A Transatlantic 4 Valve Receiver

BY

PERCY W. HARRIS


A LONG RANGE NEUTRODYNE RECIIVER. By John Underdown.


A SELF-CONTAINED SINGLE-VALVE SET. By Walter Stevens.

LATEST CONTINENTAL PROGRAMMES. PRACTICAL HINTS.

TROUBLE CORNER.

NEUTRODYNE NOTES.
PLEASE TELL ALL YOUR FRIENDS ABOUT IT.

250,000!

A Quarter of a Million Copies of No. 1 of the "Wireless Constructor" have been sold.

This huge total is a record for any British Magazine and illustrates the great confidence of the Wireless Public in Radio Press, Ltd.

A SPLENDID No. 2 will appear on SATURDAY, NOVEMBER 15th. There will be a huge demand. Look out for the new cover!

Subscription, 8/- per annum, to go to the Printers direct (Odhams Press Ltd., Long Acre, London, W.C.2).

Contents

The "Transatlantic Four" Receiver
By Percy W. Harris .......................... 603
In Passing: ................................. 628
The T.A.T. System of High-Frequency Amplification
By John Scott-Taggart, F.Inst.P., A.M.I.E.E. .......................... 612
A Double-Circuit Neutrodyne Receiver
By John Underhill .......................... 620
Wireless Telephony and the League of Nations
By Captain L. E. Flügge, B.Sc., F.Inst.E., F.I.E.R. .......................... 629
P.H. Met.S. ................................. 634
A Self-Contained Single Valve Receiver
By Walter Stevens .......................... 640
Wireless Without Worry .......................... 645
By John Scott-Taggart .......................... 661
A Short and Long Wave Crystal Set
By W. H. Fullon .......................... 649
Notes on the Dual Receiver with Neutrodyne Control
By Sir A. D. Cowper, M.B.E. .......................... 649
More Resistoflex Circuits
The Three Valve Dual Receiver
Regular Programmes from Continental Broadcasting Stations
By Captain L. E. Flügge, B.Sc., F.Inst.E., F.I.E.R. .......................... 673
Trouble Corner .......................... 688
Tested by Ourselves .......................... 692

Scientific Adviser:
Prof. G. W. O. Howes, D.Sc., M.I.E.E.
Prof. E. Washington, M.A., D.Sc.
Prof. C. L. Foulke, M.A., M.I.E.E.
Advertisement Manager:
Barclays Advertising Ltd., Bush House, Strand, W.C.2, Ltd.—City 9911.

PROTECT your LIFE and PROPERTY from DAMAGE by LIGHTNING.

It is a fool's paradise where the aerial is earthed inside the house. We need not emphasise the invitation to danger. Nor need we prove just why you are completely protected by means of the SUCCESS EARTHAREL LEAD-IN SWITCH. A glance at the illustration will show you that the design of the SUCCESS EARTHAREL earths the aerial OUTSIDE the house. This will protect your set from damage. The switch is connected either to aerial or earth by turning the knob fixed inside the house. THE SUCCESS EARTHAREL is weatherproof—the wiring arrangements are protected by a metal cap.

OUTSIDE HOUSE.
TRUE AERIAL

TO SET INSIDE HOUSE

TRUE EARTH OUTSIDE HOUSE

EARTH INSIDE HOUSE

for power and for volume

For reason of current economy L.F. stages may be reduced by the employment of power valves. The very high voltage passing through the primary of a transformer behind a power valve will break down the insulation of the primary, a common fault of old-designed transformers.

The successful employment of Power Valves renders the choice of L.F. transformers a very serious consideration which is simply overcome by fitting the SUPER-SUCCESS (All Valve) Transformer.

PRICE 6/6 EACH.

PROTECTS your SET from LIGHTNING


In replying to Advertisers, please use Order Form enclosed.

PRICE 21/-

A

MODERN WIRELESS

November, 1924

Bush House, Strand, W.C.2.
Telephone—City 9911.
Right the wrong's of your Valve System

POLAR RESISTANCE CAPACITY COUPLING UNIT

The greatest victory over distortion has been won by the abolition of the iron-core transformer in valve-coupling—and by its replacement with the Polar Resistance Capacity Coupling Unit.

Because of the inductive effects, the self-capacity effects and the eddy-currents in iron, the transformer system of coupling will always create distortions and differences in electrical vibrations according to variations in frequencies.

By the use of the Polar Resistance Capacity Coupling Unit such vibrations are handed from valve to valve with all frequencies treated evenly.

Thus the Unit is designed to act in place of the transformer, and at the same time to give such purity of reception as has never before been found possible.

PRICE 15 -
Fully Descriptive Leaflet on Request.

These Polar Products are obtainable from all Polar Stockists throughout the Country, or may be purchased direct where no authorised dealer exists.

Every purchaser is protected by the Polar Guarantee of quality and perfection.

In replying to Advertisers, please use Order Form enclosed.
The "Transatlantic Four" with coils in place.

This month I am giving the third of a series of designs for wireless receiving instruments, to which I have given the name "Transatlantic." The first of these, using low-capacity valves of the V24 and QN type, appeared last November, just a year ago, and was followed in December by a suitable note-magnifying unit. The second Transatlantic design, that is, the "Transatlantic Five," appeared in our issue for June, and contained in one cabinet the two stages of high-frequency, a detector, and two resistance-coupled note-magnifiers. The feature of this second receiver was the use of four-pin valves in low-capacity sockets. The present receiver is, perhaps, the most compact of the three, and by using two stages of high frequency, a detector and one transformer coupled note-magnifier, is economical in valves. Furthermore, the valves and plug-in transformers are contained within the cabinet, the panel itself being reserved for terminals and controls only. This makes for compactness and a neat appearance.

Special Features
The special feature of all three instruments is the use of two stages of high-frequency tuned by a double condenser, the transformers and condensers being matched for simultaneous tuning.

The use of two stages of high-frequency tuned in this way gives to the set a remarkable sensitivity, so that without using the note-magnifying valve there is no difficulty whatever on any reasonable aerial in receiving all of the British Broadcasting stations, a number of those on the Continent, and at suitable times during the night, signals from several of the American Broadcasting stations, in the phones. The first Transatlantic receiver had but three valves, i.e., there were no note-magnifying stages attached, these being reserved for a separate cabinet. The second design, as above explained, included two resistance-coupled note-magnifiers. The present receiver has but one stage of low-frequency amplification, but owing to the fact that this is transformer-coupled very high amplification is obtained. The strength of signals from the detector valve being in most cases sufficient to work a loud-speaker with only one stage of note-magnification, the signal strength is only slightly less than that obtained with the Transatlantic V, while the compactness and convenience of the design will doubtless appeal to many who wish for a good long-range receiver.

A Detailed Examination
Coming to the detailed examination of the instrument, there are six terminals at each end of the panel, the upper four on the left being concerned with the aerial tuning. When the aerial is connected to the topmost terminal, and the link between A1 and E is closed, we have a constant aerial tuning condenser of 0.0001 µF in circuit with a 0.0005 µF variable condenser in shunt across the tuning inductance, which is plugged into the two-coil holder.

Aerial Tuning Changes
With the aerial transferred to A1, we cut out the constant aerial tuning condenser and use the set with capacity in parallel across the tuning coil. With the link open and the aerial connected to A2, the variable condenser is now placed in series with the inductance coil for short waves. The remaining two terminals at the bottom left-hand side of the panel are for the low-tension leads. On the right we have three separate positive high-tension terminals, and the common

When the panel is withdrawn, the valves and H.F. transformers can be seen mounted to the rear.
negative, enabling us to apply different voltages to the two high-frequency valves, the detector and the note-magnifiers. Within the cabinet connections are provided for joining up a grid bias battery, so that with a suitable adjustment of the plate voltage and grid voltage, a power valve can be used efficiently. The lower right-hand terminals are for the telephones or loud-speaker.

The two dials control the aerial tuning condenser (whether in series or parallel) and the double condenser which tunes the two primaries of the high-frequency transformer. To the right of this tuning condenser is the control knob of the "stabiliser" (or potentiometer, as it is often called). Still further to the right are two push-pull switches, the upper one serving to cut in or out the last valve (distinguishing the filament or lighting it as required), while the lower one is a simple on-and-off switch for the accumulator. At the bottom of the panel are situated four filament resistances of the dual type, so that either bright or dull emitter valves can be used.

A Useful Arrangement

Withdrawn from the cabinet, the inner constructional details can be clearly seen. By adopting this arrangement it has been found possible to arrange the valves and high-frequency transformers in a straight line, while it has been possible to separate the high-frequency transformers from one another by a slightly greater distance than in previous models. The use of special low-capacity valve holders for both valves and transformers removes some of the difficulties attendant upon the use of four-pin valves in such a circuit.

In designing the instrument space has been allowed for the round bulb valves if these are used. The disc type of plug-in transformer can be used in place of the barrel type if desired, as there is room for either pattern.

Here is a list of the components used. The names of the actual makes adopted in the present set have been given, but it must not be imagined that other makes of equal quality cannot be used just as well.

Components

One cabinet of polished wood to take a panel, 16 in. by 8 in. by ½ in. The box must have an internal depth of not less than 8 in. and should be fitted with a sliding base so that it can be withdrawn from the cabinet with the panel attached. The actual cabinet used is of the same dimensions as that in my "All-Concert-de-Luxe" receiver, and is already available on the market in a number of makes. One panel of above dimensions in guaranteed ebonite. The actual panel is a "Pilot." Other makes I can recommend from personal experience are "Radio," "Howe - yer - Lowe," and "Paragon." (All of these are free from surface leakage).

One strip of similar ebonite, 16 in. by 2 in. by ½ in. Two brackets to hold panel vertically on the base board. (I have used stair-rod eyes.) Twelve terminals.

Two Clix plugs.

Four filament resistances (dual type if it is desired to use both bright and dull emitters.) Those used are made by McMichael.

Fig. 1.—The complete theoretical diagram, showing switching arrangements.

Valves and transformers are easily changed by lifting the lid. The holes in the rear of the cabinet are not necessary in this instrument.
Six anti-capacity valve sockets (H.T.C., Type A.)

One or more pairs plug-in transformers to cover the wavelength ranges desired. (These must be properly matched. I have used McMichael, Bowyer-Lowe, and Gent quite successfully in the present instrument.)

Plug-in coils for various wavelength ranges as explained at the end of the article.

Square section wire for wiring, screws, etc.

A number of advertisers are now specialising in complete sets of parts for the various receivers described in this book. This may save some colonial and foreign readers the trouble of sending a number of small orders to different firms.

Constructional Work

The best way to start work is to lay out the front panel carefully from the diagram given (of which a blue print full size is available at the usual price of 1s. 6d., post free from the publishers). Notice that the panel is attached to the baseboard by screws along its bottom edge and also by the two brackets referred to in the list of components. Allowance should be made for the thickness of the baseboard when you are preparing to attach the brackets to the cabinet.

The two Lissen push-pull switches are of the "one-hole-mounting" type and the five points type should be arranged so that the screw to which no blade is attached (this makes contact with the central spindle) is in the position marked in the separate switch diagram.

Making Out the Strip

The next step is to mark off the ebonite strip which carries the valve sockets. This is fairly easy, as the H.T.C. people supply a template with their valve sockets to facilitate marking out. Notice, too, that the .0003 µF condenser and grid leak are mounted on the under side of this strip, to facilitate wiring. You will also need two small pieces of wood as supports of the ends of the strip. I have not given the dimensions of these, but included them in the list of component parts as they can easily be cut from any odd pieces of wood which may be convenient. They should support the strip well above the baseboard. The baseboard itself carries the transformers and one of the .001 µF fixed condensers. The space at the aerial end of the baseboard can be utilised for the grid bias battery, which can lie on its side and be connected by the Clix terminals. Unless you are using a very high voltage on the last valve, you will probably get very good results by connecting the two Clixs together, thus avoiding the use of the grid bias battery.

A Hint

It is well to mount your variable condensers and other components on the panel before you fix the transformer in place, as, owing to the different sizes of various makes of components, the position of the transformer you use may be slightly different from that of mine. The same remark applies to the three .001 µF fixed condensers. These are used so that each H.T. tapping may be shunted by a large fixed condenser.

End view of the instrument withdrawn from cabinet.
**Modern Wireless**

**November, 1924**

**Wiring Up**

The elomite panel should now be taken, laid face downwards, and the wiring commenced. You will see that a good deal of wiring can be done on this before it is mounted on the baseboard. Before commencing to wire up, you should file the tops of all the screws that have to be soldered, being careful, of course, to remove the brass fillings from the panel with a brush before proceeding. There is no special point of difficulty in wiring up this panel, but it should be explained that there are two screws which merely serve the purpose of securing the stiff wire in position so that it will not flop about. One of these screws happens to be the screw which holds the constant aerial tuning condenser, and it should be noted that the long wire which comes to this screw is not connected to the condenser itself. It is simply soldered to this screw to hold it in place and to provide a firm lead from which the flexible lead of the coil-holder may be taken. Another such screw will also be seen on the panel to the left of this.

Four flexible leads are soldered to the tuning coil, these flexible leads are simply single strands of electric lighting flex from which the silk or cotton has been removed revealing the rubber. Four holes should be drilled in the side of the cabinet, so that these wires can subsequently be pushed through and attached to the coil-holder, attached to its supports and fastened to the baseboard in its correct position.

**A Wiring Tip**

With these vertical wires sticking upwards, examine your wiring chart carefully and shape connecting wires from the various points. In some cases you will be able to bend the vertical wires to join up the positions you want. In others you will have to cut them off short. The wiring up is a little intricate, but if you carefully examine your diagram and make a point of marking off these wires which you have already connected, the work will become easier as you proceed. I do not advise any departure from the wiring indicated, as the set valve and at the same time lights the filament. If all of these arrangements work satisfactorily push the receiver into its place, thread the flexible leads through the side of the cabinet and fasten them to the coil-holder, which should already be in position.

**Valve Hints**

These valves and transformers in position. So far as the valves are concerned the first two should be of the same make and should be suitable for high-frequency amplification while the detector and note-magnifying valves can be any of the general purpose types, or, in the last socket, one of the new dull emitting power valves, such as the B4, D.E.5, etc., may be used with
November, 1924

**MODERN WIRELESS**

Fig. 4.—Wiring diagram showing front of panel and base as if in one plane. (Blueprint No. 72 B).

Plug-in transformers can be obtained for all wavelength bands. In the reaction socket plug a 25 or 35 coil, this coil being kept at right angles to the aerial coil. Push the change switch into the position which will give three valves only and adjust your two condensers until you hear the local station. For these experiments the "stabiliser" or potentiometer knob can be turned as far as it will go to the right. When you have tuned in your station, turn the stabiliser knob and see whether you can bring the set up to oscillation point. If you are only five or ten miles from a broadcasting station you will not get any increase of strength in this way, but if you are at a greater distance you will probably find that turning the potentiometer knob to the left increases signal strength gradually until you reach oscillation point. Now with the set well below oscillation point slowly move the reaction against the aerial coil. If this movement increases the strength of signals and makes the set oscillate, all is well. If it reduces it or no oscillation is obtainable when this coil is moved close to the aerial coil, then reverse the connections to the reaction coil. In practically all cases the reaction coil should be kept at right angles, as only on very bad aerials or in difficult positions is reaction necessary on the broadcast wavelengths, as full control of the reaction is obtainable with a potentiometer. You can now try switching in the fourth valve, which should greatly increase signal strength.

If the set has been made correctly and all components are good, you should now have a most interesting time searching for the other stations. So far as results are concerned, I do not think there is much point in tabulating them, as I have not the slightest difficulty in picking up every one of the British Broadcasting stations, most of them being audible on the loud-speaker.

(Continued on page 681.)

advantage. For these tests the two grid bias wires with their Clix terminals can be connected together. Now connect up the high tension battery, and for the time being join together H.T. 1, 2, and 3 by a piece of wire, as for the preliminary test you will not need separate high-tension. A pair of telephones should now be joined up, and about 50 volts of the high-tension battery used. On the left-hand side the aerial should be connected to A1, A2 and E should be joined together and the earth wire taken from E. Be particularly careful to see that you have your H.T. and L.T. leads connected the right way round.

**Coils Needed**

If you have an average-size aerial I suggest you plug into the fixed socket of the coil-holder a No. 25 coil, or if you are near one of the longer wavelength Broadcasting stations, a 35 or a 50. For Railea and Chelmsford 350 in aerial and 100 in reaction will suit.
In passing

Many plays have been broadcast, but none of them seems to me to have the pep that is needed to get not merely across the footlights but across the ether. Somehow all of them seem to lack vim, zip and driving force. None of them so far has moved me to tears; in fact, I cannot even remember writhing in my chair with suppressed emotion, running fevered hands through my hair, tearing off my collar, grasping my teeth, or giving other signs that my deepest feelings were being stirred.

Some time ago the B.B.C. advertised for plays suitable for broadcasting. I feel, somehow, that none of those submitted will quite come up to the standard, and in order that the Company shall not be disappointed I am presenting them free of charge with a thrilling drama of love and hate which you will find below. You will, I think, agree that it has the right atmosphere, and that if it were broadcast it would make even the most hardened loudspeaker choke a little. And now without further delay let me ring up the curtain.

The Play Begins

Run to Earth,
Or the Foiler Foiled.

Dramatis Personae.

Professor Forbie. A wireless experimenter.

Phonia. His daughter.

Yupushoff. His valet.

Angelo. A young inventor in love with Phonia.

Professor M. A. Bloowski. An expert witness.

Sergius Nastikoff. A villain.

General Chuckersley. Chief Engineer of the Electronian Broadcasting Company.

Arthayurovski. Director of Programmes.


B.B.C. Inspectors, Listeners-in, Counsel, Jurymen, etc.

Scene—I: The Village of Ceruskzy in the Wilds of Electronia.

Act I.

Scene I.

Professor Forbie's Study

(A spacious apartment, though nearly all the available space is occupied by receiving sets, accumulators, condensers, high tension batteries, coils of wire and loudspeakers. The Professor is seated at the table with the phones on his head, tuning in. As the curtain rises he leaps from his chair, tears off the phones, flings them on the floor, dances on them, hits his pet corn a nasty one

Born e'er the Atlantic's never resting waves.
But have I heard it? Well, as man to man.
No toot from flute, no boom from big bassoon.
Has come to glad these straining ears of mine.
All I have heard is squeaks and whistles and howls.
Like those of some lost soul in torment dire.
Squawk, squeak they go, now up, now down the scale.

With ne'er a moment's peace for listeners in.
This was a joyous village once, but now
There lurks a villain in our midst whose hands
Are ever twiddling knobs, now this, now that.
And worse of all, there is a trouble who,
Using a spark set perfectly untuned,
Is audible on any wave you like.
Dot, dash I hear, and then a pause, dash, dash.
A pair of dots, a pause, then dashes three.
Dash, dot, dash, pause, then dash, dash, dash, and then
Come two more dashes ere he switches o'er.
"Am I O.K. old man?" he buzzes out.
O.K., I ask you! If I could but find
This welkin-rending ether hog,
I'd put
The lid on his performances. Ah me!
I hope that he may burn out all his valves,
May his condensers leak, his batteries
Buckle their plates or burst their waxen tops.
May housemaids fill with tiding zeal lay waste
His wireless den; may all his leads come loose;
May his transformers go up in blue flames,
His coils go cranky; and may circuits short
Be with him always bringing black despair.
And may his aerial fall about his ears,
His earth dry up, and horrid hidden faults
Develop in his gear day in day out.
I'll stand no more of it; I'll hunt him down;
I'll loose the dogs of war and we shall see.

(Rises and rings bell. Enter Yupushoff.)

Yu.: You rung, sir?
Prof.: Of course I did. Did you think it was an atmospheric?
Don't ask silly questions. Go to the telephone, dolt, and get me the Electronian Broadcasting Company.

(Exit Yupushoff. Professor Forbes sinks into a chair and closes his eyes. Re-enter Yupushoff.)

Yu.: Number engaged, sir.
Prof.: Away! Don't talk to me about numbers engaged. Get me the E.B.C., and quick about it.

(Exit Yupushoff hastily. The Professor sits drumming with his fingers on the table. Some time elapses. Re-enter Yupushoff with telephone which he plugs in and hands to the Professor.)

Prof.: Hullo, is that the E.B.C.? Speak up, can't hear. You're not? Then why couldn't you say so at once. (Rattles telephone and has altercation with exchange.) I'll get you the sack. I'll... Oh is that the E.B.C.? Professor Forbes speaking. I wish to lodge a complaint about interference and illegal transmission. No no. I did not say unequal emission. Illegal transmission. Very serious case. Goes on continually. Cannot hear myself think. What's that? You will send down in the morning? Good. One can always rely upon the E.B.C. to act promptly. (Hangs up telephone receiver. Rises exultant and puts on a ferocious expression.) And now my interfering partner, we'll see.

Scene II.

The Same, the Next Afternoon
(Professor Forbes is sitting at his desk. The door opens. Enter Yupushoff.)

Prof.: Welcome, gentlemen, welcome. I knew that you would not desert me in my hour of need.
Gen.: Professor, it is the proud boast of the E.B.C. that when a cry for help such as yours is received we attend to it instanter. Tell me all about it. Lay bare your wounded heart and you shall hear how our mighty organisation will bring all its forces to bear.
Art.: I would like to second those remarks. I cannot have my programmes interfered with, and if there is a criminal in your district then I will hunt him down and hang him from the highest aerial.

Prof.: I will tell you everything about this terrible business. You will excuse me if I seem a little overwrought, for in me you see a strong man brought to the verge of madness.

(Both make sympathetic noises. The Professor tells his tale. They listen eagerly, interpreting every now and then in chorus 'scandalous', 'unthinkable', 'disgraceful', 'not to be borne'.)

Gen.: Professor, we thank you. This is indeed a dreadful case. We will mobilise at once the sleuth hounds of the E.B.C., and it will not be long before you see the offender in the clutches which he so richly deserves.

Prof.: I thank you. Your hands have made your road slippery. The curtain descends slowly whilst they are doing so.

Act II.

The Next Day. Angelo's Study
(There is rather like the Professor's, only it is smaller, and it is even more cluttered up. Besides wireless sets, Angelo has hundreds of other gadgets, for he is an all-round inventor. He is sitting at a table folding with something as the curtain rises.)

Art.: At last I have it. For many weary weeks I have worked and puzzled and puzzled and worked over my patent corkscrew, and now it is perfect. Think what it means to me! When I first sought the hand of the beautiful Phonia, I was but a poor lad and the Professor would not believe that I had any prospects. But now I am sure of selling my corkscrew to the great Novelty Syndi-
MODERN WIRELESS

At a future time, and my future is assured. Let me just enure to one more to see how perfectly it works. (He whacks a cork hard into a bottle, inserts his patent cork-screw and leaves. The neck of the bottle breaks.) Tut, tut, I suppose I was careless. Let's try again. (A handkerchief's being on the door.)

Voice: Without: Open in the name of the E.B.C.

(Ange: still clutching his cork-screw, opens the door. Enter phalanx of E.B.C. Inspectors with drawn swords.)

First Insr.: Angelo, you are suspected of causing interference in the ether.

An.: Please sir, it wasn't me.

Sec. Insr.: See, we have him red-handed! At this very moment he is holding an ingenious tapping key.

Chorus of Insr.: We have the villain! Away with him. (Enter Phonia.)

Phon.: Angelo, what is this? You arrested for interfering? Oh, it cannot be. Tell me that you are guiltless.

An.: Phonia, I swear to you that I am innocent. Never was a man more unjustly charged.

First Insr.: That's what they all say. Come along quietly now and remember that anything you say will be taken down and used as evidence against you.

(Phonia flings her arms round Angelo's neck.)

Phon.: You shall not take him. (The Inspectors close round Angelo, who is led away still protesting his innocence. Phonia sinks half-jainting into a chair.)

Phon.: (Recovered): There is foul play here. But Phonia Forbice will show the world that the women of Electronica can foil villains as successfully as those of Los Angeles. My Angelo shall not die. I will prove his innocence to the hilt! (Curtain.)

Act III.

The Village Green of Czrewkzy.

An open air court has been rigged up, with a seat for the judge upon the dais, jury box, witness box and so on. In the centre of the court is an iron cage awaiting the prison. Crowds of villagers whose flattened ears prove that all are listeners-in gather round. A funeral march is being played by the 70 Military Band. Baron Pushenoff enters and takes his seat. Fandare of trumpets. The jury enter and are sworn. Counsel and witnesses take their places in the court.

Baron Push.: Bring in the prisoner.

(Ange: loaded with chains and looking very pale, is brought in and thrust into the cage.)

Baron Push.: Let the trial begin. Prisoner in the cage, are you guilty or not guilty of this dreadfully charge brought against you?

An. (fainly): Not guilty.

Baron Push.: Call the first Inspector.

First Inspector (all in one breath): On Thursday, the 21st instant, at 4 o'clock in the afternoon, acting on instructions received, I took a search party to the prisoner's house, where having gained admittance we found him with an ingenious tapping key actually in his hands.

Baron Push.: H'm, h'm. (To Angelo): Well, what have you got to say to that?

An.: It was not a tapping key at all. It was my new patent cork-screw.

Baron Push.: Well, even a cork-screw is useful for tapping.

(Laughter in court. It is instantly suppressed by the guards, who pounce three peasants.)

Baron Push.: Call Professor Blowski.

(Professor Blowski enters the witness box and is handed the cork-screw.)

Baron Push.: You are an inventor, I believe.

Prof. Blowsi (modestly): Er, yes. In fact, I have just been thinking out a little idea for installing a ventilating system in judges' wigs. Perhaps your lordship remembers the little pressure gauge attachment which I designed for babies' feeding bottles?

Baron Push.: Quite so, Professor, quite so. Now tell me what is the instrument which has been handed to you?

Prof. Blowsi, after examining the cork-screw carefully: This is quite obviously a novel and ingenious tapping key. I could improve upon it a little by . . .

Baron Push.: Yes, yes, but I am informed that it is a tapping key. Look at it again, Professor.

Prof. Blowsi: Why, now you come to mention it, it is of course a tapping key. If your lordship will allow me I will explain how it could be improved in a very simple way.

Baron Push.: That will do, thank you, Professor. I am sure the court is greatly obliged to you for the clear way in which you have delivered your expert evidence. (To the jury): Gentlemen of the jury, you have heard the charge brought against the prisoner and you have heard his defence. You have heard also the very definite statement by Professor Blowski, the leading expert in everything. It is for you to decide whether the prisoner is or is not guilty of the heinous crime of causing interference in the ether by transmitting illegally. It is not for me to bias your judgment in any way. I will merely say that when a man is caught red-handed by inspectors of the E.B.C. in the possession of what is undoubtedly a tapping key, it does look, if I may say so, very black, very black indeed. You will now consider your verdict.

(The jury leaves the box and is making for the Dog and Duck on the far side of the village green when it is gently shepherded away by the

YOU SHALL NOT TAKE HIM!

November, 1924

610
guardians. The judge closes his eyes in deep thought. There is a bust of conversation in court, which is kept within limits by the guardians with their polesaxes. The 270 Military Band continues to play martial music. Sometiine a half of the jury return, filing slowly into the box.

**CLERK OF THE COURT:** Gentlemen of the jury, have you considered your verdict?

**FOREMAN:** We have.

**CLERK:** How say you? Do you find the prisoner in the cage guilty or not guilty?

**FOREMAN:** Guilty on all counts.

(The clerk gently prods the judge in the ribs. The judge hastily smiles a vamn and the clerk whispers into his ear.)

**BARON PUSH:** Prisoner in the cage, you have been found guilty after a fair trial by your fellows. The sentence of the court is that you be hanged forthwith from the highest aerial in the neighbourhood. The Court of Justice will now close down. Good-day, everybody, good-day.

(The guardians open the cage and are about to lead Angelo off to the place of execution, when a scream is heard from the back of the crowd and Phonia is seen pushing her way through and waving something wildly.)

**PROX.:** Stay, stay! Injustice has been done! You cannot hang him! He is innocent! I have clear proof here.

(She rushes to the judge's seat and slams an undoubted tapping key on to the desk before him.)

**BARON PUSH:** Well, young lady, what's this?

**PROX.:** See, see! I know that Angelo was innocent, but I could not find the proof until the last moment. As I waited upon the edge of the crowd Sergius Nastikoff was in front of me and I saw this knob protruding from his coat tail pocket. It is he, not Angelo, who is the guilty one.

**BARON PUSH:** Let Sergius Nastikoff be placed in the cage.

(They do so. The case is heard. Sergius is found guilty by the jury without their leaving the box. Angelo is brought forward again and honourably acquitted without a stain upon his character.)

**BARON PUSH:** And I would like to say, young man, that I am distinctly taken with this patent contrive-screw of yours, which I propose shortly to test. As President of the Electriona Novelty Syndicate, I think that I can promise you one million liras for your great invention.

**PROX.:** Angelo sings her arms round Angelo. Sergius is led off to the chosen aerial. Angelo and Phoria advance to the centre of the stage, whilst the crowd forms a semi-circle round them. The 270 Light Orchestra strikes up the Wedding March.

**AN.:** Saved! By a woman's wit, the soul villain is run to earth!

(Curtain.)

**THE LISTENER-ON.**

---

**A Reader's Results with "Tri-Coil" Sets.**

To the Editor of Modern Wireless.

Sir,—I have been experimenting for the past fortnight with the "All Britain" receiver with tri-coil tuning, as described in the September issue of Modern Wireless, and the tri-coil "Purifiex" (Fig. 18) in the article on the tri-coil system of tuning on page 350 of the same issue.

I used only the materials I had in my junk box, so many of the values were altered to suit what I had. I used three-ply wood highly polished for the "All Britain" panel.

I am pleased to report that I have obtained the following results with the "All Britain"—

(a) Better tone in the loud-speaker and purer reception than I have obtained before and I have tried out nearly all the circuits in "More Practical Wireless Circuits," embodying any unusual methods as well as a great number of other circuits.

(b) Absolute selectivity although only two circuits to tune. This is a strong point, as many experimenters can testify.

(c) Great ease of tuning in either C.A.T. or series or parallel. One can turn the second condenser immediately to the figure representing the station required and then bring the aerial condenser up to it.

(d) With a B.T.H. power valve on L.F. it will give loud results on an Amplon loud-speaker sufficient for a small hall from Cardiff or Bournemouth, whilst with the addition of another power valve amplifier (single valve) and an ordinary type of valve on the first L.F. it will give thoroughly loud speaker results on distant stations.

Regarding the tri-coil "Purifiex"—

(a) This has the same selectivity as the "All Britain." With a single-valve power amplifier added, I have received Manchester and London loud-speaker whilst Cardiff and Bournemouth were working without hearing the other stations. Loud-speaker strength on Cardiff without any extra amplifier, and also on Bournemouth. I consider this good for resistance coupling.—Yours truly,

R. H. CARTER,
Secretary of the Somerset and District Radio Society,
Somerton, Somerset.
The T.A.T. System of High-Frequency Amplification.

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

This system, disclosed here for the first time, opens up new ground for those interested in long-range reception.

This article forms a part of the series on "Multi-Stage High Frequency Amplification."

Introduction

In my series of articles on multi-stage high-frequency amplification I have gone into the subject more thoroughly, probably, than has been done before, and it is hoped that full emphasis has been laid on the fact that self-oscillation in high-frequency amplifiers is due to inductive or capacitive coupling of an unintentional nature, and that of the two the inductive coupling is the easier to overcome. Toroidal coils may be used, or the coils may be shielded from each other by enclosing them in metal cases.

Fig 1.—Tuned anode and grid circuits have an inherent tendency towards self-oscillation

I have also emphasised the fact that a high-frequency transformer with so-called aperiodic primary and tuned secondary very strongly resembles a tuned anode circuit in its operation, and that the method of coupling may be replaced by a tuned anode circuit, the only important difference being that as the coupling between the primary and secondary of the high-frequency transformer is loosened, so does the arrangement differ more and more from the ordinary tuned anode circuit. The result, of course, is that as the coupling is loosened, the aperiodic anode coil begins to act more as such, and self-oscillation

The Author experimenting with a 10-valve set, using 7 stages of T.A.T. high-frequency amplification.
tendency decreases. This, of course, is very valuable when desiring to stabilise a high-frequency amplifier, but no enterprising manufacturer has seen the enormous market for a high-frequency transformer of small dimensions with variable coupling between the windings. Until somebody else besides myself wakes up to this fact, those who desire a variable coupling will use ordinary inductance coils which are much too big for multi-stage work, owing to their big inductive coupling effect between each other, not to mention the big capacity coupling which also increases with the size of the coil.

However, to return to the immediate subject under discussion, I was anxious to lead up to the particular method of high-frequency amplification which I am about to describe, and those readers of Modern Wireless who have studied my articles on this subject during the last few issues will, I hope, fully appreciate the technical arrangements described below under the description of the T.A.T. system.

I pointed out that self-oscillation in practice in every case was simply due to the fact that in the grid circuit and in the anode circuit there were two tuned oscillation circuits, and that when these two circuits were tuned to the same wavelength self-oscillation was highly probable.

Let me summarise some results by Figs. 1, 2 and 3 in this article. Fig. 1 shows a tuned grid circuit L1, C1 and a tuned anode circuit L2, C2. When these two circuits are tuned to the same wavelength, the valve will readily oscillate on the slightest provocation, i.e., when there is the slightest magnetic coupling between L2 and L1, or the slightest capacitative coupling between the two circuits. This capacitative coupling may take effect due to the capacity between L2 and L1, or the capacity inside the valve between grid and anode. However it takes place, the fact remains that this circuit oscillates very readily, and especially so if the condensers C1 and C2 are kept at low values, which, of course, is desirable if maximum build-up is required.

Fig. 2.—An aperiodic H.F. stage which normally will not oscillate.

In Fig. 2, however, an aperiodic anode coil L3 will prevent the valve oscillating, except in one special circumstance, and this should be very carefully noted, because this circumstance often occurs when working a wireless receiver and produces what, to the beginner, are unexpected results. The coil L3 is not really aperiodic, but is shunted by a capacity which is really a composite capacity formed of the self-capacity of the coil, the capacity across anode and filament of the valve, etc., etc. If the circuit L1, C1 happens to be just tuned to what we may call the natural wavelength of the coil L1 and its associated capacities, then the valve will oscillate readily. This effect is noticed on an ordinary reaction receiver if too large a reaction coil is employed. A No. 100 or a No. 150 reaction coil, for example, will make what would otherwise be a stable broadcast receiver oscillate on the broadcast wavelength. Consequently we should use a smaller reaction coil for such work.

Provided the coil does not resonate at the same wavelength as the circuit L1, C1, then self-oscillation will not be experienced with the Fig. 2 circuit.

Now, as regards Fig. 3, it might be thought that because L2 is untuned the valve V will not oscillate. If, however, we connect up this circuit and tune the circuit L1, C2 to the same wavelength as L1, C1, the chances are that, provided C1 and C2 are kept low, the valve V will burst into oscillation. If the transformer L1, L2's of the aperiodic type, no condenser C1, being employed, then self-oscillation will not take place. But aperiodic transformers of this kind are not much use for broadcast purposes, although they are frequently employed for long wave reception. In those circuits where they are sometimes used it will be found that the transformers approximately resonate to the wavelength to be received, in which case we are not really dealing with an aperiodic transformer, but a more or less tuned one, the tuning, however, being fixed for approximately a certain wavelength by using suitably sized coils.

Reason for Oscillation

The moment we tune one of the windings, however, we have both a tuned grid and a tuned anode circuit. If the condenser C2 were connected across L2, the valve would oscillate, as the arrangement would be very similar to Fig. 1. It is not, however, so obvious that if the secondary L3 is tuned a similar effect will be obtained. As I have previously explained in these articles, however, the arrangement L1, L2, C2, if L2 and L3 are fairly tightly coupled, acts in much the same way as a single tuned anode circuit, and consequently self-oscillation is very likely to occur. The only way of stopping that is by having a very loose coupling between L1 and L2, and then, of course, we lose in signal strength if the

Fig. 4.—An interesting circuit of a commercial receiver.
oscillations in \( L_2C_2 \) are applied to a valve detector or another amplifying valve.

**The T.A.T. System**

The T.A.T. system which I have developed is really a compromise between aperiodic high-frequency amplification and the method using tuned circuits. Aperiodic methods are, of course, well known, and consist of using a choke coil (air or iron-core), aperiodic transformers, or resistances. All these methods have been used in the past, the latter method being particularly suitable for high-frequency amplification of waves over 1,000 metres in length. Choke coupling has been effectively used for short wavelength work because the impedance of a choke coil increases with the frequency. Transformer coupling has been used, but only on much longer wavelengths, and is generally a poor method of passing on the high-frequency currents.

Tuned methods include tuned anodes and tuned transformers in which either the primary or secondary is tuned and sometimes both.

These are the common methods which have been hitherto used.

A method of interest in connection with this article is that illustrated in Fig. 4, which has been used by the Western Electric Company in one of their commercial sets. This circuit uses two stages of high-frequency amplification, the first being a tuned anode (in the actual set the whole of the anode inductance is not included in the direct anode circuit) and the second that the circuit \( L_2C_2 \) is really the grid circuit of the second valve, and that if the first valve is taken out of its socket there is no fear of the second valve oscillating because the circuit \( L_2C_2 \) and the choke coil \( Z \) do not combine to produce an unstable arrangement the arrangement produced is simply similar to that of Fig. 2.

