which every amateur must pass before he can claim to have emerged from the "beginner" stage. Any novice, having bought the components for a set, can connect up the various pieces of apparatus from a wiring diagram or back-of-panel plan. The ability to read and work from circuit diagrams marks a distinct step forward in the progress of an amateur towards the "expert" class.

First of all let us see what is the objection to the wiring diagram. This shows clearly the positions of the components in the set and the way in which they are connected up. But it is a trouble to have to draw full plans of the back of the set on every occasion. It is much easier to make use of what might be described as "shorthand signs" to represent the different components. As long as the signs or symbols are sufficiently distinctive and are easy to memorise, they will be just as good as pictures or plans and will take much less time to draw.

Again, it is sometimes desirable to be able to show quickly, by means of paper and pencil, just how the set in question works. This a wiring diagram cannot do. For if two sets are built using the same components connected up in the same order, but with entirely different "layouts," the wiring diagrams will bear very little resemblance one to the other, although the two sets will function alike.

Then a plan view of a set is not always very clear. It may be that one component is mounted above another, or that, for

some reason, a few of the parts have to be crowded closely together. It would surely call for no very great stretch of imagination to enable a beginner to wire up such a set from a diagram which did not give the exact positions of the components, but showed them more widely spaced, and all on the same plane.

If we take this latter arrangement and substitute for the pictures or plans of the components the "shorthand" symbols, the result is a circuit diagram. This, as it takes no notice of the actual positions of the components in the set, will hold good for any set in which the various parts are wired up in the same way.

Of course the symbols which are to represent the components must be learnt off by heart. But this is a simple matter. The sign for a coil or inductance, for instance, is easily recognisable, being merely a "picture" of a few turns of wire. The condenser sign shows two metal plates placed parallel to each other and seen edgewise.

Just to show that it is as easy to read a circuit diagram as it is to follow a wiring plan, the wiring and circuit diagrams of two sets are given as examples.

Fig. 1 is a back-of-panel wiring diagram of a simple crystal set in which tuning is accomplished by means of a variable condenser in parallel with a plug-in coil. Anyone, of course, could follow this diagram. The circuit diagram of the same set, given in Fig. 2, shows exactly the same thing, but symbols are used to represent the components.

Instead of a terminal marked "A," the sign for aerial is used. The earth terminal is replaced by the earth sign, the variable condenser by the two parallel lines with the arrow through them, etc. The connections are shown, as in the wiring diagram, merely by lines.

The other set dealt with is somewhat more elaborate. Two valves are employed as detector and L.F. amplifier respectively, reaction being introduced from the detector plate circuit.

Comparing the wiring diagram (Fig. 3) with the circuit diagram (Fig. 4), it is very easy to see that they both refer to the same set.

Now, in both the cases used as examples care has been taken to see that the actual leads used in wiring up correspond. This has been done for the sake of making the illustration more clear. For the same reason the components and signs have been made to occupy the same relative positions in both cases. But it should be understood that in the second set, for instance, where O.P. is joined to H.T. positive, and one of the phone terminals to the lead which connects the other two points, it would not matter if this order were altered in either wiring or circuit diagram. Thus O.P. could be connected direct to the telephone terminal, which, in turn, could be joined to H.T. positive. Or the telephone terminal could be connected to H.T. positive and O.P. to the telephone terminal, H.T. positive or to the lead which connects these two points.

J. F. J.

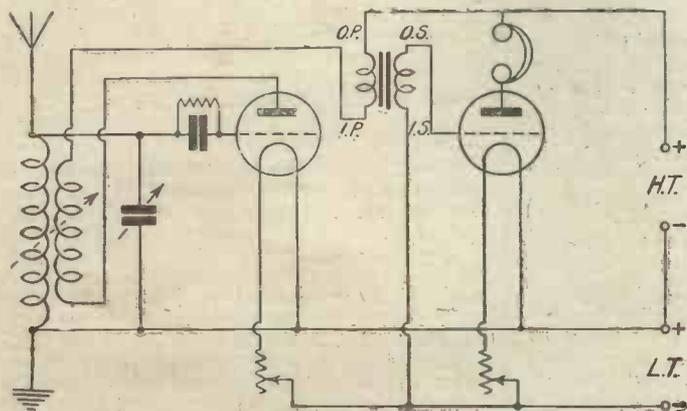


Fig. 4.—Circuit Diagram of Two-valve Set.

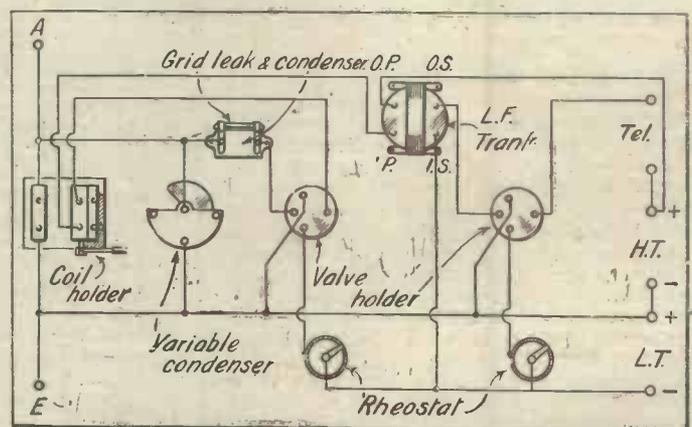
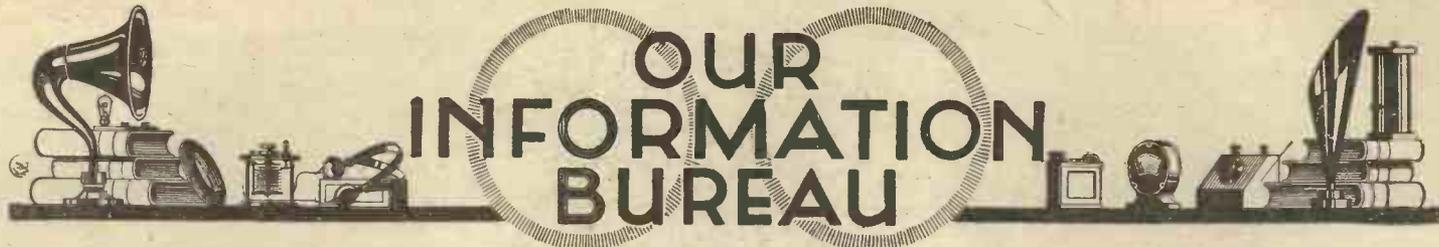


Fig. 3.—Wiring Diagram of Two-valve Set.



RULES.—Please write distinctly and keep to the point. We reply promptly by post. Please give all necessary details. Ask one question at a time to ensure a prompt reply, and please put sketches, layouts, diagrams, etc., on separate sheets containing your name and address. Always send stamped, addressed envelope and attach Coupon (p. 468).

"Plate" and "Grid."

Q.—Why are the "plate" and "grid" of the valve so called? The terms do not seem very appropriate.—K. D. (Sussex).

A.—Although perhaps not very appropriate at the present day, the construction of these two electrodes in the early valves amply justified the application of the terms you mention. The "plate" was simply a flat metal plate placed near the filament, while the "grid" was a wire mesh or grid placed between filament and plate.—J. F. J.

Transformer for H.T. Rectifier.

Q.—I intend to make up the small rectifier described in "A.W." No. 220, but have no details of a suitable step-down transformer. Can you tell me where it is possible to obtain a double-secondary transformer? I wish to have two secondary windings, one to supply H.T. current and the other to supply current for lighting the rectifier valve filaments.—H. S. (Southport).

A.—A home-made transformer is used in the actual rectifier described, and full constructional details of this component will be given in an early issue of "A.W." Complete transformers suitable for the H.T. unit are supplied by Messrs. Climax Radio Electric, Ltd., of Quill Works, Putney. This firm supplies transformers having two secondaries, one of which may be used for filament lighting. Transformers are supplied for two voltage ranges, 100 to 150 volts and 200 to 250 volts, 50 cycles.—K. U.

Vulcanised Fibre for Panels.

Q.—How does the insulation resistance of vulcanised fibre compare with that of ebonite? As vulcanised fibre is so much cheaper than ebonite, could it be used to replace this for the panel of a wireless receiver?—B. W. R. (Northampton).

A.—Ebonite is at all times the better insulator of the two substances you mention. However, the insulation resistance of vulcanised fibre, when perfectly dry, is high enough for use in a wireless receiver which does not employ H.F. amplification. But the fibre is highly hygroscopic, which means that it is capable of absorbing a considerable quantity of moisture from the atmosphere, which greatly impairs its qualities as an insulator. It should also be taken into account that ebonite is far easier to work and less liable to warp than vulcanised fibre.—B.

Aerial and Earth Connections.

Q.—I know that both a good aerial and a good earth are necessary for best reception, but which of the two is really the more important?—O. R. T. (Essex).

A.—No general answer could be given to this question, as some sets might work better with a good aerial and poor earth than with a poor aerial and good earth, while other sets might behave differently. Actually, both aerial and earth are parts of the same circuit, and full efficiency cannot be obtained if one or the other of these is poor. It is possible, however, to have so bad an earth connection that the set appears to work better without an earth. Usually in an amateur system it is the earth connection which requires most attention.—R. B.

OUR INFORMATION BUREAU

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"AMATEUR WIRELESS"
(usual price 3d.) will be
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This is just the first of two booklets to be devoted to this subject, and you should look for an early announcement with regard to the second one.

These booklets will tell in simple language everything necessary for broadcast reception. Some three years ago we published a book under a similar title, but that is now out of date. Will you note that we have not just revised it; we have placed it on one side and written an entirely fresh book which will interest our regular readers and be a particular attraction to all wireless beginners. A very special effort has been made to make the text intelligible to anybody who has the slightest interest in wireless.

The reader should ensure at once that he will get next week's copy of "Amateur Wireless" containing our free gift and he can only do that by ordering it. Further, will he do us one kindness: will he tell his friends, particularly those who are beginners in wireless and want to understand the "whys and wherefors" of their sets, of this free booklet. Next week's "Amateur Wireless" is a great opportunity for the new reader! The issue itself will be more than usually interesting, and we promise that the booklet will come up to every expectation.

**NEXT WEEK'S ISSUE
WITH FREE BOOKLET**
Order It : Tell Your Friends

Tuning Reaction Coil.

Q.—Is there any advantage to be derived from tuning the reaction coil by means of a small variable condenser connected across it?—T. O. R. (Manchester).

A.—Theoretically there is some advantage in tuning the plate circuit of a detector valve to the signals being received, but it is very doubtful whether there is any practical advantage in so doing. For instance, it would usually be impossible to tune the detector plate circuit exactly to the incoming signals, as oscillation would be liable to set in when the tuning was nearly accomplished. However, it is claimed by some that a small variable condenser across the reaction coil provides an easy means of adjusting the amount of reaction used after the magnetic reaction coupling has been roughly adjusted.—J. F. J.

Erecting a Counterpoise.

Q.—I am at present using a buried plate as the earth connection, but wish to erect a counterpoise instead. Can you give me any hints as to how to make the counterpoise as efficient as possible?—N. B. (Lichfield).

A.—It is not much use trying to put up a good counterpoise unless plenty of space is available beneath the aerial. The counterpoise should consist of a number of wires all of the same length and spaced at equal distances. These wires may either be arranged parallel to each other or, better still, spread out fanwise. If this latter method of arrangement is adopted the wires should be brought together at the house end. In either case all the wires are to be connected together at the end nearest the set and are to be joined to the earth terminal on the set. The counterpoise should be situated directly beneath the aerial, beyond the end of which it should extend for a short distance. The counterpoise must be erected as near to the ground as is convenient, as raising the counterpoise reduces the effective height of the aerial.—J. F. J.