If, however, we replace the valve in its socket and look at the circuit \( L_1C_1 \) and the circuit \( L_1C_1 \), we will see that both the grid and anode circuits of the first valve are tuned, a most dangerous combination. If the second valve were switched out, the first valve would still tend to oscillate, for the reasons given, and so the arrangement of Fig. 4 is no important step towards overcoming self-oscillation in multi-stage high-frequency amplifiers, however practical an arrangement the makers may have made it in their own particular set.
Fig. 5, of course, is much more stable because two aperiodic choke coils $Z_1$ and $Z_2$ are now employed, but this circuit is not so efficient as Fig. 4, although more stable. The reason, of course, is that with choke coils no resonating effect is obtained on the desired wavelength, and consequently signal strength and selectivity suffer. The Fig. 4 arrangement, of course, is much better than a single valve using tuned anode coupling, but is not as good as two tuned anodes if such circuit could be made stable. It is therefore a compromise, and the second valve does not give as great an amplification effect as the first.

In Fig. 5 neither first nor second valve gives a full degree of high-frequency amplification.

The Principle

It was by studying the principles involved in these multi-stage high-frequency circuits that I came to the conclusion that a solution of the problem would be to alternate tuned circuits with aperiodic circuits and so prevent any two tuned circuits coming next to each other. This arrangement I have called, for convenience, the T.A.T. system, the letters indicating "tuned, aperiodic, tuned." This implies that the different circuits in the high-frequency amplifier are alternately tuned and aperiodic. If, for example, the first grid circuit is tuned, the anode circuit of that valve will be aperiodic. The next anode circuit will be tuned and the next one aperiodic, and so on, so that a considerable number of stages of high-frequency amplification are possible without it ever happening that both the grid and anode circuit of the same valve are tuned to the same wavelength.

An example of a simple three-valve T.A.T. circuit is shown in Fig. 6. The grid circuit of the first valve, which comprises also the aerial circuit, is $L_1, C_1$ (the aerial capacity being regarded as in parallel with $C_1$). The anode circuit of this valve contains a choke coil $Z$, preferably of the air-core type. The high-frequency amplified currents result in varying E.M.F.'s produced across $Z$, and these are communicated to the grid of the second valve. This valve amplifies the high-frequency oscillations which now appear in the tuned anode circuit $L_2, C_2$, and the oscillating potentials across this circuit are communicated to the grid of the third valve which acts as a detector. In this circuit, using two stages of high-frequency amplification, there is not the slightest tendency for $V_1$ or $V_4$ to oscillate.

The valve $V_1$ will not oscillate because the choke coil $Z$, not being resonant to the incoming frequency, will not assist the first valve to oscillate. In other words, the first valve circuit is similar to the basic arrangement of Fig. 2. Exactly the same position with the reverse circuit arises in the second valve.
If we put our hand over the aerial and grid circuit of the first valve, we will see that the choke coil \( Z \) is now the grid circuit of the second valve, and this valve will not oscillate because, although the anode circuit is tuned, the grid circuit is open, or, at any rate, not naturally tuned to the same wavelength as the anode circuit. This circuit, of course, is radically different from Fig. 4, because in this latter figure the first valve will tend to oscillate although the second will not. In Fig. 6 neither valve will oscillate because we do not have two tuned circuits in either case. In one case the grid circuit is tuned and the anode circuit is aperiodic, while in the case of the second valve the grid circuit is aperiodic and the anode circuit is tuned. The letters T.A.T., indicating tuned, aperiodic and tuned, are shown in circles attached to the three principal high-frequency circuits of Fig. 6. The second valve acts as a first rate high-frequency amplifier, giving good selectivity, while the first valve does not give selectivity and does not give as good high-frequency amplification as the second.

In other words, we have one good high-frequency amplifier and one medium one, but, on the other hand, we have perfect stability, and since we can have half a dozen or more high-frequency valves arranged in the Fig. 6 style, it will be readily seen that a big total step-up effect is obtainable.

Resistance Coupling

Although a choke coil has been shown in Fig. 6, this may be replaced, as shown in Fig. 7, by a high resistance \( R_z \) of the order of 50,000 to 100,000 ohms.

The first valve now acts as a high-frequency resistance amplifier. This method of amplification is, as stated above, particularly useful above 1,000 metres, although it is interesting to note that Captain Eckersley used resistance amplification on 360 metres for the King's wireless set. Although some amplification is obtainable on these longer wavelengths, yet I think it is fairly obvious that the Fig. 6 arrangement is most suitable for the shorter wavelengths, while Fig. 7 is more suitable for wavelengths above 1,000 metres. In both cases, however, the principle is the same: tuned circuits are separated by an aperiodic circuit.

This separation, of course, is the essential feature of these circuits. A mere combination of one method of high-frequency coupling with another is, in itself, no remarkable invention. The arrangement of Fig. 1, for example, while possibly a practical circuit, misses the whole point, and misses the whole advantage of the T.A.T. arrangement. The choke coil \( Z \) in Fig. 4 might be replaced by a resistance, but, nevertheless, the stability of Fig. 7 will be missing.

An Analogy

The T.A.T. type of circuit may be conveniently compared to a man climbing a ladder.
up a hill. He gets higher and higher, one leg doing a full amount of work, with the lame leg doing a less amount but still helping him up.

So, in the same way, in T.A.T. circuits the aperiodic coupling does not give as big an amplification as the tuned anode coupling, but, on the other hand, it serves as an excellent means of separating two antagonistic circuits which, if placed together in the same valve, would cause self-oscillation. Not in which a second choke coil \( Z_2 \) is used to couple the third valve to the last valve which acts as a detector.

In this circuit, although there are three stages of high-frequency amplification, there is only one knob, \( C_2 \), to turn, and the circuit is as easy to use as an ordinary two-valve tuned anode receiver using one stage of high-frequency amplification only.

Fig. 9 shows the equivalent of Fig. 8 using resistances \( R_4 \) and \( R_5 \).

**Four-Valve Circuits**

I have successfully used several stages of high-frequency amplification without the slightest tendency towards self-oscillation, and with such a circuit, of course, at my distance from 2LO (about 9 miles), the idea of using an aerial or earth would be absurd. Loud-speaker results can be obtained with ease, the only trouble being that the selectivity is rather high, and, of course, very high if reaction is used. It was, of course, found necessary to employ reaction because the circuits are ordinarily so very stable, due to the absence of inherent reaction effects.

Fig. 8 shows a four-valve circuit for coupling valves. It will be seen in this four-valve circuit that the first valve has a tuned grid circuit and an aperiodic anode circuit. The second valve has an aperiodic grid circuit and a tuned anode circuit. The third valve has a tuned grid circuit and an aperiodic anode circuit and the fourth valve simply an aperiodic grid circuit. This, of course, applies also to Fig. 8 and my T.A.T. rule of preventing any valve having both a tuned grid and a tuned anode circuit, or virtually tuned anode circuit, is avoided.

**Five-Valve Circuits**

Fig. 10 is a five-valve receiver which may be recommended; it embodies the principles of the T.A.T. system, two choke coils \( Z_1 \) and \( Z_2 \) being employed, and two tuned anode circuits \( L_1 \), \( C_2 \), and \( L_3 \), \( C_3 \). Here we have four stages of high-frequency amplification with only three controls, as against three controls on the usual two-valve high-frequency amplification circuit. In the Fig. 10 arrangement we have two valves doing their best and two valves doing medium work.

Fig. 11 shows the equivalent of Fig. 10 using resistances \( R_{10} \) and \( R_{11} \) for coupling purposes.

It is to be noticed in all these circuits that the resistances may be used for receiving, say, 5XX, while the chokes may be used for receiving the shorter broadcast wavelengths.

**Adding Reaction**

Reaction may be applied to any of these circuits in many different ways. A usual method will be to apply the reaction from the detector valve to the grid circuit of the first valve, and Fig. 12 shows how this may be accomplished in a simple three-valve set. It will be seen that the reaction coil \( L_3 \) is coupled to the grid coil \( L_1 \), and this reaction effect is communicated, of course, not only to the aerial circuit but also to the tuned anode circuit \( L_1 \), \( C_2 \), any adjustment of the coupling between \( L_1 \) and \( L_3 \), being accompanied by a retuning on \( C_2 \) and \( C_3 \). This circuit is the best one for the beginner to try. The size of the choke coil \( Z_1 \) will depend, of course, on the wavelength about to be received, and may also depend upon the capacity of the first valve. Generally, however, a No. 200 or 250 coil will be found useful for this purpose when receiving the ordinary broadcasting stations on the 300 to 500 metre waveband. The choke coil \( Z_2 \) may be replaced by a resist-
Fig. 14.—An excellent five-valve circuit on the new system, with reaction on to the aerial circuit.

An excellent five-valve circuit is shown in Fig. 14. The value of the resistance $R_5$ may conveniently be 100,000 ohms, although as low a value as 50,000 ohms may be employed.

Fig. 13 shows a modified arrangement in which reaction is introduced, not from end to end, but from the last valve to the last tuned anode circuit $L_3, C_3$. A resistance $R_4$ is shown connected in the anode circuit of the first valve, but for short wavelengths the choke coil $Z$ shown in dotted lines may replace $R_4$.

Fig. 14 shows a five-valve receiver in which reaction from the last valve to the first is obtained.

Adding L.F. Amplification

Any of these circuits may have added to them one or more stages of low-frequency amplification for working a loud-speaker. In this case the telephones are replaced by the primary of a step-up interstage transformer, the secondary of which is connected across grid and filament of another valve fed off the same filament accumulator. The anode circuit of this low-frequency valve contains the loud-speaker, one side of the loud-speaker being connected to the anode of the valve and the other side being connected to the positive of the same high-tension battery used in the circuit chosen.

The ordinary general rules apply, and it is not thought necessary in this article to give examples of circuits using the T.A.T. system combined with low-frequency amplification. One or two such circuits may be given in the next issue of MODERN WIRELESS for the benefit of beginners.

Concluding Notes

I would very much like experimenters who try any of these circuits to write and let us know the results. The subject of long-distance communication is so bound up with multi-stage high-frequency amplification is so fascinating that it is hoped that many readers of MODERN WIRELESS will try out these arrangements, Figs. 12 and 13 being in particular recommended as a start.

The photographs give some indication of successful sets using circuits of this kind, and a successful set using this method of coupling may be described in the next issue of MODERN WIRELESS, the Christmas Double Number.

A Reader’s Three-Valve Dual Receiver.

The above photographs are of a Three-Valve Dual Receiver constructed by Mr. Hankin, of Walthamstow. On page 618 are photographs of the handsome cabinet and loud-speaker, and his letter is published on page 671.

www.americanradiohistory.com
The only resident of Little Puddleton who hasn't got a wireless!
LONG-distance reception has always held a great fascination for the author, and the present set is designed for this specific purpose. Many receivers fail, not on account of their inability to receive distant signals, but in their complete lack of selectivity. A local station will sometimes completely swamp the desired signal, making it impossible to do any real long distance work. Thus, in the majority of cases, it is first necessary to be able to get rid of the local station. The judicious use of reaction in this case will help considerably, but is seldom really adequate for complete elimination of the undesired station. A coupled circuit at once suggests itself, but this, with a tuned anode high-frequency valve, unless some form of stabilising is incorporated, is unmanageable. Potentiometer control is usually adopted and stability obtained at the expense of some efficiency, grid current being used to introduce damping into the high-frequency circuit where for maximum results it should be reduced to a minimum.

Neutrodyne Stabilisation

The so-called neutrodyne method of stabilising a high-frequency valve strikes at the root of the trouble and neutralises the internal grid to plate capacity of the valve and also the magnetic couplings which cause instability, allowing the valve to work under the best conditions for efficient amplification without distortion. This principle is used in the present set and allows full advantage to be taken of loose coupling to obtain maximum selectivity.

The particular circuit used is due to Mr. A. D. Cowper, and is the most effective that the writer has ever experimented with. The action is quite easy to follow, and is given below; it is always much more satisfactory to know what underlies the actual tuning operations, as only by so doing is it possible to get the best results out of a set.

### Maximum Amplification

The condition for maximum amplification is attained just before continuous oscillations commence, so that obviously, if we can arrange to hand just sufficient energy from the plate circuit is handed back to the grid circuit, and this is always sufficient in a well designed set to overcome any losses due to resistance, etc., so that continuous oscillations are generated.

### The Action Explained

Referring to the theoretical circuit, L, C, forms the tuned grid circuit of a high-frequency amplifier. The voltage across the grid of the amplifying valve V, whilst in the plate circuit is another tuned circuit consisting of an inductance L, tuned by a condenser C. When the latter or tuned anode circuit is tuned to resonate to the same frequency as L, C, currents introduced into the former will appear in amplified form in L, C, owing to the amplifying action of the valve. Due to the plate to grid internal capacity of the valve and magnetic coupling which exists between leads, part of the magnetic energy from the plate circuit is handed back to the grid circuit, and this is always sufficient in a well designed set to overcome any losses due to resistance, etc., so that continuous oscillations are generated.

![Fig. 1.—Compactness is the dominant note of the receiver.](image)

![Fig. 2.—The theoretical circuit of the receiver. L3 C3 is the neutrodyne circuit.](image)
Fig. 3.—The set with coils and valves removed. The stabilising condenser will be seen to the front centre of the panel.

A coupled circuit is used to obtain selectivity. The aerial circuit L₁, C₁ may be arranged for either series or parallel working by means of two terminals, A and A₁. The parallel position is obtained with the aerial connected to A and A₁ joined to E and to earth. With A₁ and E open and the aerial connected to the former series tuning is obtained. C₁ has a value of .0005 µF. The secondary circuit L₂, C₂ is variably coupled to the aerial and to the reaction coil L₅. C₂ is of .0002 µF, as is C₁, the tuned anode condenser. L₄ is the tuned anode coil. C₃ is a by-pass condenser of .002 µF, connected across the telephones to give smooth reaction control. Rectification is by the leaky grid condenser method, the usual values of .0003 and 2 megohms being adopted and the leak taken to low tension positive. The neutrodyne part of the circuit consists of L₂, C₃ as previously explained.

General Layout

From the photographs the disposition of the components is clearly seen and calls for little comment. The aerial condenser is in the left-hand corner of the panel and immediately to the front of it is the secondary condenser. That tuning the anode coil is seen to the right of the panel, whilst the handle of the stabilising condenser is seen between those of the anode and secondary condensers. The aerial and earth terminals are on the left and L.T., and 'phones on the right. Separate terminals allowing suitable H.T. potentials to be applied to the valves are at the back of the panel. This allows the H.T. battery to stand at the back and straight through connections to be made if subsequently an L.F. amplifier is added.

Between the two valves, sockets for a high-frequency transformer are located. One winding of this serves as the tuned anode coil and the other as the neutrodyne coil.
thus obviating the use of two plug-in coils as with my former design which appeared in Wireless Weekly of August 6th and 13th, 1924.

The coil holder is seen on the side of the case and is so arranged that however heavy the coil no tendency to flop will be present. This is a great advantage and economies in panel space. The filament resistances are near the centre of the panel.

Components Required

1. Ebonite panel 12 in. by 9 in. by 1/2 in.
2. Square law condensers. One of 0.0005 µF and two of 0.0003 µF. These were obtained from Bowyer-Love & Co., drilling templates being supplied.
3. Stabilising condenser. Gambrell Bros., Ltd., supply these.
5. 0.003 grid condenser
6. 0.002 condenser
7. 1 megohm leak
8. 6 ohms type filament resistances. Dual types may be substituted here if desired.
9. 300 to 600 metres H.F. transformer. L. McMichael, Ltd.
10. Suitable plug-in coils to cover the above wavelengths. Any good make will do.
11. Oak tray 12 in. by 9 in. by 5 in. by 1/2 in.

The base should be detachable, as the connections to the coil holder are made with the panel in position and base removed.


Quantity of 16 gauge tinned copper wire and V.I.R. rubber-covered flex.

Construction

If the ebonite is not guaranteed free from surface leakages the

surface should be thoroughly removed with emery paper before drilling is undertaken. The latter may be easily performed after setting out from the drilling diagram given. A scriber or sharp pointed instrument should be used for marking out but on no account use a pencil.

The Leak Connection

No difficulty should be experienced in mounting the components and little need be said about it here, except to point out how the leak is connected. An ordinary grid condenser with clips was used, and when mounted in position the leads were soldered as seen in the photograph of the wiring. One clip was then filed through as shown at X in the wiring diagram, and the whole bent up slightly with the leak in position, so that the leak was only connected to the grid side of this condenser, the filament connection supporting the other end and holding it in position above the grid condenser.

Wiring

Wiring is carried out in 16-gauge tinned copper wire, except in the case of the connection to the coil-holder and reaction leads. V.I.R. flex is used here. Reaction leads are twisted together, as shown, to prevent interaction. One is of 16 gauge wire for rigidity, and the other of V.I.R. flex twisted round it.

The connections to the coil-holder are marked clearly, the leads denoted by S going to sockets and those marked P going to plugs. They are of V.I.R. flex and are taken through the side of the case.

Testing the Set

The wiring completed, place the set on test. First connect the accumulator with the valves plugged in and see that this circuit is

Fig. 5.—Showing how the grid-leak is supported. Note that the right-hand clip connection is broken.

Fig. 6.—Illustrating the wiring. The photograph of Fig. 5 clearly shows the connections at X to the grid condenser C5. (Blue print No. 71 B).
Britain's Best
BROADCASTING SETS

1924/5
GECOPHONE
REGISTERED TRADE MARK
MODELS

LET your choice of a Wireless Set be
guided by the knowledge and experience
of the many thousands of satisfied users of
GECOPHONE Sets.

A new range of models has now been in-
troduced, each set embodying all those
superlative qualities which have made
GECOPHONE famous throughout the
World.

The range of GECOPHONE receiving
sets now meets every requirement and
offers selection to suit the pockets of all
sections of the community. Prices from
£2 10s. to £120.

Before you make your choice of a Wireless
Set ask your dealer to demonstrate the new
GECOPHONE models to you.
He will gladly do this without obligation.

GECOPHONE Sets are sold by
GECOPHONE SERVICE DEPOTS, Electrical
and Wireless Dealers, Stores, etc.
Ask for price list No. B.C. 3425.

In replying to advertisers, use COUPON
To some people

a receiver is merely a piece of mechanism. It has never occurred to them to give it a real chance—to help it become vitally alive. Brandes "Matched Tone" Headphones will exploit the full merit of your Set, bringing it to eager life. The "Table Talker" will make it talk clearly and melodiously. All the liquid tones, the pulsating warmth of a soprano will come to you unspoiled, without any unnatural harshness. It does not matter—the rioting madness of the violin, the immense grandeur of the organ or the intoxicating rhythm of a dance band, they all speak to you—ALIVE with their OWN vigorous cadences. Let Brandes products dispense with dull tonelessness and bring your receiver to vigorous life.

All Brandes products are obtainable from any reputable Dealer and carry our official money-back guarantee enabling you to return them within 10 days if dissatisfied.

Matched Tone RADIO HEADPHONES 25/-

Table-Talker 42/-

Tune with Brandes "Matched Tone" Radio Headphones. Then Listen with Brandes Table Talker

Brandes Limited, 296, Regent St., W. 1.

In replying to Advertisers, please use Order Form enclosed.
satisfactory. I have used most types of general purpose bright emitters here with success. The H.T. may now be connected with the H.F. transformer plugged in. Terminals H.T. 1 and 2 may be connected together for a start, and usually a value of 60 volts will be found satisfactory.

Neutrodyne Adjustments

The next step is to adjust the neutrodyne circuit. To do this the secondary coil only should be inserted in the socket of the coilholder, and the reaction coil (that is, the coil nearest to the front of the receiver) should be short-circuited by a piece of wire inserted into the socket and twisted round the plug. The secondary coil and H.F. transformer should of course be chosen to cover the wavelength required. For the B.B.C. range I used a 300 to 600 McMichael transformer and a Gambrell "C" coil. Alternatively a 75 or 50 may be used in place of the latter.

Screw the stabiliser condenser out to its minimum position and set the anode condenser C1, at some intermediate value, say, 40 degs. Now swing the secondary condenser C2, tapping the grid socket of the H.F. valve at the same time. Loudi ploks will be heard over a certain number of degrees, say, 20 degs. to 60 degs., denoting that the set is oscillating. Set the secondary condenser at, say, about 45 degs., leaving the anode condenser set as before at 40 degs. and gradually screw in the condenser, tapping to test for oscillation as before. With the anode and neutrodyne coils correctly connected a point will be reached where oscillation ceases. Swinging the secondary condenser will now probably cause the set to oscillate only over a very limited number of degrees, and by carefully adjusting the neutrodyne condenser a point will be found where oscillation does not take place, however the condenser C2 is rotated. The valve capacity is now completely neutralised.

Correct Connections

Should it prove impossible to do this, the neutrodyne coil is wrongly connected and the leads to it should be reversed and the process repeated. Unfortunately there is a complete lack of standardisation among makers of H.F. transformers, and experiment may be necessary to determine the correct connection. Those given are for the transformer mentioned.

The next step is to test for correct reaction. Insert a small coil in the reaction socket: a 25 or an "a" coil will be found suitable for the 300 to 500 metre band, and if this does not cause the set to oscillate, reverse the leads to it.

Satisfied that all is correct so far, insert the aerial coil and connect the aerial and earth, remembering that in the parallel position A1 should be joined to E. Now tune on the three condensers and on the position of the coils, when the local station should be easily received. Practise on this station till you are satisfied that you have the feel of the set and are getting the best out of it.

Maximum Selectivity

It is only with practice that one is able to get the best out of this arrangement. The maximum selectivity is obtained with the looseness of coupling between aerial and secondary coils and the reaction coil as tight as possible without using an undue amount of reaction. This means that the two former coils will be as far apart as is consistent with good signal strength, whilst the latter is brought as near to the secondary as possible. Probably at first the handling of the set will seem rather strange, but with practice it becomes very easy and is a pleasure to work.

Test Report

The set was tested in Kent 40 miles S.E. of L.D., in a spot which is very good for reception.
purposes. London was first tuned in, using an "A" coil in the aerial, a "C" for secondary, with a small "A" for reaction. The McMichael transformer was used, with an "K" valve for the H.F. and an "O" for detector, 60 volts being used on both by joining the H.T. to terminals. 2LO worked a loud-speaker at comfortable volume for a small room. Cardiff was received without a trace of London at excellent 'phone strength, and all the other R.B.C. stations were obtained, as were some of the German, Madrid, and Poste and Telegraphes stations.

On Sunday evening, October 12, or rather early on Monday morning, a station was received at excellent strength, although occasionally fading to a certain extent. A preacher was giving a sermon, his theme being "You can't change human nature." I waited and heard the hymn, "Fight the good fight," until the call sign was announced. This proved to be WGY, Schenectady, New York, which closed down at 9.1 Eastern Standard time. Occasionally signals were so loud as to be heard with the 'phones some inches from the head. After this, WBZ was received, "Pomp and Circumstance" being the first piece heard. Mr. Harris also received these stations on his 4-valve Transatlantic set, and we were able to compare results. The night was a most exceptional one for reception. Reaction control was delightfully smooth, and one was easily able to hang on the edge so that an atmospheric would send the set into oscillation, but it would come out on its own accord, unlike an ordinary set. With the arrangements used it was possible to work on a very loose coupling, and selectivity was accordingly increased to a surprising degree.

A Further Test

Another test was carried out on the same aerial on the evening of October 18, and much to my surprise signals equal in strength to those usually received on a crystal set were obtained from 2LO with no aerial or earth. A "C" coil acted as an i.f. aerial and an "A" as reaction. Signals were of sufficient strength to be quite readable in 'phones. On connecting aerial and earth fair loud speaking was obtained on this station.

5XX, using E, F and D coils as aerial, secondary and reaction coils and a 1,000 to 3,000 McMichael transformer, was received at good loud-speaker strength. (5XX is about 60 miles.) Radiola was also received on the same coils without a trace of 5XX, and at fair loud-speaker strength, several musical items being thoroughly enjoyed. A few degrees on the secondary and anode condensers and slight readjustment of the coupling brought one from Radiola to 5XX. Every word from the latter station could be clearly heard with the loud-speaker in the next room, about 20 ft. away. 5XX was received without aerial and earth at good 'phone strength.

At 10.10 p.m. Eiffel Tower, transmitting the usual weather forecast, was received at excellent 'phone strength. "F", "G", and "H" coils and the 4,500 to 7,000 transformer were used.

On none of these stations was it necessary to readjust the setting of the neutrodyne circuit from the position used for the 300 to 500 metre band of wavelengths.
November, 1924

LISSENIUM.

Get the carrier wave—

And ninety-nine times out of a hundred you've got the signal of an elusive station. With no other rheostat can you duplicate the performance of the LISSENSTAT. Its accurate control of a critical electron emission GIVES THE VALVE A CAPACITY TO DETECT AS NO OTHER CONTROL CAN.

SOLD IN THREE MODELS
LISSENSTAT (patents pending) gives the most acute tuning possible.

LISSENSTAT MINOR (patents pending) provides LISSENSTAT control at a popular price. Is replacing thousands of inefficient rheostats.

LISSENSTAT UNIVERSAL (patents pending) with its feature of protection for dull emitters.

Sensitivity—and the significance of the leak.

The leak resistance required in circuit depends upon the strength of signals. It also depends upon whether you want to bring in distant stations or whether you desire undistorted reception of nearer transmissions—it depends, too, upon whether you are using reaction or not, whether you are using a hard or soft valve—what the circuit is, and so on. Under ALL THESE CONDITIONS, ONLY BY FITTING THE LISSEN VARIABLE GRID LEAK CAN YOU BE SURE OF GETTING THE UTMOST SENSITIVITY. It covers all the wide range of resistance values required of a grid leak, with minute variation through.

LISSEN Variable Anode Resistance, same outward appearance as the LISSEN Variable Grid Leak. 20,000 to 250,000 ohms.

DON'T MIX YOUR PARTS—there is a LISSEN part for every vital place.

PARTS THAT PULL TOGETHER—when you know that every vital part in your receiver is pulling strongly with each other, you know you have a receiver which is the best you can ever get. With all LISSEN Parts you will get results which would never be possible with mixed parts.

LISSEN LIMITED
20-24, WOODGER RD., GOLDHAWK ROAD, SHEPHERDS BUSH, LONDON, W.12.
Telephones: Riverside 3180, 3181, 3182, 1072.
Telegrams: "Lissenium London."

LISSEN PARTS—WELL THOUGHT OUT, THEN WELL MADE.

In replying to advertisers, please use Order Form enclosed.
Get this wireless book—free!

The Book of MOV has been written and compiled by radio experts at Marconi House and the Osram Lamp Works. The most interesting and instructive work of its kind ever produced, it is issued gratis by the proprietors of MARCONI VALVES

MADE AT THE OSRAM LAMP WORKS

Sold by Wireless and Electrical Dealers, Stores, etc.

The Book of MOV is a work of reference invaluable alike to the beginner and the experienced experimenter. It should be in the hands of every wireless enthusiast. The voucher below entitles you to a copy.

Fill in and post this Voucher now—

Get the Valve in the Purple Box

Copies of The Book of MOV may also be had from Wireless and Electrical Dealers, Stores, etc.
A general view of the Berne station.

So many contradictory statements have been made in the Press lately about the transmission of speeches from Geneva, that we feel some details about this wireless feat might be of interest to our readers.

Certain daily papers stated that Mr. MacDonald's speech at the League of Nations was not transmitted at all, others that it was; but that the power used at Geneva was so small that reception was not possible in this country.

Unfortunately, these statements were incorrect. The speeches and procedure were actually broadcast,
The Sterling "Dinkie" Loud Speaker is supplied in a brown-tinted finish complete with flexible cord. Its dimensions are:—Height overall, 13 ins., Diameter of Flare, 7 ins., Diameter of Base, 4 ins.

Price 30/-

There’s always a welcome for “Dinkie”

An entertaining chap, DINKIE—the little fellow with the loud voice! Ready to reproduce all that is broadcast as “clear as a bell.” People say it is wonderful where the volume comes from. There is a ready welcome for “Dinkie” in every Radio home. Performance, finish and price are the reasons. Hear it at your dealers and you’ll buy!

STERLING DINKIE Loud Speaker

“The little fellow with the loud voice”

Advt. of
STERLING TELEPHONE & ELECTRIC Co., LTD.
Manufacturers of Telephones & Radio Apparatus, etc.
210-212 TOTTENHAM COURT RD., LONDON, W.1, ENGLAND.
The seventh-heaven!

Music transports us to the realms of romance. Who so hardened whose soul does not respond to the message of a melody! Let the "Primax" be your guide to the seventh-heaven where music reigns. The "Primax" is a wonder Loud Speaker—nothing is comparable to it in perfection of reproduction, evenness of sound distribution, and charm of appearance. It is hornless. Ask your dealer to demonstrate the supreme qualities of the "Primax." After all, hearing is believing!

STERLING PRIMAX LOUD SPEAKER

STERLING TELEPHONE & ELECTRIC CO., LTD., Manufacturers of Telephones and Radio Apparatus, etc.
TELEPHONE HOUSE, 210-212, TOTTENHAM COURT ROAD, LONDON, W.1 Works: DAGENHAM, ESSEX.

Ask your dealer for Sterling Leaflet No. 396—it illustrates and describes the wonder of the "Primax."
Accuracy

The object of free movement

Though not so stern in purpose as the movement of the Anti-Aircraft Gun—the movement of the Polar Universal Coil Holder is alike in principle, with the same ultimate object of accurate adjustment.

As the gun was specifically designed to follow quickly and precisely the rapid evolutions of the enemy raider through an ever-changing sphere of flight—so is the Polar Universal Coil Holder designed for an equally unlimited range of adjustment of coils.

POLAR UNIVERSAL 2-COIL HOLDER
Provisionally Protected under Patents and Designs Act.

The utmost closeness of coupling can also be obtained. The Holder is made to take the largest size (No. 1,500) of ordinary plug-in coils in both plugs even with these heavy coils, and the adjustment is firm and steady as the spindle can be firmly secured by means of a clamping screw in any position. There are no rubbing or sliding contacts.

British made of finest materials, and covered by the Polar Guarantee.

Unmounted
Mounted (as illustrated)

In replying to advertisers, please use Order Form enclosed
November, 1924

and reception was very good in this country. Anyone possessing a set on which they could hear the Ecole Superieure des Postes et Telegraphes could have listened to their Prime Minister delivering his epoch-making speech.

Transmission was not made on 1,000 metres from Geneva, as many listeners may have thought, but was Superieure was 500 watts, using an aerial of 300 ft., consisting of seven parallel wires. This transmission was similar to their usual outside broadcast, which begins every evening between 8.15 and 8.45 p.m.

In the "Salle de la Reformation," where the assembly of the League of Nations took place, two microphones were placed before the principal speakers. There were two distinct circuits, which were installed by the Western Electric Company. One was for the purpose of working loud-speakers in the hall, so that those present could hear distinctly all that was said. The other microphone was for the outside transmission. It led to a four-valve resistance-coupled amplifier, connected to the land line running to Paris.

Microphones of the carbon type were used, similar to those fixed by the B.B.C. in the Savoy Hotel. The four valves in the amplifier were arranged, three in series and the fourth connected in parallel with the third.

Reports of reception were received from many quarters, and speech was readable in places 1,500 miles from Paris.

300 feet masts support the aerial at the Berne transmitting station.
A Self-contained Single Valve Receiver

By Walter Stevens.

This set, using a dull emitter valve, will appeal to all who prefer a receiver in which the attendant batteries are enclosed.

The appearance on the British market of the low-consumption "dull-emitting" valve has caused a considerable amount of re-designing in the average broadcast receiver. The bulky and messy accumulator becomes unnecessary, and a small dry battery takes its place. Whereas the accumulator does not lend itself to inclusion inside the receiver, a small dry battery may be easily housed thus, and since the receiver is almost invariably installed inside the house, it can be made to harmonise more with its attendant surroundings.

In the present receiver, which employs one valve of the dull-emitter type, both high-tension and low-tension batteries are housed within the set, which is therefore quite complete in itself, requiring only to be connected to aerial and earth when in use. A photograph of the finished instrument is seen in Fig. 1. The cabinet, it will be observed, is of a larger size than that generally associated with a single-valve receiver. The reason for this becomes obvious upon referring to the photograph in Fig. 5, in which one side of the cabinet is shown open, the high-tension and low-tension batteries being exposed to view.

Terminal Arrangements

In Fig. 1, the terminals on the right of the panel reading from the rear to the front are respectively H.T. +, H.T. −, L.T. +, and L.T. −. A rubber covered lead is taken from each of these terminals, and is connected to its respective battery terminal after passing through a bushed hole in the ebonite panel. The two knobs controlling the...
A Symbol with a Story

It's a symbol that has become a commonplace... you see it in wireless articles... two or three times in most wiring diagrams. Everybody knows that it represents a valve. Ever thought how long that symbol took to evolve? The original one didn't look like that; it was just like the picture in the corner here. That was 30 years ago. Many years passed before the broken line was added. It indicated the grid—the third electrode which made broadcasting possible.

The original symbol had its beginnings in the Ediswan laboratories, where the world's first valve was made. In every Ediswan Valve you have an accumulated experience dating back to Fleming's momentous discovery.

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

The Edison Swan Electric Co. Ltd.

An interesting study of early wireless history may be made at the Science Museum, South Kensington, London, where the complete series of Dr. Fleming's experimental valves can be seen.

In replying to advertisers, use COUPON
All Your Constructional Difficulties Solved

The greatest wireless disappointment is when, after careful and sometimes difficult constructional work, only moderate results are obtained. This is usually the result of using a collection of wireless parts only semi-efficient in character and quite unsuited to the circuit employed. By building your set with

**EFESCA**

**WIRELESS COMPONENTS.**

you eliminate all these difficulties, and, providing the wiring is carried out correctly, you know you will get immediately superior results, results definitely giving an increased selectivity, a greater range, a purer tone and maximum volume without distortion.

**STANDARD ONE-HOLE FIXING** ensures absolute simplicity in constructional work.

The Components Illustrated are:

1. **EFESCA LOW-FREQUENCY TRANSFORMER, TYPE "B"**
   A one-hole fixing transformer of unique design. A special feature is that the windings and laminations are totally enclosed in an insulating compound, thus giving absolute immunity from atmospheric humidity. The transformer gives maximum amplification without distortion and is enclosed in a metal shroud which eliminates all parasite noises. Ratio 4:1, 30%.

2. **EFESCA SPEECH AMPLIFYING TRANSFORMER, TYPE "C"**
   This transformer is designed to give the amplification of a power transformer without the loss in purity of reproduction generally experienced with power amplification. The coil is wound in a special manner to neutralize resonance effects, while the laminations of the core are carefully insulated from each other to localize eddy currents and thus prevent distortion. Ratio 2:1, one-hole fixing, 25%.

3. **EFESCA HEADPHONES.**
   Popular priced headphones, maintaining the usual Efesca standard of quality. They are exceptionally clear and evenly matched in tone, and produce full volume. The magnets are of cobalt steel, ground perfectly true. Diaphragms of Stalloy. Headbands of polished Duralumin. 4,000 ohms, with 6 ft. flexible cord, 21/2d. Ditto 120 ohms, 21/2d.

4. **EFESCA "DEVOSTAT"** (Patent applied for). A specially designed Rheostat for Dull Diathermy Valves consuming 0.2 amp. The contact carrier rotates concentrically with the resistance former, and is fitted with a solid-pointed brush making contact with the resistance wire. A spring plunger maintains the contact at even pressure at every turn of the wire, thereby ensuring firm adjustment, smooth and noiseless contact throughout its action. Resistance 20 ohms. Complete as illustrated, 4/6.

5. **EFESCA VARIABLE CONDENSER**
   Provides a high standard of accuracy. Valves are spaced with micrometer accuracy, the construction providing smooth action coupled with stability. One-hole fixing. 0.01 mil. 12/6, 0.001 mil. 15/6, 0.0006 mil. 19/6, 0.0003 mil. 22/6.

6. **EFESCA VERNISTAT** (Patent applied for). Of unique construction, the Vernistat gives extremely delicate control and is smooth and silent in operation and is specially suited to high frequency and Detector Valveminator control. Resistance 50 ohms, 6/- each, complete as illustrated.

Our Catalogue No. 522 tells you all about the many unique "Efesca" features—a copy is yours for the asking.

For those not interested in the constructional side there is a wide range of complete Efesophones sets from the simple crystal set to the multi-valve receiver for loud speaker and long range work.

Sold by all wireless dealers, electricians and ironmongers. Wholesale only from:

**FALK STADELmann & Co. Ltd.,
Efesca Electrical Works, 83-7, Farringdon Road,
London, E.C.1.**

And at Glasgow, Manchester and Birmingham.

In replying to advertisers, please use Order Form enclosed.
November, 1924

MODERN WIRELESS

filament rheostat and the variable condenser are seen to the left of the battery terminals, while the coil-holder and valve are situated on the left-hand side of the panel. The two terminals at the front edge of the panel are for the telephones.

The aerial circuit terminals are hidden in this photograph by the coil-holder, but may be seen in Fig. 2. Reading from the left they are marked respectively Aerial, A, A, and E. The usual forms of aerial tuning may be tried by means of these terminals, namely, constant aerial tuning with parallel tuning condenser, parallel tuning without constant aerial tuning, and series tuning without C.A.T.

The Circuit Arrangement

A diagram of the circuit of the receiver is given in Fig. 3. The valve V acts as a detector, reaction

being obtained by coupling L, and L. The fixed C.A.T. condenser has a capacity of 0.0001\(\mu\)F, and is included in the aerial circuit when it is desired to use constant aerial tuning, by joining the aerial
to terminal A. C, is the aerial tuning condenser of 0.0005\(\mu\)F maximum capacity, and L, is the aerial tuning coil. The grid condenser C, has a capacity of 0.0001\(\mu\)F, and is shunted by the two megohm leak R.

In the plate circuit of the valve are the reaction coil L, variably coupled to the aerial coil, and the telephones T shunted by a by-pass condenser C, of 0.002\(\mu\)F, to give smooth reaction control.

The filament rheostat is included in the positive filament lead, since this has been found an advantage with the type of valve it is proposed to use.

Components Required

Manufacturers names are included in the following component list.

While it is not absolutely essential to employ the same makes of components as used in the present
receiver, the values mentioned should be strictly adhered to. The components are:

1. polished insulating panel guaranteed free from surface leakage, 9 in. x 8 in. x ½ in. That used was brown in colour. (Peter Curtis Ltd.)
2. Peerless Junior vernier 2-coil holder. (Radio Communication Co., Ltd.)
3. vernier variable condenser.
4. 30-ohm Peerless Junior Rheostat. (The Bedford Electrical and Radio Co., Ltd.)
5. Valve holder. (Burns dept. "Antiphonic.")
6. Clix terminals. (Autovendors, Ltd.)
7. terminals with markings.
   - 0.002 µ fixed condenser. (Dubilier.)
   - 0.002 µ fixed condenser (Dubilier.)
   - 0.001 µ fixed condenser.
   - 2-megohm grid leak. (Dubilier.)
   - Rubber-covered stranded copper wire.
   - Square tinned copper for wiring.

Notes on Components

The coil holder possesses a vernier arrangement which enables a fine control of reaction to be obtained.

Those who have used dull-emitter valves will have experienced the unpleasant microphonic effects inherent in valves of this type. The special springing of the valve holder used in this receiver will be found to eliminate this trouble.

A valve of the .06 type is employed, a 4½-volt dry battery serving for filament heating. A 30-ohm rheostat is incorporated, the ordinary 4 or 6-ohm resistance being quite useless with this type of valve.

Panel marking has been rendered unnecessary by the use of engraved terminals. The markings, such as Aerial, A, L.T.+, etc., are upon the tops of the terminals, where they are easily seen.

The Panel

The surface of the panel has a pleasing brown colour, and was obtained, as indicated in the component list, from Messrs. Peter Curtis. No difficulty in working this material may be anticipated. The diagram showing the position of the holes to be drilled is seen in Fig. 4. The saying "Method means quickness," applies aptly to panel drilling, and the best way to set about the work is to mark the position for each hole by means of a tool with a sharp point, and then drill all holes which are to be of the same size without changing the drill and starting on other points which may be nearer. It is surprising when one thinks of the number of amateurs who drill from one side of the panel to the other, changing the size of drill far more frequently than necessary.

Assembling and Wiring

The smaller components are best mounted first, such as the terminals and valve holder, as otherwise the panel becomes unnecessarily difficult to handle before the task of assembling is finished. The mounting of the valve holder becomes clear upon studying Fig. 7, and a hole of an inch and a half diameter requires to be drilled in the panel.

The four Clix panel bushes are mounted by the side of the battery terminals, and included merely for the sake of appearance, since bare photographs. Fig. 7 will also help to clear up any doubts concerning the wiring.

Two Clix plugs are connected by rubber-covered leads to the screw-head terminals on the reaction-coil socket in order to determine easily the correct direction of winding for obtaining reaction.

The Cabinet

Should the reader desire to purchase this ready-made, many dealers specialise in making cabinets to any size required. The following details will enable the reader to
MODERN WIRELESS

WHY PAY?

Why spend good money every week to have your accumulators re-charged when you can do this yourself at home, FREE OF ALL COST?

Why suffer the annoyance of being left with accumulators run down and the trouble of having them to an exchange station, when you can keep them always fully charged and in perfect condition in your own home?

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

ULINKIN

PATENT No. 223971.

THE D.C. HOME CHARGER

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

PRICE £2 2 0 CARPET.

Complete with simple instructions

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

Trade Enquirers Invited.

The Gran-Goldman Service
(Dept. M.22), 71, Fleet Street, London, E.C.4

BRANDE'S HEADPHONES.

A combination of all the good points necessary in really good head-phones. Excellent response, absolute comfort, exceptional strength, and extreme durability. Ask for the phones in the sealed carton.

G.R.C. Low Frequency Transformer.

As used on standard G.R.C. amplifiers, and guarantees maximum amplification without distortion. Correct impedance ratio, minimizing distributed capacity, low core losses, correct shielding and careful impregnation, permits of as many as four stages of amplification being used without bowing.

List No. 17779.

Each 15/ -

Put the World on your Dial.

The complete absence of inter-electrode capacity simply explains the power of the MYERS to reach across continents. The purifying effect of bunched leads in the stem inherent to the ordinary valve is to blind your receiver to the faint signals from stations beyond the seas. But one valve can span and bring in any far distant station with power, freedom from microphonic noise or distortion. The name MYERS—a password to beyond the seas.

Myers Valves

PRACTICALLY UNBREAKABLE


In replying to advertisers, please use Order Form enclosed.
Variable Condensers

Type A.

Made in all capacities from 0.001 microfarad to 0.001. All values are correctly indented and beautifully balanced; and the top and bottom plates are perfectly round in shape, being made of best of materials.

L.F. Inter-Valve Transformers

Ratio 1 to 1. Tested for insulation with 200 volts across the winding, giving a minimum of 100 Megohms insulation resistance. Also tested in pairs for transformer 

Give amplification with purity of tone and freedom from all trace of distortion. Twelve month's guarantee against defects due to faulty materials or workmanship.

Clarke's "Imp" Crystal Receivers

Reed No. 1447. Stamped "B.B.C." Measures 3 1/2 in. by 3 1/2 in. high. Fitted with Adjustable Crystal Detector, Crystal Holder, Wave-length Adjuster and four Terminals for Phones, Serial and Earth. Protected in Dark Blue Mahogany with all metal fittings nickel-plated. Can be worked with three or four pairs of Headphones. Suitable for reception of the lower broadcasting wave-lengths up to a range of about 15 miles.

Variable Condensers

Type B.

Similar to type "A", but with addition of a Vernier in combination with it. The capacities of these condensers are guaranteed correct. Both A and B condensers are one- hole Naming type.

"Velvet - Touch" Rheostats

6 ohms, affording great insulation and adequate valve filaments. Produces just that velvety touch so desirable, no scraping noise as heard in cheaper makes.

Variometers

"A" Type

Ball type ebonite motor revolving inside an ebonite ball type case; motor externally wound, stator internally wound, effecting tight coupling for fine tuning. Ratio 12 to 1. Cover lower W/4, or H/4 stations. Ebonite knob. Wobble pattern anti-capacity dial. N.P. brackets and fittings, one-hole fixing.

H. CLARKE & CO., (MANCHESTER) LTD.
ATLAS WORKS, OLD TRAFFORD, MANCHESTER

Radio Engineers,

"Grants" "Portland, Manchester."

In replying to advertisers, please use Order Form enclosed.
construct the cabinet for himself should he so desire.
The work is carried out in a finished mahogany, and the required dimensions of the necessary wood are as follows:

2 sides 9 in. long, 9$\frac{1}{4}$ in. high.
2 sides 8 in. long, 9$\frac{1}{4}$ in. high.
Base 9$\frac{1}{4}$ in. x 10$\frac{3}{4}$ in.

The cabinet is constructed to a size which allows the upper edge of the ebonite panel to become flush with the top of the cabinet, strips of wood being fixed to the inside of the cabinet 1 inch from the top to act as a support for the panel.

One of the 9$\frac{1}{4}$ in. x 9$\frac{1}{4}$ in. sides is hinged and is fitted with a knob, the position of which may be seen in Fig. 1, while in Fig. 5 this side may be seen open, its purpose being to enable the batteries to be easily accessible.

**Batteries and Valve**

A Hellesen dry battery of 4$\frac{1}{2}$ volts has been employed for filament heating. For the sake of quick reference these batteries are given different names, the name of that used in the present instance being "Glate." In any case care should be taken to select a battery of large capacity, otherwise its life will be short.

The high-tension battery was made by the same firm, the name in this case being "Wirin," and has a total voltage of 60.

The valve is one of those known as the 06 ampere type, and any well-known make may be used. This, of course, applies equally well to the batteries, but in no case should cheap ones be substituted, as usually these are very unreliable.

**Operating the Receiver**

The batteries are inserted in the cabinet (convenient positions are those shown in Fig. 5) and connections taken from the terminals on the panel through the Clix panel bushes to their respective battery terminals. It is possible that the full 60 volts of the high-tension battery will be required, although the valve is to be used as a detector. Now connect the aerial, earth and telephones to the receiver, and also insert the valve in its socket. This latter should not be done until the rheostat has been turned to the "off" position, and it is advisable to leave the H.T. terminal disconnected until you are assured that the valve lights correctly.

Constant aerial tuning may be tried first of all by connecting the

Fig. 6.—The wiring diagram. Full size blue prints are available, No. 70 B.
MODERN WIRELESS

Fig. 7.—The wiring of the receiver can be clearly followed from the photograph.

aerial to A, and E to earth, A and E being joined by a piece of wire. A No. 50 coil is now inserted in the aerial (fixed) socket, and a No. 75 in the reaction coil socket. Switch the valve on, taking care not to burn the filament too brightly. Tuning is carried out by adjustment of the variable condenser. If the station desired is within easy range the coils should be placed as far apart as possible while tuning is carried out, and upon receiving the signals they may be brought slowly towards each other, retuning at the same time on the variable condenser. If signals become weaker instead of stronger, the leads to the reaction coil should be reversed by means of the two Clix plugs and sockets, and the tuning process carried out again.

For best results it is advisable to try varying both the filament temperature and the high-tension supply, and also to try the different forms of tuning.

Series aerial tuning may be used by connecting the aerial to A, and earth to E, no link being used in this case. A smaller coil may be tried in the aerial socket with this form of tuning.

Ordinary parallel tuning without constant aerial tuning may be used by connecting the aerial to A, earth to E, and A joined to E as with constant aerial tuning.

TEST REPORT.

THE single-valve set described in the foregoing article was tested eight miles east of 2LO. Two aerials were used, one a 75-ft. twin, 45 ft. high, the other a single wire, 60 ft. long, 20 ft. high, badly shielded at one end by the house.

Constant aerial tuning was employed throughout the test, except in the case of 5XX, when ordinary parallel tuning was used.

Comparative Tests.

2LO was the first station received. A No. 50 coil was placed in the aerial socket and a No. 75 coil in the anode socket. The set was first tested on the large aerial and the condenser dial read 18°. On this adjustment 2LO was so loud as to be uncomfortable in the headphones and the loud-speaker was worked with sufficient volume for a small room.

Signal strength on the small aerial was of course not so great, but very good telephone signals were received. The aerial tuning condenser was in this case set at 19°. The large difference between the two aerials and the small one between condenser readings amply demonstrate the advantage of constant aerial tuning. With this aerial arrangement speech could easily be understood at 15 feet from the loud-speaker when used in place of the telephones.

Stations Received.

The large aerial was then connected to the set, and the following stations were all received at about equal signal strength, being sufficiently clear to enable the weather forecasts and call signs to be quite easily read:

- London, 2LO, 18°
- Newcastle, 5NO, 41°
- Birmingham, 5IT, 62°
- Aberdeen, 2BD, 71°

For these stations a No. 50 coil was used for the aerial circuit and a No. 75 for reaction.

- Birmingham, 5IT, 8°
- Aberdeen, 2BD, 11°

These latter readings were obtained with a No. 75 coil in the aerial socket, the reaction remaining unchanged; a slight increase in signal strength was noticed.

On the smaller aerial no other stations except 2LO and 5XX were received, unless under reaction coupling was used.

5XX was tuned in with a No. 150 coil in the aerial socket and a No. 200 in the reaction socket. The condenser reading was 80° for this station, which comfortably filled a small room on a loud-speaker on the large aerial, and was pleasantly audible on the small one. In the latter case the aerial condenser read 105°. Parallel tuning was employed in both cases.

The valve used during the test was a D.E. 3. H.T. was varied between 20 and 80 volts, as suggested by the manufacturers, best results being obtained with a voltage of about 60.

The whole set, being self-contained, is suitable for placing in the drawing-room, as no unsightly accumulators or other necessary components are outside the set. The receiver is comparatively small and can be placed on a small shelf in a convenient position.

Do not wait a whole month for your next wireless literature.

"The Wireless Constructor"

is published on November 15th.

Place your order at once to avoid disappointment.
**The CURTIS CONSTANT-TUNED HIGH FREQUENCY AMPLIFIER**

**ON CONTROLS NO CONDENSER**

**ABSOLUTELY AUTOMATIC TUNING**

IT is quite possible for a signal, practically inaudible on headphones with even one high frequency and detector valves, to become positively deafening when passed through two stages of low frequency amplification, but the reproduction will be far more distorted than if the detector signal strength had been twice as loud, when only somewhat less than half the amount of low frequency amplification would be required to yield the same volume of audibility.

It is automatic that the louder the signal strength at the detector valve, the less low frequency amplification required for any given volume of audibility, and correspondingly more natural and true reproduction will result.

YOU CANNOT USE TOO MUCH HIGH FREQUENCY AMPLIFICATION NOR TOO LITTLE LOW FREQUENCY AMPLIFICATION FOR PERFECT REPRODUCTION.

**BUT** the use of more than one stage of high frequency amplification has, hitherto, proved impracticable, because of the extreme difficulty in tuning and the need for considerable skill and patience to obtain results which, even at best, would be erratic and unreliable.

Designers and Manufacturers have therefore been compelled to rely on the employment of a detector and low frequency amplification to make up for the weakness of the receiver signal, with consequent comparative distortion.

The Curtis Constant Tuned High Frequency Amplifier is the only automatic high frequency amplifier on this or any other market which, when connected in circuit, guarantees the maximum efficacy of two stages of radio amplification of any wave-lengths between 300 and 3,000 metres, and requires no additional controls, nor more effort, skill or patience in tuning, than is required for the operation of the usual orthodox single stage tuned anode circuit.

**THE CURTIS CONSTANT-TUNED HIGH FREQUENCY AMPLIFIER CHANGES THE WHOLE CHARACTER AND QUALITY OF WIRELESS REPRODUCTION AND**

...its automatic simplicity combined with increased receptivity, selectivity and power, is predicated to make two stages of high frequency amplification a sine qua non of every Wireless Receiver for the Experiment and Home Constructor, or the purchaser who prefers to buy a professionally constructed instrument.

For the greater convenience of the constructor, and so as to conform with existing panel design, the Curtis Constant Tuned High Frequency Amplifier is designed for use and must be connected up in exactly the same way in which an ordinary High Frequency Transformer is used.

The Curtis High Frequency Amplifier may be instantly substituted for any High Frequency Transformer in any existing circuit or instrument where such is used, but the corresponding condenser of such transformer must be turned to allow for any one wire disconnected therefrom.

The Curtis Constant Tuned High Frequency Amplifier guarantees such an increase of receptivity as to permit the efficient use of a suitably designed wavetrap.

**ANYTHING FROM ANYWHERE THE DUODYNE III**

**A GENUINE LONG DISTANCE RECEIVER**

**2 STAGES HIGH FREQUENCY AMPLIFICATION AUTOMATIC TUNING.**

In the Duodyne III the fullest advantage has been taken of the extra-ordinary virtues of the Curtis Constant-Tuned High Frequency Amplifier. The first valve functions through the Curtis High Frequency Amplifier, the second as an orthodox tuned anode and the last as a rectifier. Guaranteed perfect reception at full power and of extraordinary purity from anywhere in the United Kingdom of any broadcasting station from Aberdeen to Madrid.

In spite of a multiplicity of stations operating on a congested wave band, the Duodyne, used in connection with a Curtis wavetrap, requires that TRUE FASCINATION OF WIRELESS—LISTENING IN—AT WHERE YOU WILL!

**PRICE £10**

THE DUODYNE V. A truly International Receiver which combines the Duodyne III with a two stage Power Amplifier. Four valves (using one low frequency amplifier only) will be found more than sufficient to operate a Loud Speaker from the most distant stations for drawing room purposes. The last valve will be necessary for Dance or public demonstration or mid-speaker work on the most distant Continental stations.

The exquisite purity of loud-speaker (Amplico) reproduction with a Duodyne V is a positive revolution and has never yet been equalled by any professional model on this or any other market. Nottingham Relay Station (200 watts) on a Loud-speaker with 2LO (only 1 miles away) cut out is no mean performance for the Duodyne V with a Curtis wavetrap.

**PRICE £18 19 6.**

**WAVETRAPS HAVE FAILED ! !**

BUT not because of any inefficiency of the wavetrap, but rather because the receivers with which these were used did not have sufficient reserve of power to stand the loss inherent with a wavetrap and yet " fetch in " the more distant stations.

On a conservative basis the Curtis Wavetrap with the Duodyne III will cut out principal station (15kw) at one mile and bring in two other stations; 4 miles and bring in 50 per cent, of the remaining stations; 6 miles and bring in all British Stations at will.

**THE CURTIS WAVETRAP 35/- PRACTICALLY ELIMINATES MORSE AND MUSH**

---

**PETER CURTIS, LTD.**

75, CAMDEN ROAD, N.W.1.

Telex: "Paracur," BIRMINGHAM: 78, Newall Street, MANCHESTER: 312, Euston Gate.

In connection with THE PARAGON RUBBER MANUFACTURING CO., LTD., NULL

---

In replying to Advertisers, please use Order Form enclosed.
The Seconds tick by in the silent chart room and down in the Southern Pacific the navigator shapes his course by the unfailing accuracy of his chronometer.

How would he fare if his shipowners had tried to economise by installing cheap alarm clocks in place of chronometers?

And yet frequently enough we find instances of people getting inferior results from their wireless sets because they have attempted to economise on condensers.

There is no economy in this really, because sooner or later they have to take out the "just as good" and substitute an article of sound manufacture.

We do not say that all cheap condensers are necessarily bad; you may be lucky and get a good one, but if you buy a Dubilier you bet on a certainty you get a good one every time.

Naturally if we are to maintain such a high standard our products must be slightly more expensive than those which carry no guarantee, but we are convinced that in the interests of true economy you should specify Dubilier.
Wireless Without Worry.

By FRANCIS.

The wireless enthusiast has an entrancing hobby, but one which, like most hobbies, fails in some of its pleasure if it does not afford interest and entertainment to one’s family or intimate friends. For this reason the enthusiast would do well to remember that the reception of telephony without wires has lost its novelty for the layman and is now almost commonplace. Consequently, the entertainment radiated from the various stations of the B.B.C. is alone of permanent interest.

This it will remain, if only care is taken that the speech and music are undistorted and free from extraneous noises. To say “Ah, those are X’s,” or “That is Morse from Channel shipping,” or to blame Leafield, does not compensate listeners for enduring a weird and unpleasant variety of noises, some of which are claimed to be 2LO and some Aberdeen.

The only satisfactory way to make sure of giving entertainment is to receive the programme radiated from your nearest station. Do this, and you can obtain easily sufficient volume to enable you to...
"filter" out noises and interruptions either by re-tuning or other means. Remember that the greater the distance of the station you are receiving, the more noise, atmospherics and other disturbances you are likely to bring in. So, to get clean, pure, undistorted reproduction, be content with your local station. After all, the programmes from all the B.B.C. stations are of good quality, and generally not inferior to those of other provincial places of entertainment, while the latest news and special items of national interest are all relayed direct from London.

These observations are the outcome of my own recent experiences. I was electrified one day when informed that the "mess of wireless" about the rooms had driven my wife to the point where she must have either "a new house or a new husband"! This led to a heart-to-heart talk, with the family ranged on one side and myself on the other. Further enquiry as to what it was they did want brought out this information.

They wanted apparatus arranged so that they could switch it on when desired. There was to be little or no "tuning-in"; no one was to come along and tune-in another station in the middle of some interesting item. There were to be no wires about the room, and no batteries and no frame aerial, or, at any rate, none visible. I was to be given a whole room to myself at the top of the house, where I could make as much mess as I liked and produce as many unhuman-like noises as I pleased. Now, the real object of this article is to show how I managed to satisfy my family and enable them to receive their wireless programme at will and with certainty. The conditions fulfilled may be summarised as follows:-

1. Reception from one station only.
2. Fixed tuning.
3. Switch control.
4. No visible aerial, wires, or batteries.
5. No additional furniture, or interference with furniture already in room.

One wall of the room selected for this purpose has on its other side a cupboard which opened into another room. In this wall I pierced a hole about 5 ft. from the floor and into the cupboard. Into this hole and flush with the wall was fixed a square box with a back screwed on and an open front. The box was made of a size to just accommodate the receiver decided upon. To cover the edges of the box and joints in the wall a frame was made. Polished mahogany was used to match the room furniture. The width of the framing is 2½ in. and it projects 1½ in. from the wall face. It was fixed by four brass strips, one on each side of the frame. These were screwed to inside edges of the frame and to the inside of the box. Thus there are no visible fixings or nails maruing the appearance of the wall, in the front of the frame and flush with its face was fixed a glass-panelled door large enough to enable

The receiver is housed in the cupboard and the earth plate is normally covered by a mat.

Fixed tuning arrangements are used.
GENUINE SERVICE WITHOUT PROFIT

For the benefit of the Home Constructor we have now opened a CONSTRUCTORS' DEPARTMENT

Any constructor purchasing a complete set of parts either direct from us or through any of Our Agents for any published circuit whatsoever and experiencing any difficulty thereof, may send his request to the Constructors' Department, Peter Curtis, Ltd., together with a postal order to cover the nominal charge of 2/6 per valve holder. For this sum we shall examine the set, rectify any errors and return carriage forward in perfect working order under average conditions on P.M.G. Aerial.

(a) Care should be taken to pack carefully, as all goods will be returned in same case as received.
(b) Mention the vendor from whom the parts were purchased.
(c) Unless the charge for passenger carriage is included, the set will be returned carriage paid on goods train.

THE SILVER GHOST
CRYSTAL RECEIVER.

With its richly engraved panel and plate holders mounted on a POLISHED ALUMINIUM casket, combines the exclusive efficiency and elegance of a Curtis Radio Instrument.

PARAGON-CURTIS
One Piece Mica Condenser

The metal parts, main di-electric and connecting terminals are set in a Paragon composition and moulded simultaneously under considerable pressure. The Paragon-Curtis Condenser is practically indestructible; it may be immersed in boiling water for an indefinite period; will stand flame, or may be thrown violently against the wall without fear of damage or loss of efficiency.

The STANDARD of CONDENSER EFFICIENCY.

PARAGON EBONITE PANELS

As supplied to the B. B. C.

British Broadcasting Co. Ltd.

PARAGON • CURTIS

PARAGON-CURTIS • CURTIS FILAMENT RHEOSTAT.

Price £0 0 0

The reception of local broadcasting needs nothing more pretentious than the RADIONETTE (Crystal and Tone Note magnet). Purity of reproduction is gained by the crystal, which purity we have been careful to retain by the satisfactory choice and disposition of the metal transformers. The RADIONETTE Crystal and TWO Valves was designed in the earliest days of Broadcasting.

PARAGON RUBBER MANUFACTURING Co., Ltd., HULL

PARAGON POLISHED MAHOGANY EBONITE

Is NOT a Composition, but GUARANTEED POST OFFICE QUALITY EBONITE and is of similar specification to the now universally used PARAGON EBONITE. PANELS CUT TO SIZE. Squared, edges ground, 1d. per sq. inch.

In replying to Advertisers, please use Order Form enclosed.

PETER CURTIS, LTD.
75, CAMDEN ROAD, N.W.I.

Telex Gra - 766

BIRMINGHAM - 96, Newhall St., Central 7266.

MANCHESTER - 312, Deansgate. Central 5095.

In conjunction with THE PARAGON RUBBER MANUFACTURING Co., Ltd., HULL.
In replying to Advertisers, please use Order Form enclosed.
A GREAT deal has been written recently on the subject of adding external loading coils to ordinary broadcast receivers in order to tune in the high-power station at Chelmsford. While this may be done quite efficiently, the majority of broadcast listeners object to a receiver which requires these external arrangements, and the present crystal set has been designed to cover the ordinary broadcast band and also a few wavelengths without an external and cumbersome loading coil; the whole of the tuning system being permanently housed inside the set.

To prevent dead-end effects while working on the lower wavelengths, provision has been made for cutting out the loading coil by means of two terminals on the front of the panel. The most novel feature of the set, however, is the method in which the two coils have been wound, resulting in compact coils of low self-capacity. The ease with which these coils may be wound is also an important consideration to those whose wish is to make really efficient coils. The well-known tens and units method of tapping the coils has been adopted on account of its simplicity, and the fact that the maximum amount of inductance is always used—an important point where efficiency is concerned. No variable condenser is necessary, thus keeping the cost of the com-

ponents to a low figure. Two rotary type stud switches are used, and the tappings are taken to these. One is entirely concerned with single turn tappings, giving fine tuning, and the other with coarse adjustment by ten turn steps. A fixed condenser of 0.0005 µF capacity has been provided for use on the higher wavelengths, or where the aerial is extra large it may be used in series on the lower wavelengths.

Circuit Diagram

Fig. 2 shows the circuit arrangement of the receiver. T₁ is the aerial terminal, although the aerial may be joined to T₅ as an experiment where the aerial capacity is high. The real object of the latter terminal is to enable the 0.0005 µF condenser C to be placed across L₁ and L₂ on the higher wavelengths. L₂ is shown in two parts; the switch S₂ works over ten turns, and S₁

Fig. 3 shows a diagram of how the tappings and units switches control the amount of inductance used.
works over the remaining seventy turns. The latter switch also controls the amount of \( L_2 \) in circuit when the terminals \( T_5 \) and \( T_6 \) are connected together, thus including the latter coil.

**Components Required**

The following is a list of components required for the construction of the receiver.

- Ebonite panel, 8 ins. by 5½ ins. by 1 in. (Paragon; Peter Curtis, Ltd.)
- Cabinet of suitable size.
- 1 0.0005 \( \mu F \) fixed condenser. (Lissen, Ltd.)
- 2 Switch arms.
- 4 Switch stops.
- 30 Contact studs.
- Crystal detector. (Burndedpeft, Ltd.)
- 7 4-B.A. terminals.
- 6 oz. 20 S.W.G. D.C. wire.
- 6 oz. 24 S.W.G. D.C. wire.
- About 9 ft. tinned square copper wire.
- 1/2 in. Cardboard tube of 2 in. diameter.
- About 4 ft. of 1/2 in. by 1/8 in. wood.
- About 10 ft. 1 in. by 1/2 in. wood. (Alternatively, thick matches will be suitable.)

**Constructional Details**

The ebonite panel should now be drilled in accordance with the drilling diagram, Fig. 4, the positions for the various holes being first marked with a sharp-pointed instrument. The mounting of the components calls for no comment, for it is very unlikely that any difficulty will be experienced here.

Radio Press panel transfers have been used for marking the various components, resulting in a very distinctive and pleasing appearance in the finished receiver. An envelope containing 80 different labels may be obtained from the Radio Press Sales Department for the modest price of 6d. They are as simple to use as a child's transfer and a good selection is included.

The construction of the coils may now be undertaken, and a good idea of their appearance when finished may be gathered from the photographs showing views of the back of the panel with coils in position.

It will be noticed that the two coils differ in size, the smaller one being used by itself on the lower wavelengths, while the larger is employed in series with the former upon the higher wavelengths. It is a good plan to wind the loading coil first, as despite the fact that it is the larger of the two coils, the necessary tappings require less skill to make than do those of the other coil.
For Detection—Use H.F.

MASTER VALVES have MASTER REASONS

FOR DETECTION—USE MULLARD H.F. VALVES.
Because: MULLARD H.F. VALVES have positive grid current.
Reason: Grid current is essential for the operation of a grid leak detector: without grid current there can be no grid leak rectification.

FOR H.F. AMPLIFICATION—USE MULLARD H.F. VALVES.
Because: MULLARD H.F. VALVES have the correct amount of positive grid current.
Reason: Positive grid current is necessary for stability in H.F. operation.

FOR L.F. AMPLIFICATION—USE MULLARD L.F. VALVES.
Because: MULLARD L.F. VALVES have NO harmless positive grid current.
Reason: Positive grid current damps L.F. amplification and causes distortion.
Stipulate MULLARD H.F. Red Ring Valves for H.F. AMPLIFICATION AND DETECTION—12/6 each.
Stipulate MULLARD L.F. Green Ring Valves for L.F. AMPLIFICATION—12/6 each.
Write for leaflet M8 and take greater care of your valves, by asking your dealer for the Mullard Safety disc, free on request. If he cannot give you this disc send us his name and address and we will send him a supply.

Mullard
THE MASTER VALVE

Advt.—The Mullard Radio Valve Co., Ltd. (M.W.), Nightingale Works, Nightingale Lane, Balham, S.W.12.

In replying to Advertisers, please use Order Form enclosed.
Dull Emitters Repaired Quick!

GOOD NEWS! Your "D.E.'s" can now be repaired with 2 volt .25 amp filament, to give results equal to new. Prompt service.

We can do most types except "WECO-type" and valves having electrodes brought out at opposite ends of tube (that is, low capacity valves).

NEW RADION COOL VALVES.

We are now offering three types of dull emitter valves—

C.1. For H. F. and D—1.8 to 2 volts .25 amp
C.2. For L. F. 1.8 to 2 volts 35 amp
C.3. 1 volt 76 amp, 21-.

Anode 20-60. Manganese factor 9.

RADIONS, LTD., BOLLINGTON, near MACCLESFIELD.

WARNING — COIL HOLDERS

It has come to our notice that a certain firm are misleading the public by offering for sale under the name of Magnum an inferior imitation of our Coil Holder. To fairness to yourself as well as to us, insist on the genuine Magnum Coil Holder as used by the designers of the Transatlantic V, All Concert de Luxe, Simplicity 3, Purifiers, etc., etc. In future every Coil Holder of our manufacture will bear the name MAGNUM.

Send stamp for Illustrated List and set of leaflets dealing with S.T.103, 4-Valve Family, Simplicity 3, All Concert de Luxe, Transatlantic 5, Purifiers, etc., etc. As described in our leaflets dealing with Transatlantic, etc., for every Coil Holder of our manufacture will bear the name MAGNUM.

CONSTRUCT THE OMNIT for £11 0s. 5d.

CONSTRUCT THE 4-VALVE FAMILY for £1 4s. 3d.

CONSTRUCT THE ALL CONCERT de LUXE for £3 10s. 6d.

CONSTRUCT THE SIMPLICITY 3-VALVE for £4 13s. 6d.

CONSTRUCT THE TRANSATLANTIC V. for £11 13s. 11d.

Carriage and Packing Free on Retail Orders under £5 and over.

BURNIE-JONES & Co., Ltd.
Magnum House, 288, Borough High Street,
LONDON, S.E.1.

652

In replying to advertisers, please use Order Form enclosed.
Although it must not be imagined that the construction of either coil presents any great difficulty. To commence then with the loading coil, the frame is first constructed from a length of the 2 in. by ¾ in. wood mentioned in the list of components. 2 ft. 1 in. of this will be required, this length being cut into four 6½ in. lengths. Each piece is now cut as shown in Fig. 5 A and B. The four pieces are utilised to form two crosses, the appearance of each then being as in Fig. 7. The method of fitting two pieces together may be clearly explained by stating that the part marked a in Fig. 5 is simply placed upon the part b. If the trenches are cut ½ in. deep, the two pieces will fit tightly together if made accurately. The slots in each piece can be easily made by using a fret-saw and should be cut out before the cross pieces are joined together. A small length of ¾ in. by ¾ in. wood (say 1 in.) is now prepared, and a hole of ½ in. diameter bored through the centre.

The object of this piece of wood is to allow a space of ½ in. between the two crosses when these are joined together to form the sides of the coil former. A hole is bored through each cross in the position indicated by the screw-head in Fig. 7. The two crosses are joined together by means of a wood screw, or nut and bolt of suitable length, this passing through the holes bored in the crosses and the small piece of wood previously mentioned, the latter being placed between the crosses to effect the desired ¾ in. space.

Winding the Loading Coil.

24 gauge wire is used for the winding of this coil. Before commencing, however, a good supply of ¾ in. by ½ in. wood should be secured and placed close at hand. A number of strong matchsticks are quite a satisfactory alternative, if wood of the requisite size is not procurable. A ½ in. square strip about 1½ in. long is inserted at the bottom of each of the four double slots in the former, in such a manner that the strip bridges the gap between the crosses. To one of these the end of the wire is secured, leaving an inch or so free, and winding commenced.

It will be found that ten complete turns may be wound in one layer, and a tapping is taken at the tenth turn. The method of doing this is very simple; the wire is merely formed into a loop about two inches long, and the end nearest the coil twisted round a few times to preserve the loop. Winding is continued after inserting another strip of wood in each slot, the wire being taken to the side opposite that on which the tapping was taken, and over the next wood strip. This of course brings the eleventh turn over the first turn, and the next turn will come over the second turn, but

Fig. 7.—Wiring may be conveniently carried out by joining corresponding letters and numbers on the coils and studs. The loading coil is seen on the left and two views of the lower wavelength coil are given, showing the position of the tappings.

653
separated in each case by about \( \frac{1}{2} \) of an inch—the thickness of the wood strips. The coil would be less efficient if the eleventh turn were wound over the tenth, and so on, as this would result in the twentieth turn being over the first turn on reaching the end of the row. This method of winding would increase the self-capacity and is not recommended.

Having wound another ten turns and thus reached a point above the tapping previously made, a second tapping is taken in the same manner as before. Another four wood strips and another layer follow, the tapping for this layer being at the thirtieth turn. The remainder of the coil is wound in an exactly similar manner, the positions of the tappings being approximately as in Fig. 7. From this figure it will be seen that there are thirteen layers in all, the commencement of the winding and the first tapping being on opposite sides of the same row. The numbers are for reference when wiring is commenced.

The Low Wavelength Coil

The former for this coil is somewhat similar in appearance to that of the loading coil. In this case, however, a cardboard tube is utilized for spacing the two crosses, and also to aid in making the "units" tappings. The dimensions of the crosses, which are constructed in a similar manner to those of the loading coil, are shown in Fig. 8. The cardboard tube has a diameter of two inches, and is \( \frac{1}{2} \) of an inch long. Ten holes are made in this at intervals of about \( \frac{1}{4} \) in. and are illustrated in Fig. 7; this figure, of course, is not drawn to scale.

The first layer, from which the units tappings are taken, is wound on before fixing the tube between the crosses. The end of the 20 gauge wire is secured by means of the first hole in the tube, leaving two or three inches of wire free. One turn is wound, and a loop is then formed, about 3 ins., in length, this being pushed through the second hole, and twisted a few times after being brought outside the tube. Another turn is then wound on, and a tapping taken with the aid of the third hole C, and so on, until the tenth turn has been tapped. The relative positions of these tappings, which are lettered from A to K, may be gathered from Fig. 7, in which an end view of the tube is shown.

The crosses are now screwed together with the tube between them, in such a manner that the screw passes through the centre of the tube. On the actual set the spacing of the layers on this coil has been effected by means of \( \frac{1}{2} \) in. diameter ebony rod, but matches or \( \frac{1}{4} \) in. square wood may be used with perfect confidence.

Four strips are now inserted, and the eleventh turn wound above the first, as in the case of the coil already constructed. At the twentieth turn a tapping is taken in a manner exactly similar to that employed in tapping the large coil. In fact, from this point we proceed in exactly the same way as from turn twenty of the loading coil. In this case, however, the coil is completed after winding seven complete layers, including, of course, the first layer, from which the tappings were taken.

Wiring

The wiring diagram is seen in Fig. 7, which, however, does not show the connections from the coils to the studs. The few connections illustrated should be carried out first as it will be hard to get to certain spots on the panel after joining the studs to the coil tappings. This latter should present no difficulty if the constructor is able to solder, for the coil tappings are each given a separate number in the case of the larger coil, while in the case of the small coil, the units tappings are lettered, and the tens tappings numbered. The contact studs are also lettered and numbered, and it is only necessary to join corresponding numbers or letters in the most convenient manner; e.g., tapping 11 on the loading coil goes to stud 11, which will be seen on S1, and tapping F goes to stud F of S1.

The coils are prepared for the soldering of their tappings before mounting them on the wooden base mentioned in the component list. It will be found convenient to cut off the ends of the loops.
The SHIPTON New Type Strip Rheostat & Potentiometer

Protects your valves...

Various devices are available for the protection of valves from accidental short circuit; but fitting is troublesome. When you fit The SHIPTON Rheostat (one hole fixing) your valves are protected since the SHIPTON 7 ohm model is fitted with a fuse, A spare fuse is contained in every box. This Rheostat, besides combating a safety fuse, is designed with a special tension spring on the spindle assuring good contact while retaining a light action, and actually costs no more than the now obsolete rheostat.