Power Amplifier.

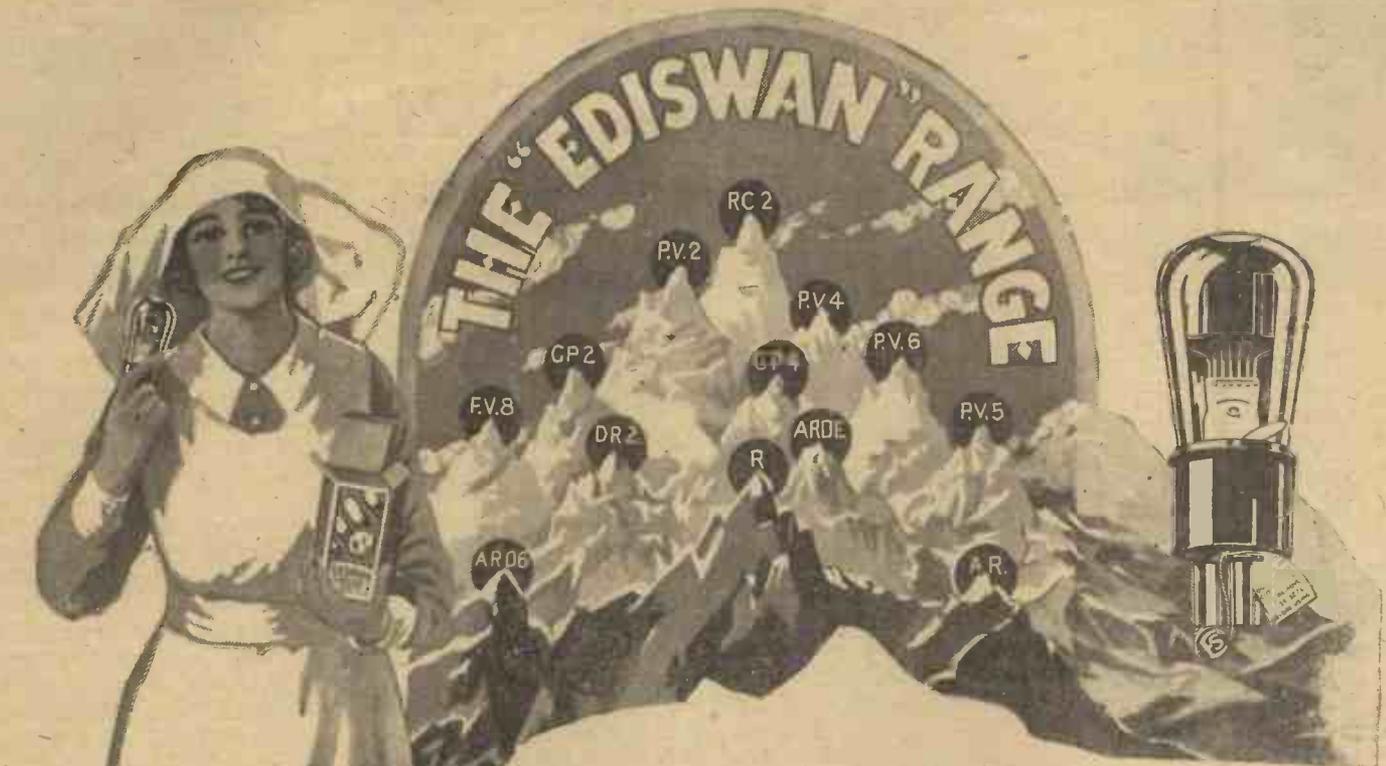
Q.—In what respect does a "power" amplifier differ from an ordinary L.F. amplifier?—M. C. S. (Bournemouth).

A.—There is no difference whatever except that in a power amplifier a larger valve than that ordinarily used for reception is employed, together with suitable H.T. and G.B. voltages. This enables a greater amount of power to be handled by the amplifier, without distortion, than would otherwise be the case.—B.

Variometer Windings.

Q.—When making variometers, should the total number of turns be evenly distributed between the two windings or not?—K. C. (Dundee).

A.—The same number of turns should not be put on each of the windings. There should be slightly more turns on the smaller coil (the rotor) than there are on the larger coil (the stator). The reason for doing this is that it is desirable to have half the total inductance contained in each coil. As the inductance of a coil increases with the diameter of the turns, other things being equal, more turns will be required on the smaller coil.—B.



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		*R.C.2	P.V.6 (1-Watt)

*The anode resistance used should not be less than 1-5 megohms.

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R.	4	8/-	P.V.4	18/6
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NR.2



Maurice Cole

NEXT WEEK AT 2LO

By "THE LISTENER"



Cedric Sharpe

ON Sunday afternoon the Wireless Orchestra and Chorus, conducted by Stanford Robinson, will be heard, and a special performance of a play by Mr. G. J. Vaughan Emmett, entitled *St. Francis d'Assisi*, will be given. As this year is the seventh centenary of the saint, the inclusion may be considered appropriate.

A Hymn Festival Service will be broadcast from Chester Cathedral to 2LO and 5XX from 8.0 to 8.55. The service will be conducted by Sir H. Walford Davies, and the address will be given by the Rt. Rev. Dr. Henry Luke Paget, Bishop of Chester. The Sunday appeal will be by the Rt. Hon. Lord Riddell. The evening concert includes popular artistes, such as Arthur Catterall, violinist; Norman Allin, of the B.N.O.C.; and Bella Baillie.

The pianist for the week for the special recitals is Maurice Cole.

On Monday during the day will be heard E. Kaye Robinson, A. P. Gayford, James Agate, and Sir Walter Morley Fletcher amongst the speakers. Light music will be provided by the R.A.C. Dance Bands and Alex Fryer's Orchestra from the Rialto. In the evening will be heard the noted 'cellist, Cedric Sharpe; Plunket Greene; and the Wireless Chorus under Stanford Robinson.

Tuesday presents considerable contrasts. In the afternoon Sir H. Walford Davies will transmit to schools; later will follow the bands of William Hodgson at the Marble Arch Pavilion and the London Radio Dance Band under Sidney Firman. The speakers include Dame Henrietta Barnett. On the lighter side will be heard

Ronald Gourley, the blind entertainer, followed by a performance by the Hungarian String Quartet, with Maria Basilides as vocalist, and a special feature recital of songs by Dale Smith.

Three popular light orchestras will be heard on Wednesday, Camille Couturier's at Frascati's, Reginald Foort from the New Gallery, and Alex Fryer's from the Rialto. A. Bonnet Laird will reappear, and Mr. R. A. Watson Watt and Dr. Saleeby are amongst the speakers, as well as Sir Oliver Lodge. Early in the evening will be heard the late Harold Chapin's play *Augustus in Search of a Father*. This made its first appearance in March, 1910, filling a triple bill with G. B. Shaw's *Man of Destiny* and *How He Lied to Her Husband*. The cast at 2LO includes Ashton Pearce, Fred Grove and Alan Howland. Then will follow a musical section by the Wireless Orchestra, with Doris Vane and Howard Rose as vocalists. At 10.15 p.m. a variety programme will include Florence Marks, late of the Abbey Theatre, Dublin. She specialises in Irishry, in song and verse. Other artistes will be Pauline and Diana, Harry Merryless, a Scots comedian and a newcomer to the microphone, and the popular cross-patter comedians, Clapham and Dwyer.

Two feminine speakers on Thursday are Mrs. E. Fielder Hodgson and Ann Spice. The London Radio Dance Band and the Geoffrey Goodhart Sextet will form agreeable contrasts, with Olive Kavann as vocalist. At 10.15 a variety feature will be provided by Miss Ella Retford, who will give selections from her repertoire.

On Thursday again we have one of the

best cinema bands which broadcast, that of Frank Westfield, from the Prince of Wales, Lewisham. The speakers during the day include M. Stéphan, G. A. Atkinson, the film critic, the Rev. P. Maryon Wilson, and Lady Rosalie Neish, the novelist. We are also to have some music, the Wireless Symphony Orchestra, under G. O'Connor Morris, with William Primrose, violinist, and Sydney Northcote, tenor, assisting.

At 8 o'clock on Friday the second Radio Tournament will be given by Amyas Young. It will be similar to that of last year, though two new items will be introduced in the form of the Interport Field Gun Competition, Royal Navy and Desert Warfare, introducing armoured cars and tanks. Special sound effects have been devised so that, although the production is being carried out in the studio, the listeners should have very vivid ideas of the real thing. The conversation of "a boy and girl in the street" will give clues to the items as they appear.

Mrs. Marion Cran, who has recently returned from a long tour, will speak on Saturday, and Mr. Basil Matthews. Mr. John Ansell will also conduct the 2LO Military Band. Later will be heard the London Repertory Players and the Wireless Chorus, followed by the Second Battalion of the Scots Guards. Then comes the Acton Cadets, also Mr. R. E. Jeffrey, T. C. Sterndale Bennett in some of his songs at the piano, and the Westminster Singers.

Commencing also on Saturday, October 9, a monthly survey of Reviews will be given from London and Daventry by Mr. J. W. Robertson Scott.

H.T. BATTERIES

NEVER use a run-down H.T. battery from a misguided sense of economy, as this results in crackling and disturbing noises in the receiver when in operation. A battery often runs down in sections—that is to say, some cells are quite good, while others are completely run out. Each tapping should therefore be tested with a voltmeter in order to ascertain where the dead cells are.

If a voltmeter is not at hand, the test may be carried out with a small flash-lamp bulb. Where dead cells are found, they should be shorted by means of a piece of wire. Incidentally the life of a high-tension battery is prolonged by the use of large-capacity fixed condensers across each

tapping from the receiver; such condensers should be in the neighbourhood of 2 microfarads capacity each. These components also prevent parasitic noises which emanate from the high-tension battery.

H. B.

The new Danzig broadcasting station formally opened on September 20 last. Apart from time signals, weather reports, market quotations and news bulletins, it relays its daily entertainment from Königsberg. Broadcasts are effected on a wavelength of 272.7 metres.

An attempt will be made on October 9 to portray by sound effect the Inter-Port Field Gun Competition by the Royal Navy.

FLEX CONNECTIONS

A GOOD idea is to have flex connections to most units of the four terminal type, such as resistance-coupled units, choke-coupled units, L.F. and H.F. transformer units. The idea of this is to make the interchanging of these sections of the circuit a simple matter.

For instance, if we have an L.F. transformer in a set to which flexible leads are taken, it is a simple matter to substitute for this component a choke-coupled unit or a resistance-coupled unit. In addition to this, it is possible to transpose the order of the amplifying units.