THE MOST PERFECT RHEOSTAT YET INTRODUCED

SHIPTON New Type Strip
RHEOSTAT 7 ohm (with fuse) 3/-
SHIPTON New Type Strip
RHEOSTAT 30 ohm 3/-
SHIPTON New Type Strip
RHEOSTAT 60 ohm 3/-
SHIPTON POTENTIOMETER
630 ohm 4/6

Packed in neat fireproof boxes.

E. SHIPTON & CO., LTD.
37, Tothill Street, Westminster, S.W.1.
Telephone: Victoria 7.
Telegram: "Rheostats, Park." Also at 14, King Street, Covent Garden, W.C.

"BIG-BEN" LONG RANGE ONE-VALVE SET

COMPLETE, AS SUPPLIED.
This Set will work a Loud-Speaker 10 miles from the Broadcasting Station and has at least a 50 miles range with "phones.
Supplied complete with H.T. Valve (25/-), 1 pair "phones, High and Low Tension Batteries, with Marcro Tax paid. Retail Price £7 12s. 6d.
Arrange a demonstration at your local Dealer's. If he cannot supply, instruct him to write to us or write direct to -

STOCKALL, MARPLES & CO. (1912) Ltd.
610, Clerkenwell Road, E.C.1.
Telephone: Clockmond 6345.
Telegrams: Stockalls, Smiths, London.

Autumn Leaves

Standing at my window the other evening watching a gusty wind whirling the dead leaves round my sundial, I was forced to admit that our short summer was over. All too short it seemed to me: just a few bright days and before we knew where we were autumn had set in with winter unpleasantly close—well, not altogether unpleasantly. I rather look forward to long winter evenings. It's a restful change from being harried by the children to go and play in the garden, as they insist on my doing when it's light till ten.

In the winter they seem perfectly satisfied to sit and listen to the perfect tunes of the Volutone giving them Miss Nobody Special's latest bedtime story or the first part of the evening concert. The Volutone also is powerful enough to enable them to talk without disturbing the concert; in fact, it's proved itself a positive blessing and at a price well in keeping with the Fellows' policy of

Quality Apparatus at Low Cost.

Fellows Volutone.
£4:10:0
Fellows Junior.
£1:10:0

In replying to Advertisers, please use Order Form enclosed.
What Mr William Le Queux thinks of the B.T.H. B4 Valve

6 VOLTS—0.25 AMPS.

Mr. William Le Queux, the famous novelist, is equally famous in the world of radio technics. He was one of the pioneers of wireless, and has been experimenting for 20 years. His transmitting station 2.A.Z. at Guildford was the first station in the world to broadcast regularly every night.

Mr. William Le Queux, as a result of his Jungfrau experiments, has proved the superiority of the B4 Valve—the first of its kind, and the best . . . .

The B.T.H. Type B4 Valve was the first valve taking only 0.25 amperes at 6 volts sold in this country. It is acknowledged as the supreme valve for use as a low frequency power amplifier.

Obtainable from all Electricians & Radio Dealers

The British Thomson-Houston Co. Ltd.
Branches at: Belfast, Birmingham, Bristol, Cardiff, Dublin, Glasgow, Leeds, Liverpool, Manchester, Merseyside, Newcastle, Sheffield, Swansea

Price 35/-

In replying to advertisers, please use Order Form enclosed
in order to facilitate the baring and cleaning of the wire. The two ends thus formed are twisted together after being carefully scraped.

The coils are now mounted by means of four wood screws on the 8 ins. by 6 in. by 1 in. wooden baseboard, approximately in the positions shown in photographs of the back of the panel. The wooden board is now joined to the lower end of the ebonite panel by means of two wood screws passing through the panel in the position shown in Fig. 4.

At this stage the tappings of the coils are connected to their respective studs with the aid of ¼ in. square section tinned copper, this wire being chosen chiefly on account of its rigidity. This completes the receiver save for the cabinet, which may be bought or constructed as desired.

Operating the Set

The aerial is joined to T1 and the earth to T5. If it is desired to receive a station working on one of the usual wavelengths, i.e., 350 to 500 metres, the two terminals at the top of the panel, T1 and T4, are left open, and tuning carried out by placing the arm of the switch S2 on the first stud, and varying S1 slowly over all its studs. If this does not bring in the desired signals, the second stud on S2 should be tried, and another complete variation of S2. This process should be carried on, together with frequent adjustments of the crystal detector until signals are arriving at maximum strength. It should be noted that when working with the set under these conditions, no signals will be obtained when the arm of S2 is on any of the studs from 8 to 20, since these are not in circuit.

Aerial Connections

The aerial may be taken to T2 if a very large aerial is used, and the effect noted after the necessary retuning has been carried out.

The long wave broadcasting station at Cleethorpes is received by connecting the aerial to T2, earth to T5; T4 is joined to T1 by means of a piece of square section wire, one end of which may be fitted with a small chonite knob for the sake of appearance.

Searching is carried out in the same way as before, placing S2 first of all on the twentieth stud this time, then on the nineteenth and so on.

Test Report

The set was tested east of 2LO in the outer suburbs on a twin aerial 75 ft. long and 45 ft. high. Good results were obtained from both 2LO and 5XX.

Fig. 10.—The connections to the loading coil may be seen from the above photograph.

Fig. 11.—A View behind the panel taken from one side.
When receiving 2LO the aerial was connected to the terminal marked aerial, and the earth wire to earth; the link joining the loading coil terminals was taken out. Best results were obtained under these conditions with \( S_1 \) on the third stud and \( S_4 \) on the second stud. Signal strength was observed to be less than that obtained from the average crystal set. Upon placing the aerial lead-in upon the terminal \( T_3 \) instead of the aerial terminal, rather louder signals were obtained after returning on \( S_2 \) and \( S_4 \). The settings for these were \( S_2 \) on the seventh stud and \( S_2 \) on stud five. On connecting a loud-speaker to the telephone terminals, speech was audible at a distance of five feet.

Reception of 5XX.

The set was prepared for the reception of 5XX by joining the terminal of the loading coil by means of the link, and taking the aerial to the aerial terminal, and earth lead to earth terminal. Loud signals were received from this station with \( S_3 \) on stud six, and \( S_4 \) on stud eighteen. When using a loud-speaker, speech was just audible at a distance of 8 ft. It was found that the switch \( S_1 \) made little difference to strength of signals from 5XX.

The fixed 0.003 \( \mu F \) condenser was placed in parallel with the two coils by joining \( T_2 \) to \( T_4 \) (earth) and under these conditions maximum strength was obtained by placing \( S_2 \) on stud one and \( S_4 \) on stud fourteen.

Results on Small Aerial.

On a smaller aerial of comparative inefficiency, 2LO was received at fair strength with the 0.0003 \( \mu F \) condenser in series; \( S_3 \) was placed on its third stud, as also was \( S_4 \).

On the same aerial, 5XX was received with \( S_2 \) on stud nineteen, while no sound on \( S_4 \) appeared to give better strength than its neighbour. For the latter station, of course, the lead-in was connected to the aerial terminal, and \( T_2 \) and \( T_4 \) were joined together. On the very small aerials, probably, it will be necessary in most cases to join \( T_2 \) to \( T_4 \), thus putting the condenser in parallel with the coils.

It should be noted that all of the foregoing stud numbers bear no reference whatever to those given in the wiring diagram, these latter being merely for the purpose of aiding in wiring up. The stud number in each case is obtained by counting from left to right on the front of the panel.

A photograph of the 3 Valve dual constructed by Mr. Hosseil.

To the Editor of MODERN WIRELESS.

Sir,—Enclosed please find a photo of my wireless set. As you will see, it has been altered rather from the original design, which was the 3-valve-dual, as described in the April number of MODERN WIRELESS. I have enclosed the valves, which meant that the H.F. transformer had to be shifted a little. I use a D.P.D.T. switch for 2 or 3-valves. A master resistance—a microstat—is in the L.T. negative lead and is very useful. On the telephone terminals. Hence in use, either one or the other of the pairs of terminals has to be shorted. I can detect no difference whatever on either pair of the terminals. Trusting the photo is suitable for publication.—Yours truly, F. C. Hosseil.

Teddington.

The 3 Valve Dual Receiver.

To the Editor of MODERN WIRELESS.

Sir,—In response to the request for reports on circuits published in your paper, I send the following:

First 2-valve I can hear, in Exeter, all the B.B.C. main stations and also 2PY and an unknown relay station. All these stations are of 'phone strength, and the third valve would enable me to use a loud-speaker, if I had one. A fine tuning device is shown in the photo, which explains itself, a rubber ring pressing on the edge of the dials. Morse-jamming is always very bad. 5IT and 2BD are never readable owing to morse, which, by the way, is all spark. I do not use the 100,000 ohms resistance across the grid of the first valve and find it is not wanted. The grid bias terminals are along the bottom next to the 'phone terminals. The 004 \( \mu F \) condenser is connected across the I.S. terminals and these are joined in series with the telephone terminals. Hence in use, either one or the other of the pairs of terminals has to be shorted. I can detect no difference whatever on either pair of the terminals. Trusting the photo is suitable for publication.—Yours truly, W. J. Easton.
WITHOUT ELECTRON WIRE
YOU CANNOT KNOW REAL AERIAL EFFICIENCY

Wireless enthusiasts must be on their guard. There are dealers all over the country who are trying to foist upon the public colourable imitations of the famous "ELECTRON WIRE."

IF "ELECTRON WIRE" IS THE WIRE YOU WANT BE CAREFUL THAT YOU GET IT.

It brings envied results. Multitudes of wireless experts as well as enthusiasts all over the world are using it. Every day we get shoals of letters telling us of the remarkable reception experts and amateurs are getting with "ELECTRON WIRE."

If you ever find a better aerial get it. A good reception is worth any price you pay.

BUT AVOID DECEPTION. LOOK AT THE NAME AND THE BOX. If it is not our distinctive box refuse it and save disappointment.

Some dealers may even tell you that they cannot get boxes for "Electron Wire," and may try to sell you a wire coiled to look like "Electron Wire." Refuse it.

Ask for and insist upon "Electron Wire" in our distinctive white box printed in blue. Refuse any wire which may look like "Electron Wire," and may even be boxed under a similar name.

TAKE NOTICE OF THIS WARNING!
Buy "Electron Wire" in our distinctive box only, plainly printed in blue on every side with and the price 1/8. Refuse all others.

Try It—then you will know why it is so popular. Ask your dealer for ELECTRON WIRE. But you must agree to return it if it does not prove up to every claim made for it. If your dealer does not sell ELECTRON WIRE yet, he can get it for you, or we will send it direct to you upon receipt of P.O. or cheque. Do not send stamps PLEASE.

The CHEAPEST AERIAL and the Best in the World.

1/8

NEW LONDON ELECTRON WORKS, Ltd.

(Members of the B.B.C.)

Telephones: East 1821. East 6043.

A.J.S.

The Hall Mark of

RADIO PERFECTION

There are definite and convincing reasons why the A.J.S. models will claim the attention of every Radioist. The name alone is complete evidence of reliability in every detail of construction, design, material and finish. On the other hand, every A.J.S. instrument possesses distinguishing characteristics. You owe it to yourself, before deciding on any other make, to get your local dealer to show you the latest A.J.S. improvements.

The New Model
A.J.S. Receiver.
The dominant features of all A.J.S. Receivers are: Efficiency, Selectivity, Power and Clarity of Reception. They are extremely flexible, and function on any wave-lengths from 150 metres to 20,000 metres, and give most successful results on Franca and small Indoor Aerials.

PRICES.
Panel Only.
Two-Valve Panel - £12 1/-
Three-Valve Panel - £15 17/6
Four-Valve Panel - £20 5/6

Complete Sets.
Two-Valve Set - £17 10/6
Three-Valve Set - £22 5/6
Four-Valve Set - £27 10/6

Complete Sets consist of Panel as illustrated, Valves, Headphones, High and Low Tension Batteries, Aerial Wire, Insulators, Lead-in Tube.

The Unitop Cabinet Receiver.
Constructed to contain an A.J.S. Four-Valve Receiver, the Unitop Cabinet combines the maximum of wireless efficiency with the minimum of space. Produced in Mahogany or in Light or Dark Oak, as preferred, the Unitop Cabinet shown is of distinctly handsome appearance. It forms a compact and attractive article of furniture, and may be placed upon any convenient table, while it is sufficiently portable to be carried to any outdoor function.

In Mahogany or in Light or Dark Oak, complete with Four-Valve Receiver and all Accessories, ready for use, 30 Guineas.

The A.J.S.
Loud-Speaker.
The A.J.S. Loud-Speaker is the outcome of lengthy research and experiment, and justly claims to be the last word in Loud-Speaker design. The accurate proportions and smoothly blending curves of its non-resonant horn give to the A.J.S. Loud-Speaker those correct acoustic properties which ensure the true reproduction of the sound waves, while its extreme sensitiveness enables the utmost volume of sound to be produced, with a complete absence of distortion.

Price, with Metal Horn and Electro-Plated Fittings, £4 15/6.
With Oak or Mahogany Horn and Electro-Plated Fittings, £5 10/6.

A.J. STEVENS & CO. (1914) LTD.
WIRELESS BRANCH, WOLVERHAMPTON.

Phone: 1552 (3 lines). Wireless Call Sign: 5 RI. "Grams: " Reception, Wolverhampton."
Notes on the Dual Receiver with Neutrodyne Control

By A. D. COWPER, M.Sc., Staff Editor.

These notes will be of interest to readers making the set described in "Modern Wireless," April, 1924, Vol. II, No. 7.

ConSiderable interest appears to have been aroused by the valve-crystal dual circuit, with neutrodyne control of the tuned-anode H.F. stage, described by the writer in the April number of Modern Wireless. From the number of inquiries received from correspondents both in the British Isles and from points in the States (where an account of the dual had appeared in Radio News), evidently many amateur constructors have been ambitious enough to attempt this extremely powerful, but at the same time admittedly tricky circuit. Judging from some reports received, others have been successful in duplicating the extremely satisfactory results observed by the writer. At the same time, some correspondents have met with trouble on certain points; especially (as was anticipated by the writer) in connection with the extremely small neutrodyning condenser. These notes are an endeavour to clear up some of the points raised.

The Neutrodyne Condenser

Subsequent experiment has shown that the two small condensers in series, one fixed and one a small "vernier" variable, used for the neutrodyne control, can be substituted by a single specially low-minimum two-plate condenser made up with one each of the usual standard "fixed" and "moving" plates, No. 2 or No. 4 B.A. screwed brass rod, knob and pointer, with nuts and spring washer, as illustrated in the diagram. This is mounted on the back of the panel where the "vernier" three-plate condenser originally described was arranged. It will be noted that both fixed and moving plate are trimmed down (with a sharp pair of scissors, subsequently carefully flattening the plates with the help of a domestic flat-iron) so as to give ample clearance in the minimum position. They are mounted at about 1/8 in. apart, this distance being adjustable by adjusting the position of the nuts locking the moving plate on its spindle, the spring-washer maintaining the relative position of the plates. There is no need for a scale on this condenser; a plain pointer suffices. Contact is made to the moving plate by an open spiral of, e.g., No. 28 wire, connected to the outer end of the neutrodyning coil. The fixed plate is connected to the grid.

The dimensions and value of the radio-choke coil interposed between the L.F. transformer "O.S." and the grid are not critical. The simplest possible plain solenoid coil of No. 32 enamel wire was suggested in the original article. A plug-in coil of about 250 turns can be used instead, or a very compact flat slab coil of No. 32 enamel-insulated wire wound between cheeks of Comet, fibre, or plain 3-ply wood, 3 to 4 in. diameter and separated by a cardboard disc about 1/4 in. thick, and 1 in. diameter, some 300 to 400 turns of wire being wound in this narrow slot. The resulting coil can be conveniently mounted flat on the side of the frame of the receiver.

The Anode Coil

The anode-coil with its double and two-pile winding, adopted for simplicity and compactness, appears to have given some trouble. Experiment has again demonstrated that the neutrodyning coil, since it does not form a critically-tuned oscillating circuit of its own which may affect the efficiency of reception, can be made in a very much more compact form, regardless of H.F. resistance, by winding it on No. 28 or No. 32 enamel-insulated wire, on the end of the same former on which the anode-coil proper is wound. The anode-coil can also be made single layer, say 60 turns of No. 20 or No. 22 on a 4-in. tube, the compact fine-wire neutrodyning-coil allowing sufficient room for this. Otherwise the arrangement and connections should be identical with those described in the original article. An even more compact arrangement for both the A.T.I. and anode coil has been adopted by the writer, similar to a form of inductance developed for extreme selectivity, described in a recent number of Wireless Weekly. The coils are wound as a succession of single-layer thick slab coils, in slots cut with a hack-saw in a six-rayed star former of 3-ply wood, made up of three sections (as indicated in the diagram) and notched so as to fit together in star form. The slots are spaced at
The A.T.I. is wound with No. 20 S.W.G. d.c.c. wire, 20 turns in each of 5 slots, the portion included in the aerial circuit being ten turns of No. 15 in one slot. The anode-coil is of No. 22 d.c.c., 25 turns being wound in 4 slots, the neutrodyne coil being about 50 turns of No. 28 enamel-insulated wire wound all in the next slot, and accordingly in more than one layer thick, as the slot is wider than the diameter of the wire. The neutrodyne coil is, as before, wound in the same direction as the anode-coil and connected up in exactly the same way, the inner end being connected to any point at earth potential for H.F.

The resulting coils are extremely compact, and give the same tuning-range with .0002 μF tuning condensers as the original ones. In the finished receiver it will be found that freer access is given to the wiring when using these.

No other changes are introduced, the panel being precisely as originally figured. The actual receiver will be available for inspection in the Radio Press Service Department for the customary three weeks after the publication of this note.

Whilst one correspondent has been successful with a perikon type of crystal rectifier, the writer recommends only the stable carborundum-tinned-iron combination described. It should be clearly understood that no success is to be anticipated with this receiver unless and until satisfactory signals have been obtained with the switch in the "single" position, i.e., plain single-valve reception, using the tuned-anode as ordinary tuned-plate reaction (and probably not critically tuned to the wave-length, as the neutrodyne may not suffice to hold the circuit down from oscillating with the very liberal Myers 4-volt valve and ample H.T.). Also that on switching to "dual" in general nothing will be heard until the anode is duly tuned, this tuning being quite sharp. Then the neutrodyne control should in one position (maximum) completely or partially silence the receiver, in the other position (minimum) allow violent oscillation, even to the whistling stage, the adjustment for distortionless reception at maximum strength being between these extremes. If this state of affairs is not observed, the direction of connection of the neutrodyning coil, etc., should be investigated, and the value of the neutrodyning condenser altered by adjusting the position of the moving plate on its spindle. Too high a minimum may produce persistent howling in all settings of the neutrodyne condenser. The setting of the carborundum crystal is not at all critical in this circuit.

Ampere H.T. should be used, e.g., 100-120 volts with a Myers valve.

An interesting photograph showing Mr. Kirke, of the B.B.C., tuning the Zoo Perambulator Transmitting Set.

November, 1924
LISSENAGON TUNING CHART.

Note the Intermediate coils, 30, 40 and 60.

<table>
<thead>
<tr>
<th>No. of Coil</th>
<th>Minimum Wave-length</th>
<th>Maximum Wave-length</th>
<th>Minimum Wave-length</th>
<th>Maximum Wave-length</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>185</td>
<td>310</td>
<td>100</td>
<td>325</td>
<td>4/10</td>
</tr>
<tr>
<td>30</td>
<td>225</td>
<td>440</td>
<td>130</td>
<td>475</td>
<td>4/10</td>
</tr>
<tr>
<td>35</td>
<td>265</td>
<td>530</td>
<td>160</td>
<td>635</td>
<td>4/10</td>
</tr>
<tr>
<td>40</td>
<td>300</td>
<td>610</td>
<td>190</td>
<td>800</td>
<td>5/10</td>
</tr>
<tr>
<td>45</td>
<td>380</td>
<td>715</td>
<td>240</td>
<td>900</td>
<td>6/4</td>
</tr>
<tr>
<td>50</td>
<td>460</td>
<td>950</td>
<td>290</td>
<td>1,000</td>
<td>6/4</td>
</tr>
<tr>
<td>55</td>
<td>500</td>
<td>1,000</td>
<td>330</td>
<td>1,100</td>
<td>6/4</td>
</tr>
<tr>
<td>60</td>
<td>590</td>
<td>2,700</td>
<td>400</td>
<td>4,110</td>
<td>7/7</td>
</tr>
<tr>
<td>65</td>
<td>705</td>
<td>3,600</td>
<td>440</td>
<td>5,220</td>
<td>8/5</td>
</tr>
<tr>
<td>70</td>
<td>800</td>
<td>3,900</td>
<td>500</td>
<td>6,000</td>
<td>8/9</td>
</tr>
<tr>
<td>75</td>
<td>900</td>
<td>4,200</td>
<td>550</td>
<td>1,420</td>
<td>9/2</td>
</tr>
</tbody>
</table>

In spite of the capacity of the aerial across its terminals, in this new LISSEN crystal set we are able to use the same size coil as would be necessary in an anode circuit to receive the same stations. Consequently a big signal voltage is built up, which is reflected in the strength of signals.

In the new LISSEN CRYSTAL SET a form of tuning is employed which varies the inductance instead of varying the capacity—AND IT DOES SO IN COMBINATION WITH A LISSENAGON COIL, WHICH IS PECULIARLY EFFICIENT WITH THE FORM OF TUNING EMPLOYED.

Tuning is accomplished by moving the metal plate in relation to the inductance, and although the moving plate is entirely unconnected with the electrical circuit, ITS INFLUENCE IS EFFECTIVELY APPLIED THROUGH THE MEDIUM OF THE MAGNETIC FIELD CREATED.

Two coils are needed to receive Chelmsford and another broadcasting station. To change over from one station to the other, take one LISSENAGON coil out and plug the other appropriate one in. One coil on the lower wavelengths covers several broadcasting stations.

LISSEN LIMITED,

TELEPHONES: 3180, 3181, 3182, 1073 Riverside.
TELEGRAMS: "Lissenium, London."

LISSEN PARTS—WELL THOUGHT OUT, THEN WELL MADE.

In replying to advertisers, please use Order Form enclosed.
THE FORMO-DENSOR with INTEGRAL VERNIER

COARSE AND FINE TUNING IN ONE MOVEMENT.

NO MORE BUCKLED VANES.

LOWEST MINIMUM CAPACITY.

"STRAIGHT LINE" TUNING.

SO-CALLED "SQUARE LAW" SUPERSEDED

A special feature of the Formo-Densor is that useless capacity is eliminated to a very high degree, which is rendered possible by its unique construction. This enables the ideal of high inductance and low capacity to be more nearly approached than with the ordinary forms of condenser, whether called "Square Law" or otherwise, as, with its low self-induction and low minimum, together with coarse and fine tuning in one movement, an equally efficient wavelength curve is obtained, as with any "Square Law" condenser.

THE FAMOUS FORMO COMPONENTS

ARE UNEXCELLED FOR ORIGINALITY
HIGH QUALITY & FINE PERFORMANCE
FORMO SHROUDED TRANSFORMERS

ARE MADE IN RATIOS TO SUIT ALL STAGES AND CIRCUITS

All Ratios 18/-

B.B.C. WIRELESS DRY BATTERIES

No. 1 W.

Standard Pocket Lamp Size—13 volt system with patent spiral wire terminals and plug-n-sales to take Wood Plug.

Note: 1-12 batt. = 51 volts.

Used units replace easily.

Consists as illustrated.

PRICE CARRIAGE PAID, 7/- PER DOZEN, WITH PLUG.

Standard Sizes:

No. 2 W. Slab. 15/2 volts. 3-volt tapping. Size approx. .9 x .9 x 3 in. ........................................ Price 3/- each

No. 4 W. Slab. 26 volts. 5-volt tapping. Size approx. 10 x 11 x 3 in. ........................................ 6/6

No. 6 W. Black. 40 volts. 9-volt tapping. Size approx. 19 x 3 1/4 in. ........................................ 12/-

Prices include Wood Plug, Carriage Paid.

Manufactured by—

The BRITISH BATTERY Co., LTD.

CLARENDON RD., WATFORD, HERTS

The DRUMMOND 4-in. Multi-purpose Lathe.

Make your own parts!
— half the fun in W ireless is gone if you buy everything complete

Winding coils, turning up forms, plugs, knobs—a hundred and one jobs, drilling, slotting, boring, screw-cutting—all may be done well and cheaply on the Drummond. A contact stick—or a bush for your car—make it yourself and pay for the Lathe with the money you save.

DRUMMOND Bros. Ltd., GUILDFORD.

Please send me, post free, list of your small items, with details of deferred payment

(Send in unsealed envelope for list.)

In replying to advertisers, please use Order Form enclosed

November, 1924
More Resistoflex Circuits

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

Great interest has been evinced in the interesting Resistoflex Circuits given last month, and in this article a further series appear which form an interesting basis for more experiments.

The fullest details of a successful Resistoflex set are given in Nos. 1 and 2 of our new magazine, the Wireless Constructor. The second issue contains a blue print showing the wiring of the complete set, and those who desire to make up a two-valve receiver on these lines cannot do better than follow the instructions given.

On the other hand, there are many who prefer to make up their own circuits and carry out experiments with them without building up a finished instrument. With this class of wireless public I have the fullest sympathy, as most of my own work has been done in this way, although the finished article is always made up before a circuit is specifically recommended for the average experimenter to build up.

There, are however, many circuits which the more experienced experimenter will want to try out. Such circuits, while not of a character which can be recommended to every class, afford a vast amount of interest, and even if a little more skillful adjustment is required to obtain results which fully justify the extra complications.

Circuits of this kind are possible, using the Resistoflex principle, and one or two are given in this article, and they will afford excellent opportunities for really interesting experimental work.

Basic Resistoflex Circuits.

Before considering these circuits, I would like to repeat, for the benefit of new readers, two of the principal Resistoflex circuits. The first is illustrated in Fig. 1, which differs from Fig. 1 of last month's article on the Resistoflex circuit by a few details. The constant aerial tuning condenser has been omitted because the condenser $C_2$ across the high resistance $R_4$ is, in itself, a condenser in series with the aerial capacity, so reducing the effect of the latter capacity.

The condenser $C_2$ has been specified as .0005 $\mu F$, although I would suggest that individual readers may experiment with different capacities up to .002 $\mu F$. As a matter of fact, .0003 $\mu F$ was used on the actual set being described in the Wireless Constructor. If a constant aerial tuning condenser is used, its value should be greater than the .0001 $\mu F$, so that its capacity, when connected in series with $C_2$, will result in an effective capacity of .0001 $\mu F$. A condenser in the aerial circuit for the purpose of obtaining the constant aerial tuning effect should consequently have a value of .0002 $\mu F$.

Such a small constant aerial tuning condenser, however, may be omitted altogether, and in the circuits given in this article this omission is made because the condenser $C_2$ will minimise the effect of the aerial capacity, although this minimisation will not be as effective as the insertion of .0002 $\mu F$ condenser directly in the aerial lead.

As there are many thousand readers of Modern Wireless who were not reading this journal when I first introduced the use of a constant aerial tuning condenser in the aerial lead, I would explain that the use of this condenser enables greater selectivity to be obtained, and also enables a wider range of wavelength to be covered by the parallel tuning condenser across the aerial inductance. Moreover, a set using this scheme is much more readily reproducible because the same set may be used on all sorts of different aerials.

Fig. 1.—The Resistoflex circuit without constant aerial tuning.
holder. I prefer, myself, the three-coil system of Fig. 2, because a
good control of reaction is obtainable by using this method, and
greater flexibility is obtained by using the tri-coil system which I
introduced in the September issue of Modern Wireless.

Transformer Connections

While speaking of transformers, I might remind readers that there
is a great deal in the connecting of the windings. There are four
different ways of connecting the leads to a high-frequency trans-
former, and it is really desirable to try all these connections. The
first thing to do, of course, is to have the secondary connected up
in a certain way and then to try reversing the primary. Then, leaving
the primary connected as the last time, try reversing the secondary.

This may sound troublesome, but the fact of the matter is that
different high-frequency transformer manufacturers have their
own ideas as to the connecting of the windings to the pins, which
are made to fit into an ordinary valve socket. It is needless to
remind readers that a special anti-capacity valve-holder should be
used for a high-frequency transformer; these valve-holders are
strongly to be recommended for both valves and transformers, what-
ever kind of a valve is in use, whether an H.F., detector, or L.F.
valve. Several types of these holders are on the market, and
preference should unquestionably be given to these holders for
purely technical reasons.

Condenser Values

As regards the condenser C, in
Fig. 1, it has already been stated that experiments may be carried
out to show the effect of different capacities. The condenser C, is of
the fixed type, and a variation is not necessary, because the sole
object of this condenser is to steady the anode voltage and to prevent
any high resistance in the anode circuit from producing any peculiar
reaction effects. The capacity may conveniently be 2 μF, but in the
case of a good high-tension battery, the condenser may be omitted
altogether, although it is really sounder practice to employ such
a condenser in all valve circuits, although, of course, you should be
sure there is no leakage through the condenser.

The condenser C, across the
telephones is not critical as regards
its value. I have used .0003 μF
with success. The battery B, is
important, but the value of the
grid voltage is critical, and in Fig. 1
I have shown the positive terminal of the battery B, con-
ected to a potentiometer R, connected across the filament accu-
ulator. This potentiometer will enable a careful adjustment of the
grid potential of the tube valve. This will usually be between 1 volt
and 6, according to the type of valve used in V, and the voltage
of the anode battery B,. It is impossible to state, in an article,
what values to use, but it will usually be suitable in the case of
general purpose valves.

Anode Voltage

Do not make the mistake of
using too low an anode voltage for
B,. Remember that the resistance
R, cuts down the voltage of the
detector valve. Personally, I
would recommend that 100 volts
be used for B, and tappings taken from this battery
of the first valve, and
another tapping to the anode of the second valve. The method of
connecting these tappings is shown.

As a matter of fact, it is desirable,
really, to connect a 2-microfarad

Fig. 2.—A recommended form of tri-coil Resistoflex circuit.

Fig. 3.—The principle applied to two stages of H.F., to give
one L.F. stage.
HEADPHONES

TELEFUNKEN 4,000 ohms
Adjustable, die-cast, most sensitive obtainable with equal weight gain. (Double Receiver) positive, N. & K. HEADPHONES. 4,000 ohms, 12 3/12, 6,000 ohms, 13 3/12.

N. AND K. GRAMICIDE. Coils: 25, 5, 3: 35, 5; 50, 2/3; 75, 5, 5; 100, 2/3; 150, 2/3; 200, 5/6; 250, 6; 300, 5/6; 400, 1/6; 500, 1/6; 600, 1/9; 700, 1/10. 1,000, 1/10.

VALVES. Censor P.F., P.2, 12 1/6; Mullard Ora, 12 1/6; Ediswan, 12 1/2; Marconi M. and R. S. 13 1/2; Bell Emitter D. E. R., 21 1/2; Post 6d. each.

TERMINALS

No. 1

No. 2

No. 3

Terminals. (large, aerial and earth, complete with 5 nuts and 2 washers (2 B.A.), 2 for 8d. By Post, 1/2.)

Wireless Crystals

“Herzitz,” Show’s, 1/2. Buss’s, 6d.

Intervalle Transformers

“Buss” TRANSFORMER, 3 to 1, 18/6 ROYAL, (for 35/6–1), 25/6.
Radio Instruments 25/-, Brunet, Shrewsbury 11/9
Iracane, Shrewsbury 21/-
Siverstown, 21/-

H.F. TRANSFORMER, plug-in type, from 4 6. Post 4d. extra.

Celluloid Accumulators

BUST BRITISH MADE.

Batt. 12 1/2 4 5 6 5 10 12 1/3 12 1/4 12 1/6 15 1/2 15 1/4 15 1/3 15 1/9
H.T. BATTERIES 30 v. H.T. B. 15/6 Post 1/2

N. & K. LOUD SPEAKER

Instrument Wires

British Made Copper Wires.
Prices per lb.

T.O. BUSS, Scientific Instrument Maker,
77, CLERKENWELL ROAD, LONDON, E.C.1.


Established 1850.

February, 1924

MODERN WIRELESS

In replying to Advertisers, please use Order Form enclosed.

667
"ELLA" BATTERY CHARGERS

They work from a lamp holder

A.C. Model.
Output 5-10 amps, 9 volts. Complete with Pole Indicating Ammeter and all connecting leads and adapter - £6 6 0

D.C. Model.
Output 5 amps, 9 volts. Machine only £5 12s. 6d. With Switchboard and Pole Indicating Ammeter and Regulating Resistance as illustrated - £6 15 0

There is an "ELLA" Battery Charger for every supply voltage.

BATTERIES charged at home have much longer life and give better service than when charged outside.

"ELLA" Battery chargers save their cost many times over.

Send for descriptive leaflet. Trade Supplied.


'Throughout a wireless.

V. ZEITLIN & SONS. 144, THEOBALDS ROAD, LONDON, W.C.1. 'Phone, Museum 6314 & 3705.

NEUTRON

The World's Greatest Radio Crystal
Concert Tested and Guaranteed

Testimony:

"I have tried several makes of crystal and I must say Neutron is the best. We have only a plain crystal set 21 miles from London, and could hear music quite plainly by laying the phones on the table. It is all you advertised it to be."

W. W.

Stocked by all best Radio Dealers. 1/6

Sole producers,

NEUTRON Ltd. SICILIAN HOUSE, SOUTHAMPTON ROW, LONDON, W.C. Phone, Museum 2677.

Sole distributors -

V. ZEITLIN & SONS. 144, THEOBALDS ROAD, LONDON, W.C.1. 'Phone, Museum 6314 & 3705.

In replying to advertisers, please use Order Form enclosed.
condenser across each tapping and the earth, instead of across one tapping and the earth as shown. This, however, adds to the expense, and it is really doubtful whether, after all, such a condenser is really worth while.

Potentiometer Control

Instead of using the rather neat method of using a potentiometer (which method, of course, is as old as the hills but rarely used), a variable grid battery may be connected in the position of $B_3$, with the positive terminal connected in the negative terminal of the filament battery $B_1$. The trouble of this arrangement, of course, is that it is not possible to obtain an adjustment of grid potential finer than $\frac{1}{2}$ volt, and this means a great deal in the case of a general purpose valve working with fairly low anode voltages. It is so easy to weaken signal strength by putting too much negative voltage on the grid, and if you are in any doubt about the question, you would be well advised to use a potentiometer in the manner indicated. This method, of course, prevents the grid battery from becoming run down, and the amount of current taken by the potentiometer itself is negligible compared with the current taken by the valve filaments.

Valves to Use

Fig. 2, of course, is the recommended arrangement described in the Wireless Constructor. I would mention here that the first valve may be a D.E.3B, which is a very excellent dail emitter valve when used as the first valve in a circuit of this kind, or, in fact, any circuit which involves resistance amplification. The degree of amplification, with such a valve, is very considerably greater than with the general purpose valves. The capacity between the electrodes, of course, is rather too high, where the valve also has to act as a high-frequency amplifier, as in the case of the Resistoflex, but in this particular type of circuit I have obtained first-rate results with such a valve in the first position. An ordinary valve may be used in the second position. Of course many valves differ as regards acting as detectors and the second valve should, if possible, be chosen for its detecting qualities. Tappings of the high-tension battery may be arranged as shown.

Double H.F. Circuits

The next four circuits are of great interest because they show two stages of high-frequency amplification, whereby the Resistoflex circuit may be used so as to combine long range with economy of valves. It is possible to apply the principle to two stages of H.F. combined with one, or two, stages of low-frequency amplification, three valves being used in all, the last one being used as a detector.

In Fig. 3 it will be seen that transformer coupling is used to couple the first to the second valve and the second to the third. The third valve acts as a detector, the low-frequency currents passing through the resistance in the combined aerial and grid circuits. These low-frequency potentials are communicated to the grid of the first valve which now also acts as a low-frequency amplifier. The amplified low-frequency currents pass through the loud-speaker L.S. so that in this circuit we have two stages of high-frequency amplification, one detector valve and one stage of low-frequency amplification.

A further development is to obtain an extra stage of low-frequency amplification, and this is shown in Fig. 4. Instead of connecting the loud-speaker in...
the anode circuit of the first valve, we connect the primary of a step-up transformer $T_1, T_2$, the secondary $T_2$ of which is connected in the grid circuit of the second valve. This second valve provides an extra stage of low-frequency amplification, and the twice amplified low-frequency currents now finally pass through the loudspeaker L.S.

Fig. 5 shows a method of coupling two valves by means of a combined tuned anode circuit and impedance so as to obtain two stages of high-frequency amplification and two of low. It will be seen that the resistance $R_4$ in the anode circuit of the first valve results in low-frequency potentials being applied to the grid of the second valve, which acts as the second low-frequency amplifier, as well as the second high-frequency amplifier. The high-frequency coupling between the two valves is accomplished by means of a tuned anode circuit $L_2, C_5$.

The high-frequency output of the second valve is communicated to the grid of the third valve by means of the high-frequency transformer $L_3, L_4$, and the anode circuit of the second valve also contains the loud-speaker. The third valve, of course, acts in the ordinary way as a detector, the rectified low-frequency currents being passed through the resistance in the aerial circuit, so enabling the first valve to be used as a low-frequency amplifier as well as a high-frequency amplifier.

Fig. 6 is a modification of Fig. 5 in that tri-coil coupling is used to improve the sensitivity and selectivity of the circuit by introducing reaction into the anode circuit of the first valve and the grid circuit of the third.

This circuit has great possibilities and opens the field to a very light three-valve set giving two stages of high-frequency amplification and two stages of low.

**Conclusion**

In conclusion I would impress on readers the importance of a correct adjustment of anode voltage and grid bias, because either of these factors may completely spoil the working of the circuit. Experiment may be carried out by varying the different anode resistances, which may vary in value from 50,000 to 100,000 ohms. Experience to date prompts me to suggest the higher values if maximum signal strength is desired, but there is so much opportunity for experiment with these circuits that I would not, at this stage, like to lay down any definite rules.

The gradual tendency to employ special valves also complicates the position for anyone writing particulars of a circuit, because it is obviously impossible to specify details to suit all sorts of different combinations of apparatus. The golden rule, of course, is to have as many elements of the circuit variable so that whatever components are used, efficient results may be obtained.
The Three Valve Dual Receiver
Photographs of the set referred to in this letter appear on pages 618

To the Editor of Modern Wireless.

Sir,—Being a constant reader of your journal Modern Wireless, and having built several circuits that have been illustrated in same, I thought I'd write and let you know some of my experiences. Following on from crystal circuits, and as we all more or less start with, I built up the 3-valve circuit published in the March edition, Vol. 1. This being my first attempt, I can now look back and see why I was unable to obtain any other station except London at reasonable strength. London. I remember, came in very loud, but Birmingham etc., very weak. Being anything but satisfied, I built the S.T. 100 (which is now well known) circuit when it was published in June, 1922. This set when completed rendered me service for my trouble and extra care I had taken. The first time I tuned London in I got the idea into my head that I could get better reception by tapping out the 100,000 ohms resistance; it was certainly louder, but again experience tells me now I was sacrificing quality, besides being unable to pick up other stations. Having kept to this circuit for over twelve months, the wrongs revealed themselves. The first thing I did was to put the 100,000 ohms resistance back in the circuit. This improved the tone immensely, volume came along too, with careful adjustments.

Other B.B.C. Stations

Other B.B.C. stations came in with surprising strength and clarity. Radiola, Post and Telegraphs, the Hague and two German stations followed. These results were more than gratifying. The next circuit that caught my eye was the 3 valve dual in April issue, Vol. 3. I at once sent for the blue prints of same, as these were a great asset to me; they certainly saved me much time and assured me that the holes are in the exact positions where required, the layout in general being all that can be desired. Having received the blue prints I drilled and tapped all holes for terminals, engraved panel, etc. I fitted the components as advised, wired up (bus-bar wiring 16 gauge) Panel now being completed, although very anxious to put it to the test, I got on with the cabinet; sketched out a design, and being handy with carpenter's tools I set to work. It took me a month to complete it. I am more than pleased; I did the thing thoroughly. As you can see by the photos enclosed, it makes a nice piece of furniture, besides the excellent music and entertainment derived from it. Being all enclosed makes it very convenient, as well as out of the way of dust. Accumulators, H.T. batteries, etc. have a separate division at the back of panel, the grid bias battery I put on the top for convenience sake when in use. The top can be opened on hinges half-way or lifted right away, which enables me to get at my H.T. for plugging different voltages when a change is desired. The loudspeaker horn I constructed myself from mahogany 3 ply, using an ampion attachment. This answers excellently. It is triangular in shape, so can be fitted into corner of the room if needed. The thing that appealed to me in this circuit was every valve is independently controlled in both high and low tension circuits. I find on test I obtain the best results with 120 volts on the first valve, only 32 volts on the detector valve, and 120 volts on the third valve, using 4 1/2 volts grid bias on both Cossor P1 and P2 valves. All B.B.C. stations come in well. Most excellent London and Chelmsford, very strong and sweet, no distortion whatever.

Continental Stations

Continental stations all seem to come in well. Radiola very strong on loud speaker, can be heard in the next house easily. Madrid I managed to get on Sunday night for the first time, not much volume on loud speaker, just enough to be heard all over the room. No doubt can be got much stronger with more careful adjustments; on the phones it was plenty strong enough and reception pure. Other stations that I have heard are The Hague, Post and Telegraphs, Petit Parisien, Konigswusterhausen, and several more that I do not know. I am more than pleased, especially as my aerial is not very high, and close by a generating station runs parallel with it. Am now looking forward to an enjoyable winter, feeling certain that, under more favourable conditions, stations I have not yet received I will come in after London has closed down. For while London is transmitting, I much prefer to enjoy their concert than run the risk of upsetting other people. Thanking you for the valuable information I have gained through your excellent journal, and wishing it every success.—Yours truly,

A. Hankin.

Wallhamstone, E. 17.
Those readers who have bought Radio Press envelopes and constructed receivers with their aid will have found how extremely easy home construction becomes when every possible detail is fully explained without regard to space. In a periodical certain limits must necessarily be observed, and it is in this respect that the envelope presents its chief advantage by giving just those details which the most novices require.

Two new envelopes are now on sale, and may be obtained from the Radio Press Sales Department and bookstalls all over the country, these being envelopes Nos. 8 and 9. Envelope No. 8 gives full details for the construction of a single-valve reflex receiver, by Herbert K. Simpson. The circuit employed has proved very popular amongst readers, and gives pure signals with excellent volume, being very stable and easy to handle. The only tuning adjustments required are those of two variable condensers, one tuning the aerial coil which is mounted by itself in a socket on the panel, while the other tunes the secondary winding of a plug-in high-frequency transformer. A crystal detector is used for rectifying, the valve acting in a dual capacity both as high-frequency and low-frequency amplifier. A rheostat is used which permits the use of either a bright or dull-emitter valve.

When completed, the receiver presents a very neat appearance, and is well worth the trouble taken in making it.

Envelope No. 9 supplies directions for making an efficient single-valve reflex receiver, by the author of envelope No. 8. Despite the large number of single-valve circuits which have made their appearance and perhaps enjoyed a short popularity, the circuit in which the valve acts as a detector with reaction on the aerial coil, remains one of the most reliable and efficient of all. This circuit is employed in the receiver described in envelope No. 9. An ordinary two-way coil holder is employed to allow variable coupling between aerial and reaction coils. A variable grid leak is used, and the filament rheostat is of the type allowing the use of either bright or dull-emitter valve.

Each of the two receivers of which brief outlines have been given is very easy to construct, and even with no wireless knowledge at all one could hardly go astray when aided by such explicit instructions as those given in these Radio Press Envelopes.

Radio Press Panel Transfers

After constructing a wireless receiver, the almost inevitable question is asked, "How shall I mark my panel?" The Radio Press, Ltd., have solved this difficulty by introducing a cheap and very effective method. For the very modest sum of 6d. you can now obtain a complete set of 80 different transfers carefully enclosed in a sealed envelope to ensure adequate protection. The transfers are simplicity itself to use, and give any receiver a distinctive and professional appearance. Full instructions for use are given.
November, 1924

MODERN WIRELESS

<table>
<thead>
<tr>
<th>Ref. No. of Transmission</th>
<th>G.M.T.</th>
<th>Name of Station</th>
<th>Call Sign and Wavelength</th>
<th>Locality where situated</th>
<th>Nature of Transmission</th>
<th>Closing down time or approximate duration of Transmission</th>
<th>Approx. Power used</th>
</tr>
</thead>
<tbody>
<tr>
<td>43</td>
<td>3.30</td>
<td>Frankfurt</td>
<td>467 m.</td>
<td>Germany</td>
<td>C</td>
<td>Until 5 p.m.</td>
<td>1 Kw.</td>
</tr>
<tr>
<td>44</td>
<td>3.30</td>
<td>Konigsberg</td>
<td>460 m.</td>
<td>East Prussia</td>
<td>C</td>
<td>One hour</td>
<td>1 Kw.</td>
</tr>
<tr>
<td>45</td>
<td>3.30</td>
<td>Voxhaus</td>
<td>430 m.</td>
<td>Berlin</td>
<td>C &amp; N</td>
<td>5.30 p.m.</td>
<td>700 Watts.</td>
</tr>
<tr>
<td>46</td>
<td>3.30</td>
<td>Munich</td>
<td>485 m.</td>
<td>Bavaria</td>
<td>C</td>
<td>Until 4.30 p.m.</td>
<td>1 Kw.</td>
</tr>
<tr>
<td>47</td>
<td>3.30</td>
<td>Leipzig</td>
<td>452 m.</td>
<td>Germany</td>
<td>C</td>
<td>Until 5 p.m.</td>
<td>700 Watts.</td>
</tr>
<tr>
<td>48</td>
<td>3.35</td>
<td>Eiffel Tower</td>
<td>FL 2500 m.</td>
<td>Paris</td>
<td>N</td>
<td>5 minutes</td>
<td>5 Kw.</td>
</tr>
<tr>
<td>49</td>
<td>3.30</td>
<td>Pershoreau</td>
<td>PCFF 2735 m.</td>
<td>Amsterdam</td>
<td>N</td>
<td>10 minutes</td>
<td>2 Kw.</td>
</tr>
<tr>
<td>50</td>
<td>4.0</td>
<td>Kiel</td>
<td>1150 m.</td>
<td>Czechoslovakia</td>
<td>N</td>
<td>10 minutes</td>
<td>1 Kw.</td>
</tr>
<tr>
<td>51</td>
<td>4.0</td>
<td>Hamburg</td>
<td>392 m.</td>
<td>Germany</td>
<td>L</td>
<td>30 minutes</td>
<td>700 Watts.</td>
</tr>
<tr>
<td>52</td>
<td>4.30</td>
<td>Radio-Paris</td>
<td>SFR 1780 m.</td>
<td>Clichy</td>
<td>N C &amp; N</td>
<td>Until 5.45 p.m.</td>
<td>8 Kw.</td>
</tr>
<tr>
<td>53</td>
<td>4.30</td>
<td>Eiffel Tower</td>
<td>FL 2600 m.</td>
<td>Paris</td>
<td>N</td>
<td>8 minutes</td>
<td>5 Kw.</td>
</tr>
<tr>
<td>54</td>
<td>4.45</td>
<td>Stuttgart</td>
<td>437 m.</td>
<td>Wurttemberg</td>
<td>C &amp; W</td>
<td>Until 6 p.m.</td>
<td>1 Kw.</td>
</tr>
<tr>
<td>55</td>
<td>5.00</td>
<td>Radio-Belgique</td>
<td>SBR 207 m.</td>
<td>Brussels</td>
<td>C &amp; N</td>
<td>6 minutes</td>
<td>500 Watts.</td>
</tr>
<tr>
<td>56</td>
<td>5.55</td>
<td>Leasanne</td>
<td>HBZ 850 m.</td>
<td>Switzerland</td>
<td>W &amp; N</td>
<td>10 minutes</td>
<td>1.5 Kw.</td>
</tr>
<tr>
<td>57</td>
<td>6.00</td>
<td>Zurich</td>
<td>690 m.</td>
<td>Switzerland</td>
<td>C &amp; N</td>
<td>Until 7.15 p.m.</td>
<td>1 Kw.</td>
</tr>
<tr>
<td>58</td>
<td>6.15</td>
<td>Kiel</td>
<td>1150 m.</td>
<td>Prague</td>
<td>W</td>
<td>8 minutes</td>
<td>5 Kw.</td>
</tr>
<tr>
<td>59</td>
<td>7.00</td>
<td>Eiffel Tower</td>
<td>FL 2600 m.</td>
<td>Vienna</td>
<td>C</td>
<td>Until 9 p.m.</td>
<td>1 Kw.</td>
</tr>
<tr>
<td>60</td>
<td>7.00</td>
<td>Munster</td>
<td>407 m.</td>
<td>East Prussia</td>
<td>C &amp; N</td>
<td>Until 8.30 p.m.</td>
<td>1.5 Kw.</td>
</tr>
<tr>
<td>61</td>
<td>7.00</td>
<td>Radio-Wien</td>
<td>530 m.</td>
<td>Germany</td>
<td>C</td>
<td>Until 9 p.m.</td>
<td>700 Watts.</td>
</tr>
<tr>
<td>62</td>
<td>7.00</td>
<td>Konigsberg</td>
<td>406 m.</td>
<td>Russia</td>
<td>C &amp; N</td>
<td>Until 9.30 p.m.</td>
<td>1 Kw.</td>
</tr>
<tr>
<td>63</td>
<td>7.00</td>
<td>Hamburg</td>
<td>302 m.</td>
<td>Germany</td>
<td>C &amp; N</td>
<td>Until 9.30 p.m.</td>
<td>700 Watts.</td>
</tr>
<tr>
<td>64</td>
<td>7.00</td>
<td>Stuttgart</td>
<td>437 m.</td>
<td>Wurttemberg</td>
<td>C &amp; N</td>
<td>Until 9.30 p.m.</td>
<td>1 Kw.</td>
</tr>
<tr>
<td>65</td>
<td>7.15</td>
<td>Zurich</td>
<td>690 m.</td>
<td>Switzerland</td>
<td>C &amp; N</td>
<td>9.15 p.m.</td>
<td>1.5 Kw.</td>
</tr>
<tr>
<td>66</td>
<td>7.15</td>
<td>Leipzig</td>
<td>452 m.</td>
<td>Germany</td>
<td>C &amp; N</td>
<td>8.33 p.m.</td>
<td>700 Watts.</td>
</tr>
<tr>
<td>67</td>
<td>7.15</td>
<td>Luzanana</td>
<td>HVB 850 m.</td>
<td>Switzerland</td>
<td>C</td>
<td>8.30 p.m.</td>
<td>400 Watts.</td>
</tr>
<tr>
<td>68</td>
<td>7.30</td>
<td>Frankfort</td>
<td>497 m.</td>
<td>Frankfurt</td>
<td>C &amp; N</td>
<td>Between 9 and 10 p.m.</td>
<td>1 Kw.</td>
</tr>
<tr>
<td>69</td>
<td>7.30</td>
<td>Stuttgart</td>
<td>437 m.</td>
<td>Wurttemberg</td>
<td>C &amp; N</td>
<td>Until 8.30 p.m.</td>
<td>1 Kw.</td>
</tr>
<tr>
<td>70</td>
<td>7.30</td>
<td>Basel</td>
<td>415 m.</td>
<td>Silesia</td>
<td>C</td>
<td>Until 10 p.m.</td>
<td>1.5 Kw.</td>
</tr>
<tr>
<td>71</td>
<td>7.30</td>
<td>Leipzig</td>
<td>452 m.</td>
<td>Germany</td>
<td>C &amp; N</td>
<td>Until 9.15 p.m.</td>
<td>1.5 Kw.</td>
</tr>
<tr>
<td>72</td>
<td>7.30</td>
<td>Zurich</td>
<td>690 m.</td>
<td>Switzerland</td>
<td>C &amp; N</td>
<td>8.30 p.m.</td>
<td>700 Watts.</td>
</tr>
<tr>
<td>73</td>
<td>7.30</td>
<td>Voixhaus</td>
<td>130 &amp; 500 m.</td>
<td>Berlin</td>
<td>C &amp; N &amp; W</td>
<td>Until 10.10 p.m.</td>
<td>2.5 Kw.</td>
</tr>
<tr>
<td>74</td>
<td>7.30</td>
<td>Munich</td>
<td>485 m.</td>
<td>Bavaria</td>
<td>C &amp; N</td>
<td>Until 10.10 p.m.</td>
<td>2.5 Kw.</td>
</tr>
<tr>
<td>75</td>
<td>8.15</td>
<td>Radio-Belgique</td>
<td>SBR 265 m.</td>
<td>N C &amp; N</td>
<td>Until 10.10 p.m.</td>
<td>2.5 Kw.</td>
<td></td>
</tr>
<tr>
<td>76</td>
<td>8.30</td>
<td>Ecole Sup des</td>
<td>FPTT 450 m.</td>
<td>Paris</td>
<td>L N &amp; C</td>
<td>Two or three hours</td>
<td>500 Watts.</td>
</tr>
<tr>
<td>77</td>
<td>8.30</td>
<td>Postes et</td>
<td>SFR 1780 m.</td>
<td>Clichy</td>
<td>N</td>
<td>One half hour</td>
<td>8 Kw.</td>
</tr>
<tr>
<td>78</td>
<td>8.30</td>
<td>Telegraphes.</td>
<td>426 m.</td>
<td>Rome</td>
<td>C &amp; M</td>
<td>Until 9.45 p.m.</td>
<td>4 Kw.</td>
</tr>
<tr>
<td>79</td>
<td>8.30</td>
<td>Radio-Paris</td>
<td>SFR 1780 m.</td>
<td>Clichy</td>
<td>T &amp; C</td>
<td>9.30 p.m.</td>
<td>8 Kw.</td>
</tr>
<tr>
<td>80</td>
<td>9.30</td>
<td>Radio-Berica</td>
<td>SFR 1780 m.</td>
<td>Madrid</td>
<td>T &amp; C</td>
<td>Until midnight.</td>
<td>3 Kw.</td>
</tr>
<tr>
<td>81</td>
<td>10.00</td>
<td>Eiffel Tower</td>
<td>FL 2600 m.</td>
<td>Paris</td>
<td>T (spark)</td>
<td>5 minutes</td>
<td>5 Kw.</td>
</tr>
<tr>
<td>82</td>
<td>10.15</td>
<td>Eiffel Tower</td>
<td>FL 2600 m.</td>
<td>Paris</td>
<td>T (spark)</td>
<td>5 minutes</td>
<td>5 Kw.</td>
</tr>
<tr>
<td>83</td>
<td>11.57</td>
<td>Eiffel Tower</td>
<td>FL 2600 m.</td>
<td>Berlin</td>
<td>T (spark)</td>
<td>5 minutes</td>
<td>5 Kw.</td>
</tr>
</tbody>
</table>

**SUNDAYS**

<table>
<thead>
<tr>
<th>a.m.</th>
<th>Frankfurt</th>
<th>467 m.</th>
<th>Germany</th>
<th>SC</th>
<th>1 hour</th>
<th>1 Kw.</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.00</td>
<td>Hamburg</td>
<td>392 m.</td>
<td>Germany</td>
<td>T</td>
<td>5 minutes</td>
<td>700 Watts.</td>
</tr>
<tr>
<td>7.55</td>
<td>Leipzig</td>
<td>452 m.</td>
<td>Germany</td>
<td>SC</td>
<td>1 hour</td>
<td>700 Watts.</td>
</tr>
<tr>
<td>8.00</td>
<td>Komarow</td>
<td>1800 m.</td>
<td>Czechoslovakia</td>
<td>C</td>
<td>1 hour</td>
<td>1 Kw.</td>
</tr>
<tr>
<td>9.00</td>
<td>Eiffel Tower</td>
<td>FL 2600 m.</td>
<td>Paris</td>
<td>T (spark)</td>
<td>3 minutes</td>
<td>6 Kw.</td>
</tr>
<tr>
<td>9.30</td>
<td>Komstwasserhaus</td>
<td>LP 680 m.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>10.00</td>
<td>Eiffel Tower</td>
<td>FL 2600 m.</td>
<td>Paris</td>
<td>T (spark)</td>
<td>5 minutes</td>
<td>5 Kw.</td>
</tr>
<tr>
<td>10.00</td>
<td>Kiel</td>
<td>1150 m.</td>
<td>Czechoslovakia</td>
<td>SC</td>
<td>1 hour</td>
<td>1 Kw.</td>
</tr>
</tbody>
</table>

675

www.americanradiohistory.com
<table>
<thead>
<tr>
<th>Ref. No. of Transmission</th>
<th>G.M.T.</th>
<th>Name of Station</th>
<th>Call Sign and Wave-length</th>
<th>Locality where situated</th>
<th>Nature of Transmission</th>
<th>Closing down time or approx. duration of Transmission</th>
<th>Approx Power used</th>
</tr>
</thead>
<tbody>
<tr>
<td>92</td>
<td>10.00</td>
<td>Breslau</td>
<td>-- 415 m.</td>
<td>Silesia</td>
<td>SC</td>
<td>1 hour</td>
<td>1.5 Kw.</td>
</tr>
<tr>
<td>93</td>
<td>10.00</td>
<td>Radio-Wien</td>
<td>-- 530 m.</td>
<td>Vienna</td>
<td>C</td>
<td>2 hours</td>
<td>1 Kw.</td>
</tr>
<tr>
<td>94</td>
<td>10.30</td>
<td>Lyons</td>
<td>VN 470 m.</td>
<td>Lyons</td>
<td>C</td>
<td>Until 11 a.m.</td>
<td>500 Watts.</td>
</tr>
<tr>
<td>95</td>
<td>10.30</td>
<td>Stuttgart</td>
<td>-- 437 m.</td>
<td>Wurtzburg</td>
<td>C</td>
<td>1 hour</td>
<td>1 Kw.</td>
</tr>
<tr>
<td>96</td>
<td>10.40</td>
<td>Eiffel Tower</td>
<td>FL 2600 m.</td>
<td>Paris</td>
<td>T (spark)</td>
<td>Until 3 minutes</td>
<td>3 Kw.</td>
</tr>
<tr>
<td>97</td>
<td>10.50</td>
<td>Konigswusterhaus</td>
<td>-- LP 2800 m.</td>
<td>Berlin</td>
<td>C</td>
<td>Until 11:15 a.m.</td>
<td>6 Kw.</td>
</tr>
<tr>
<td>98</td>
<td>10.55</td>
<td>Eiffel Tower</td>
<td>FL 2600 m.</td>
<td>Paris</td>
<td>N</td>
<td>5 minutes</td>
<td>5 Kw.</td>
</tr>
<tr>
<td>99</td>
<td>11.00</td>
<td>Stockholm</td>
<td>-- 440 m.</td>
<td>Sweden</td>
<td>FS</td>
<td>Until 12:15 p.m.</td>
<td>500 Watts.</td>
</tr>
<tr>
<td>100</td>
<td>11.10</td>
<td>Zurich</td>
<td>-- 650 m.</td>
<td>Switzerland</td>
<td>C</td>
<td>1 hour</td>
<td>1.5 Kw.</td>
</tr>
<tr>
<td>101</td>
<td>11.15</td>
<td>Konigsberg</td>
<td>-- 460 m.</td>
<td>East Prussia</td>
<td>T</td>
<td>5 minutes</td>
<td>1 Kw.</td>
</tr>
<tr>
<td>102</td>
<td>11.37</td>
<td>Nauen</td>
<td>POZ 2800 m.</td>
<td>Berlin</td>
<td>T (spark)</td>
<td>8 minutes</td>
<td>8 Kw.</td>
</tr>
<tr>
<td>103</td>
<td>1.00</td>
<td>Radio-Paris</td>
<td>SFR 1780</td>
<td>Clichy</td>
<td>C &amp; N</td>
<td>2 p.m.</td>
<td>1.5 Kw.</td>
</tr>
<tr>
<td>104</td>
<td>3.00</td>
<td>Ned. Radio Industrie</td>
<td>PCCG 1070 m.</td>
<td>The Hague</td>
<td>C &amp; N</td>
<td>Until 5:20 p.m.</td>
<td>1.3 Kw.</td>
</tr>
<tr>
<td>105</td>
<td>3.00</td>
<td>Breslau</td>
<td>-- 415 m.</td>
<td>Silesia</td>
<td>C</td>
<td>Until 3:45 p.m.</td>
<td>1.5 Kw.</td>
</tr>
<tr>
<td>106</td>
<td>3.00</td>
<td>Stuttgart</td>
<td>-- 437 m.</td>
<td>Wurtzburg</td>
<td>C</td>
<td>Until 3 p.m.</td>
<td>1 Kw.</td>
</tr>
<tr>
<td>107</td>
<td>3.00</td>
<td>Radio-Wien</td>
<td>-- 530 m.</td>
<td>Vienna</td>
<td>C</td>
<td>Until 2 hours</td>
<td>1 Kw.</td>
</tr>
<tr>
<td>108</td>
<td>3.00</td>
<td>Frankfurt</td>
<td>-- 497 m.</td>
<td>Germany</td>
<td>C</td>
<td>1 hour</td>
<td>1 Kw.</td>
</tr>
<tr>
<td>109</td>
<td>3.30</td>
<td>Munich</td>
<td>-- 485 m.</td>
<td>Bavaria</td>
<td>L</td>
<td>Until 3 p.m.</td>
<td>700 Watts.</td>
</tr>
<tr>
<td>110</td>
<td>4.00</td>
<td>Hamburgh</td>
<td>-- 392 m.</td>
<td>Germany</td>
<td>C &amp; N</td>
<td>30 mins.</td>
<td>8 Kw.</td>
</tr>
<tr>
<td>111</td>
<td>4.15</td>
<td>Radio-Paris</td>
<td>SFR 1780</td>
<td>Clichy</td>
<td>C</td>
<td>Until 5:45 p.m.</td>
<td></td>
</tr>
<tr>
<td>112</td>
<td>5.00</td>
<td>Radio-Belgium</td>
<td>SFR 285 m.</td>
<td>Brussels</td>
<td>C</td>
<td>6 p.m.</td>
<td>2.5 Kw.</td>
</tr>
<tr>
<td>113</td>
<td>6.00</td>
<td>Eiffel Tower</td>
<td>FL 2600 m.</td>
<td>Paris</td>
<td>N</td>
<td>10 mins.</td>
<td>3 Kw.</td>
</tr>
<tr>
<td>114</td>
<td>6.00</td>
<td>Voxhaus</td>
<td>-- 430 m.</td>
<td>Berlin</td>
<td>Ch</td>
<td>30 mins.</td>
<td>700 Watts.</td>
</tr>
<tr>
<td>115</td>
<td>7.00</td>
<td>Radio-Wien</td>
<td>-- 530 m.</td>
<td>Vienna</td>
<td>C</td>
<td>Until 9 p.m.</td>
<td></td>
</tr>
<tr>
<td>116</td>
<td>7.00</td>
<td>Stockholm</td>
<td>-- 440 m.</td>
<td>Sweden</td>
<td>C</td>
<td>Until 10 p.m.</td>
<td>500 Watts.</td>
</tr>
<tr>
<td>117</td>
<td>7.00</td>
<td>Munster</td>
<td>-- 407 m.</td>
<td>Westphalia</td>
<td>C</td>
<td>Until 6:30 p.m.</td>
<td>1.5 Kw.</td>
</tr>
<tr>
<td>118</td>
<td>7.00</td>
<td>Voxhaus</td>
<td>-- 430 &amp; 500 m.</td>
<td>Berlin</td>
<td>DS &amp; C</td>
<td>Until 9:15 p.m.</td>
<td>700 Watts.3</td>
</tr>
<tr>
<td>119</td>
<td>7.00</td>
<td>Konigsberg</td>
<td>-- 460 m.</td>
<td>East Prussia</td>
<td>C</td>
<td>Until 8:30 p.m.</td>
<td>1.5 Kw.</td>
</tr>
<tr>
<td>120</td>
<td>7.00</td>
<td>Hamburgh</td>
<td>-- 392 m.</td>
<td>Germany</td>
<td>C</td>
<td>Until 9:45 p.m.</td>
<td></td>
</tr>
<tr>
<td>121</td>
<td>7.00</td>
<td>Eiffel Tower</td>
<td>FL 2600 m.</td>
<td>Paris</td>
<td>W</td>
<td>8 mins.</td>
<td>700 Watts.</td>
</tr>
<tr>
<td>122</td>
<td>7.15</td>
<td>Lausanne</td>
<td>HB2 350 m.</td>
<td>Switzerland</td>
<td>DS</td>
<td>Until 8:30 p.m.</td>
<td>5 Kw.</td>
</tr>
<tr>
<td>123</td>
<td>7.15</td>
<td>Zurich</td>
<td>-- 650 m.</td>
<td>Switzerland</td>
<td>C &amp; N</td>
<td>Until 9:15 p.m.</td>
<td>700 Watts.</td>
</tr>
<tr>
<td>124</td>
<td>7.15</td>
<td>Leipzig</td>
<td>-- 452 m.</td>
<td>Germany</td>
<td>C &amp; N</td>
<td>Until 8:40 p.m.</td>
<td>1.5 Kw.</td>
</tr>
<tr>
<td>125</td>
<td>7.30</td>
<td>Breslau</td>
<td>-- 415 m.</td>
<td>Silesia</td>
<td>C</td>
<td>Until 10 p.m.</td>
<td>1.5 Kw.</td>
</tr>
<tr>
<td>126</td>
<td>7.30</td>
<td>Stuttgart</td>
<td>-- 437 m.</td>
<td>Wurtzburg</td>
<td>C</td>
<td>10.30 p.m.</td>
<td></td>
</tr>
<tr>
<td>127</td>
<td>7.40</td>
<td>Ned. Sentorestelle Fabrick</td>
<td>NSF 1090 m.</td>
<td>Hilbersham</td>
<td>C</td>
<td>Until 10 p.m.</td>
<td>1 Kw.</td>
</tr>
<tr>
<td>128</td>
<td>8.00</td>
<td>Radiofonica</td>
<td>-- 426 m.</td>
<td>Rome</td>
<td>C &amp; N</td>
<td>Until 9:30 p.m.</td>
<td>4 Kw.</td>
</tr>
<tr>
<td>129</td>
<td>8.15</td>
<td>Radio-Belgeique</td>
<td>SFR 265 m.</td>
<td>Brussels</td>
<td>NC &amp; C</td>
<td>Until 10:10 p.m</td>
<td>2.5 Kw.</td>
</tr>
<tr>
<td>130</td>
<td>8.30</td>
<td>Radio-Paris</td>
<td>SFR 1780</td>
<td>Clichy</td>
<td>N</td>
<td>Until 9 p.m.</td>
<td>8 Kw.</td>
</tr>
<tr>
<td>130</td>
<td>8.30</td>
<td>Ecol. Sup. de Postes et Telegraphes</td>
<td>IPPT 450 m.</td>
<td>Paris</td>
<td>C or L</td>
<td>Between 10 &amp; midnight</td>
<td>500 Watts.</td>
</tr>
<tr>
<td>131</td>
<td>9.00</td>
<td>Radio-Paris</td>
<td>SFR 1780</td>
<td>Clichy</td>
<td>D</td>
<td>Until 10:45 p.m</td>
<td></td>
</tr>
<tr>
<td>132</td>
<td>9.30</td>
<td>Petit Parisien</td>
<td>-- 340 m.</td>
<td>Paris</td>
<td>C</td>
<td>Until 12:30 a.m.</td>
<td>8 Kw.</td>
</tr>
<tr>
<td>133</td>
<td>9.30</td>
<td>Radio-Iberica</td>
<td>-- 392 m.</td>
<td>Madrid</td>
<td>C</td>
<td>Until 12:30 a.m.</td>
<td>400 Watts.</td>
</tr>
<tr>
<td>134</td>
<td>10.00</td>
<td>Eiffel Tower</td>
<td>FL 2600 m.</td>
<td>Paris</td>
<td>T (spark)</td>
<td>5 mins.</td>
<td>3 Kw.</td>
</tr>
<tr>
<td>135</td>
<td>10.44</td>
<td>Eiffel Tower</td>
<td>FL 2600 m.</td>
<td>Paris</td>
<td>T (spark)</td>
<td>3 mins.</td>
<td></td>
</tr>
<tr>
<td>136</td>
<td>11.37</td>
<td>Nauen</td>
<td>POZ 3100 m.</td>
<td>Berlin</td>
<td>T (spark)</td>
<td>8 mins.</td>
<td></td>
</tr>
</tbody>
</table>

**SUNDAYS (contd.)**

<table>
<thead>
<tr>
<th>Ref. No. of Transmission</th>
<th>G.M.T.</th>
<th>Name of Station</th>
<th>Call Sign and Wave-length</th>
<th>Locality where situated</th>
<th>Nature of Transmission</th>
<th>Closing down time or approx. duration of Transmission</th>
<th>Approx Power used</th>
</tr>
</thead>
<tbody>
<tr>
<td>137</td>
<td>3.00</td>
<td>Radio-Wien</td>
<td>-- 330 m.</td>
<td>Vienna</td>
<td>Mon Wed Fri.</td>
<td>Until 5 p.m.</td>
<td>1 Kw.</td>
</tr>
<tr>
<td>138</td>
<td>4.00</td>
<td>Lausanne</td>
<td>HB2 330 m.</td>
<td>Switzerland</td>
<td>Wed. + Th.</td>
<td>1 hour</td>
<td>400 Watts.</td>
</tr>
<tr>
<td>139</td>
<td>4.30</td>
<td>Ecole Sup. des Postes et Telegraphes</td>
<td>IPPT 450 m.</td>
<td>Paris</td>
<td>Thurs. + C</td>
<td>2 hours</td>
<td>500 Watts.</td>
</tr>
</tbody>
</table>

**SPECIAL DAYS.**
The Decisive Test

You may expect from the Bowyer-Lowe Square Law Condenser a higher standard of condenser performance than is otherwise to be obtained. Read why.

There is little difficulty in making a Square Law Condenser. Its principle is well known to Radio Engineers. The real problem is to obtain simplicity of tuning which such a condenser gives without sacrificing other equally important factors in condenser efficiency.

In the Bowyer-Lowe Square Law Condenser this problem has been solved so successfully that the instrument is actually more sensitive, more electrically and mechanically efficient, than a similar size variable condenser of the ordinary kind.

For instance, the capacity ratio of a variable condenser determines its wavelength range. The capacity ratio of the Bowyer-Lowe .0005 pf ordinary condenser was the highest among instruments of its kind; but the capacity ratio of the .0005 Bowyer-Lowe Square Law Condenser, equal to 190 to 1, is the highest in wireless.

As a result, case after case comes to our notice where users who have installed these Condensers find that they can cover a given range with fewer coils and obtain reception of a purity and volume which has astonished them. Here are extracts from letters of two of our customers:

"With your new condensers I find that I can tune all B.B.C. Stations on one coil instead of three, and obtain cleaner and purer reception." 

"Since installing your Condensers in the place of others I have been able to receive stations clearer and have picked up long-distance stations more easily, louder and without distortion."

Bowyer-Lowe Square Law Condensers are made on a principle (Patents Pending) which does not involve an increase in the size of the instrument, and reduces all losses to a minimum.

The capacity of every condenser is guaranteed; the high praise of independent critics is the buyer's assurance of their mechanical and electrical excellence.

The Decisive Test of condenser efficiency is performance. Judging on this basis, your choice of a Square Law Condenser will lead you to the Bowyer-Lowe Instrument for selectivity, wavelength range, signal purity and excellence of design.

Bowyer-Lowe Tested Square Law Condensers

All good dealers stock them at prices from 11/6. If unobtainable locally, write direct.

BOWYER-LOWE CO. LTD. LETCHWORTH

In replying to advertisers, please use Order Form enclosed

MODERN WIRELESS

How to be sure of your Ebonite

Nothing is more disheartening than to build a splendid set and find when all the work has been done, that metallic ebonite has spoiled your efforts.

Make sure of your ebonite by buying Bowyer-Lowe Panels, which are entirely free from metal. Guaranteed Post Office Grade A, and ready for use without rubbing down.

Prices: Semi-matt surface, 3d. per sq. inch. Hard polished one side and all edges, 1d. per square inch. Laminated and engraved for any Radio Press Set (except Q.M.E. top panel), hand polished one side and all edges, 1d. per square inch. Thickness 1/16 inch in all cases. Ebonite is sold under seal and bears on covering and reverse side of panel our Trade Mark. Insist on seeing these proofs of identity before buying.

Bowyer-Lowe NON-METALLIC Radio Panels

A 'Three-in-One' Testing Device

The Bowyer-Lowe Wave-meter may be used for tuning, calibrating of coils and transformers, for checking wave-lengths, and, by a simple adjustment, as an efficient wavemeter for cutting out an interfering station.

To the experimenters it is as useful as it micro-meter is to the engineer.

The instrument of ebonite and enclosed in a Mahogany Case, is individually calibrated and supplied with full instructions.

Bowyer-Lowe Wavemeter (MARK 1) £4-4-0

Write for illustrated brochure.

Bowyer-Lowe Co. Ltd., Letchworth.
Honeycomb—the ideal Inductance

Low self-capacity—Small Absorption Factor—Minimum H.F. Resistance—No dead end losses—High self-Induction—these are the qualities of the ideal inductance. They are found to perfection in IGRANIC Honeycomb Duolateral Coils.

**IGRANIC Honeycomb Concert Coils**

This coil has been specially developed to provide for the reception of the B.I.C. concerts and the telephony transmitted by experimenters on shorter wave-lengths. For purity of tone, distortionless reproduction, and maximum volume they fill a long felt want.

Prices: 4/10, 5/- & 5/3 according to wave-length.

**IGRANIC Plug Mounted Coil.**

Made in twenty sizes for wave-length ranges of 100 to 23,000 metres, each size having a definite wave-length range dependent upon the capacity of the condenser used in association with it.

Prices from 5/- to 15/- each.

**IGRANIC Gimbal Mounted Coil.**

This coil is mounted upon two gimbal, or studs, positioned diametrically opposite, and these form the terminals and the means of fixing to the coil holder. As a result, it is possible to obtain a wide range of precise and accurate adjustments. As in the plug mounted type, it is made in twenty sizes providing the same approximate range of wave-lengths.

Prices from 4/10 to 15/- each.

Because Igranic Honeycomb coils are so wound that each wire (except where insulated wire comes in contact) is surrounded by an air pocket, the self-capacity and also the absorption factor is very low.