H. B.

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

THE CHOICE OF EXPERTS—

and all discriminating amateurs

Look through your copies of the leading radio journals, notice how often

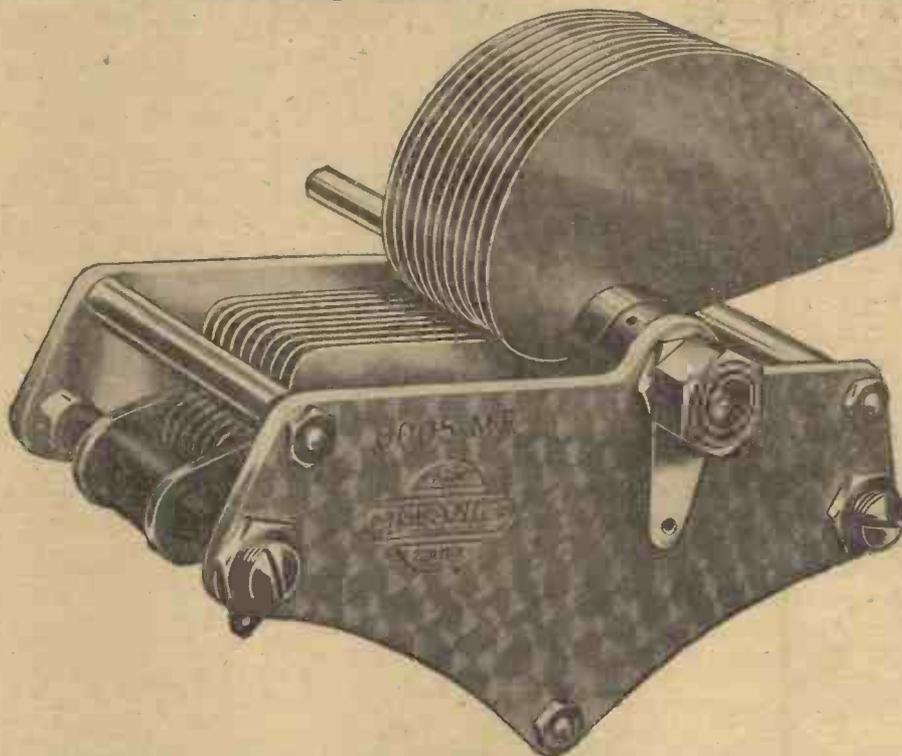
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AUTO-CHOKE
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COMMENCING on Saturday, October 9, Mr. J. W. Robertson Scott will broadcast from London and Daventry a monthly survey of reviews.

A Radio Tournament, similar to the Tattoo which was broadcast from 2LO last November, will be repeated on October 9. The evolutions and presence of the detachments taking part in the display will be suggested solely by sound effects.

Between October 3 and 9 Manchester will hold its Civic Week, during which period the B.B.C. stations will co-operate in the productions to be staged in that city.

In commemoration of the seventh centenary of the death of St. Francis of Assisi on October 3, a play from the pen of Mr. G. J. Vaughan Emmett will be broadcast from 2LO and other stations.

A short play entitled *Augustus in Search of a Father*, written by Mr. Harold Chapin, an author killed during the war, is to be broadcast from 2LO on October 6.

Both Cardiff and Daventry will relay the Swansea National Eisteddfod on

Monday, October 4, when the winners of the competitions will be heard.

The first all-wireless exhibition to be seen in Birmingham will be held under the auspices of the *Birmingham Weekly Post* in the Drill Hall, Thorp Street, from Tuesday, October 5, to Saturday, October 16, both dates inclusive.

In the opinion of the B.B.C. women cannot become efficient radio announcers. They state that they have found that women are temperamentally less suitable than men, and the heavy physical strain imposed on the announcer is greater than could be borne by the average woman.

The Radio Transmitters' Union of Northern Ireland has been formed as a body which will concentrate upon purely local affairs. The members are required to qualify by being members of the T. and R. section of the Radio Society of Great Britain.

In the cause of charity the Glasgow station orchestra is giving a symphony concert in the Usher Hall, Edinburgh, on October 8. The interchange of station resources in this way is a growing and encouraging feature of Scottish broad-

casting. The artists at the concert are Miss Dorothy Silk, soprano, and Solomon, the pianist.

Sir Oliver Lodge, whose series of popular scientific talks were so much appreciated by listeners last season, has arranged to broadcast another series beginning on October 6. His general subject will be "Atoms and Worlds."

The Nijni Novgorod Radio Laboratory, under the call sign RRP, is now operating a new beam transmitter.

Several thousands of soldiers who should have been sleeping on the heather-clad Devil's Punchbowl at Hindhead, Surrey, listened to London's broadcast music recently on army wireless sets.

A competition programme, when prizes will be offered, will be given from London and the high-power station on October 18. Photographs of those taking part will be published in the *Radio Times*, and listeners will be asked to identify them from their voices.

An experimental station for both wireless telephony and telegraphy has been recently inaugurated at Tokio (Japan). Under the call sign J1PP it transmits on a power of 1 kilowatt, and frequently relays the JOAK Tokio official broadcasting programmes on alternately 20- and 35-metres wavelength.

The Cape Town broadcasting station emits a tuning signal in every way similar to that given out by 2LO.

According to reports received from Italy, the old Rome transmitter is in course of transference to Naples, where it is being re-erected at Capo di Posillipo. Although the wavelength on which it will definitely operate is that of 333.3 metres, it is possible that, unless by the time the early tests are being effected the full new scheme of European wavelengths has come into operation, experiments will be made on 352 metres. The studio, which is situated on the fifth floor of the Pantalea Palace at Santa Lucia, is already being equipped. The Italian Broadcasting Company also has under consideration the erection of broadcasting stations at Palermo, Genoa, Turin, Venice and Trieste, for which wavelengths have already been allotted by the Geneva Bureau.

Mr. Percy Pitt is to conduct the first of a monthly series of symphony concerts, organised by the B.B.C., which are to take place in Glasgow's largest hall. World-famous artists and a specially augmented orchestra are to take part in these concerts, the first of which will be given on October 28. They will also, of course, be broadcast through 5SC.

A new amateur transmitter, with the call sign NPC2B, has been installed at Delft, Holland. It experiments nightly on 5, 20 and 50 metres.



WIRELESS CONCERT AT AN AERIAL MEETING

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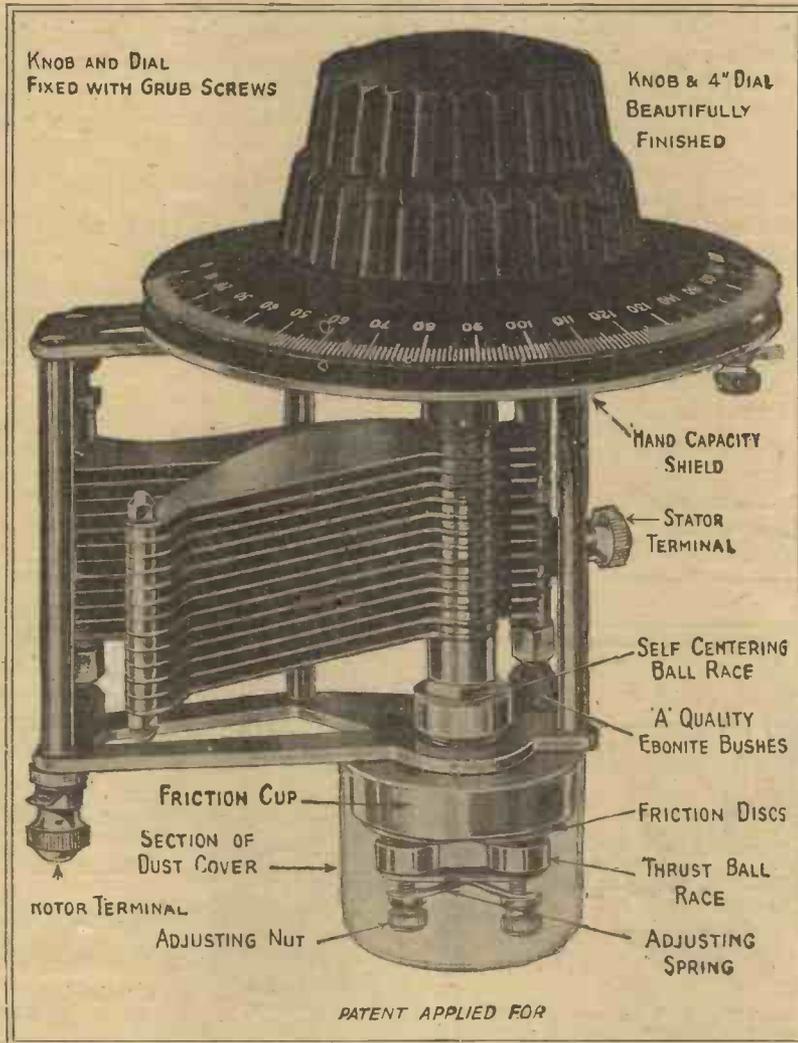
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MORE RADIOGRAMS

ACCORDING to a rumour current in Washington the Ku-Klux-Klan intends to erect a broadcasting station in an Eastern district of the United States.

On September 19 last the Elberfeld broadcasting station celebrated the first anniversary of its birthday.

A Hymn Festival Service will be relayed from Chester Cathedral to 2 L O and 5 X X from 8 to 8.55 p.m. on October 3. It will be conducted by Sir H. Walford Davies, and the address will be given by the Right Rev. the Bishop of Chester.

The 2 L O programme organised in commemoration of Trafalgar Day on October 21 will include a relay from H.M.S. *Victory* at Portsmouth.

In order to meet more adequately the requirements of Scottish farmers, the Board of Agriculture for Scotland has now arranged with the B.B.C. that, instead of a summary of the prices ruling in English and Welsh markets, a summary of the prices obtained by the Department from Scottish markets should be broadcast from all Scottish stations. Helpful suggestions from farmers are invited.

The preliminary work on the construction of the new 60-kilowatt Rhineland transmitter at Langenberg, near Elberfeld, is so far advanced that it is hoped experi-

mental tests may be carried out latest middle December in order that the station may be brought into regular operation during the Christmas holidays. Langenberg utilises a wavelength in the broadcasting band (200-600), and not a high wavelength in the neighbourhood of 2,000 metres, as has been previously stated.

Gounod's *Faust*, conducted by Mr. Percy Pitt, will be given from London on October 15. In the cast will be Mr. Robert Radford, Mr. Howard Williams, and Mr. Parry Jones.

The B.B.C. is to attempt a new method of deciding the problem of the ideal programme. A number of well-known public men, not necessarily connected with the entertainment world, will give, in a series of programmes, their conception of what a broadcast programme should be like.

A luminous signal connected with a wave-meter is to be fitted to the studios of nearly 200 European broadcasting stations when the new wavelengths come into force on October 15. Whenever a station accidentally works on a higher or lower wavelength, a flickering light will warn the engineers. They will then be able to make adjustments to get back to their right wavelength.

Near Aberdeen, Daventry can sometimes be heard clearly, though faint, on a crystal set. Some of the German stations are also occasionally audible.

THE CONTRIBUTION OF SCIENCE TO HUMAN LIFE

WE are asked to draw our readers' attention to a forthcoming series of lectures with the above title, to be held at the Guildhouse, Eccleston Square, London, S.W.1. These lectures, each one of which is in the hands of eminent scientists, are free to all, and no tickets are required. They start on October 3 and continue every Sunday up to and including December 19, from 3.30 to 4.45 p.m.

One lecture which should be of great interest to wireless enthusiasts is to be given by Dr. W. H. Eccles, F.R.S., on *The Influence of Wireless on Modern Life*, the date of which is November 7. A leaflet giving full particulars of the other lectures has been received.

Institute of Wireless Technology.— Meetings of the Institute of Wireless Technology will take place on Wednesday, October 6, and Wednesday, November 10, 1926. The first meeting will be held at the Engineers' Club, Coventry Street, W., at 7 o'clock p.m., and will take the form of a debate, subject, "That it is impossible to obtain absolute purity of tone with a valve detector." The debate will be opened by Mr. Y. W. P. Evans, M.I.R.E., in support of the motion, and Dr. F. T. Fawcett, M.A., Ph.D., D.Sc., against.



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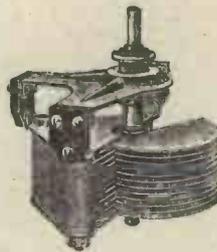
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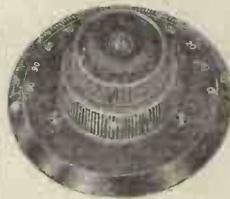


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Made to change over any number of contacts. Design ensures that self-capacity is negligible. Contacts are self-cleaning.

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To most people who knew the R.I. Permanent Mineral Detector in the past, it seemed almost impossible that any further improvement could be added.

After careful experiments, however, R.I. decided that one alteration would be necessary for perfect rectification, and this adjustment has been made to the new season's model.

In the new model, a metal cylinder, in which is cut 10 slots, is fitted to the end of the spring plunger. These slots, which are all of uniform size, are arranged so that they engage with a pin, in 10 different positions, when it is desired to vary the point of contact of the crystals. Immediately contact with the crystals is made, the pin engages in one of the slots, and prevents the crystals being rotated in contact, and thus becoming damaged. At the same time, the mechanism is so arranged that any slot can be selected.

It can be truly said that this detector has absolutely revolutionised the crystal receiver, as it will remain perfectly sensitive for an indefinite period, without re-adjustment.

It is manufactured in two different forms. The ordinary type is provided with a pair of supporting clips for mounting the component. The other form is designed for one-hole fixing, and is provided with a detachable ebonite cover which protects the adjusting knob when in position.

Clip-mounting type, 6/-
One-hole fixing type, 6/6



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Harmonics

SIR,—I think THERMION is in error in No. 222 issue of "A.W.," when he expresses his fear that under the new wavelength scheme the harmonics of 400-600-metre stations will cause heterodyning of 200-300-metre stations. If he looks up the list of proposed new wavelengths published in No. 218, p. 190, he will find that this cannot happen provided stations keep to their proper wavelengths. (This, of course, is the essence of the whole scheme whether harmonics are considered or not.) For instance, let him take Sundsvaal, Sweden, on a frequency of 550 kilocycles or 545.6 metres. The first harmonic of this would be on exactly 1,010 kilocycles or 272.7 metres, and could cause no heterodyning of Cassel, San Sebastian or Norrköping, which share this frequency. Similarly for any other station in the list. The reason, of course, lies in the separation of each station, or group of stations, by exactly 10 kilocycles.

The point he raises about the harmonics of long-wave stations is, however, serious, and I think these stations should be asked to use wavelengths whose harmonics fall exactly on wavelengths used by shorter-wave stations. No interference by these harmonics, in the shape of heterodyning, could then occur.—P. R. B. (Bedford Park).

A New Rectifier Needed

SIR,—I do not think that there can be any question that what is most wanted at the moment is a new method of rectifying oscillatory currents for the purposes of detection. The valve, used in conjunction with a grid condenser and leak, is the most sensitive rectifier known at present, but it is very imperfect from the point of view of fidelity of reproduction. So much so, in fact, that many amateurs are going back to the old-fashioned method of rectifying on one of the bends of the characteristic curve—anode rectification. This is a definite retrograde step, and anode rectification can never become really popular when a more sensitive method of rectifying is available. What is wanted is an entirely new system of rectification, at least as sensitive as the leaky-grid-condenser method, and giving a purity of reproduction not inferior to anode rectification.—D. F. (N.3).

Television for the Amateur

SIR,—Now that television is an accomplished fact, with at least one transmitting station in operation, could you not publish constructional details of the simplest possible television receiver? Readers of your paper would then be able to set up experimental television receiving stations for themselves, and this

should certainly speed up progress in the perfection of the receiving side of this new branch of wireless. There can be little doubt that the present high state of efficiency of telephonic receiving sets is due, in large measure, to amateur efforts.—G. N. (London).

A NOVELTY IN VARIOMETERS

WE regret that an unfortunate error occurs in the above article. The Fig. 6 given on page 249 does not properly belong to the article. The correct Fig. 6 is here given.

As there appears to be some slight difficulty in assembling the instrument, the following hints may help. In order to make a good job the rotor and stator

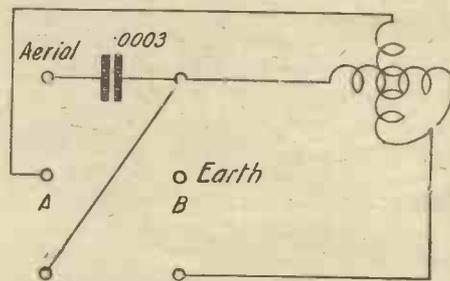


Diagram of Connections for Variometer.

windings should be tied at the diagonals with thread before removal from the former. The wooden supports G are glued to baseboard F and support the stator, which is rigidly secured by means of the brass clips E. This can be easily seen from the photographic view at the head of the article.

The spindle-bracket assembly AB is secured to the rotor by means of the clamp plates C.

The Radolian Company's Converter.

One of our readers, whose initials are H. H. H., has written to the Radolian Company asking for particulars of their converter, and mentioning that he saw it referred to in AMATEUR WIRELESS. The firm cannot send him the particulars he wants because H. H. H. omitted to give his address.

"Cleaning the Gas-cooker" is the title of an article appearing in the current issue of "The Amateur Mechanic and Work" (3d.), and should be of great use to many readers. Other articles appearing in the same issue are: "Adding a Porch to a Cottage," "In the Metal-worker's Shop: A Few Things You Shouldn't Do," "Simple Valve Timing of Motor-car Engine," "A Wall Flap or Folding Table," "Hints and Kinks Illustrated," "Making a Steel Aerial Mast from Scrap," "Restoring an Old Oak Chair," "Field-magnets for Small Electric Motors," "Overhauling Motor-cycle Clutches."

"WIRELESS ADVENTURES ON THE BROADS"
(continued from page 431)

speaker; when one was feeling especially drowsy, in fact, it was almost too loud.

Several other stations also came in at loud-speaker strength. Radio-Paris was just loud enough to be heard if everybody kept quiet; the same applied to London (approximately 105 miles distant).

One evening an operatic transmission came in excellently on the loud-speaker, but unfortunately Bluffy could not identify it. It was certainly not an English station (a glance through the programmes proved that), and from the direction of the frame aerial (approximately N.E. - S.W.) it seemed that it must have been Hamburg.

In half an hour one evening (when the others were so busily occupied that they did not want to listen to the loud-speaker) more than ten different stations were heard by Bluffy, who was listening with a pair of phones; but as the set was not calibrated for the external aerial, and all the British stations were transmitting an S.B. programme, he could not identify any of the signals with accuracy. Indeed, there were so many stations to be heard, and "dial reading" was so difficult in the confines of the cabin, even with the aid of an electric torch (Curly suggested that he looked "like a gas-man trying to inspect a meter in an awkward corner!"), that Bluffy found it impossible to keep count of the number of stations.

Several times Bluffy tried to tune-in Daventry's morning or afternoon programme while the Snipe was under way, but always there was too much interference from the magneto (the boat was "powered" with an 18-h.p. petrol engine). However, it is doubtful, even if reception had been really good, whether any of us would have been sufficiently energetic to turn the frame as we went round each bend of the river.

On two occasions the outfit was used to provide entertainment for others besides the crew of the Snipe—once accidentally and once intentionally. The first occasion was on a Sunday afternoon, when the Snipe was moored along the quayside at Yarmouth.

Bluffy had brought the set out on deck, and the afternoon programme from Daventry was coming in at good strength. Quite soon a respectable-sized crowd had gathered to listen to what was, perhaps, for Norfolk people, a novelty.

The second occasion was an evening spent in a small inn close by Hickling Broad. Besides the local habitués there were present quite a number of yachting folk; all appreciated the programme—except for some speeches and a talk!

In conclusion, there are two facts worth putting on record: Firstly, although the Snipe cruised every day, and moored at a different place each night, the setting of the aerial for the reception of Daventry was always the same relative to the boat. Secondly, the writer of this article is BLUFFY.

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TERMINALS, complete, Brass Pillar, VO Phone, 1d. Ni ke, 3 for 4d. Studs, top pins 2 a 1d. Nickel, 4 for 3d. screwed spacers or pins 2 for 1d. Nickel, 1d. Tags, 6 a 1d. Nickel, 1 a 1d.
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LISSEN Loud Spa or U-t, 13/6; H.F. or L.F. Choke, 10/-; 2-centi meter, 2/6; Coils, all at cost. List Price.

DR. NESPER L.S. Unit, 15/11; r. Nesper I.S. "Grande", 37/6. 4,000 ohms.

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Grand Value in NON-MICROPHONIC VALVE HOLDERS. Board Mounting, 1/6.

SUNDRIES. Newer 2-way geared coil-stand, 6/6. 4-point condenser, 17/6, 15/-, "R.I." New Type Aerial Tuner, 39/6. Gambrell Neutrovania, 5/6. Voltmeters, 1/10c. Readme, 7/3. H.F. Transformer: all wavelets: this, Magnum, 7/-, Strada, 6/6. Bowyer-Lowe, 7/-, McMichael, 10/-, 12/6, Var. Grid Leaks, Bretwood, 3/-, Watmel, 2/6, Anodes B, 3/-, W., 3/6.

LOW LOSS SQUARE LAW. This variable Condenser is simply marvellous value. It cannot be equalled in price or quality.

Post 6d. set. Vernier 1/- each extra.

CHOKES—Cosmos H.F. 6/6; Lissen H.F. or L.F. 10/- each; 150 volt, F. or H.F. 10/- ea. A.J.S. 15/- with unit 20/-; R.I. Multi Ratio, L.F. 27/6, standard Model 25/-.

ORDERS BY POST MUST BE ACCOMPANIED BY SUFFICIENT T.V. POSTAL CHARGES.

Ormond Products. SQUARE LAW LOW-LOSS. 0005, 9/6, 0003, 8/6 (1/8 each 10/- to vendor). FRICTION GEARED, 0005, 15/6, 0004, 14/6; 0005, 13/6. STRAIGHT LINE FREQUENCY FRICTION GEARED, 0005, 20/-, 0003, 19/6. S.L.F. SERIES, 12/-; 0002, 11/-.

SQ. LAW LOW-LOSS DUAL, 0005, 16/6; 0006, 16/6. ORMOND FRICTION DIAL 100 FILAMENT RHEOSTATS DUAL, 2/6; 60 ohms or 200 ohms, 2/-; POTENTIOMETER, 400 ohms, 2/6. L.F. SERROUED, 10/-; 200, 17/6.

IGRANT TRIPLE HONEY COMB INDUCTION COILS. 0, 2/9; 40, 2/9; 50, 2/9; 60, 3/-; 75, 3/3; 100, 3/6; 150, 3/9; 200, 4/-; 250, 4/6; 300, 4/9; 400, 5/6; 500, 7/-; 700, 9/6; 1,200, 14/-; 1,500, 16/-; 2,000, 18/-.

Coupler, 2/6; 500 Ohm, 4/6. Micro Condenser, 1000/5/6. Dial 1/- extra. Vernier Balancing coil, 5/6. Indigraph Vernier knob and Dial, 7/6. Microvener, 8/6.