Because the surface area of the wire used in the making of Igranic Honeycomb Coils is as large as is compatible with the maintenance of the air pockets, high frequency resistance is at its minimum.

Because Igranic Coils may be obtained in 20 sizes to cover wave-lengths between 100 to 23,000 metres there is a type for the wave-length you use, which will thus ensure complete absence of dead end losses.

Because of these characteristics of Igranic Coils one may transfer to the detector and utilise the maximum of energy and so obtain the highest efficiency.

If you feel that you are not getting the best results—get Igranic Honeycomb Coils and start better reception to-day.

IGRANIC Radio Devices include: Honeycomb Coils, Variometers, Vari-Couplers, Bi-plug Coil Holders, Tri-plug Coil Holders, Filament Rheostats, Battery Potentiometers, Intervale Transformers, Vacuum Friction Pencils, etc. They carry a six months' guarantee and are obtainable of all reputable dealers.

Write for List Z274.

Birmingham—71-72, Exchange Buildings.
Bradford—18, Woodview Terrace.
Cardiff—Western Mail Chambers.

Glasgow—30, Wellington Street.
Manchester—30, Cross Street.
Newcastle—30, Pilgrim Street.

149, Queen Victoria Street, London
Works: Elstow Road, BEDFORD.
### SPECIAL DAYS (contd.)

<table>
<thead>
<tr>
<th>Ref. No. of Transmission</th>
<th>G.M.T.</th>
<th>Name of Station</th>
<th>Call Sign and Wavelength.</th>
<th>Locality where situated</th>
<th>Nature of Transmission</th>
<th>Closing down time or approx. duration of Transmission</th>
<th>Approx. Power used.</th>
</tr>
</thead>
<tbody>
<tr>
<td>140</td>
<td>5.00</td>
<td>Komarov</td>
<td>1800 m.</td>
<td>Czechoslovakia</td>
<td>Thurs., C</td>
<td>1 hour</td>
<td>1 Kw.</td>
</tr>
<tr>
<td>141</td>
<td>5.15</td>
<td>Zurich</td>
<td>630 m.</td>
<td>Switzerland</td>
<td>Mon., Wed., Fri., C</td>
<td>Until 5.30</td>
<td>1.5 Kw.</td>
</tr>
<tr>
<td>142</td>
<td>5.15</td>
<td>Zurich</td>
<td>650 m.</td>
<td>Switzerland</td>
<td>Thurs., L &amp; Sat., C</td>
<td>1 half-hour</td>
<td>1.5 Kw.</td>
</tr>
<tr>
<td>143</td>
<td>5.40</td>
<td>NSI</td>
<td>1050 m.</td>
<td>Hilversum</td>
<td>Mon., C</td>
<td>Until 6.40</td>
<td>1 Kw.</td>
</tr>
<tr>
<td>144</td>
<td>6.00</td>
<td>Eiffel Tower</td>
<td>FL 2600 m.</td>
<td>Paris</td>
<td>Mon., Wed., Fri., C &amp; N</td>
<td>Until 6.50</td>
<td>5 Kw.</td>
</tr>
<tr>
<td>145</td>
<td>6.00</td>
<td>Eiffel Tower</td>
<td>FL 2600 m.</td>
<td>Paris</td>
<td>Tues., Thrs., Sat., N</td>
<td>10 mins.</td>
<td>5 Kw.</td>
</tr>
<tr>
<td>146</td>
<td>6.00</td>
<td>Voxhaus</td>
<td>430 m.</td>
<td>Berlin</td>
<td>Wed., Ch</td>
<td>30 mins.</td>
<td>700 Watts</td>
</tr>
<tr>
<td>147</td>
<td>7.00</td>
<td>Svenska</td>
<td>420 m.</td>
<td>Stockholm</td>
<td>Thurs., C</td>
<td>Until 10</td>
<td>500 Watts</td>
</tr>
<tr>
<td>148</td>
<td>7.00</td>
<td>Stockholm</td>
<td>440 m.</td>
<td>Sweden</td>
<td>Wed., Fri., Sat., L &amp; C</td>
<td>Until 10</td>
<td>500 Watts</td>
</tr>
<tr>
<td>149</td>
<td>7.40</td>
<td>Smith &amp; Hooghoudt</td>
<td>PAG 1050 m.</td>
<td>Amsterdam</td>
<td>Wed., C</td>
<td>Until 9.40</td>
<td>1.3 Kw.</td>
</tr>
<tr>
<td>150</td>
<td>8.10</td>
<td>Middelradd</td>
<td>PCM 1050 m.</td>
<td>Ymuiden</td>
<td>Thurs., C</td>
<td>Until 10</td>
<td>600 Watts</td>
</tr>
<tr>
<td>151</td>
<td>8.40</td>
<td>FGGG</td>
<td>1070 m.</td>
<td>The Hague</td>
<td>Wed., C</td>
<td>Until 10</td>
<td>1 Kw.</td>
</tr>
<tr>
<td>152</td>
<td>8.40</td>
<td>Amsterdam</td>
<td>PX9 1050 m.</td>
<td>Holland</td>
<td>Tues., C</td>
<td>Until 9.40</td>
<td>10 Kw.</td>
</tr>
<tr>
<td>153</td>
<td>8.40</td>
<td>NSI</td>
<td>1050 m.</td>
<td>Hilversum</td>
<td>Fri., C</td>
<td>Until 10.30</td>
<td>400 Watts</td>
</tr>
<tr>
<td>154</td>
<td>9.00</td>
<td>Le Matin</td>
<td>SFR 1780 m.</td>
<td>Paris</td>
<td>Tues., Thrs., C</td>
<td>Until 10.45</td>
<td>8 Kw.</td>
</tr>
<tr>
<td>155</td>
<td>9.30</td>
<td>Petit Parisien</td>
<td>340 m.</td>
<td>Paris</td>
<td>Wed., Fri., D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>156</td>
<td>10.00</td>
<td>Radio-Paris</td>
<td>SFR 1780 m.</td>
<td>Clichy</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**The "All Britain" Receiver.**

To the Editor of MODERN WIRELESS,

SIR,—The following results on a copy of your "All Britain" Receiver may interest you. The receiver in question was modified by placing the valves inside the cabinet, otherwise your design has been copied. I took it away with me on a trip to the Mediterranean coast of Spain just to see what it would do, and started off with a length of electron wire hanging from a height of about 60 ft., thence downwards at a slight angle, the remainder being fed down inside a steel ventilator to the room below. With this Bournemouth was quite distinct at 6 p.m., whilst still daylight, from a position just south of Cane St. Vincent (Spain). This is easily 900 miles. By 8 p.m. Glasgow, Manchester and Newcastle were quite comfortable on two pairs of phones in series, distance slightly over 1,000 miles, and as the atmospheres were so bad lower on the latter part of the programme was received on two valves only. These results were duplicated night after night from all points between Gibraltar and Tarragona, so the results quoted are not occasional "breaks." The atmospheric conditions round this part of the world are against long-distance work, and the stay-at-home enthusiast would hardly credit the terrific din which commences with sunset and continues until the early hours, due to the heat and sultry weather. The crash and roar is appalling, like a constant barrage of machine guns and heavy guns, until the ear drums become weary of it all. However, on the evening of October 10, I had the opportunity of hooking up to a good four-wire aerial of bronze wire, nearly 80 ft. long; so, after midnight, notwithstanding bad static, I picked up several faint carrier waves, and eventually heard sufficient to identify them as American. The most distinct was evidently a children's hour by a lady, followed by several announcements and the remark "J. W. E. announcing." a song "My blue eyed baby," solo, etc. At 1.25 a.m. G.M.T. another station was tuned in, and during a few seconds' lull in the "artillery display," a gentleman announced, "This is WOO, the station in Philadelphia," followed by a song, whistling solo, male voice duet, piano solo, etc. This was heard at Valencia (Spain), and a conservative estimate of the distance from Philadelphia is about 3,700 miles. A few more were heard on October 11 and 12, but the static made it almost impossible to pick out the call letters; but one station was heard very clearly at midnight, G.M.T. reading market reports, one quotation of $4.70 being pronounced "four dollars twenty cents." Considering this would be only 7 p.m. in the U.S., I think the "All Britain" is likely to do some good work later on. Wishing your journal continued success, Yours truly,

T. F. S.

Malaga, Spain, Oct. 14, 1924.
Can You Locate Faults?

A MODERN valve set is an intricate piece of apparatus capable of giving marvellous results when properly constructed and adjusted. But what if an error has been made in the wiring, or some fault has developed in a vital component? It would appear at first sight that it is a difficult task for the inexperienced amateur to trace a single fault, as the components of a valve set are numerous, and connections seem puzzling.

In the October 1 issue of Wireless Weekly, Mr. K. Roberts gave some valuable practical hints on valve set troubles, and no reader who is pleased with the reliability of the broadcasting programmes can afford to miss these tips for tracing troubles. Some notes on the elimination of distortion are also given in this valuable article.

Part I of an article entitled "A Low-Power Radio Transmitter" also appeared in the October 1 issue, an article which will make a special appeal to the amateur proficient in reception and to the beginner in radio transmission.

An exceptionally interesting article entitled "One Hundred Metres and Below," by Mr. Percy W. Harris, appeared in the October 8 issue, in which many methods of obtaining good results on these super short waves are discussed.

Nowadays, the experimenter who cannot go below 200 metres on his tuner is looked upon as out of date, and those who are missing the interesting short-wave broadcasting and amateur transmission, should make haste and learn how to receive such stations.

A single-valve receiver for bright or dull emitter valves is described by Mr. Stanley G. Rattee, Member I.R.E., in the October 15 issue. Simplicity in construction, together with ease in operation over all wavelengths, are the outstanding features of this simple receiver.

The Supersonic Heterodyne

Mr. J. Scott-Taggart is writing a series of general and constructional articles on a most fascinating type of receiver—the Supersonic Heterodyne—the first of which appeared in the issue of Wireless Weekly for October 22. The operation and design of the supersonic receiver has never been really tackled in this country, and this article by such an eminent authority on wireless matters will present entirely new ideas to the experimenter.

Capt. Round writes on the design of resistance capacity coupled low frequency amplifiers in the same issue, and all who desire pure, undistorted sound from their receivers should read this extremely interesting article by the research engineer of the Marconi Company.

A unique feature in this issue is the presentation of twelve pages of photogravure reproduction. The remarkable clearness of outline and almost stereoscopic relief of each object combine to afford almost the advantages of having before one the actual object depicted. Radio Press wireless receivers present a most realistic appearance, even rendering a wiring diagram unnecessary in many cases.

Unfortunately the cost of this form of reproduction is high, and it has been decided for the time being to present a free photogravure supplement with every alternate issue of Wireless Weekly until it has been ascertained to what extent these are appreciated.

---

SPECIALITIES

CONDENSERS FOR ALL PURPOSES

H.F. TRANSFORMERS.

A series of H.F. plug-in transformers in six ranges of wave length. They are made of our highly polished non-loss oblate. The windings are carried in staggered slots, well protected. For successful H.F. amplification it is essential to use really efficient transformers. Users' opinions confirm that those of M.H. manufacture are the best.

H.F. TRANSFORMERS.

A series of H.F. plug-in transformers in six ranges of wave length. They are made of our highly polished non-loss oblate. The windings are carried in staggered slots, well protected. For successful H.F. amplification it is essential to use really efficient transformers. Users' opinions confirm that those of M.H. manufacture are the best.

H.F. TRANSFORMERS.

No. 00, 93 to 153 metres... 10
No. 01, 150 to 300 metres... 10
No. 1, 300 to 600 metres... 10
No. 2, 550 to 1,300 metres... 10
No. 3, 1,100 to 2,000 metres... 10
No. 4, 2,500 to 7,000 metres... 10
The Complete Set... 55

Can be supplied in matched pairs at NO extra charge if requested at time of ordering.

L.M. MICHAEL LTD

Wireless Engineers, Radio Corner, 179, STRAND, LONDON, W.C.2

680 In replying to advertisers, please use Order Form enclosed.
at good strength. As a matter of fact the set was not finished until ten minutes past one a.m. one morning, and of course all British Broadcasting stations had closed down long before. Within ten minutes WGY was audible all over the house on the loud speaker, and when this station shut down about 2 o'clock a very slight readjustment brought in WJB of Boston, where a musical programme was in progress. On the next evening I succeeded in receiving all of the British Broadcasting stations at excellent strength, the fourth valve being used only to make use of the loud speaker. Several German stations, French, and, of course, Madrid, came through well, Madrid being easily heard, although this station was not strong. Of course, Madrid, came through, my loud speaker. Several German stations, French, and, of course, Madrid, came through well, Madrid being easily heard, although this station was not strong. Of course, Madrid, came through, my loud speaker.

H.T. Tappings

It should be noted that when using only three valves the third H.T. tapping is connected to the detector valve, so that there is a big difference between the note-magnifier voltage and the detector voltage, the wander plug of H.T. 3 should be altered to the detector voltage when cutting out the fourth valve. When a common voltage for detector and note-magnifier is used, no change is, of course, necessary. To have arranged a change of voltage at the time of change over would have complicated the switching considerably and in a way I do not consider justifiable for the slight advantage gained. It is very easy to switch on the last valve for greater strength and then to vary the wander plug for best results.

It is now possible to buy ready engraved panels for Modern Wireless sets, but if you make up your own panel, I am sure you will be very pleased with the Radio Press panel transfers, which are very easy to apply, and, as to the results, you can see them from the photograph of my own set.

As usual, I shall be very pleased to hear from readers who obtain good results from this set, as it has been designed to meet the requirements of a number of readers who have asked for a Transatlantic design with valves within the cabinet.

Pulling out valves of the 65 ampere type work quite well in this set, and can be used by those who have difficulty in getting their accumulators charged.

Looking down on the receiver. Notice the double square law condenser for tuning the two H.F. stages

I have not found the need of magnetic reaction, although this is provided for in case some readers have high-resistance aerials. Constant aerial tuning is quite successful in this receiver, and has the advantage of giving a broader range of wavelengths with a given coil.

When you have become quite used to handling a receiver with the common high-tension, you will, of course, want to try the effects of varying the high-tension on the high-frequency, detector and note-magnifying valves, and also of using grid bias. On most high-frequency valves, 40 or 50 volts is ample, and 30 or 40 will generally do for the detector. On the note-magnifying valve I recommend the use of a voltage of about 100 with grid bias to suit the particular valve used. Of course, you only need use one high-tension battery if this reaches 100 volts, separate wander plugs from the H.T. 1, 2 and 3 being plugged in to the values desired. If your battery is only a 66 volt you will need another unit joined in series to get the higher voltage for the note-magnifier.

To the Editor of Modern Wireless.

Sir,—I think it is my duty to write you a few lines regarding the Panel Card purchased from you, and to tell you the results obtained from the assembled set.

I am more than satisfied, and everybody who has heard it says it is the loudest and clearest set they have listened to.

Perhaps it will not surprise you to hear that I received a nice concert from America during a period of 1 hour, 10 mins., from 12.30 p.m. on October 5 to 1.30 a.m. on the following day. Unfortunately more interference from ships prevented me from hearing any more.

The announcements were very clear, and I distinctly heard the announcer say, "This will complete the concert from the Hotel Brunswick, and we are now switching over to the Opera House, where the opera 'H.M.S. Pinafore' will be broadcast. Springfield, Mass., U.S.A., now closing down." I have unfortunately not been able to find an American radio programme to verify this.

The three-valve set was made according to your panel card No. 1. Thanking you for supplying me with such a useful card.

Yours truly,

Lancaster.

HARRY TELL.

To the Editor of Modern Wireless.

Sir.—Before leaving Glasgow the parts were obtained for the construction of the "3-Valve Simplicity Receiver."

Having obtained excellent results we thought it only fair that you should be advised of them. The broadcast concerts from Aberdeen, Glasgow, Bournemouth are received regularly, and on occasions ZIO and Brussels come in well, this performance being far ahead of the majority of the wireless enthusiasts here, who are using multi-valve sets. Atmospheres and the nearness of SUH are the only drawbacks, harmonics from SUF having been eliminated.

Yours truly,

WIRELESS OPERATOR.

CHIEF OFFICER.

s.s.—Alexandria.

"Reflex Receivers in Theory and Practice."

Owing to the great interest evinced in the Raphofoxx articles by Mr. John Scott-Tiggar, his usual chapter of "Reflex Receivers in Theory and Practice" has been unwaveringly held over this month.

681

www.americanradiohistory.com
HULLO EVERYBODY!!

LISSEN.

Variable Grid Leak 2/6
Anode Resistance 3/6
Lissen Dimar 3/6
Lissen 
Dol Universal 10/6
2-way Switch 3/6
 undertaker Field
TI Transformers.  10
25, 50, 100. 1/6,
Caps. 40, 60, 90, 120, 180, 240, 500, 1000, .001, .0025, .005, .01, 2.5.
Mica Switch. 8/6

POST 3d. each.

DUBLIJKER.

001, 002, 003, 004. 005, 006, Fixed, 3/6.
007, 008, 009, 010, Caps. 25.
Type 577, 61 2/6
Grid Lowering 2/6
Anode Resistance 25., 50., 75, 100, 150, 200.
Extra value, 200. 15/6.
Mica Switch 25.

POST 3d. each.

IGRANIC.

Caps. 25, 62, 35, 50, 62, 75, 90, 96, 100, 120, 150, 180, 220.
88 230, 300, 500.
104, 105, 150, 220.
Fil. Rhenstest 2 6.
POTENTIAL 25.
Vernier Rhenstet, 7 6.
Silvertown.

POST 3d. each.

STERLING SQUARE LAW CONDENSERS.
with Vernier.

001 2 6.
005, 006 2 6.
007, 008 2 6.
009, 010 2 6.

POST 2d. each.

EDISON BELL.

0001 to 5000 Fixed 3/6.
0005, 0006, 0007, 0008, 0009, 0010 2 6.
0011, 0012, 0013, 0014, 0015, 0016, 0017, 0018, 0019, 0020 2 6.
0021, 0022, 0023, 0024, 0025 2 6.

POST 2d. each.

WEST END DEPOT FOR
POLAR, JACKSON, BRON, K.U., MANHATTAN, ETC., COSWELL TOWN, SILVERTOWN, IGRAIC, LISON, RACE PRESS ENVELOPES, DUBLIJKER, EDISON BELL, ETC.

POST FREE OFFER. POST PAGE No. 1. Not Applicable to Foreign Orders.

DELIVERY. Every endeavour is made to despatch goods by return, but sometimes delays occur which are beyond our control and in which cases Customs may rest assured that their orders will be executed in the very shortest period. They will therefore realise that it is not possible to have orders cancelled through above causes. All orders over 20/- post free U.K. c/n.

RHEOSTATS.

Ormonat 2/6.
Raymond 2/6.
Do, with dial 2/6.
Potential motor T.C.M. 8/6.
Burned Dual 7/6.

POST 3d. each.

TRANSFORMERS.

Marine Instruments 25.
I.E.C. 35.
I.E.C. 50.
Anode Resistance 36.
General Radio 40.
General Radio 60.
25-Watt, 60-Watt 30.
Raymond 25.
Anode Resistance 60.
Raymond 90.
Anode Resistance 96.
Raymond 100.

POST 3d. each.

TRANSFORMERS (H.F.).

Commercial, 36.
Radio Vacuum 12.
Eureka Condensed 12.
Silverstvet 12.

POST 3d. each.

H.T.C. Post 2d.
Special valve holder above panel.
Ditto, for under panel 1/6.

POLAR POST 6d.

300 var. Condenser 10/6.
3003 10/6.
Micrometer Condenser 6/6.
Cam Verner 2-way 2/6.

Enclosed glass, Art Sketch.

EDISON BELL.

Shaped Plug 1/6.
Also with Base, 1/3.

FINE VARIOMETERS.

DOUBLE SILK WOUND, Closed Coupling, One Hole Fitting.

EDISON BELL.

Fine Enclosed Glass.

NOTICE!

OUR WONDERFUL MICRO-METER ADJUSTMENT GLASS ENCLOSED DETECTOR. WHY PAY MORE?

POST 6d. each. 1/11

WATMEL.

Var. Grid Leak 2/6.
Anode Resistance 3/6.

POST 2d. each.

BRETWOOD (Model)
Var. Grid Leak 2/6.
Anode Resistance 3/6.

POST 2d. each.

DUPLEX WAXLESS BASKET COILS

Min. Self-Capacitance Set of 5 1/8

By Post 2 1/2.

WATMEL MICROSTAT

FOH. D. or B. VALVES 2/9.

“BUCKS” for Reflex. 12/6.

EBONITE 3 for 1/2

EBONITE 3 for 1/4

EBONITE 3 for 1/6

3 Qualities.

BASKET HOLDERS.

FOR Reflex, etc. - 12/6

MANCHESTER 14/11

STANDARD - 14/11

SHROUDED - 18/6

COIL PLUGS.

Single Coil Holder mounted on ebonite base and fitted with terminals 1/4.
Ditto, swivel movement 1 6.

CRYSTAL Post DETECTORS 4d. each

Enclosed glass, Art Sketch.
Ebonite Base.

GRID LEAK.

DUBLIJKER 2 6
McMichael 1 6
Edison Bell 1/6

POST FREE.

“BABY” COIL STANDS (EBONITE)

GRAND VALUE.

5-Way, 2-Way Post, 2/6.
5-Way, 4 3/4 by Post 4/9

By Post 2 1/2.

“UNIDYNE” RECORDING SET

THE 4- ELECTRODE VALVE

Thorpe K 4.

1/6.

2 Microshort Filament Resistances 2 9.

Variable Grid Leak 1/6.

Single Pole Double-Throw Switch 1 9.

Variable Condenser, with Verner 7 3.

Cam Verner 3-way 21 3/4.

Panel S in., by 1 1/2, 1 1/2.

2 5-pin Valve Holders by 1 6.

1 Fixed Condenser, 001, 1 2 2 3.

1 Fixed Condenser, 0002, 1 2, 2 3 2.

1 2 3.

Silverwood L.F. Transformers

5 yds. 15 Gauge Tinned Copper Wire 1 2.

Necessary Screws, Nuts, and Washers Free if above 1/6 post paid.

K. RAYMOND

27, LISLE STREET,
LEICESTER SQUARE, W.C.2

In replying to Advertisers, please use Order Form enclosed.

THE NO. 1 INDIAN INSTRUMENT MAKER

HOURS OF BUSINESS:
DAILY - 9 to 7.45
SUNDAY - 10 to 1

Phone: GERRARD 1057
**Brass Former**

TO MAKE YOUR OWN COILS

**Double**, 24 spokes each side.

**POST FREE**

---

**Guide for Chelmsford**

On 1,600 Metres

Aerial Reaction

Coil No. 150 200

Tuned Anode 250 or 300

---

**Valves**

**Cossor P.1 and P.2** 12/6

**Mullard L.F. & H.F.** 12/6

**Mullard D. ra** 21/-

**B.T.H. R.4** 8/6

**B.T.H. R.5 -06** 25/-

**Ediswan A.R.** 12/6

**Ediswan A.R.D.E.** 21-

**Ediswan A.R.06** 25/-

**Marconi R. and R.5 12.6**

**Marconi D.E.M.** 21-

**Marconi D.E.3** 25/-

**POST FREE**

---

**Radio Press Envelopes**

No. 1 at 1/6

2, 3, 4 at 2/6

---

**COIL STANDS**

Ebonite 2-way with Extension Handles Nickel Fittings 3/3

By Post 3/9

Ditto 3-way 4/9

By Post 3/3

CAM-VERNIER (2-way) POST FREE 7/6

POLAR (2-way) 11-

GOSWELL (see elsewhere)

---

**BRASS FORMER**

To make your own coils

**Double**, 24 spokes each side.

**POST FREE**

---

**Radio Press Transfers 6d.**

By Post 5d.

---

**All Valves on post sent at Purchaser’s Risk.**

---

**Phillips D.E. Valves**

04 Type 15 to 19 each 17/6

Post 6d. each

---

**Thorpe K4 Valves**

(5-pair) for Unidyne 17/6

**Thorpe K1** 10/-

**POST FREE**

5-Pin Valve-holder - 10

---

**NEW Lissen Lines**

5 Point Switch - 4-

Auxiliary Res. - 1/3

Lissen Choke - 10/-

**POST FREE**

---

**Post Pages Continued**

**Extra Postage on Foreign Orders.**

---

**The Cream of the World’s Headphones**

Sterling 4,000 ohms.

New Model ... 25-

Brown’s (Featherweight) 25-

B.T.H. (Wonderful Tone) ... 25-

Brandes (Matched Tone) 25-

General Radio ... 20-

---

**Telefunken 4,000 ohms Heavy Phones**

As light as a Feather ... 17.11

---

**Dr. Nesper’s Headphones**

Genuine Nesper-phones, 4,000 ohms. Fits comfortably on the head.
double leather-covered springs, loose flexible cords, nickel-plate parts. Very comfortably fitting to the head.

---

**BEWARE of “Pattern” Offered Cheaply**

---

**Accumulators**

Maké well-known firm for me.

2 v. 40 amps. 6/- By post 10/6

4 v. 40 amps. 10/- By post 17/6

4 v. 60 amps. 19/- By post 39/6

4 v. 80 amps. 22/- By post 24/6

6 v. 50 amps. 37/- By post 59/6

8 v. 80 amps. 42/- By post 38/6

8 v. 100 amps. 38/6 By post 40/6

---

**Universal (Franco)**

Basket Coil Stand, 2-way Post Free 5/-

Franco, 2-way (plug-in) ... 12/6

Ditto 3-way 17/6

The only GEARED COIL HOLDER on the market.

---

**Chelmsford (5 X X)**

D.C. Coil Basket, complete with adapter, specially made to use with 65 & 66 diameter, 2/-

Loading plug and socket 9d.

D.C. COIL for 5 X X 1/6. By post 1/9

---

**Right Opposite Daly’s Gallery Door**

**K. Raymond 27, Lisle Street, Leicester Square, W.C.2**

---

**K. Raymond 27, Lisle Street, Leicester Square, W.C.2**

---

**In replying to Advertisers, please use Order Form enclosed**
SWITCHES ON
Porcelain D.P.D.T. 1/2d.
Porcelain D.P.T. 1/4d.
Ebonite D.P.D.T. 1/3d.
Ebonite S.P.D.T. 1/8d.
Min. Panel D.P.D.T. 1/4d.

BATTERIES 4½
Value English 4½ 44d.

H.T. BATTERIES.
Best Made 50 v. 7½d.
Best Made 60 v. 7½d.
Best Made 90 v. 11½d.
Ever-ready 60 v. 13½d.
Seners' 10 v. 1½d.
Ever-ready 10 v. 1½d.
B.B.C. 10 v. 3½d.
B.B.C. 15 v. 5½d.
B.B.C. 20 v. 10½d.
Siemens' Ever-ready ditto 10½d.

RHEOSTATS.
Small 5 ohms 1½d.
One Hole Fixing 1½d.
Cramps 1½d.
Ebonite Former 1½d.
Dito and Dial 1½d.
Urglass T.C., and all known makes.

CRYSTAL
DETECTORS, &c.
Enclosed Brass, Large 1½d.
Ditto, Nickel or Brass, Large 1½d.
Small Brass 1½d.
Ebonite, Resinated 1½d.
No. Met. Type 2½d.
Burnded 3d.
Ditto Coarse Coating 1¼d.
Gold Spreader 1½d.
Neuton Crystal, (Shaw's) 8½d.
Midle 1½d.

VALVES.
Dutch Detector 4½d.
"Dutch" 7½d.
Pullings "B." 8½d.
French "Metal" 6½d.

TOOLS.
Set of Spanners 1½d.
Gas, 4, 6, 8, 10 B.A. set 2½d.
Small Softening Wrench 6½d.
7-Iron (H.L.) Drills 1½d.

MURRAY VALVE HOLDER (Patent) 1½d.
Leafless Valve Holder, Solid Ebonite 1½d.

EBONITE PARTS.
Good Coil Plugs from 4½d.
Edison Bell Shaped 1½d.
Raymond ditto 1½d.
Baskets Auditors 5½d.
Also at 1½d & 1½d.

5-way Coil Stands 2½d.
With Extends, Handle 2½d.
Also at 3½d, 4½d.

3-way 43, 4½, 5½.
Gould's Patent 9½d.
France 12½d.
Flic, etc. 11½d.

Coil Plugs Short 1½d.
Dito, Strong Movement 1½d.
Coil Plugs and Clips 6½d.

SUNDRIES.
BRASS PARTS.
W.O. or Pillar Terminals 1½d.
Small Pillar 4½d.
Phone 4 B.A. 1½d.
Phone 8 B.A., 2 for 1½d.
Valve Sockets 4½d.
(Above with Nut Washer)
Valve Funis and Nuts 3½d.
Stop Funis and Nuts 2½d.
Plug and Socket pr. 1¼d.
Spring Washers 3½d.
Spade Screws 1½d.
Fun Screws 2 for 1½d.
Spade Tags 2½d.
Spring Pillar Terminals 2½d.
Nuts, 2, 4, 5, 6, 8 B.A. 3½d.
Washers (Brass) 12½d.

SUNDRIES.
"Tungstean " "Muller" 1½d.
"Similar Set" (Titles or selenium) 2½d.
Good "Knobs" 1½d.
Rods, Nuts and Washers 3½d.
Switch Arms 8½d.
Copper Foll. 2½d.
1½d. Sq. Zinc Copper 10½d.
1½d. Tin Copper 17½d.
Bound Tin Copper, varn.
Insulated Single 1½d.
Insulated Single 8½d.
Ends on Chasis 1½d.
Galvanic Sensing (Aluminium) 6½d.
Brass Washers (Brass) 1½d.
Nickel Plated Terminals 2½d.
Nickel Contact Studs 2½d.
Nickel Switch Arm 1½d.
(Variometer for 5½d.)

SHAW'S HERTZITE.
BEATS ALL OTHER "TENS" 1½d.
Impossible to Advertise All the Goods Stocked.

WARE IMITATIONS.
N and K.
4,000 ohms 12½d.
Genuine stamped.

MYERS VALVES.
UNIVERSAL D.E. 12½d.
Strong Valve Templates 4½d.
Bog Insulators 1½d.
"Rayo" Reel 1½d.
Thick Rubber Leads 2½d.
Baffle Plates 2½d.
Panels Drilled
Radio Fire Envelope
Raymond Fixed Condensers 9½d., 900 to 9000, 1000, 2000, 1000, 1½, 1½, 1½
2½, 5, 7½, 10, 15, 20, 30, 60, 100, 300, 600, 1200, 2500, 5000.

BATTERIES 4½
4d.½ 5d.½ ALL BEST MAKES.

K. RAYMOND
27, LISLE STREET, LEICESTER SQUARE, W.C.2

BYPASS DRILLS
13½ each
Cutting & Milling Gear
5½

M. RAYMOND
27, LISLE STREET, LEICESTER SQUARE, W.C.2

CRYSTAL DETECTORS.
Get own coils.

RAYSIE STONE.
CRYSTAL SETS
Per set 1½d.
Condenser Brushes

HERTZITE.
BATTERIES
ALL THE REST 1½d.
Impossible to Advertise All the Goods Stocked.

"WARE Imitations.N
N and K.
4,000 ohms 12½d.
Genuine stamped.

MYERS VALVES.
UNIVERSAL D.E. 12½d.
Strong Valve Templates 4½d.
Bog Insulators 1½d.
"Rayo" Reel 1½d.
Thick Rubber Leads 2½d.
Baffle Plates 2½d.
Panels Drilled
Radio Fire Envelope
Raymond Fixed Condensers 9½d., 900 to 9000, 1000, 2000, 1000, 1½, 1½, 1½
2½, 5, 7½, 10, 15, 20, 30, 60, 100, 300, 600, 1200, 2500, 5000.

BATTERIES 4½
4d.½ 5d.½ ALL BEST MAKES.

K. RAYMOND
27, LISLE STREET, LEICESTER SQUARE, W.C.2

BYPASS DRILLS
13½ each
Cutting & Milling Gear
5½

M. RAYMOND
27, LISLE STREET, LEICESTER SQUARE, W.C.2

CRYSTAL DETECTORS.
Get own coils.

RAYSIE STONE.
CRYSTAL SETS
Per set 1½d.
Condenser Brushes

HERTZITE.
BATTERIES
ALL THE REST 1½d.
Impossible to Advertise All the Goods Stocked.

"WARE Imitations.N
N and K.
4,000 ohms 12½d.
Genuine stamped.

MYERS VALVES.
UNIVERSAL D.E. 12½d.
Strong Valve Templates 4½d.
Bog Insulators 1½d.
"Rayo" Reel 1½d.
Thick Rubber Leads 2½d.
Baffle Plates 2½d.
Panels Drilled
Radio Fire Envelope
Raymond Fixed Condensers 9½d., 900 to 9000, 1000, 2000, 1000, 1½, 1½, 1½
2½, 5, 7½, 10, 15, 20, 30, 60, 100, 300, 600, 1200, 2500, 5000.
I suppose that one of the most common troubles to beset the really critical experimenter when he has constructed a new receiving apparatus is the presence of a certain undercurrent of noise. The ideal set would be perfectly silent when no signal was coming in, but absolute silence in headphones or loud-speaker is a condition of perfection that few of us manage to reach. If you disconnect the aerial and earth of nearly any set and switch on the batteries there is a faint but easily discernible noisiness, not unlike the sound of the sea as heard from some considerable distance, and accompanying this intermittent cracklings occur which may be quite loud or very faint indeed. In such conditions nine people out of ten would probably blame the high-tension battery, to whose guilt all symptoms seem to point; but in spite of the evidence it may be entirely blameless. Not long ago I constructed a set which behaved exactly in the way described. I thought that the battery was probably near the end of its days, and ascribing noisiness to this cause I did not bother further about the matter. A little later, however, I made up another set containing two stages of resistance capacity coupled low-frequency amplification—in the first set the low-frequency couplings were by means of transformers. This second set when tried out with the same high-tension battery proved to be absolutely noiseless. There was in fact that background of absolute silence which, though we read of it so often, we seldom manage to achieve. Now here is clear proof that the high-tension battery was not to blame.

Modern H.T. Batteries

The high-tension battery of to-day is as a matter of fact a very great advance upon those which were in use even a year or two ago. Then the cells in radio plate batteries were identical with those which form part of pocket flash-lamp refills. They were not specially designed to give a steady current for long periods on end, and as they were frequently overloaded they soon began to develop those current fluctuations which are responsible for cracklings and splutterings. The cells of to-day are much better made, and most makers have tackled the depolariser question with very satisfactory results. The insulation between cells has also been improved and, taking them all round, high-tension batteries are now extremely efficient components of the receiving set. Though as a general rule a battery is not of much use when its E.M.F. has fallen to less than two-thirds of the original reading, I have one in use at the moment which, though it has fallen from 120 volts to rather less that 70, is still perfectly quiet. From other members of the staff of Modern Wireless I learn that they have had similar
November, 1924

MODERN WIRELESS

The present popularity of Square Law Condensers and the efficient working of the straight wavelength curve require a coil of very low self-capacity. Any high-capacity coil renders more inaccurate the plotting of the wavelength curve on the principles which are now being advocated.

It is easily proved that Square Law Condensers operate nearest the straight line when they are used in conjunction with

PLUG-IN

This is due to their extremely low self-capacity. Reversion to the old type condenser is only equalized in its inefficiency by coils of high self-capacity with Square Law Condensers.

Low self-capacity, low I.F. resistance, maximum transference of energy and consequently maximum signal strength, sharper tuning and selectivity, follows the listing of "Diamond Sunflower" Coils etc., etc. Prices include the plug.

STEEL 'PHONES

These noted light-weights are tested and guaranteed to give perfect and distortionless reception, with maximum comfort. Thousands sold to satisfied customers. Equal to any and cheaper than most other really good 'phones. 17/6

Carriage paid, or from local dealers. Per pair.

Buy at Wembley, or from any good Wireless Dealer. If unable to obtain from your local store, wire to:

STELLA WORKS

31-37, Wybert Street,

LONDON, N.W.1.

Telephone: Museum 8310.

Museum 8310.

In replying to advertisers, please use Order Form enclosed
MODERN WIRELESS

A. MUNDAY, Ltd.,
Electrical and Wireless Engineers,
TEL., CITY 2972.
(One door from Queen Victoria St. & Queen St.)
And at 45, EASTCHEAP, E.C.3.
ROYAL 4530.

We are Stockists of
STERLING SQUARE-
LAW CONDENSERS
BOWYER-LOWE
SQUARE-LAW
CONDENSERS
POLAR CONDENSERS
ORMOND and
FORMO CONDENSERS

Accumulators in Stock charged
6 volt 60 amp., 26/6
ALL MAKES OF EVERYTHING
FOR WIRELESS.

IF Big Ben could hear his chimes reproduced by the new
General Radiophones he would indeed be a proud
timepiece.

General Radiophones are different. Their ready response
to signal intensity of only 1/1000 of an ampere is an
achievement which places them far above all competitors
for efficiency.

A new method of matching the earpieces by means of specially
invented visual gauges, and the incorporation of a carefully
designed sound box, ensures singular clarity and natural
reproduction.

General Radiophones are unrivalled for strength
and finish, and they weigh
only 7 ozs.

Ask your dealer for a
demonstration.