"E" Type L.F. Transformers, 1,500, 16/-; 2,000, 18/-; 2,500, 20/-; 3,000, 22/-; 3,500, 24/-; 4,000, 26/-; 4,500, 28/-; 5,000, 30/-; 5,500, 32/-; 6,000, 34/-; 6,500, 36/-; 7,000, 38/-; 7,500, 40/-; 8,000, 42/-; 8,500, 44/-; 9,000, 46/-; 9,500, 48/-; 10,000, 50/-.

15/-; 5-1.16/-, FIL Rheo. and Potentiometers stocked. On and Off Switch, 2/5. Radio do, 2/6. Earthing Switch, 3/-, Jacks from 2/-; Plugs from 1/3. All parts available stocked, 2/11.

OUR NOTE ONE VALVE and CRYSTAL SET, in solid polished cabinet, complete with valves, phones, H.T. and L.T. Units, Aerial Equipment, Daventry Coil, Extraordinary value 45/11. Carriage, 2/-.

ASTOUNDING 2 Valve AM VALUE in L.F. plier, 25/11. Amplifiers in or COMPLETE handsome with valves, polished box, H.T. and L.T. Units, Aerial, 44/6. Carriage, 1/6. Carriage, 2/-.

H.T. BATTERIES. EVEREADY 66 v., 12/6; 108 v., 21/-; T.3 for D.E. Valves, 7/6. SIEMENS H.T. 60 v., 12/6. HELIOPHON 500 v., 14/6. Various 10 D.E. Batteries, 1/6 to 2/6.

EBONITE, "Grade A" 2/6, while you wait, 3/16 at halfpenny per sq. inch. 4 in. at three farthings.

WATERMELON PRODUCTS. 0002 or 0003 and Grid Leak, 2/6. Fixed Condenser, all caps, 2/-, Variable G.L., 2/6 (3 to 5 meg). Anode 50,000 to 100,000, 2/6. Ditto, 100,000 to 75,000, 3/6. Auto choke L.F. Coupling, 38/6. Post 1/11.

WARNING. SEE K. RAYMOND'S NAME ON PREMIER'S LIST. THIS WILL ASSURE YOU GETTING THE GOODS I ADVERTISE. PLEASE ASK "IS THIS RAYMOND'S?"

WONDERFUL LOW-LOSS STRAIGHT LINE FREQUENCY ALL STATIONS CONDENSER (No. 4).

Supreme SELECTIVITY. Each station has a CLEAR TUNING SPACE. CROWDING entirely ELIMINATED. S PLAINED tuning DISTINCT and DEFINITE Radio reception. PRECISION workmanship. Solid Brass valves (a very important factor). Central position of rotor INSURES MINIMUM panel space. ONE HOLE FIXING. Pistal connection to rotor gives silent working. Special Spring top Bush gives 3/4 turn but easy movement. LOW LOSS S ELETON ENDS. ALL HIGH EST possible QUALITY. Everyone AMAZED at the beauty and finish of these Condensers, and to compare with the OUT OF DATE AMERICAN CONDENSERS now on the market, we ask you to try the BRITISH ARTICLE.

0003 ... 6/11
0005 ... 7/11
WITH VERNIER 1/- EACH EXTRA. POST 6d. PER SET.
Also LOW LOSS FR CT ON GEARED 10/6 post 6d. per set. IMPORTANT! These condensers are planned with central shaft and specially curved vanes and therefore only take up the same amount of room as the standard type. The wide sweep of the ordinary type S L F needs much more room on panel. Please note Test Report, P. b. 27/26, "Amateur Wireless".

Unolicited Testimonial. 382, Cranbrook Road, Ilford, Essex. Messrs. Raymond, I am writing to let you know the wonderful change your new type condenser has made in my one valve straight set. On Sunday evening (with 210 working) I was successful in receiving Radio Berne, Dublin, Hamburg and Newcastle at excellent phone strength. All these stations had previously passed me by. I can only say that if there is a 100 per cent condenser on the market, yours is IT.

Harry L. Prickett.

BARGAIN DEPT.—Huge quantities of window-solled and goods which have been taken in exchange for sale at ridiculous prices. Bargains not sent by post.

BEFORE YOU PURCHASE ELSEWHERE CALL AND LET ME QUOTE YOU I can offer you 20 per cent. discount on many lines (not combine). Cheapest House in London WE HAVE THE GOODS! BE SURE IT'S RAYMOND'S.

K. RAYMOND

OPEN. 9 to 8 Daily. 'Phone: 27 & 28a, Lisle Street, 9 to 9 Saturday. Gerrard 4637. Leicester Sq., W.C.2 11 to 1 Sunday. Gerrard 2821. 1 min. Leicester Square Tube. Opposite Daly's Gallery Door.



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

GREAT BRITAIN

The times given are according to Greenwich Mean Time.

London (2LO), 361 m. 1-2 p.m., con.; 3.15-4 p.m., transmission to schools; 3.30-5.45, con. (Sun.); 4.15 p.m., con.; 5.15-5.55, children; 6 p.m., dance music; 7-8 p.m., time sig., news, music, talk; 8-10 p.m., music; 9.0, news (Sun.); 10 p.m., time sig., news, talk, special feature (Mon., Wed., Fri.). Dance music daily (exc. Sundays) from 10.30 until midnight.

Aberdeen (2BD), 495 m. Belfast (2BE), 440 m. Birmingham (5IT), 479 m. Bournemouth (6BM), 386 m. Cardiff (5WA), 353 m. Glasgow (5SC), 422 m. Manchester (2ZY), 379 m. Newcastle (5NO), 404 m. Much the same as London times.

Bradford (2LS), 310 m. Dundee (2DE), 315 m. Edinburgh (2EH), 328 m. Hull (6KH), 335 m. Leeds (2LS), 321.5 m. Liverpool (6LV), 331 m. Nottingham (5NG), 326 m. Plymouth (5PY), 338 m. Sheffield (6FL), 306 m. Stoke-on-Trent (6ST), 301 m. Swansea (5SX), 482 m. Daventry (25 kw.), high-power station, 1,600 m. Special weather report, 10.30 a.m. and 10.25 p.m. (weekdays), 9.10 p.m. (Sun.); 11.0 a.m., light music (exc. Sat. and Sun.); relays 2LO

from 4 p.m. onwards, own con. on Mon. Dance music daily (exc. Sun. and Tues.) till midnight; on first Friday in each month until 2 a.m.

IRISH FREE STATE.

Dublin (2RN), 397 m. Daily, 7.30 p.m. Sundays, 8.30 p.m. until 10.30 p.m.

CONTINENT

The Times are according to the Continental system; for example, 16.30 is 4.30 p.m., and 08.00 is 8 a.m. G.M.T.

AUSTRIA.

Vienna (Radio Wien), 582.5 m. and 531 m. (5 kw.). 11.00, con. (almost daily); 14.30, con.; 18.25, news, weather, time sig., con.; 21.00, dance (Wed., Sat.).

Graz, 401 m. (750 w.). Relay from Vienna. Also own con. (Wed.), 19.10.

BELGIUM.

Brussels, 487 m. (1.5 kw.). 17.00, orch. (Tues., Thurs., Sat. only), news; 20.00, lec., con., news. Relay: Antwerp, 265 m. (100 w.).

CZECHO-SLOVAKIA.

Prague, 372 m. (5 kw.). Con., 18.00-22.00, daily.

Brunn (OKB), 521 m. (3 kw.). 18.00, con. (daily).

Koszice, 2,020 m. (2 kw.).

DENMARK.

*Copenhagen (Radioraadet), 347.5 m. (700 w.). Sundays: 09.00, sacred service; 15.00, con.; 19.00, dance. Weekdays: 19.00, lec., con., news; dance to 23.00 (Thurs., Sat.).

Ryvang, 1,150 m. (1 kw.). Sundays: 08.00, sacred service.

*Relayed by Odense (810 m.), Sorø (1,150 m.).

FINLAND.

Helsingfors (Skyddskar), 520 m. (500 w.).

(Continued in second column of page 464)

CHIEF EVENTS OF THE WEEK

SUNDAY, OCTOBER 3.

London Seventh Centenary of St. Francis d'Assisi.
Birmingham Studio Service—Canon A. H. Phelps.
Manchester Festival from Chester Cathedral.

MONDAY

London Piano Sonatas by Maurice Cole.
Aberdeen London Radio Players: Grey Ash.
Birmingham Orchestral Concert. Soloists: Eda Bennie, Sydney Coltham.
Cardiff Concert by Eisteddfod Winners.
Manchester Opening of Manchester Civic Week.

TUESDAY

London B.B.C. Chamber Concert. S.B. to all stations.

WEDNESDAY

London Augustus in Search of a Father.
Birmingham Birmingham Repertory Chorus Concert.
Bournemouth Scovell and Wheldon, Syncopated Duetists.
Cardiff Wynne Ajello, Soprano.
Newcastle John Gilpin.

THURSDAY

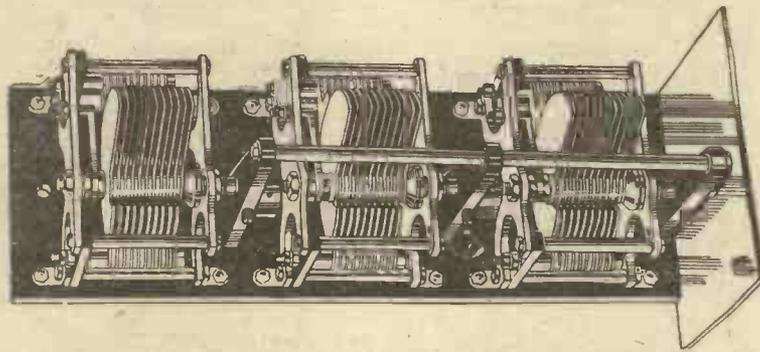
London The Geoffery Goodhart Sextet.
Cardiff Wagner Programme.
Manchester The Jeffersons.

FRIDAY

London Lady Neish reading *Forestalled*.
Birmingham Callender's Cable Works Band.
Bournemouth The Sweep.

SATURDAY

London Radio Tattoo and Tournament. The Westminster Singers.
Aberdeen Birthday Programme.
Birmingham Wireless Exhibition Programme.
Cardiff Marion Richardson, Mezzo-soprano.
Manchester Gems from the Operas.



The **CYLDON**
(pronounced SIL-DON).
TRIPLE GANG CONDENSER

CONSTRUCTORS are giving this handsome new model a most enthusiastic welcome because of (1) Its absolute freedom from whip. (2) Independent adjustment of each Condenser by novel means, completely eliminating hand capacity.

OTHER attractive features are:— Each Condenser electrically separated; anti-capacity plate supplied; operation of all three Condensers as "silky" as if only one was used; whole instrument perfectly rigid; supplied ready for immediate fitting; construction and finish are well up to the fine Cyldon standard.

For the New Five Valve "Elstree SOLODYNE."

Price £3-10-0 (Without Dial)

Get full particulars of all Cyldon Products from your dealer or write direct to the makers. Other Cyldon Condensers comprise Square Law, Square Law Dual Pattern, and the S.L.F. 4 in. Knob Dial supplied free with Square Law and Dual Models, and 2/- extra with S.L.F. or Triple Gang.

SYDNEY S. BIRD & SONS

"Cyldon" Works, Sarnesfield Road, Enfield Town, Middlesex.
Telephone - ENFIELD 0672.

Send for particulars of the Cyldon WAVEMETER—it identifies unknown stations, and makes searching and testing out simplicity itself.



Cyldon TEMPRYTES

The best means of valve control. British made and delivered from stock immediately. Can be supplied in correct resistance for any Valve. State resistance (ohms) required when buying, or be sure to give name of Valve and voltage of Accumulator supplying current to the Valve.

Cyldon Temprytes - 2/6 each
Holder Mounting - 1/6 "

"1927 Five" Set

As described in "Amateur Wireless," Sept. 25th

Set of 3 **BECOL** Low Loss Coil Formers and Discs for Low Wave Lengths **12/6**
Ready to receive fittings and windings. per set

Set of 3 **BECOL** Low Loss Coil Formers and Discs for High Wave Lengths **12/6**
Ready to receive fittings and windings. per set

DELIVERY FROM STOCK

Packing and Postage 9d. extra.



Panels for this set, size 27½" x 7" x ¼", R2 Quality, mat surface 9/4. Superfine highly polished de Luxe 24/-. Mahogany Grained Highly Polished 16/-. All ready for use, not drilled. Packing and postage 1/- extra.

THE BRITISH EBONITE COMPANY, LTD.
Nightingale Road, Hanwell, London, W.7

100,000 RUGS—GIVEN AWAY

This Phenomenal Offer is made to the readers of *Amateur Wireless*. On receipt of Postal Order for 10/6 we will forward direct from our Looms to your address one of our "Prudential" Brusselslette

Carriage 1/- Extra.

REAL SEAMLESS WOVEN CARPETS
Guaranteed Genuine Bargains

Suitable for Drawing-room, Dining-room, Bedroom, etc., handsomely bordered in 30 Turkey patterns and fashionable self shades of Crimson, Greens, Blues and Art Colourings to suit all requirements and large enough to cover any ordinary-sized room. These carpets with FREE RUGS will be sent out as sample Carpets, showing you the identical quality we supply. They are made of material equal to wool, and being a speciality of our own, can only be obtained direct from our



10/6

Looms, thus saving the purchaser all middle profits. Over 400,000 sold during the past 12 months. Money willingly returned if not approved. Thousands of Repeat Orders and Unsolicited Testimonials received. With every carpet we shall absolutely give away a very handsome rug to match. Gigantic Illustrated Bargain Catalogue of Carpets, Hearthrugs, Blankets, Table Linens, Curtains, etc., post free, mentioning *Amateur Wireless*, 2/10/26 when writing. Established over Half-a-Century.

F. HODGSON & SONS (Dept. A.W.), Woodsley Rd., City of Leeds.



Like the Potter at his wheel

THE modern mechanic at his lathe, and the old-time potter at his wheel—craftsmen both! Though the electric motor has replaced the foot pedal, much of the potter's skill and deftness in fashioning his ware is needed by the worker responsible for making the modern Loud Speaker.

Those engaged in the production of **Brown** Loud Speakers and Headphones have not allowed the necessity of mass-production to exclude the human element. It is this which is responsible for the many unique features for which the **Brown** is noted. Through every stage—from the original designing of the instrument to the final rigorous testing—the **Brown** receives from the

hands of its makers, almost the care and attention of a parent. You can only appreciate the full meaning and effect of this conscientious workmanship when you see and hear the **Brown** for yourself. In its flawless appearance, in its superb tone, and in its remarkable volume—alike in every phase of the Broadcast—the **Brown** stands by itself—ahead of comparison.

The new **DISC**. **Brown** reputation is fully upheld in this, the latest model. Strongly housed in its handsome metal case, in volume and tone it is unequalled among Loud Speakers. In two models (both 2,000 ohms).

Black and Gold **£7.7.0** Oxidised Silver **£8.8.0**

S. G. BROWN, Ltd., Western Ave., N. Acton, W.3.

Retail Showrooms: 19, Mortimer Street, W.1; 15, Moorfields, Liverpool; 67, High Street, Southampton. Wholesale Depots: 2, Lansdown Place West, Bath; Cross House, Westgate Road, Newcastle; 120, Wellington St., Glasgow; 5-7, Godwin St., Bradford; Howard S. Cooke & Co., 59, Caroline St., Birmingham. N. Ireland: Robert Carmany, Union Chambers, 1, Union St., Belfast.

Brown

G.A.5906

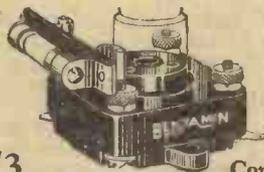
Advertisers Appreciate Mention of "A.W." with Your Order



Saving Space

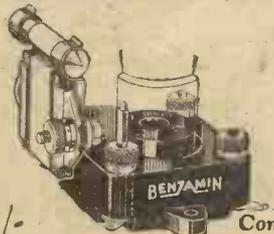
TWO NEW ideas for saving back panel space—simplifying wiring and mounting, and doing away with all the troubles arising through faulty connections and spacing.

Remember, also, that the BENJAMIN Anti-Microphonic Valve Holder is not only infinitely superior to all its imitators in design and finish, but in actual performance too.



5/3 Complete

VALVE HOLDER & GRID-LEAK
A Dubilier Dumerohm 2 meg. Grid-Leak is fixed on to a rigid insulating bar by means of nickel-plated copper clips.



7/- Complete

VALVE HOLDER, GRID-LEAK & CONDENSER

Nickel-plated copper clips carry a Dubilier fixed Condenser (.0003) in addition to the Grid-Leak. Series or parallel.

BENJAMIN VALVE HOLDER

without Leak or Condenser.

Price 2/9

From all good Dealers

BENJAMIN

BRITISH MADE

Clearer-Tone, Anti-Microphonic

VALVE HOLDER

THE BENJAMIN ELECTRIC LIMITED
Tottenham, London, N.17.

Valve Holder and Grid Leak. Regd. Design No. 722529

Valve Holder, Condenser and Grid Leak. Regd. Design No. 722528

"BROADCAST TELEPHONY" (continued from page 462)

- *Tammerfors, 368 m. (250 w.).
- *Jyvaskyla, 561 m. (100 w.).
- *Porl, 254.2 m. (100 w.).
- *Oulu, 233 m. (100 w.).
- *Relay Helsingfors.

GRAND DUCHY OF LUXEMBURG.

Radio Luxemburg (LOAA), 1,200 m. Con.: 14.00 (Sun.), 21.00 (Thurs.).

FRANCE.

Eiffel Tower, 2,650 m. (5 kw.). 06.40, weather (exc. Sun.); 07.15, 08.00, physical exercises; 11.00, markets (exc. Sun. and Mon.); 11.20, time sig., weather; 15.00, 16.45, Stock Ex. (exc. Sun. and Mon.); 18.00, talk, con., news; 19.00 and 23.10, weather; 21.00, con. (daily). Relays PTT, Paris; 07.15, 08.00 (daily), also on Sat., 21.10-23.00.

Radio-Paris (CFR), 1,760 m. (about 3 kw.). Sundays: 12.45, con., news; 16.30, Stock Ex., con.; 20.15, news, con. or dance. Weekdays: 10.40, news; 12.30, con., markets, weather, news; 16.30, markets, con.; 20.15, news, con. or dance.

L'Ecole Sup. des Postes et Télégraphes (PTT), Paris, 458 m. (800 w.). 07.15, 08.00, physical exercises (exc. Sun.); 20.30, lec. (almost daily); 21.00, con. (daily).

Le Petit Parisien, 333 m. (500 w.). 21.15, con. (Tues., Thurs., Sat., Sun.).

Radio L.L. (Paris), 350 m. (250 w.). Con. (Mon., Wed., Thurs.), 20.30.

Radio-Toulouse, 432 m. (2 kw.). 17.30, news (exc. Sun.); 20.45, con.; 21.25, dance (daily).

Radio-Lyon, 280 m. (1.5 kw.). 20.20, con. (daily). Temporarily closed.

Strassburg, 205 m. (100 w.). 21.15, con. (Tues., Thurs.).

Radio Agen, 318 m. (250 w.). 12.40, weather, Stock Ex.; 20.00, weather, Stock Ex.; 20.30, con. (Tues., Fri.).

*Lyon-la-Doua, 480 m. (1 kw.). Own con., 20.00 (Mon., Wed., Sat.).

*Marseilles, 351 m. (500 w.).

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

*Bordeaux, 411 m.

*Grenoble, 588.2 m. (500 w.).

*Relays of PTT Paris.

Montpellier, 220 m. (200 w.). 20.45 (weekdays only).

Angers (Radio Anjou), 300 m. (250 w.). Daily: 20.30, news, lec., con.

Bordeaux (Radio Sud-Ouest), 332 m. Con., 21.00 (Mon., Fri.).

Mont de Marsan, 390 m. (300 w.). Con. (weekdays only), 20.30.

Algiers (N. Afr.) (PTT), 310 m. (100 w.). 22.00, con. (Mon., Thurs.).

Ste. Etienne (Radio Forez), 220 m. (100 w.). Testing.

Casablanca (Morocco), 305 m. (600 w.). 19.00, con.

GERMANY.

Berlin, on 504, 571 and 54 m. (4 kw.). 05.30, con., physical exercises (Sun.); 08.00, sacred con. (Sun.); 11.55, time sig., news, weather; 17.30, orch.; 19.30, con., weather, news, time sig., dance music until 23.00 (Sat., Sun., Thurs.). Relayed on 1,300 m. by Königswusterhausen (1,300 m.) and Stettin (241 m.).

Königswusterhausen (LP), 1,300 m. (8 kw.). 10.30-11.50, con. (Sun.); 14.00, lec. (daily); 19.30, relay of Berlin (Vox Haus) con. (daily). 2,525 m. (5 kw.), Wolff's Buro Press Service: 05.45-19.10. 2,880 m., Telegraphen Union: 07.30-18.45, news. 4,000 m. (10 kw.), 06.00-20.00, news.

Breslau, 418 m. (4 kw.). 11.00, con. (daily). Divine service (Sun.); 16.00, con.; 18.00, lec.; 19.30, con., weather, time sig., news, dance (relays Berlin). Relay: Gleiwitz, 250 m.

Frankfort-on-Main, 470 m. (4 kw.). 07.00, sacred con. (Sun.); 15.00, con. (Sun.); 15.30, con.; 19.00, lec., con., weather. Dance: relays Berlin. Relay: Cassel, 273.5 m.

Hamburg, 392 m. (4 kw.). Relayed by

Bremen (279 m.), Hanover (297 m.), Kiel (234.5 m.). Sundays: 06.25, time sig., weather, news, lec.; 08.15, sacred con.; 12.15, con.; 17.00, con.; 18.15, sports, weather, con. or opera, dance. Weekdays: 04.45, time sig., weather; 06.00 and 06.30, news, weather; 11.55, Nauen time sig., news; 13.00, weather, con.; 15.15, con.; 17.00, relays Berlin; 18.00, lec.; 18.55, weather and con.; 21.00, dance (Sun., Thurs., Sat.).

Königsberg, 464 m. (4 kw.). 08.00, sacred con. (Sun.); 15.30, con.; 16.00, con. (Sun.); 18.30, lec.; 19.00, con. or opera, weather, news, dance (irr.). Relay: Danzig, 272.7 m.

Leipzig, 452 m. (4 kw.). Relayed by Dresden (294 m.). 07.30, sacred con. (Sun.); 19.15, con. or opera, weather, news, cabaret or dance (not daily).

Munich, 486 m. and 204 m. (4 kw.). Relayed by Nuremberg (340 m.). 10.30, lec., con. (Sun.); 15.00, orch. (Sun.); 15.30, con. (weekdays); 17.30, con. (weekdays); 18.15, lec., con. (Sun.).

Muenster, 410 m. (1.5 kw.). Relayed by Elberfeld (259 m., 750 w.), Dortmund (283 m.). 10.45, Divine service; 11.00, news (Sun.); 18.40, news, weather, time sig., lec., con.