GENERAL RADIO COMPANY, LIMITED,

20/- per pair

In replying to Advertisers, please use Order Form enclosed.
experiences with high-tension batteries of good quality. This being so, the old rule that the high-tension battery should be the first part of the set to be blamed if noise occurs may no longer be such a sound one as it used to be. So long as the high-tension battery is of large size, and provided that proper care is taken not to overload it, it will last for a very long time and will give smooth, quiet working throughout its life. You cannot really know what your high-tension battery is being called upon to deliver unless you possess and use a milliammeter, which is an instrument that every wireless experimenter should possess. The most suitable kind is one which reads from 0 to 20 milliamperes. If it is wired into the set so that the whole of the current delivered by the high-tension battery passes through it, it enables you to see at once what you are asking the battery to do. If the load is excessive it should be cut down by applying a proper grid bias to the low-frequency valves. In most sets there is a large waste of high-tension current in the note magnifiers. The amount of grid bias can be increased in many cases without cutting down signal strength and without bringing the working point down to the lower bend of the characteristic curve.

The Transformers

Now if the high-tension battery is not responsible for the under-current of noise which occurs in a receiving set, to what component must we look in order to track it down? The fact that of the two sets referred to above that fitted with resistance capacity coupling was silent whilst the other was noisy shows that the transformers were to blame in this instance, and I believe that in most cases they are the culprits. A pretty good indication can be obtained in the way shown in Figs. 1A and B. If the set is at all noisy disconnect the plate of the rectifier (V2 in the diagrams) from the primary of the low-frequency transformer and place the telephones in circuit as shown in Fig. 1A. Now listen very carefully to see whether the same kind of noises can be heard. They will of course be much fainter if they are present, since there is now no note magnification, and it may require careful listening to detect them if they were already small in the first instance. To make quite sure that you can recognise the kind of noise replace the telephones for a few moments in their original position as in Fig. 1B. Then reconnect as in Fig. 1A. Should the noises be present when the note magnifier is cut out then they are probably due to the high-frequency transformer in place of the transformer.

Anode Resistances

But even resistance capacity amplification can be exceedingly noisy if components of the very best make are not used. Many types of cheap anode resistances are most unstable when in use. Their resistance is continually varying, with the result that current fluctuations and cracklings occur. The best method of testing anode resistances is that shown in Fig. 2, the method of putting in the note magnifiers temporarily out of circuit being again employed, or the set may be cleared of aerial and earth disconnected and the H.F. valve or valves switched off. Where two stages of resistance capacity are employed it may be only one resistance that is seriously at fault. The offender can be discovered by interchanging them. Noises will be at their worst when both stages of note magnification are used and the offender is placed between high-tension plus and the plate of the rectifier. It should be noted, by the way, that resistance capacity amplification may give rise to a good deal of trouble where a double circuit tuner is used unless the secondary is earthed. Failure to take this step may lead to the occurrence of actual bowing in the note magnifiers.

Transformer Interaction

The whole question of transformer interaction is an exceedingly difficult one. It used to be thought that if low-frequency transformers were placed a good distance apart with their cores at right angles interaction was most unlikely to occur. If it should happen it was held that earthing the cores of both transformers would put an end to the trouble. As a matter of fact experiments made recently have shown that interaction can take place at almost incredible distances, that it still persists even if the cores are at right angles, and that earthing them is by no means a complete cure. It has been found, too, that even metal-cased transformers interact strongly upon one another. I am rather inclined to believe that no set containing two low-frequency transformers can give an absolutely silent background. Recently I have been using the circuit shown in Fig. 3, which gives exceedingly good results. Here V1 is the high-frequency amplifier with tuned anode coupling. V2 is the rectifier coupled by means of a low-frequency transformer to the first note magnifier V3.
The NEW RADIAx REACTION UNIT

is instantly fitted to any panel.

The New H.F. Transformers and Tuned Anode Cells are the result of two years' concentrated experiment and experience on H.F. Valve Couplings. The proportions of primary and secondary provide a definite and effective Potential Step-up, which is often called for, but seldom obtained. Tuned with variable or fixed inductances and a perfect coupling, the reaction results use Anode Cells above 1000 metres. H.F. Transformers 9/6, 3/6, 1/6, 3/10, 1/10, 1/0, 6/6.

Tuned Anode Inductances some range and prices as Transformer.

For first stages H.F. use Radiax Transformers on first stage up to 1000 metres. Tuned Anode Cell over 500. Second and further stages Radiax Semi-Aperiodic Anode Cell advised. This gives a perfect system which does amplify and doesn't self oscillate. Prices 9d. each extra up to 1000 metres. 1/6 each extra over 1000 metres.

Make Your H.F. Valves Efficient.

The New Reaction Unit (Regd.) achieves a remarkable efficiency; with perfect control can be used on any transformer, but in conjunction with the RADIAx H.F. Transformers or Tuned Anode Cells it makes an average set into a "Supers" without the super's difficulties of control. Probably no other method will enable coupling so close to oscillation point without distortion or resonation. Height is instantly adjustable. With one-hole fixed perfect minus and guaranteed uniformity, suitable for 1000 metres, the price is 6d. Extra Anode Cells are non-interchangeable for 500-1000, 3/1, 1/6, 9d.

Tapped Anode Inductances.

Designed as part of our Regulated Reactance System, is a most convenient Tuned Anode unit for 500-1000 metres. It is perfectly made and calibrated, while its neat die-screw switch brings in the section one at a time. 25/-.

LISTS AND CATALOGUES.—Please send your system for 25/- for catalogue information. H.F. Couplings: (1) Radiax Reactance Units. (2) Radiax Reactance Units.

CONSTRUCTORS.

Please note that we can supply from stock, cabinets, panels, etc., for all lists as described in this journal and in other lists as published.

Send list for descriptive leaflets.

EXAMPLES.

FOUR-VALVE FAMILY

SIMPLEST / TUNED / LIVE

ALL CONCERT / TECHNO

OMNIPOLAR

ALL BRITAIN

Extra for cabinets and panels 1/- to 5/-

All cabinets are of seasoned walnut, handmade and polished. Prices are guaranteed electrically, made in specialist's workshop, accurately grained and cupro-nickel.

Our new 100 page List—an Encyclopedia of Information—sent on receipt of order.

"S. A. CUTTERS,"


Phone: Chancellor 802.

'RUTTER' Columbian Pine Masts

2,000 in use.

Designed by Naval Expert.

37 ft. Turret two complete 37 6

37 ft. Turret Super Mast 53 6

50 ft. in 3 sections 71 6

45 ft. Telescope Mast 84 6

45 ft. Double Telescope 85 19 6

55 ft. Super Mast 86 9 6

Light, neat and efficient. The telescopic sections enable the mast to be erected as a light and the sections at 5/- each.
Other Causes of Noisiness

There are many other causes of noisiness, some of which may take a good deal of tracking down, unless one can recognize the symptoms and has some idea of what to look for. One that frequently proves baffling is due to the accumulator itself. For some reason, a certain amount of chemical action always appears to occur between the container of a cellloid-case accumulator and the acid solution which forms the electrolyte. This may give rise to excessive gassing during dis-charge, a phenomenon which is practically absent where cases are made of glass. Even when the battery is standing on open circuit gassing frequently takes place and can be heard if the ear is placed close to it. If gassing is very bad bubbles are apt to form on the plates, setting up a fluctuating internal resistance, with the result that the temperature of the filaments is not quite constant and that cracking noises are heard. A pinch of Hubbard's soap, if not a complete remedy in such cases, is certainly a palliative. Dirty or loose connections to the low-tension battery may also be responsible for a good deal of noisiness. Great care should always be taken to see that the contact surfaces of the terminals of this battery are clean. In some makes of accumulator, connections between individual cells are made by means of lead strips fixed to terminals. Corrosion may take place in time at points where these strips are connected to the terminals, and if this is not attended to a certain amount of unwanted noise is most probably the result. Plug and socket connections from the low-tension battery to the set are becoming very popular. That they are most handy there can be no doubt.

Valves

One of the most mystifying sources of parasitic noises is sometimes to be found in the valves themselves, especially if they are of the kind which work with their filaments heated to a very high temperature. Some filaments begin to be responsible for cracklings as soon as the rheostat is set so that they are brightly illuminated. The only means of discovering whether a valve is noisy in this way is to make use of the process of substitution, trying other valves in the holder. It should be remembered that it is always bad practice to work valves very brightly.

Gridleaks and Anode Resistances

I referred a little way back to the cracklings due to badly made anode resistances which caused fluctuations in the plate current. Gridleaks may also offend in the same way, and if they are faulty, noisiness may be extremely bad. The worst of all types of gridleak is that which employs a graphite line made upon mica or elephant. These almost invariably become troublesome sooner or later in their career. Variable leaks and resistances are very widely used nowadays, and some of them are very badly made. Most of them have a screwed plunger which passes through a collar and compresses carbon pellets contained within a tube. Unless the plunger fits the collar very tightly the leak or resistance will be noisy in certain positions owing to the chance contact made. When buying a variable gridleak or anode resistance, always make sure that there is no play endways or sideways in the plunger; otherwise you are sure to experience trouble from noisiness.

MODERN WIRELESS

November, 1924

A timely word to the wise on Low Capacity Valve Holders

We hereby notify the public that they should insist upon getting the H.T.C. Valve Holder, which is not sold without drilling template bearing the name H.T.C. It is your protection against spurious imitations.

BRITISH and FOREIGN Patents are applied for and all steps necessary for the protection of the public, the trade and the patentees will be taken as occasion arises.

High technical opinions on the H.T.C. principle

Mr. John Scott-Taggart, F.Inst.P., A.M.I.E.E.: "The mid-spaced contacts on certain types of special valve holders are particularly suitable for high-frequency work. The ordinary arrangement where the contact pins are very close together and the sockets being frequently only a matter of 1/8th inch apart, is entirely unsuitable for high-frequency, or, in fact, for any other work."

Mr. Percy W. Harris: "Four-pin valves can be used in the original H.T.C. holder by using the low-capacity sockets. The ordinary socket will reduce the efficiency of the set considerably, and if it is desired to use four-pin valves, one of the many low-capacity valve sockets now available is strongly recommended."

If your local dealer cannot supply write direct to:

H.T.C. ELECTRICAL CO., LTD.
2 & 2a, BOUNDARIES ROAD, BALHAM, S.W.12.
Trade Enquiries Invited. TELEPHONE: Battersea 374

There is no reason why you should not expect better results than are obtained by working with the H.T.C. with the hope of securing better results. Externally made holder designed upon the H.T.C. principle by careful and restless inspection during their construction and the materials used preclude any possibility of manufacturing fault. The design of the H.T.C. is such that it operates efficiently in all circuits. They are especially designed to prevent any chance of the primary windings fault happening to high tension.
An L.F. Transformer: The U.S. Radio Co.'s 'Super'

A specimen of their "Super" L.F. inter-valve transformer has been submitted to us for test by the U.S. Radio Co., Ltd., a South London firm. This is a handsome, well-finished instrument of a familiar type, superficially, with large vertical coil and ample iron core. The design has evidently been carefully thought out: the bolts which hold together the frame and supporting feet do not pass through the laminations of the core, and really comfortably large and accessible terminals, clearly marked, are fitted on two ebonite terminal-strips at the top, soldering tags for more permanent connections being also provided.

The favourable impression given by a first inspection of this instrument was borne out in actual test. Measuring the signal voltage obtained across the 'phones with a certain uniform test signal, of an audio-frequency controllable between useful limits, the build-up recorded with this transformer compared very favourably with that obtained with other standard patterns under identical conditions; whilst the tone, in reception of broadcast music and speech, with ample H.T. and proper grid-bias in use, was comparable to that of the best of the others. Approximate quantitative comparison with

<table>
<thead>
<tr>
<th>Type of Valve</th>
<th>Filament Current Amp.</th>
<th>Filament Volts</th>
<th>Dry Battery To Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>D.E. 3</td>
<td>.06</td>
<td>2.5 to 3</td>
<td>No. 961 for 1 or 2 valves.</td>
</tr>
<tr>
<td>B. 5</td>
<td>.06</td>
<td>2.5 to 3</td>
<td>No. 960 for 2 or more valves not exceeding 0.3 amperes in total.</td>
</tr>
<tr>
<td>B. 6</td>
<td>.12</td>
<td>3</td>
<td>No. 948 or No. 884 sizes, one cell per valve.</td>
</tr>
<tr>
<td>D.F. Ora</td>
<td>.06</td>
<td>2 to 3</td>
<td>No. 940 or No. 948 for 1 or 2 valves.</td>
</tr>
<tr>
<td>A.R. .06</td>
<td>.06</td>
<td>2.5 to 3</td>
<td>No. 884 for 3 or 4 valves.</td>
</tr>
<tr>
<td>Wescovalve</td>
<td>.25</td>
<td>1.1</td>
<td>No. 960 for 1 valve.</td>
</tr>
<tr>
<td>Dextraudion</td>
<td>.1</td>
<td>1.0</td>
<td>3 No. 884 cells connected in series for 2 valves.</td>
</tr>
<tr>
<td>D.E.V.</td>
<td>.2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>D.E.Q.</td>
<td>.2</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

OBTAINABLE FROM ALL LEADING DEALERS.

SIEMENS BROTHERS & Co., Ltd., WOOLWICH, LONDON, S.E.18

In replying to advertisers, use COUPON
DO YOU RETUNE EVERY EVENING

While it is natural to expect to switch in without the necessity for retuning, experience knows that often elaborate retuning is a preliminary to an evening's broadcast. Think of the effect of an "inconstant" grid leak? one, say, affected by changes of temperature.

Temperature affects the resistance, which in turn controls the flow of electrons back to the filament. An incorrect grid leak resistance, incorrect from temperature alteration, may be of too low a value, permitting the off-grid to become too negative; or on the other hand the overcharge cannot escape through a resistance too high in value.

Constant in all temperatures is one vital characteristic of an efficient variable grid leak. First adjust resistance best for working conditions—then it's always set—"if it's a constant variable grid leak."

Watmel Wireless

IMPORTANT NOTICE to intending purchasers

The Watmel Wireless Co. wish to notify the trade and public that their Variable Grid Leak Patent Application No. 106699 was contested in the Registrar's Court, and an Appeal in both instances the Patent Grant was upheld and costs awarded.

It is the aim of this Company to protect its good customers' interests, and also its own interests by securing Patent protection for the novelties in its specialties, as it is these novelties, invented by experts and exhaustively tested, which are the Hall Mark of all Watmel Products.

All goods of our manufacture bear this mark: It is your only guarantee.

THE WATMEL WIRELESS CO.
332a, Goswell Road, London, E.C.1.

100% EFFICIENCY H.T. BATTERY. THE CONSTRUCTORS' IDEAL.

Amazing value, positively unexceeded. See "Apparatus tested." All Cells guaranteed. 12 cells, 11½ volts, 11½ ohms, 100% more capacity. Compare this standard cell on photo. Terminated and insulated. Cells, 4—12s., carriage extra. 60 cells type in polished Oak Case, as required. 12 s. carriage 1 3, All Cells replaceable. Last line. Sample Cells 6s. Room actual maker note, saving 50c. in lumber's goods.

MODERN WIRELESS

SIEMENS HEADPHONES AND LOUD SPEAKERS

BRING TO THE TOWN THE MUSIC OF THE COUNTRY AND TO THE COUNTRY THE MUSIC OF THE TOWN.

Prices:
120 ohms £1.2.6
2000 ohms £1.4.0
4000 ohms £1.5.0

Obtainable from all Dealers.

SIEMENS BROTHERS & CO. LTD.
WOOLWICH, LONDON, S.E.18.

Also manufacturers of WIRELESS RECEIVING SETS, BATTERIES, &c.

In replying to advertisers, use COUPON
You waste your money

by purchasing inferior components. The dingy, appointing and distorted results laboriously obtained prove this very quickly. You save money in the beginning and in the end by coming to us in the first place and being fitted by our knowledge, our reputation, and our Service. 

THE LEADING HOUSE IN LONDON FOR FIRST-CLASS APPARATUS AND COMPONENTS

We supply the complete set of components for any of the well-known circuits. Send for our knowledge, coming out reputation, and money in the beginning and in the end by coming to us in the first place and being fitted by our knowledge, our reputation, and our Service.

SPECIMEN LIST OF PARTS RECOMMENDED FOR TRANSATLANTIC

Bowyer Lowe Variatubo Condensers, No. 6
Dubler fixed condensers, No. 5
Bankbridge fixed condensers, 25

You only save money in the beginning and in the end by coming to us in the first place and being fitted by our knowledge, our reputation, and our Service.

GENT & CO., LTD—EST. 1872.

Manufacturing Electrical Engineers,
"FARADAY WORKS",
LEICESTER.

BROADCAST MESSAGE TO THE TRADE:

There are many so-called lightweights but none compare in weight, quality, and price with the—

PRICE: 12/6

Trade only Supplied

The HEADQUARTERS OF ALL WIRELESS ACCESSORIES, AND AT THE RIGHT PRICE & QUALITY.

Write for our Illustrated Catalogue, comprising a comprehensive list of all Wireless Accessories.

THE WHOLESALE FITTINGS CO., Ltd.
23, 25 and 27, COMMERCIAL ST., LONDON, E.I.

South London Depot: 65, NEWINGTON BUTTS, LONDON, S.E. 11
Manchester: 78-90, High Street.

BRISTOL: 14, North Street, Stokes Croft.
transformers of known flat characteristics did not bring out any noticeable resonance phenomena. The ratio is stated to be 5 to 1: measurement of the D.C. resistance of the windings showed that this is not merely the resistance ratio. The insulation resistance appeared to be satisfactory. The present instrument, if the high quality of the specimen submitted is an indication, can be heartily recommended, and indicates the vast strides that have been made recently in the design of really effective transformers for.L.F. amplification.

Mullard Safety Discs

Messrs. Mullard Radio Valve Co., Ltd., have drawn our attention to a neat little device, the Mullard Safety Disc, which by guarding against accidental short-circuits whilst inserting valves in their sockets will materially lengthen the average effective life of valves used in experimental work. This is a small disc of coloured felt, adapted to be stuck down on the top of an ordinary solid valve-holder, with four small holes in it corresponding to the valve leg sockets. It is evident that this insulating material effectively safeguards the filament against accidental connection in the high tension battery circuit, as no metallic contact can be established until the legs are properly oriented with reference to the sockets.

"Dualstat" Filament Resistance

A filament resistance, for use with a single bright emitter valve, with a coarse and a fine adjustment incorporated in the single instrument, has been submitted by Messrs. The Northcote Motor Co., Ltd. In this the resistance spiral is wound on an insulating tube which itself slides within another, and is controlled by the usual spindle and knob. The outer tube is mounted behind the panel by a one-hole-fixing device of the usual pattern. The instrument is about 2 in. long and ¾ in. diameter. Two small terminals are provided on the exterior of the outer tube, the one making connection with some point on the internal resistance spiral by means of a contact-spring. Coarse adjustment of resistance is made by simply withdrawing the knob from the "off" position (i.e. right home) to a suitable distance; the fine adjustment is then obtained by rotating the knob, thus enabling an adjustment of a fraction of a single turn of the resistance wire to be made.

On test the maximum resistance was found to be of the order of one ohm only, which is totally inadequate where a six-volt accumulator is used with any valve that is modest in its requirements as to L.F. supply and voltage. On practical trial it was found easy to obtain a fine adjustment of the detector-valve filament temperature, e.g. when using a valve rated at 3.5 volts with a four-volt accumulator. Owing to its low resistance we cannot recommend this rheostat to our readers. The name also appears rather misleading.

Fixed Condenser Labels

Troubles with the ordinary type of fixed condenser mounted in a wax-filled moulded case, such as the uncertainty as to its nominal capacity on account of the precarious or illegible labelling, is permanently dispelled in a type samples of which have been submitted for our inspection by Messrs. Shermays, Ltd., and which we understand form the subject of applications for Patents and Registered Designs. In these a small white label with clear block figuring is let in actually in the top of the condenser case, so that it cannot be lost or effaced, and figures are easily read. On the samples submitted the labels were certainly very clear and legible, and afforded no excuse for supplying a .001 uF fixed condenser for a .001 uF, which has been known to occur. The method, we gather, is available for condenser manufacturers.

Cosmos Strip Coils

A set of eight plug-in coils, in which the "Cosmos" strip (composed of a number of wires embedded in prepared paper) is used, has been submitted by Messrs. Metro-Vick Supplies, Ltd., in conjunction with the short-wave coil already reported upon in our columns. The lower numbers are uniform in appearance with the latter, being 3½ in. diameter by 3 in. thick, whilst the higher numbers are 4½ in. diameter with the same thickness. The coils are entirely
enclosed, and have the usual plug-and-socket fitting. They are labelled with their inductance values in micro-henries, though they are listed under the ordinary numbers 35, 40, 50, 75, 100, 125, 200, and 300, corresponding approximately to those numbers of turns in the usual type of coil.

On trial with .0003 μF aerial capacity and a variable tuning condenser of .003 μF (actual) capacity these coils were used to cover the range from 300 to 3,000 metres with ample overlap; and in every case a suitable reaction-coil could be chosen to give steady oscillation at will. The magnetic coupling is not great until the coils are brought quite close; these make good surfaces for any ordinary purpose, and adjustment of coupling can be conveniently obtained by sliding one coil across the face of the other.

Suitable reaction control was afforded by these coils; thus with a single 06 valve and 50 volts H.T., using Nos. 33 and 75 coils, on an ordinary 70-ft. single-wire aerial (not particularly high, but well situated in a quiet corner of Essex), late at night there came in at comfortable 'phone strength, in addition to the four main B.B.C. stations in their range and Petit Parisien, no fewer than five of the B.B.C. relay stations in turn. 3XX came in on the Nos. 150 and 200 at moderate loud-speaker strength on the single valve (about 35 miles away); Radio-Paris at good 'phone strength, but with severe interference from Chessington. 2LO (also at about 35 miles) was audible many feet away from the 'phone. On the Nos. 50 and 75 several foreign stations were read on the single valve, Madrid being, however, badly heterodyned by a German station.

As a secondary, or as tuned-amplifying coils, the Nos. 50 and 75 covered comfortably the range from 300 to 600 metres with a .00025 μF tuning condenser. We found the tuning sharp, and selectivity accordingly above the average, and have no hesitation in recommending these strip inductance-coils for general use.

Together with the made-up coils, samples were sent us of the paper strip used, with the number of fine copper wires embedded in parallel in its length. This is provided for those who desire to make up their own coils, the strip being wound in spiral form and the wires then joined up in series or parallel in any desired formation. This is thus possible to make up coils of remarkably low H.F. resistance and distributed capacity, whilst the dielectric losses appear to be much less than one might be tempted to expect with this prepared paper dielectric.

A New Wander-Plug.

A neat type of wander-plug which provides for easy attachment of the connecting wire, and certain electrical connections throughout, has been submitted for our inspection and trial by Messrs. A. H. Hunt, Ltd. The first is made by nipping a bare end of the wire between the conical end of the brass plug fitting and an internal cone in the insulating handle, the wire coming out at the end of the latter; whilst a split end to the lower portion of the plug gives secure electrical contact in the battery connecting sockets.

Wire-bending Pliers

The present fashion for wrist with stout bare tinned wire, with all angles bent exactly at right angles, has inspired, apparently, the design of a special tool for making those right-angle bends on which the aesthetic appearance of the finished result so largely depends. A bending pliers, a sample of which has been sent us by V.R. Pleasance. This tool is similar to an ordinary pair of small pliers, and is 3 1/2 inches long; but instead of the ordinary type of square or wire-cutting jaws, it has jaws formed in V-shape, so that when closed on a wire the latter is forced into a sharp right-angled bend. On trial, both with No. 16 bare wire and with the substantial square wire often used, a sharp bend was readily formed, a little trouble being necessary to ensure that the legs of the bend remained straight during the operation.

Valve Marker

An extremely practical device for the use of the amateur constructor who experiences trouble in marking out the valve-leg holes in his panel is a valve marker submitted for our inspection by V.R. Pleasance.

This tool carries, on the end of a convenient wooden handle, a metal disc from which project four substantial sharp spikes, spaced in the correct manner to correspond to the usual valve-leg spacing. By placing this against the panel and giving a smart blow to the handle, the sharp points mark the panel after the manner of a centre punch, so that the drilling operation can be taken in hand without centre punching. Practical trial on an experimental panel brought out the convenience and saving of time.
The plate suspended from the ceiling acts as the aerial.

The "All-Wave Receiver"

To the Editor of Modern Wireless,

Sir,—It will no doubt interest you to know the results I have had with your "All-Wave Receiver," as described in your February issue of this year.

I have made it up on an ebonite panel, Paragon, and have mounted it in a sloping mahogany cabinet, its appearance being all that can be desired. There are several small alterations I have made, there being extra H.T. leads for each valve and a second fixed coil-holder mounted on the panel. I have also added a "vernier" across the anode T.C.

The extra coil-holder enables me to use tuned anode coupling with reaction on the anode, which I find easier to handle than having the aerial and anode coils reacting.

With this circuit I have received all the main British stations except Cardiff on the L.S., a small Claritone, this during the summer holidays before the wintertime came. Added to this I have had all the French stations, Brussels and Madrid on the L.S. 2ZY, Liverpool and Birmingham are very loud; 5XX comes in fairly well on the L.S. Radiola about the same; Belfast comes in as well as 2LO.

On the "phones" I have had very many amateurs from all parts using two valves, H.F. and Det.

The set is very selective. I am able to get London and Manchester with little interference from the one not wanted, and the terminal arrangement enables many circuits to be tried.

However, the most extraordinary part is the entire absence of distortion, although the transformer is of unknown make purchased eighteen months ago, when I had had little experience. In spite of its performance, I should never risk buying anything but the best again.

I might add that I have enjoyed all the issues of both your excellent papers and am looking forward to the new monthly.

Thanking you for the excellent set.—Yours truly, H. B. Taylor.

Knutsford, Cheshire.

The "Tri-Cell" Reflex Receiver

To the Editor of Modern Wireless,

Sir,—I have just finished making a Tri-cell Reflex set as described by Mr. Harris in the September number of Modern Wireless; and as you ask for reports on results obtained, I am writing to say that in my opinion it is the most satisfactory reflex circuit yet evolved. I find it remarkably selective and have no difficulty in tuning in all the B.B.C. stations. I have heard Madrid on it and also a number of other Continental stations which I have not yet identified. Glasgow and Newcastle come in at almost the same strength as London, whilst Chelmsford is too loud for the telephones and has to be turned down. I am using a "voco-valve" with two dry cells in parallel.

Thanking you for so excellent a circuit.—Yours truly,

Michael C. W. Thomas.

Broadstairs.

MODERN WIRELESS

(Continued from page 646.)

the valves to be seen and changed when necessary. Above this, and still flush with the frame, is an ebonite panel carrying the control switches, and a distributing block to enable loud-speaker or headphones to be plugged in when required. With the exception of the loud-speaker, which can be in any convenient place, this is the only part of the outfit visible in the room.

On the other side the receiver box projects into the cupboard and the batteries are placed on the shelf immediately below, where they are easily accessible. On the shelf above is placed a two-stage L.F. amplifier with its H.T. batteries.

For the aerial and earth system two tin plates are used each 36 in. by 22 in.; one is suspended from the ceiling from insulated hooks and one is placed on the floor and covered with a mat. The aerial circuit is tuned with a .0005 F condenser and an inductance consisting of a basket coil of 70 turns of No. 18 d.c.c. wire. The inductance value was found by trial and the condenser adjustment subsequently fixed with sealing wax. The receiver used is a Marconiphone six-valve H.F. panel, transformer coupled, with no reaction and rather flat tuning. The low-frequency amplifier is a Marconophone N.B. 2. The volume obtainable is such that signals can be heard loudly and clearly 100 ft. away in the garden when the room door is open. The two first switches are to cut out the L.F. amplifier if desired. The third switch lights the filament to the L.F. valves, while the torsenstat knob controls the current supply to the H.F. valves. The photographs clearly show the aerial and earth system, and how the apparatus is disposed. Obviously any form of receiver could be used, and an outside aerial would, of course, simplify the apparatus necessary, but in my case I wanted to free that aerial for other purposes.
Another Refinement

-added to the "Fulstop" Condenser. The new registered stator vane of the "Fulstop" Condenser reduces the minimum capacity limit to an extremely low point because its shape eliminates all parallel lines as the moving plates rotate. This assists materially the possibilities of fine tuning.

This innovation is another proof that we leave no stone unturned to improve still further what is already the finest variable condenser in the world.

Read what "Modern Wireless" says:

"We can strongly recommend this type of geared condenser for careful tuning and for use in situations where small capacity effects are troublesome." - October, 1924.

PRICES:

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>.001</td>
<td>.13/6</td>
</tr>
<tr>
<td>.0003</td>
<td>.10/3</td>
</tr>
<tr>
<td>.0005</td>
<td>.11/3</td>
</tr>
<tr>
<td>.0002</td>
<td>.9/6</td>
</tr>
</tbody>
</table>

Protected throughout the world.

Stocked by most Wireless Dealers, but if you have any difficulty write to:

J. H. NAYLOR, Ltd., THE WIEND, WIGAN.

CLIX Popularity —the Secret!

Solder all connections! Where you can’t-use CLIX

You can’t have efficiency in Radio anywhere unless you have efficient contact everywhere.

You can’t solder everywhere—but you can use CLIX.

By virtue of the tapered plug-socket design CLIX ensures perfect contact—an obvious improvement on various forms of split-pin plugs, which, however accurately machined, can only provide a "two-point" contact. Think it out!

CLIX may be wired at points A, B, C, D, or E. F affords an ideal point for soldering when permanent connections are required.

Retail Prices —

| CLIX with Locknut 3d.  |
| CLIX Insulators  |
| (6 colours) 1d. each |
| CLIX Bushes  |
| (6 colours) 1d. pair |

The With

Electro-Link 159 Uses.

Obtainable from all Wireless Dealers or direct from the Patentees and Manufacturers:

AUTOVEYORS LIMITED

Radio Engineers and Contractors,
84, VICTORIA ST., LONDON, S.W.1
What Others Say

"Amateur Wireless," August 16
"Simplicity has been the keynote of the C.A.V Loud Speaker—even when the Loud Speaker is reproducing broadcast with sufficient volume to fill a large hall, there is no trace of mechanical noise, the notes being perfectly mellow."

"Broadcast." September, 1924
"Under the test, and a very severe test, we have given the Loud Speaker, it came out with flying colours. Specially recommended."

"Popular Wireless," August 2nd
"The workmanship is solid and sound—no displeasing distortion was noticeable. We can recommend this Loud Speaker to our readers."

"Wireless and Allied Trades Review"
"Takes its place in the front rank of really good loud speakers and is, if we may suggest anything, a decided advance on many of the instruments we have come across to date."

What more do you want?

WRITE FOR A COPY OF THE
C.A.V LOUD SPEAKER FOLDER

MORE GUARANTEED COMPONENTS
Besides the selection shown in our HALF-PAGE advertisement on Page 680, we introduce to you the following:

<table>
<thead>
<tr>
<th>COMPONENTS</th>
<th>Plain</th>
<th>Vernier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacities</td>
<td>0.001</td>
<td>0.005</td>
</tr>
<tr>
<td>Grid Leak &amp; Condenser, Mounted</td>
<td>0.009</td>
<td>0.013</td>
</tr>
<tr>
<td>Grid Leak &amp; Clips (Ample Resistance)</td>
<td>0.030</td>
<td>0.035</td>
</tr>
<tr>
<td>Reversine Coil Holder (3 coil)</td>
<td>0.045</td>
<td>0.050</td>
</tr>
<tr>
<td>Reversine Coil Holder (3 coil)</td>
<td>0.060</td>
<td>0.065</td>
</tr>
<tr>
<td>Coil Mounts. For Panel Mounting, with terminals</td>
<td>0.075</td>
<td>0.080</td>
</tr>
<tr>
<td>Potentiometer, Mounted on ebonite base, with Points</td>
<td>0.090</td>
<td>0.100</td>
</tr>
<tr>
<td>Filament Resistance Adapter (plug-in type)</td>
<td>0.110</td>
<td>0.120</td>
</tr>
<tr>
<td>Plugs &amp; Sockets in 3-coloured ebonite</td>
<td>0.140</td>
<td>0.150</td>
</tr>
<tr>
<td>Crystal. Most excellent, long life, sensitive</td>
<td>0.170</td>
<td>0.180</td>
</tr>
</tbody>
</table>

Radio Press Books
- keep them for reference and get better results

There's a Radio Press Book for every Wireless need
consult your book-seller

L. M. MICHAEL LTD WIRELESS ENGINEERS
IN CONJUNCTION WITH B. HESKETH LTD
RADIO CORNER, 179, STRAND, LONDON, W.C.2

In replying to Advertisers, please use Order Form enclosed.

Barclays 159

G. T. 870.

www.americanradiohistory.com
A SELECTION OF FOUR ITEMS FROM
THE "COSMOS" RADIO CATALOGUE AND HANDBOOK D.S. (7117/1 SEPTEMBER 1924)—PRICE 6d.

A

"COSMOS" UNIVERSAL TWO-VALVE SET.

D E S I G N E D for reception from both British and Continental Broadcasting Stations on wavelengths from 300 to 3,000 metres, Reaction on to the anode or aerial circuit is changed at will by the movement of one lever—a feature exclusive to "Cosmos" Sets. Illustration shows the receiver in simple hardwood case.

METRO-VICK SUPPLIES, LTD.
(Proprietors: Metropolitan-Vickers Electrical Company, Limited),

B

"COSMOS" DISTORTIONLESS NOTE AMPLIFIER

T H R E E stages of L.F. Amplification, embodying resistance-coupling and giving far better and purer reproduction than is possible with amplifiers using iron-cored transformers. This amplifier is used in standard "Cosmos" Valve Sets, V.S. 6 and V.S. 7.

METRO-VICK SUPPLIES, LTD.
(Proprietors: Metropolitan-Vickers Electrical Company, Limited),

C

"COSMOS" UNIVERSAL TWO-VALVE CABINET SET.

H A N D S O M E Cabinet Set in Oak, embodying the two-valve receiver unit, described above (A). Provision is made in the design of these Cabinets for adding when required, the three-valve note amplifier (B), thus converting the Set into a 5-valve Set for receiving from British and Continental Stations at loudspeaker strength.

METRO-VICK SUPPLIES, LTD.
(Proprietors: Metropolitan-Vickers Electrical Company, Limited),

D

"COSMOS" UNIVERSAL FIVE-VALVE SET.

K N O W N IN both the two-valve receiver unit (A) and the three-valve note amplifier unit (B), this set comprises one stage of H.F. Detection and four stages of L.F. Amplification. It is a very convenient set for armchair listeners, as the height of the table is just right to enable adjustment of controls to be made while sitting in the chair, and it is capable of receiving at L.S. strength both British and Continental Broadcasting.

METRO-VICK SUPPLIES, LTD.
(Proprietors: Metropolitan-Vickers Electrical Company, Limited),

THE "COSMOS" CATALOGUE AND HANDBOOK OUGHT TO BE IN YOUR POSSESSION. OBTAIN A COPY TO-DAY FROM YOUR DEALER.

In replying to Advertisers, please use Order Form enclosed.
"Exide" Batteries enable you to get the very best results from your set, because they maintain uniform current over a long period of discharge.

Made up in 2-volt, 4-volt, and 6-volt units, there is an "Exide" available for every type of valve.

The prices are low and there is no better battery made.

Use an "Exide" with your set this autumn and secure clearness in reception.

BUILT BY THE LARGEST BATTERY WORKS IN THE BRITISH EMPIRE.

"Exide" Batteries can be obtained from your usual dealer, or the nearest "Exide" Service Station.

Look for this sign

450 Service Agents.
Depots at Birmingham, Bristol and Manchester.

Manufactured by—

THE CHLORIDE ELECTRICAL STORAGE COMPANY LIMITED.

at CLIFTON JUNCTION, Nr. MANCHESTER,
London Depot:
219/229, Shaftesbury Avenue, W.C.2.

In replying to Advertisers, please use Order Form enclosed.
If you remember

Jones’s extraordinarily caustic remarks concerning Loud Speakers, you will be surprised at the calm serenity which reigns throughout his household since the advent of the “Sparta.” Judging by his obvious eagerness to display it, he is thoroughly proud of this excellent Speaker. In fact, his persistent desire to make you “listen just a minute” is only equalled by that of the fond parent possessed of a precocious but misguided child nearly able to recite “The Loss of the Royal George.” Yet even his severest critics are unanimously agreed that his claims for sustained volume are decidedly upheld by the “Sparta”; whilst the younger generation are thoroughly appreciative of the Savoy Dance music and vote the clarity and purity of reproduction to be first-rate.

If you think Loud Speakers must necessarily distort, hear the “Sparta” demonstrated—you will quickly realise why Jones is so enthusiastic. All good dealers stock the “Sparta.”

The AMPLIFYTONE AERIAL

is used by experts because they know how much signal strength is lost by the usual wire aerial.

HUNDREDS OF TESTIMONIALS.

One User writes:—“I have replaced a 7/22 wire aerial by the Amplifytone I got from you, to my complete satisfaction, both in volume and tone. The improvement is very marked.”—D. Ireland, Glasgow.

The Amplifytone Aerial is made from the highest grade Electrolytic Silicon Bronze (100 feet) 2½ times stronger than copper) in tape form—it won’t corrode. Packed in boxes, including the patent lead-in clips and insulators. Ask your Dealers, or 6/6 post free from United Manufacturers and Agency, Ltd., 45, Horseferry Rd., London, S.W.1.