Norddeich (KAV), 1,800 m. 23.00 and 03.00, weather and news.

Stuttgart, 446 m. (4 kw.). 10.30, con. (Sun.); 15.30, con. (weekdays); 16.00, con. (Sun.); 17.30, time sig., news, lec., con. (daily); 20.15, time sig., late con. or cabaret.

HOLLAND.

Amsterdam (PCFF), 2,125 m. (1 kw.). Daily: 06.35-15.30 (exc. Mon. and Sat., when 12.30-13.30), news, Stock Ex.

Hilversum (HDO), 1,065 m. (5 kw.). 09.00, sacred service (Sun.); 19.10, con.; 21.00, news, con.

HUNGARY.

Buda-Pesth (Csepel), 560 m. (2 kw.). 16.00, dance music; 19.00, con. or opera; dance nightly.

ICELAND.

Reykjavik, 328 m. (700 w.). Con., 19.30.

ITALY.

Rome (IRO), 425 m. (3 kw.). 09.30, sacred con.; 16.30, relay of orch. from Hotel di Russia; 16.55, news, Stock Ex., jazz band; 19.30, news, weather, con.; 21.15, late news.

Milan, 320 m. (1 kw.). 20.00-23.00, con., jazz band (nightly).

JUGO-SLAVIA.

Belgrade (Rakovitza) (HFF), 1,650 m. (2 kw.). 16.00, news (daily), con. (Tues., Thurs., Sat.).

Agram (Zagreb), 350 m. (500 w.).

LATVIA.

Riga, 475 m. (1.2 kw.). Con. daily, 20.00-21.00.

NORWAY.

Oslo, 382 m. (1.5 kw.). 18.15, news, time, lec., con.; 21.00, time, weather, news, dance relayed from Hotel Bristol, Oslo (21.30-23.00, Sun., Wed., Sat.).

Bergen, 400 m. (1 kw.). 18.30, news, con., etc.

*Riikan, 445 m. (50 w.).

*Porsgrund, 405 m. (100 w.).

*Relays Oslo.

POLAND.

Warsaw, 480 m. (2 kw.). Daily: con., 10.00-12.00; 14.00-22.00.

RUSSIA.

Moscow (RDW), 1,450 m. (12 kw.). 16.55, news and con.; 22.00, chimes from Kremlin. (Popoff Station), 1,010 m. (2 kw.). 18.00, con. (Tues., Thurs., Fri.).

Radio Peredacha, 410 m. (6 kw.).

Trades Union Council Station, 450 m. (2 kw.). 17.00, con. (Mon., Wed.).

Leningrad, 940 m. (2 kw.). Weekdays: 15.00.

Nijni Novgorod, 860 m. (1.2 kw.). 16.00

(Continued in second column of page 466)

The Great
 “How to do it” Weekly

*Amateur
 Mechanic
 and Work*

A paper devoted entirely to helping all who like to turn their hands to some useful domestic job or interesting practical hobby. Edited by Bernard E. Jones, Editor of “Wireless Magazine,” “Amateur Wireless,” and other famous technical publications.

Contents of “Amateur Mechanic,” on Sale, Sept. 30, include:—

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 (Illus.)

Cleaning the Gas-cooker

Making a Wall Flap or Folding
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 Mechanic” will save you
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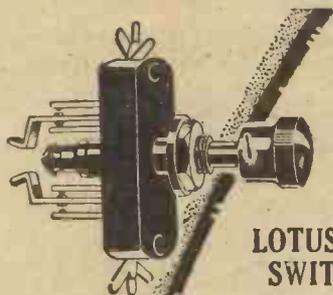
¶ A specimen copy of “Amateur Mechanic” will be sent post free to any reader who sends a post-card to the Editor, “Amateur Mechanic,” La Belle Sauvage, London, E.C. 4.



Cassell

Advertisers Like to Know That—“You Saw it in ‘A.W.’”

The latest in Jacks & Plugs

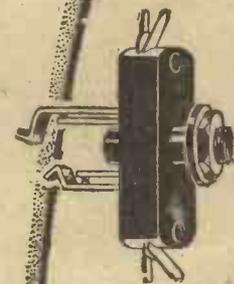


LOTUS JACK SWITCHES

This push-pull switch is designed to occupy the minimum space, being only 1 1/4 in. deep. Of the finest Bakelite, it has nickel silver springs and contacts of pure silver. Soldering contacts can be made to suit any wiring.

PRICES

No. 9, as illustrated 4/-
others from 2/9



LOTUS JACK

Designed to take up the least space, the depth back of panel being 1 1/4 in. Made from best Bakelite mouldings, with nickel silver springs and pure silver contacts. One-hole fixing. Soldering contacts can be brought into any position.

PRICES

No. 3, as illustrated 2/6
others from 2/- to 3/-

LOTUS JACK PLUGS

Designed for use with Lotus Jacks. Made from best Bakelite mouldings and nickel plated brass. To fix, the wires are placed in slots and gripped in position by a turn of the screw cams. Made by the makers of the famed 'LOTUS' Vernier Coil Holders and 'LOTUS' Buoyancy Valve Holders.

PRICE 2/-

From all reliable Radio Dealers

LOTUS

JACKS · SWITCHES · PLUGS

Garnett, Whiteley & Co., Ltd.

Lotus Works,

Broadgreen Road, Liverpool.

"BROADCAST TELEPHONY" (continued from page 464)

(Tues., Fri., Sun.), con.; also on 80-110 m. (15 kw.).

Astrakhan, 650 m. (1 kw.).

Kieff, 780 m. (1 kw.). 17.00, con. (daily).

SPAIN.

Madrid (EAJ6), 392 m. (1 kw.). Daily: con. Madrid (EAJ7), 373 m. (1.5 kw.). Con. daily. Closes 00.30 (Mon., Wed., Sat.).

Madrid (EAJ4), 340 m. (1 kw.). 16.00, con. The Madrid stations are again working to a rota, varying time of transmissions daily.

Barcelona (EAJ1), 325 m. (1 kw.). 17.00-21.00, news, lec., con. (Sun.); 18.00-23.00 (daily).

Barcelona (Radio Catalana) (EAJ13), 462 m. (1 kw.). 19.00-23.00, con., weather, news.

Bilbao (EAJ9), 415 m. (500 w.). 19.00, news, weather, con. Closes down 22.00.

Bilbao (Radio Vizcaya) (EAJ11), 418 m. (500 w.). 22.00-24.00, con. (daily).

Cadiz (EAJ3), 357 m. (550 w.). 19.00-21.00, con., news. Tests daily (exc. Sun.), 24.00.

Cartagena (EAJ15), 335 m. (500 w.). 20.30-22.00, con. (daily).

Seville (EAJ5), 355 m. (500 w.). 21.00, con., news, weather. Closes down 23.00.

Seville (EAJ17), 300 m. (500 w.). 19.00-22.00, con. (daily).

San Sebastian (EAJ8), 346 m. (1.5 kw.). 17.00-19.00, 21.00-23.00 (daily).

Salamanca (EAJ22), 355 m. (1 kw.). 17.00 and 21.00, con. (daily). Closes down 23.00.

SWEDEN.

Stockholm (SAS.), 430 m. (1 1/2 kw.). 10.00, sacred service (Sun.); 17.00, sacred service; 18.00, lec.; 20.15, news, con., weather. Dance (Sat., Sun.), 20.45.

Relays.—Boden (SASE), 1,200 m.; Eskilstuna, 250 m.; Falun (SMZK), 370 m.; Gothenburg (SASB), 288 m.; Gefle, 208 m.; Joenkoeping (SMZD), 199 m.; Karlsborg (SAJ), 1,365 m.; Karlscrona (SMSM), 196 m.; Kristinehamn (SMTV), 292 m.; Karlstadt (SMXG), 221 m.; Linkoeping, 467 m.; Malmo (SASC), 270 m.; Norrkoeeping (SMVV), 260 m.; Orebro, 237 m.; Ostersund, 720 m.; Sundsvall (SASD), 545.6 m. (1 kw.); Trollhattan (SMXQ), 322 m.; Umea, 215 m.

SWITZERLAND.

Lausanne (HB2), 850 m. (1 1/2 kw.) (temp.). 19.00, lec., con. (daily).

Zurich (Hongg), 513 m. (500 w.). 10.00, con. (Sun.); 16.00, con. (exc. Sun.); 19.15, lec., con., dance (Fri.).

Geneva (HB1), 760 m. (2 kw.). 19.15, con. (daily).

Berne, 435 m. (1.5 kw.). 09.30, organ music (exc. Sat.); 15.00, 19.30, con.

Basle, 1,000 m. (1 1/2 kw.). Con. daily, 19.30.

The employment of electrical energy for stimulating the growth of plant-life has been tried in various forms, and is engaging the attention of the World Power Conference. Experiments in electrical soil fertilisation have not as yet led to any great practical results, but there seems a possibility that radio activity may supply the means to this end.

The new Langenberg (Rhineland) 60-kilowatt broadcasting station will effect its first tests on a wavelength of 468.8 metres.

Burns' programmes are ever popular, and another is to be submitted from the Glasgow station on October 7. It will take the form of a recital by Mr. Ian MacPherson of the lesser-known songs of the Scottish bard. Many of these will be unfamiliar, even to Scotsmen.

TRADE BREVITIES

IN view of the fact that so many amateurs are to-day interested in the construction of supersonic heterodyne receivers, it is gratifying to learn that the results attained justify the time and expense involved. Mr. W. R. Parkinson, of Birchington, is enthusiastic regarding his success with a set in which he has incorporated the special Super-het Kit marketed by the General Electric Co., Ltd., under the name of Gecophone. He says he has logged about 25 stations on the loud-speaker, and, in fact, gets something on almost the whole semi-circumference of the dials, on the frame aerial alone.

A folder dealing with Magnum screened coils has been received from Burne-Jones and Co., Ltd., of Magnum House, 296, Borough High Street, S.E.1.

The Orphean Radio Reproducer is the name given to an artistic cabinet loud-speaker made by L. B. Tickle and Co., of 61, Borough Road, S.E.1. A descriptive folder concerning this has been received.

We are asked to make clear to our readers that the Oxford Wireless Telephony Co., Ltd., of 22 and 29, Queen Street, Oxford, is in no way connected with a firm calling themselves "Oxford Wireless Co.," of London. The Oxford Wireless Telephony Co., Ltd., was registered at Somerset House as a private limited company in November, 1922.

We have received from Messrs. Will Day, Ltd., of 19, Lisle Street, Leicester Square, W.C., a copy of the third edition of their International Radio catalogue, just published. Its price is 6d., which seems a moderate charge for such a well-printed catalogue. Brimful of information from cover to cover, it is replete with illustrations of all that is latest and best in radio broadcasting and receiving apparatus.

New publications issued by the British Thomson-Houston Co., Ltd., of Crown House, Aldwych, W.C.2, include: Leaflet R.7,433, which deals with B.T.H. head telephones and loud-speakers, which have been reduced in price. Leaflet R.7,447 deals generally with all types of B.T.H. receiving valves. It gives full particulars of the four new B.T.H. valves, viz., the B2, B4H, B5H and B11 types. Catalogue A.G. 201. This is a complete catalogue of B.T.H. valves containing, in addition to the usual data, an interesting treatise on valve characteristics. This catalogue is not intended for general distribution, but single copies will be sent to those who are interested.

Folder No. 4,117/7, issued by Metro-Vick Supplies, Ltd., of Trafford Park, Manchester, deals with the new Cosmos resistance-coupling unit introduced, it will be remembered, at the Radio Exhibition.

A special programme, compiled by a professional footballer, will be broadcast on October 23 from London and Daventry.

TABLE 1			TABLE 2			
Coil	Inductance in microhenries	Self-capacity in micro-microfarads	Coil	Parallel capacity in micro-microfarads	Wave-lengths in metres	Effective resistance in ohms.
35	61	15	35	300	264	2.8
40	90	15	40	"	318	2.9
50	150	9	50	"	406	3.3
60	200	13	60	"	472	4.4
75	295	12	75	"	573	5.3
100	540	11	100	"	774	6.6
150	1,410	12	150	"	1,250	15.8
200	2,220	17	200	"	1,580	19.7
250	3,070	17	250	"	1,860	24.9
300	4,800	14	300	"	2,320	28.2

Results of independent H.F. tests made by the N.P.L.

Here are the figures — judge for yourself!

The National Physical Laboratory figures fully bear out our claim that the LEWCOS Coil is the most efficient produced. In the design of radio inductances, the smaller the R/L value for any circuit, the greater is the selectivity and the signal strength. This fact has predominated over all other considerations in producing Lewcos Inductance Coils with the



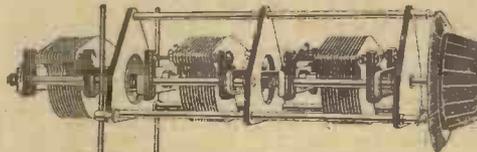
result that we can publish without fear the R/L values for LEWCOS Inductance Coils as obtained from the N.P.L. measurements together with the wave length at which measurement was made. LEWCOS Coils make all the difference in reception. Ask your wireless dealer to demonstrate the Lewcos Coil on his set. Descriptive leaflet gladly sent on application.

LEWCOS Inductance COIL

The LONDON ELECTRIC WIRE COMPANY and SMITHS, LIMITED
 Phone: Clerkenwell 1388 Playhouse Yard, Golden Lane, London, E.C.1 Telegrams: Electric, London

JUDO

Tested & Guaranteed Components BY BOWYER-LOWE



GANG CONTROL CONDENSER

This condenser has been designed for use in single control receivers, such as the "Elstree Solodyne," and is provided with three independent condensers of .0005 Mf. capacity insulated from one another, but controlled by one dial. A simple means is provided for varying the relative positions of the rotors so that the different coils and transformers can be balanced.

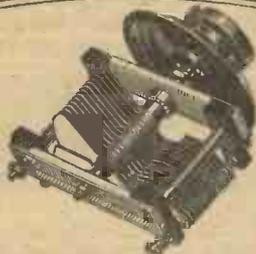
Each rotor is mounted on ball-bearings, while universal joints are used between them to ensure smooth operation. Two adjustable supports are provided to remove the strain of the weight from the panel.

List 252. With 4 in. dial £3 13 0
 Without dial £3 10 0

Send 1/6 in stamps for Catalogue of Bowyer-Lowe Components — a handy guide to better reception



ANNOUNCEMENT BY THE BOWYER-LOWE CO. LTD. LETCHWORTH, HERTS



POPULAR CONDENSER

This popular price of this new Condenser of unrivalled precision presents to the amateur the ideal instrument for his experimental set. The construction executed for mechanical perfection has been achieved by the use of a ball-bearing rotor, eliminating harshness and unreliability of tuning.

Electrical efficiency and exceptional range of wave-length together with full dial availability for tuning is combined in its low loss square law design.

If at any time the Bowyer-Lowe Condenser develops a fault during the twelve months after purchase the article will be replaced free of charge.

0.0005 Mf. 10/6



COIL SCREENING BOXES

In introducing our new screening box and base for coils, which has been so largely developed by Mr. J. H. Rayner, we have achieved an almost perfect electrostatic shield. The whole base and circular screen screwing together, and being earthed by an extra terminal on the base. Six sockets, complying with the Radio Press Ltd. standards, are fitted on the base for coils, together with six terminals for coil connections.

List No. 240. Price 15/-
 Interchangeable coils and transformers for any Radio Press Set from 4/6

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AMERICAN VALVES



Why buy them for your Neu rodnye or Superhet? Use British Made **RADION 5.25 15/- Power Valve**. They are supplied in both American and British bases. Specially designed for these circuits on the lines of the best American. Satisfaction absolutely guaranteed. Every valve is practically identical. Can be supplied in matched sets. Fil. 5.5 max. 25 amps. Impedance 8,000 ohms. Amplification 7.2. British Base 525B. American Base 525C. Guarantee in every valve box.

Use **RADION** Reliable Valves

Obtainable from **BARKERS, BENEFINKS, GAMAGES, WHITELEYS,** and most other untied dealers.

If any difficulty write: the sole manufacturers **RADIONS LTD.,** Bollington, Macclesfield, England. List Free on request

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PICKETTS CABINETS

For every Wireless Constructor. Send for Cabinet Designs and Lists Free. **Picketts, (A.M.) Cabinet Works, Bexleyheath.**

WET H.T. BATTERIES

British made round or square Leclanche Glass Jars, 2 1/2 x 1 1/2 x 1 1/2, for wet H.T. Units. Waxed, 1/3 doz. plain, 1/6 doz. Zincs, 1/- doz. Grade 1 sacs, 1/6 doz. Grade 2 sacs, 1/3 doz. Carr. & packing extra. **Eton Glass Battery Co., 46, St. Mary's Rd., Leyton, E.10**



1/9 DON'T PAY MORE AERMONIC VALVE HOLDER

Anti-capacity. Anti Phonic. Don't pay more than 1/9 if hard to get drop us a line. **AMES CHRISTIE & SONS LTD.,** 245, West Street, SHEFFIELD. London Agents: **A. F. BULGIN & Co.,** 10, Curator Street London, E.C.4

Valves Repaired AS GOOD AS NEW!!

HALF LIST PRICE (Except Weeco, B.P.'s, and low capacity types). Minimum D.E. Current 0.15 amps. when repaired. **WIGG & DULL EMITTERS** Listed at less than 10/- Repaired at minimum charge. **VALCO** LTD., Dept. A.W., Tabor Row, W.imbledon, S.W.20

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With the **LISSENOLA, BROWN A,** or an adjustable Earpiece, and our perfectly made highly finished Specialties, you can easily construct a handsome Hornless Paper diaphragm-type Loudspeaker, or any other approved type. You will obtain volume with unsurpassed tonal quality. Pric.s., Particulars and Diagrams for stamp.

GOODMAN'S, 27, Farringdon Street, E.C.4. Also obtainable from **Speicers Birtes, 4/6, Masons Ave., E.O.2.**

"Battery Eliminators."—We regret that owing to the varied nomenclature applied to the various valves on the market an error appeared under the above title of an article appearing in this journal on page 364 of the September 18 issue. The U5 bi-phase rectifying valve as illustrated is an Osram valve and not Mullard as stated. The battery eliminators mentioned in the text use a Mullard DU5 valve.

Messrs. The Benjamin Electric Co., Ltd. —We draw our readers' attention to the fact that the valve known as the S.P.55/R (Red Spot), which this firm market, has been altered in price from 18s. 6d. to 22s. 6d.

CLUB DOINGS

Barnet and District Radio Society

Hon. Sec.—**MR. J. NOKES,** Sunnyside, Staplyton Road, Barnet.

KEENNESS was the predominating feature of the society's opening meeting of the autumn session, held in the clubroom on Thursday evening, September 16. Capt. L. A. Bratt (G5XO), the new president, was in the chair, and there was an enthusiastic gathering of members. While the indoor meetings have been suspended during the holiday season the committee has been busy and has purchased a fine array of new components and instruments for the use of the members. During the evening various suggestions for the activities of the society during the winter months were put forward, and an attractive programme of events is being arranged. The hon. sec. will be pleased to supply full particulars of the society to anyone interested.

Stretford and District Radio Society

Hon. Sec.—**W. HARDINGHAM,** 21, Burreleigh Road, Stretford, Manchester.

We have received a copy of the 1926-7 syllabus of the above society, from which we gather that a very ambitious series of lectures, demonstrations and interesting fixtures has been arranged. All meetings and lectures start at 8 p.m., and members assemble at 7.30 p.m. The headquarters of the society are "The Cottage," Derby Farm, Derbyshire Lane, Stretford. Interested amateurs should write at once to the hon. sec., who will supply full details of the society's doings.

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All thicknesses planed both sides ready for use, and cut to any size without extra charge.

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Prime Dry American Black Walnut

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Wood horns for all speakers, also Gramophone attachments.

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

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

The amount of the Deposit and Fee must be remitted by Postal Order or Registered Letter (Cheques cannot be accepted), addressed to

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WIRELESS.—Capable, trustworthy men with spare time who wish to substantially increase income, required where we are not fully represented. Applicants must have practical knowledge of installation of Set and Aerial, be a Householder or live with parents, and be able to give references. State age and experience.—Address, Dept. 28, General Radio Company, Limited, Radio House, Regent Street, London, W.1.

PATENTS.—Trade Marks. Advice Handbook free.—B. T. King, Regd. Patent Agent, 146a, Queen Victoria Street, London.

TRANSFORMERS, Phones, Loudspeakers rewound; guaranteed efficiency 12 months, 4s. Trade invited.—Transform 115, Links Road, Tooting, London.

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Get the wonderful 14-inch CINCINNATI CONE; 11/6

Complete with bronze base and support, ready to have Brown reed phone screwed on, making it into complete cone speaker, post 1/6. Attachment for Lissenola, 2/6 fully guaranteed. **J. W. MILLER, 68, FARRINGTON STREET, E.C.4.** Sole British Distributor. Phone, Central 1950.

THE ULTRA ONE METER

is an entirely new production

of wonderful precision and delicacy, from microamps to 20 amps, millivolts to 2,000 volts. Measures 50 ohms to 50 megohms.

Instrument only 50/- Multipliers each 6/6

Free descriptive Booklet, 16 pages, stamp.

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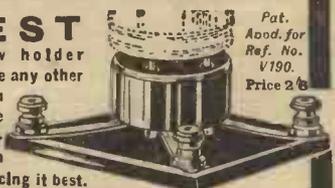
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100 for 4/8

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Medium Strength

"It's the Tobacco that counts"

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P.1359

Tested and Proved



THE ADVANTAGES OF THE WONDERFUL P.M. FILAMENT

Indisputable proof of the superiority of the wonderful P.M. Filament is given by the test panel.

As an example the P.M. 3 is illustrated above undergoing one of many searching tests and the readings indicate:

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- [3] The voltage at which maximum results are secured is well below the highest rating of the filament.

These features alone give you a three-fold safety.

- Q Safety against the burden of heavy upkeep costs because the P.M. Filament makes your accumulator charges last seven times as long.
 - Q Safety against premature valve replacements because the P.M. Filament, operating at a temperature so low that no sign of glow can be discerned, has a vastly increased life.
 - Q Safety against "oversunning" because the P.M. Filament is so conservatively rated that it can withstand a reasonable overload without damage—its high efficiency, however, making this ability unnecessary.
- Valves with the wonderful P.M. Filament give you three times more for your money.

ASK YOUR RADIO DEALER FOR P.M. VALVES

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THE MASTER VALVE

NEW REDUCED PRICES

- For 4-volt accumulator or 3 dry cells
- THE P.M.3 (General Purpose) 0.1 amp. 14/-
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