NO MORE CATWHISKERS

NO MORE ADJUSTMENTS

A Permanent Detector which cannot go wrong

EASILY ATTACHED TO ANY SET

Wireless is so recent that progress is bound to be rapid. There are sure to be, from time to time, some really astonishing discoveries all in the direction of simplifying wireless and its application to everyday life.

We must not be surprised at anything which the army of wireless research enthusiasts produce.

Such a discovery is the wonderful New Crystal Valve which abolishes Catwhiskers and other delicate adjustments.

Here is a rectifier which produces good results, however crude it may be adjusted. Just a turn of a milled screw and there you are.

The “Hovimo” Crystal Valve must not be confused with the ordinary “Permanent” Detector, neither is it to be compared with the Silicon-borne and other similar combinations.

“HOVIMO” CRYSTAL VALVE

is an entirely new invention. Can be simply adjusted to suit the individual set, and once right, always right. It is equally excellent for crystal sets and for circuits employing crystal rectification, as well as for crystal loud speaker systems. Always producing a remarkably pure tone. Ask your dealer for it, or in case of difficulty write direct to M. MOLBACK, 27, High Holborn, London, W.C.1

Send today for List showing our廣elected “Hovimo” Components.

Fuller’s United Electric Works, Ltd., Woodland Works, Chadwell Heath, Essex

London Office: 9b, High Street, W.C.2

Telephone: “Fuller, Chadwell Heath.”

In replying to Advertisers, please use Order Form enclosed.
The search for hidden treasure was formerly one of the recognised methods of acquiring wealth.

Unfortunately most of the treasure has now been found, so we have got to fall back on the adage "A penny saved is a penny gained," and amass our treasure by not spending it.

The two chief sources of expense in Wireless are the recharging of accumulators and the replacement of valves. The Louden Valve reduces these to such an extent that, reckoned by the money it saves, it is a fortune in itself.

To begin with, the Louden Valve costs only 10/-. It takes only 0.4 ampere in the filament, enabling your accumulators to last twice as long on one charge as with the ordinary bright filament valve taking 0.75 amp. You have, in fact, very nearly the advantage of a dull emitter valve at a cost of 10/-. It gives its maximum volume at about 4.9 volts on the filament. Increasing the brilliance of the filament beyond this point causes a slight drop in the volume. Thus there is no temptation to run the valve "all out" and a long life results.

Finally the filament enjoys great length of life because the harmful charges which otherwise would continuously bombard it are forced through the spiral anode out of harm's way.

All these advantages are yours when you buy a 10/- Louden Valve, and this takes no account of the Silver Clear reproduction which alone makes the Louden Valve worth twice what is asked for it.

Buy Louden Valves for your Set to-day and prove the matter for yourself.

---

The Plain Louden for Detecting and Low Frequency Amplifying.

Filament Volts . . . . . 4.8-5
Filament Amps . . . . . 0.4
Anode Volts . . . . . 40-60

The Blue Louden for H.F. Amplification.

All Loudens are silver-clear and free from mush. The current consumption is low and the life long.
Radio is essentially a progressive hobby. Half the attraction lies in the advancement from the chrysalis stage of the Crystal Receiver to a "Five-Valver" or even a full-blown transmitter. Yet your ultimate success depends upon the books which guide your steps along the path of wireless progress. You cannot do better than put your trust in Wireless Press publications. With their aid it is a simple matter for you to obtain a complete knowledge of the subject from A to Z.

- "Radio Experimenters' Handbook." Two Parts. 3/6 each. Postage 3d. each.
- "Wireless Valve Transmitters: The Construction of Small Power Apparatus." By W. James. 9/-. Postage 9d.

The Wireless Press are the pioneers of authoritative wireless literature, catering for every possible need.

THE WIRELESS PRESS, LIMITED,

In replying to Advertisers, please use Order Form enclosed.
November, 1924

MODERN WIRELESS

From the tiniest nut to the finished Loud Speaker

THE non-technical visitor to the works of S. G. Brown, Ltd., will be amazed at the large number of processes and the magnitude of the equipment necessary to produce Brown Loud Speakers and Headphones.

To many, a pair of headphones consists merely of a couple of coils in each ear-piece, together with a circular magnet and a diaphragm. But even the simplest type of Brown headphones—the famous featherweight F. Type—manufactured under ideal conditions and you will appreciate that parts ground to 1/1000 part of an inch must obviously give infinitely better results.

And it is the same with Brown Loud Speakers.

Not only have their design—based on the world-famous A. Type Headphones—been proved superior for sensitiveness and tonal purity—but their success is due in no small degree to the wonderful accuracy of the many manufacturing processes.

Remember that your Loud Speaker should be an investment—the few shillings necessary to obtain a Brown will be more than repaid to you by the increased enjoyment of hearing really true-to-life reproduction and by the knowledge that you own an instrument capable of giving you many years of service.


For replying to Advertisers, please use Order Form enclosed.
A cheap Panel—
may be the most expensive
part of your Receiving Set.

NOT everything masquerading as ebonite is worth using as a panel—in fact, it is difficult to conceive a greater test for any insulation material than to use it in a Wireless Set. The extremely weak impulses received upon your aerial, when conveyed to your Set, so readily leak away that the greatest care must be taken to preserve them if you are going to receive any signals at all. That is why a cheap panel can be easily proved to be a waste of time and money. Radion is sold in black and mahogany—a beautiful colour, very similar to old mahogany—with dials and knobs to match. It is packed in stout envelopes in the convenient sizes shown below.

Radion is the highest grade of insulation in the world, and has been specially developed for wireless use. Its highly-polished surface, which need not be removed before use, enhances the appearance of the finished instrument and prevents the formation of dust.

Radion is sold in black and mahoganite—a beautiful colour, very similar to old mahogany—with dials and knobs to match. It is packed in stout envelopes in the convenient sizes shown below.

For your next set choose Radion—every panel is stamped—then you can be certain that it will look better and work better.

<table>
<thead>
<tr>
<th>Size</th>
<th>Black</th>
<th>Maho-</th>
<th>Size</th>
<th>Black</th>
<th>Maho-</th>
<th>Size</th>
<th>Black</th>
</tr>
</thead>
<tbody>
<tr>
<td>x4</td>
<td>5/-</td>
<td>7/-</td>
<td>x7</td>
<td>7/-</td>
<td>5/-</td>
<td>x10</td>
<td>15/-</td>
</tr>
<tr>
<td>7/-</td>
<td>12/-</td>
<td>10/-</td>
<td>10/-</td>
<td>13/-</td>
<td>12/-</td>
<td>12/-</td>
<td>12/-</td>
</tr>
<tr>
<td>12/-</td>
<td>15/-</td>
<td>13/-</td>
<td>15/-</td>
<td>15/-</td>
<td>15/-</td>
<td>15/-</td>
<td>15/-</td>
</tr>
</tbody>
</table>

Special Note—All 1/8" thick—quite sufficient owing to Radion’s tremendous strength.

FROM ALL DEALERS.

AMERICAN HARD RUBBER CO. (BRITAIN), LTD.
AN APOLOGY.

We tender our sincere apologies to those unfortunate wireless enthusiasts who have been unable to obtain supplies of our "Efficiency" inductances. The enormous demand which has arisen for these inductances has taxed our manufacturing facilities to the utmost. We have now, however, made arrangements for coping with the rapidly increasing demand and can confidently say that in future no wireless set need be out of date through the lack of "Efficiency" inductances. The term "out-of-date" may sound rather a sweeping statement, but any user of these inductances will tell you that this set is years ahead of those fitted with the old-fashioned type of coil.

FIT "EFFICIENCIES" AND BE UP-TO-DATE.

GAMBRELL BROS., LTD.
76, VICTORIA STREET, LONDON, S.W.1.
Works: MERTON ROAD, SOUTHFIELDS, S.W.18.
Phones: VICTORIA 9938; PUTNEY 3641-2.
West End Agent: J. V. Mulholland, 4, Blenheim St., New Bond St., W.1.
Mavilair 2892.

LISTOLEON VARIABLE CONDENSER

The LISTOLEON Variable Condenser is always picked out from its competitors (at whatever price) as being the best in appearance and accuracy.

A Variable Condenser is about the only item in the wireless trade in which appearance is so vitally important. The reason is obvious to the discriminating buyer, because good appearance means accurate and close spacing of the vanes, clean cut stampings and absolutely dead accurate spacing washers.

The LISTOLEON Variable Condenser excels in these features and the nickel-plated finish of all brass parts greatly enhances its good selling points.

An examination of the prices below will show you at a glance that the LISTOLEON Variable Condenser is beyond competition.

<table>
<thead>
<tr>
<th>Capacity</th>
<th>.001</th>
<th>.00078</th>
<th>.0006</th>
<th>.0005</th>
<th>.00009</th>
<th>.00007</th>
<th>.00006</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>With vernier</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

RADIOPHONES LTD
SAVOY STREET, STRAND, LONDON, W.C.2
Telephone: Regent 6692.
“Radpholim, Rand, London.”

ADVICE TO THE HOME CONSTRUCTOR

WHY BUY EBONITE?

It is expensive and its surface deteriorates under the action of light.

Ask your dealer for TROLITE

Trolite is backed by a National Physical Laboratory Certificate showing highest insulation resistance and dielectric strength combined with a low-power factor.

TROLITE FOR PANELS AND MOULDED PARTS has the following advantages over EBONITE —

1. It is cheaper.
2. It does not discolour or lose its surface insulation under the influence of light.
3. It can be supplied with a brilliant polish free from surface leakage.
4. It is soluble in acetone, and this substance can be used as an adhesive. A joint made with acetone is as strong as the material itself. Trolite components can thus be fixed to a Trolite Panel without screws.
5. It can be supplied in various colours and fancy designs.

F. A. HUGHES & CO., LTD.
204-206, Great Portland Street, London, W.1
Established 1868.

Telephone: Museum 859-0 (2 lines.)
Telegram: “Distancing, Wode, London.”

In replying to advertisers, please use Order Form enclosed.
"UTILITY" VARIABLE SQUARE LAW CONDENSERS

The "UTILITY" NO-CAPACITY SWITCH, as used in the constructional articles appearing in this journal, specially designed by electrical engineers to reduce the electrostatic capacity, this switch has proved to be exceptionally reliable in action and has self-cleaning contacts.

Size  Knob  Type  Price
1 Pole Change over. WM120 1 3/6
2  " " WM120/2 4
3  " " WM120/3 6
4  " " WM120/4 7
5  " " WM120/5 8
6  " " WM120/6 8

Size  Lever  Price
1 Pole Change over. WM147 1 4/6
2  " " WM147/2 6
3  " " WM147/3 6
4  " " WM147/4 7
5  " " WM147/5 7
6  " " WM147/6 8

W.M. 124

NO-CAPACITY SWITCHES

Manufactured by WILKINS & WRIGHT LIMITED, UTILITY Works, Kenyon Street, Birmingham.

In replying to Advertisers, please use Order Form enclosed.

WHOLESALE ONLY.

WIRELESS DEALERS—Our new 68-page Trade List of Radio Parts now ready, showing Trade and Retail Prices. It is yours for the asking.

Authorised Factors of ALL N.A.R.M. Specialities

Complete Sets, Accessories and Component Parts.

We were one of the very first Wholesale Factors of "Wireless," and our new Catalogue is the very latest thing in Wireless.

THE LARGEST TRADE RADIO LIST EVER ISSUED.

Staggering Prices. Huge Stocks. Get To Know Us—It Will Pay You.

Ask for our "CAPITOL" SPEAKER (Retail Price £1 : 12 : 6)

Buy from an Established House. IMPORTANT—Trade only Supplied.

HOBDAY BROS., LTD.
(Dept. D),
21, 23, 25 & 27, Gt. Eastern Street,
LONDON, E.C.2.

Phone: Cerkenwell 2800 (6 lines).

The New G.P.
The Economical Bright Emitter

This Valve has been designed as an all-round receiving valve and is suitable for detection and also for both H.F. and L.F. amplification. While economical from the point of view of current consumption, it compares favourably with most other makes, is free from microphonic noises and has an amplification factor of about 9 to 1.

Anode Voltage ... 30-80 Volts.
Filament Voltage .... 3.6-4 Volts.
Normal Filament Current .45 Amps.
Diameter of Bulb ... 15 m.m.
Overall Length .... 115 m.m.
Standard 4-pin cap.
Orange-tinted bulb.

In case of difficulty and doubt.

MANUFACTURED ONLY BY

RADIONS, LTD.
BOLLINGTON, Nr. Macclesfield.

MODERN WIRELESS

"GÖLTONE" (Regd.) WIRELESS RECEIVING SETS
British Made.

Elegant appearance. Highly selective. Simplicity in Tuning. Designed for receiving on any Wavelength. The Two-Valve Set clearly receives British Broadcasting and Continental Stations, and for Loud-Speaker Reception the Three, Four- and Five-Valve Sets have proved entirely satisfactory in all parts of the Kingdom. Polished Cabinet. Ebonite panel, fitted with Valve Holders, Filament Resistances, Condensers for Tuning Aerial and Anode Circuits, Knob Switch for High and Low Tension Circuits, etc. Provided with Plug-in Coils to receive all the British Broadcasting Stations. Plug-in Coils to receive Paris, Berlin and other high wave stations are interchangeable and can be supplied.

Both the Low Tension and High Tension Batteries can be fitted inside the Cabinet, and the only wires on view are the aerial and earth.

TWO-VALVE CABINET, £7-10-0. Marconi Patent Royalties, 2/-
THREE-VALVE CABINET, £10-10-0. Marconi Patent Royalties, 3/-
FOUR-VALVE CABINET, £13-10-0. Marconi Patent Royalties, 5/-
FIVE-VALVE CABINET, £16-18-0. Marconi Patent Royalties, 6/-

See Catalogue for full details, together with particulars and prices of above Sets for "Home Construction."

CRYSTAL DETECTORS

Improved type dustproof Detectors, mounted on Ebonite Base. Fitted with Glass Dust Shield. Price 1/6 each. Partly for Pawdering Price 1/9 each. Vertical or horizontal types supplied.

Large fully illustrated Radio Catalogue, No. R/110, showing a wide range of complete Receiving sets and Radio Components, post free, on request. Fancy Business Card for Trade Terms.

W. & G. "EASIFIX" RADIO. High and Low Tension Assembly.

OF THE "POWQUIP" TRANSFORMER

EVERY POWQUIP TRANSFORMER IS ACTUALLY TESTED ON AERIAL AND IS THE RESULT OF YEARS OF SCIENTIFIC RESEARCH WORK.

The POWER EQUIPMENT Co., Ltd.,

LEEDS—Messrs. Ellison & Holman, 123, Albion Street.
MANCHESTER—Messrs. Richard Davis & Sons, 51, Berry Street.
BRISTOL—Messrs. The Shaw Electrical Co., 13, Temple Street.
BIRMINGHAM—Messrs. E. A. Wood, Aston Road.
AUSTRALIA (New South Wales and Queensland)—Messrs. Keith Stables, Montrose House, 27-29, King Street, Sydney.

In replying to Advertisers, please use Order Form enclosed.
Every step fully explained—

Even if a man has never built a Set before—if he has never had the opportunity of examining one closely—if he knows absolutely nothing about Wireless—if he has no friends to advise him—he could still select a suitable design from among those described in "Wireless Sets for Home Constructors," and get splendid results from the very beginning.

The complete beginner—if he lived near a Broadcasting station—would probably build one of the Crystal Sets. Even if he wished to start with a Valve Receiver right away, without going through a probationary period on a Crystal Set, he would find the 2-Valve Broadcast Receiver a wonderfully simple and efficient instrument, costing but little for material. The more advanced experimenter, on the other hand, will appreciate the many exclusive and original features which are incorporated in the 4-Valve Universal Receiver—its sensitiveness and its power.

In any case, we would emphasise that the reader will find every step fully described and explained in the clearest and most interesting manner.

SHOWS HOW TO BUILD:
- Simple Crystal Receiver
- An Inductive-coupled Crystal Set
- A two-valve Low Frequency Amplifier
- A two-valve Broadcast Receiver
- A three-valve Regenerative Receiver
- A single-valve Reflex Receiver
- A three-valve Broadcast Receiver
- A four-valve Universal Receiver

Together with information as to testing and operation of Receiving Sets.

Wireless Sets for Home Constructors
By E. Redpath

Radio Press
Series No. 17
Dampness—the arch-thief of signal strength.

The wonderful Eureka Concert Grand was not evolved in a day—or a week—or a month—or, for that matter, in a year. It was the direct outcome of much intensive study of the problem of Low Frequency amplification and the possibility of obtaining "power" results without the necessity of using power valves. From the first, the radio engineers who designed the Eureka worked on original lines. In fact, apart from the fact that the Eureka has a primary winding and a secondary winding it has little in common with ordinary Transformers. Take its superb insulation, for example. In the Faraday House Test Report (sent free of charge to all interested) it is recorded that the tremendous pressure of 2,000 volts was necessary to break down the insulation between windings and between windings and case.

Concert Grand 30/-

But that is not all. This tremendously high insulation safety factor is permanent. No matter how old your Eureka its insulation will always be perfect because the Transformer is hermetically sealed up after its last test report.

Dampness cannot affect it. Many L.F. Transformers absorb moisture (see Dr. Roberts' article in "Popular Wireless," August 30th) and naturally signal strength is considerably reduced. If your Set is not as loud as it was, say, six months ago it is quite likely that your Transformer is the cause. Discard it and instal a Eureka Concert Grand. You will get greater purity of sound, increased volume, and freedom from trouble. Remember that the Eureka is the only Transformer that can be suspended in water for fourteen days and used immediately without any harmful effects.

Eureka No. 2 22/6

From all Dealers.

Transformer De Luxe

In replying to Advertisers, please use Order Form enclosed.
THE IDEAL BOOKS FOR THE BEGINNER

OVER A QUARTER OF A MILLION HAVE BEEN SOLD
of these books which every beginner buys.

"WIRELESS FOR ALL" (qd. net) is No. 1 of the famous Radio Press Series of handbooks.
"SIMPLIFIED WIRELESS" (ts. net) is the very popular sequel. Each book, however, is self-contained.

For the novice whose knowledge of Wireless is absolutely nil, these are the two books which he will need. Both are from the pen of John Scott-Taggart, F.Inst.P., A.M.I.E.E., a master in the difficult art of explaining technical subjects lucidly and in language everyone can understand. These two books treat the elements of Wireless very thoroughly, and even the more experienced amateur will find them helpful in elucidating any difficult points which may not be absolutely clear to him.

Wireless for All


9d. (qd. post free.)

Simplified Wireless


1/- (1/- post free.)

In replying to Advertisers, please use Order Form enclosed.
FALLON CONDENSER CO., LTD.,
White Ribbon Works, Broad Lane, Tottenham, N.15.

THE "Royal" LOW-FREQUENCY SUPER TRANSFORMER
THE WONDER JOB

1. The self-capacity of the secondary winding of the "ROYAL" is 6 micro-micro-hanks—far
and away lower than that of any other Transformer in general use.
2. It is tested to 1,000 volts between windings.
3. The inductive values of both windings are practically nil.
4. Hysteresis, leakage losses and capacity are absolutely nil.
5. It is completely METAL shrouded, thus eliminating any interaction between trans-
formers.
6. Windings completely impregnated—termed Complete absence of resonances—
which means that the lower harmonics are rendered
in equal manner with the high notes.

PRICE £1 0 0

DO YOU KNOW ANY TRANSFORMER THAT EQUALS
THE ABOVE SPECIFICATION?

AN OFFER.—We shall be pleased for readers of this journal to
come and compare the performance of the "ROYAL" as against
any other Transformers which they may have installed
in their sets. We are willing to dispatch to you one or two
"ROYAL" Transformers on the understanding that if they
are returned intact to us within Seven Days, post paid,
WE WILL IMMEDIATELY REFUND THE PURCHASE COST.
THIS WILL CONVINCE YOU.

SOMETHING NEW.

SOMETHING BETTER.

TYPE D10 TRIPLE RANGE CONDENSER WITH
VERRINER CONTROL

1. Is absolutely immune from stray capacity effect—You hand will not affect the tuning
however far.
2. Will tune from nil to 1000 Mc. per second.
3. By a single change in the terminal connections either one, one or seven capacities may
be used at will, with Verriner control on all
4. Brings in stations quite unobtainable with
Multiplex Type Condensers.

Overall Size—

2 x 2 in. by 3 x 2 in. by 2 x 2 in.

PRICE £1 7 6

THE EFFECTIVE RESISTANCE OF THE TYPE D10 IS NIL
AND THE WAVE-LENGTH GRAPH IS PRACTICALLY A
STRAIGHT LINE.

TYPE D5 WAVE FILTER AND
WAVE METER UNIT.

A simple and compact unit accessory that will
improve the selectivity of the receiver and allow
it to be used under interference of any receiver.
The unit may also be used for a number of other
practical and experimental purposes, including
the measurement of wave frequencies (wave-
lengths) of received signals.

Type D5 Wave Trap or Filter £1 12 6
Type D5 Wave Meter £2 5 0

(Calibrated)

BATTERY SWITCHES.

(Standardised by many leading Manufacturers)

FOR CONVENIENT FILAMENT CONTROL

Single Glove Black 2 0 Double Glove Black 2 4
Philips 2 6 " Niel 1 6 " Niel 14 3
Complete in carbon with screws.
Write for Complete Illustrated Catalogue.

R. A. ROTHERMEL, Ltd.
Manufacturers of all kinds of Radio
and Electrical Instruments
24-6, Maddox St., Regent St., London W.1

In replying to Advertisers, please use Order Form enclosed.
THREE POPULAR BOOKS

The CONSTRUCTION of CRYSTAL RECEIVERS

By ALAN L. M. DOUGLAS.

This book deals exclusively with crystal receivers for the reception of signals from the ordinary B.B.C. stations and also the high-powered station.

Price 1/6 net (post free 1/8).

HOW TO ERECT YOUR WIRELESS AERIAL

By B. MITTELL, A.M.I.E.E.

To every newcomer and many "old hands" this book will make all the difference between poor and first-rate reception. Mr. MitteIl is a professional radio engineer, and he has had many years' experience of aerial erecting and knows just those points where beginners go wrong. Incidentally, he took a prominent part in the erection of the huge aerials at Northolt and elsewhere. This is a useful volume which should be found on every wireless bookshelf.

Price 1/- net (post free 1/2).

HOW to MAKE your OWN BROADCAST RECEIVER

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

This book is by the Editor of Wireless Weekly and of Modern Wireless, and tens of thousands have made their first crystal set from this book, which is a sequel to "Wireless For All" and "Simplified Wireless." This book contains much valuable data on aerials and how to erect them, and the purchaser can go straight home, make one of the three very simple and cheap sets, erect his aerial, and enjoy the programme from his local station or from the high-powered station.

Price 1/6 net (post free 1/8).

Published by RADIO PRESS, LTD.,
Bush House,

In replying to Advertisers, please use Order Form enclosed.
This Broadcast Crystal Receiving Set is undoubtedly the neatest and most efficient of its kind obtainable. The construction throughout is perfect, and every detail has been carefully considered to obtain the best results. The detector fitted is our NEW SILVER type with REVOLVING CRYSTAL and Silver Cat's Whisker. Provision is made for adding loading coil to receive the new Chelmsford Station. All Brass Parts are lacquered and all components are the best. Price of Cabinet only, with lid £2:2:6

**THE "CAMECE" CRYSTAL SET**

- Fully Licensed by Postmaster-General, and stamped B.B.C. Regd. No. 226.

**THE "MULTIPHONE" CONNECTORS**

For use with several pairs of headphones on your set. Each 1/6. Fully Illustrated on leaflet and with a-way round type as above. Each 9/10.

**THE "MULTIPHONE" CONNECTORS**

For use with several pairs of headphones on your set. Each 1/6. Fully Illustrated on leaflet and with 6-way round type as above. Each 9/10.

**THE "MULTIPHONE" CONNECTORS**

For use with several pairs of headphones on your set. Each 1/6. Fully Illustrated on leaflet and with 6-way round type as above. Each 9/10.

**THE "MULTIPHONE" CONNECTORS**

For use with several pairs of headphones on your set. Each 1/6. Fully Illustrated on leaflet and with 6-way round type as above. Each 9/10.

**THE "MULTIPHONE" CONNECTORS**

For use with several pairs of headphones on your set. Each 1/6. Fully Illustrated on leaflet and with 6-way round type as above. Each 9/10.

**THE "MULTIPHONE" CONNECTORS**

For use with several pairs of headphones on your set. Each 1/6. Fully Illustrated on leaflet and with 6-way round type as above. Each 9/10.

**THE "MULTIPHONE" CONNECTORS**

For use with several pairs of headphones on your set. Each 1/6. Fully Illustrated on leaflet and with 6-way round type as above. Each 9/10.

**THE "MULTIPHONE" CONNECTORS**

For use with several pairs of headphones on your set. Each 1/6. Fully Illustrated on leaflet and with 6-way round type as above. Each 9/10.

**THE "MULTIPHONE" CONNECTORS**

For use with several pairs of headphones on your set. Each 1/6. Fully Illustrated on leaflet and with 6-way round type as above. Each 9/10.

**THE "MULTIPHONE" CONNECTORS**

For use with several pairs of headphones on your set. Each 1/6. Fully Illustrated on leaflet and with 6-way round type as above. Each 9/10.

**THE "MULTIPHONE" CONNECTORS**

For use with several pairs of headphones on your set. Each 1/6. Fully Illustrated on leaflet and with 6-way round type as above. Each 9/10.

**THE "MULTIPHONE" CONNECTORS**

For use with several pairs of headphones on your set. Each 1/6. Fully Illustrated on leaflet and with 6-way round type as above. Each 9/10.

**THE "MULTIPHONE" CONNECTORS**

For use with several pairs of headphones on your set. Each 1/6. Fully Illustrated on leaflet and with 6-way round type as above. Each 9/10.

**THE "MULTIPHONE" CONNECTORS**

For use with several pairs of headphones on your set. Each 1/6. Fully Illustrated on leaflet and with 6-way round type as above. Each 9/10.

**THE "MULTIPHONE" CONNECTORS**

For use with several pairs of headphones on your set. Each 1/6. Fully Illustrated on leaflet and with 6-way round type as above. Each 9/10.

**THE "MULTIPHONE" CONNECTORS**

For use with several pairs of headphones on your set. Each 1/6. Fully Illustrated on leaflet and with 6-way round type as above. Each 9/10.
BUY THIS BOOK
AND
Your Wireless Worries will Disappear

THIS volume, "500 WIRELESS QUESTIONS ANSWERED" (2/6 net), is a veritable mine of information. Encyclopedic in its scope, it is written so that the veriest novice can understand. Every section of wireless is dealt with in a highly competent manner by G. P. Kendall, B.Sc., and E. Redpath, the joint authors, both of whom, by long experience, understand just those difficulties which worry the average experimenter.

There are 500 answers to typical questions on the following subjects:

- Aerials.
- Amplifiers.
- Crystals and crystal sets.
- Earths.
- Frame Aerials.
- Gridleaks and condensers.
- Interference.
- Loud-Speakers.
- Morse.
- Primary Batteries.
- Ranges.
- Reaction.
- Secondary batteries.
- Sounds and signals.
- Telephone receivers.
- Tuning coils.
- Tuning condensers.
- Valves.
- Wave-lengths.
- Waves.
- Wire.
- Miscellaneous problems.

Buy a copy to-day from your wireless dealer or bookseller, or send 2/6 to the publishers and get the book by return post.

Published by RADIO PRESS, LTD.,
Bush House, Strand, W.C.2.
Silvertown
WIRELESS ACCESSORIES
Quality guaranteed by over 50 years' electrical manufacturing experience

EBONITE TRANSFORMER FORMERS.
No. 3. Complete with metal legs, 1/3 each. Made in other sizes.

TESTING BUZZERS.
Mounted on ebonite base with terminals and shunt or mounted with terminals, shunt and switch. 7/- and 4/– each. Supplied unmounted 3/6 each.

Single Valve Type.
MOUNTED VALVE SOCKETS
Single, double and triple. Suitable for use with valves or for plug-in type high-frequency transformers, 5/–, 9/– and 13/6 each.

B 500
Price 21/- each.

Guaranteed for 12 months.

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

High amplification without distortion and complete freedom from internal noises.

Correct design, high-class finish.

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

Makers—
THE SILVETOWN COMPANY,

LIVERPOOL: 54, Castle Street.
LONDON: 100 and 102, Cannon Street.
MANCHESTER: 16, John Dalton Street.
NEWCASTLE-ON-TYNE: 56, Westgate Road.
PORTSMOUTH: 49, High Street.
SHEFFIELD: 88-90, Queen Street.

In replying to Advertisers, please use Order Form enclosed
CONTENTS.
1. A 2/6 Crystal Set.
3. A Single Valve Magnifier.
5. A Simple 2-Valve Receiver.
6. A 3-Valve Cabinet Set.
7. An "Old Folks" Receiver.
8. A 3-Valve "All Concert" Receiver.
10. A 3-Valve Reinartz Set.
11. An S.T. 100 Set for the Beginner.

Radio Press Series No. 20
TWELVE TESTED WIRELESS SETS
AND HOW TO MAKE THEM
BY PERCY W. HARRIS

And make one of the fine multi-valve sets such as the "Transatlantic.
This is the season for receiving broadcasting from American and Continental
stations, and there is no more fascinating or instructive pastime than
searching for those elusive stations.

They will, however, not be elusive if you build a set produced by such an
experienced designer as Mr. Harris.

Look at the varied contents and you will realise what a bargain such a
cheap but reliable book is. Every set is not merely tested by the author
but by hundreds, and sometimes thousands, of readers who have bought
this book.

Buy it to-day from your wireless dealer or bookseller (2s. 6d. net) or send
2s. 8d. to the publishers:
RADIO PRESS, LTD., Bush House, Strand,
Hold this new Portable Oldham upside down and the acid cannot spill

A new non-spillable accumulator that can be carried in the pocket without fear of the acid falling out and spoiling the clothes. Just the accumulator for Dull Emitter Valves. Of small size and light weight it is easily the most economical method of lighting Weocos, Wuncells, 1-volt Oras, and two of them in series are absolutely ideal for the 0.6 amp. type of Valve.

Built from seamless cellu-loid of the highest grade with substantial terminal knobs, it is a typical Oldham product. Actually it is very similar to the accumulator used in the Oldham Miner's Electric Lamp — the most popular lamp in the country.

Its plates are manufactured under the same special activation process, which has the property of ensuring a longer life and a greater ability to hold the charge when the accumulator is not in use. Remember that it costs only a few pence to charge it — that the charging can be done in a few hours — and that its absolutely constant output is preferable to any type of dry battery. Hearing these points in mind you will realise that the new Oldham Non-spill Accumulator is just the one for your Dull Emitter Valves.

For Dull Emitters

2 volts
10 amp. hrs. (actual)

12'-

In replying to Advertisers, please use Order Form enclosed.
THE RADIO PRESS
ENVELOPE SYSTEM

THE Radio Press Envelope System is generally acknowledged to be the greatest aid to the constructor yet evolved. Each envelope contains working diagrams, exact size blue prints of wiring and of the panel (suitable for drilling), a set of photographs printed on real art paper and in a manner impossible in a book or periodical and showing the set and wiring from every possible angle, a list of components and the full instructions for making each set and using it.

These envelopes are obtainable from all principal wireless dealers and booksellers or direct from the publishers:


R.P. Envelope No. 1. Price 1s. 6d. (1s. 8d. post free).

A huge number of this ST. 100 envelope has been sold and practically all the tens of thousands of successful ST. 100 sets in the country have been made from this design, which works a loud-speaker with ease up to 30 to 35 miles.

R.P. Envelope No. 2. Price 2s. 6d. (2s. 8d. post free).
How to Make a Family 4-Valve Receiver. By Percy W. Harris.

This is the ideal easily-handled set for long range loud-speaker work. For those some distance from a station this set is ideal.

R.P. Envelope No. 3. Price 2s. 6d. (2s. 8d. post free).
The "Simplicity" 3-Valve Set. By G. P. Kendall, B.Sc.

Notwithstanding extreme ease of operation this set gives excellent results and will receive all the B.B.C. stations and many Continental ones upon the phones and will work a loud-speaker from the nearest ones.

R.P. Envelope No. 4. Price 2s. 6d. (2s. 8d. post free).
The "All-Concert de Luxe" Receiver. By Percy W. Harris.

A supremely efficient 3-Valve set with enclosed valves and all the latest technical improvements incorporated.
When compiling your Advertising campaign, do not overlook the claims of the three predominant media in radio; viz., MODERN WIRELESS, WIRELESS WEEKLY, and The WIRELESS CONSTRUCTOR. You cannot afford to ignore the responsive public that eagerly and consistently studies the pages of these journals and which constitutes an excellent established market for your goods.

MODERN WIRELESS, WIRELESS WEEKLY and The WIRELESS CONSTRUCTOR readers embrace the huge section ranging from the youthful broadcast receiver experimenter, and the amateur inventor to the highest expert in Wireless, and the greatest confidence is reposed in the practical hints, diagrams and constructional notes repeatedly appearing in the columns of these journals written by men whose names arc "household" words in the world of radio. Such a specialised and interested community cannot fail to elicit the maximum response to your appeal.

Write now for advertisement rates and details of forthcoming issues to the Advertisement Manager.

BARCLAYS ADVERTISING, Ltd.
Advertising Agents, Consultants & Contractors,
BUSH HOUSE, STRAND, LONDON, W.C.2.
Telephone City 9011 (Ext n 9)

In replying to Advertisers, please use Order Form enclosed.
**BOOK ORDER FORM**

Cut out this form and hand it to your newsagent or wireless dealer, or post it to Radio Press, Limited, Bush House, Strand, London, W.C.2, who will despatch by return post.

**PLEASE DO NOT LIMIT YOUR ORDER TO ONE BOOK IF YOU THINK YOU WILL REQUIRE OTHERS.**

Please supply a copy of each of the publications against which a tick has been made.

<table>
<thead>
<tr>
<th>Name.</th>
<th>Author.</th>
<th>Radio Press Series No.</th>
<th>Price.</th>
<th>PRICE PLUS POSTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Wireless For All.&quot;</td>
<td>John Scott Taggart, F.Inst.P., A.M.I.E.E.</td>
<td>1</td>
<td>6d.</td>
<td>11d.</td>
</tr>
<tr>
<td>&quot;Simplified Wireless.&quot;</td>
<td>John Scott Taggart, F.Inst.P., A.M.I.E.E.</td>
<td>2</td>
<td>1/1</td>
<td>1/2</td>
</tr>
<tr>
<td>&quot;How To Make Your Own Broadcast Receiver.&quot;</td>
<td>John Scott Taggart, F.Inst.P., A.M.I.E.E.</td>
<td>3</td>
<td>1/6</td>
<td>1/8</td>
</tr>
<tr>
<td>&quot;How To Erect Your Wireless Aerial.&quot;</td>
<td>B. Mitnell, A.M.I.E.E.</td>
<td>4</td>
<td>1/6</td>
<td>1/8</td>
</tr>
<tr>
<td>&quot;Construction of Crystal Receivers.&quot;</td>
<td>P. D. Tyers</td>
<td>5</td>
<td>1/6</td>
<td>1/8</td>
</tr>
<tr>
<td>&quot;How To Make a 'Unit' Wireless Receiver.&quot;</td>
<td>Alan L. M. Douglas.</td>
<td>6</td>
<td>1/6</td>
<td>1/8</td>
</tr>
<tr>
<td>&quot;Pictorial Wireless Circuits.&quot;</td>
<td>E. Redpath.</td>
<td>7</td>
<td>2/6</td>
<td>2/8</td>
</tr>
<tr>
<td>&quot;Wireless Valves Simply Explained.&quot;</td>
<td>Oswald J. Rankin</td>
<td>8</td>
<td>1/6</td>
<td>1/8</td>
</tr>
<tr>
<td>&quot;More Practical Valve Circuits.&quot;</td>
<td>Percy W. Harris.</td>
<td>13</td>
<td>2/6</td>
<td>2/8</td>
</tr>
<tr>
<td>&quot;Wireless Sets For Home Constructors.&quot;</td>
<td>E. Redpath.</td>
<td>15</td>
<td>2/6</td>
<td>2/8</td>
</tr>
<tr>
<td>&quot;Tuning Coils and How To Wind Them.&quot;</td>
<td>G. P. Kendall.</td>
<td>16</td>
<td>1/6</td>
<td>1/8</td>
</tr>
</tbody>
</table>

**RADIO PRESS PANEL CARDS.**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;How To Make The W.I Receiver.&quot;</td>
<td>Herbert K. Simpson</td>
<td>1</td>
<td>1/-</td>
<td>1/2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;How To Build An ST100 Receiver.&quot;</td>
<td>John Scott Taggart, F.Inst.P., A.M.I.E.E.</td>
<td>1</td>
<td>1/6</td>
<td>1/9</td>
</tr>
<tr>
<td>&quot;How To Build A 4-Valve Receiver.&quot;</td>
<td>Percy W. Harris.</td>
<td>2</td>
<td>2/6</td>
<td>2/9</td>
</tr>
<tr>
<td>&quot;How To Build The 'Simplicity' 3-Valve Set.&quot;</td>
<td>G. P. Kendall, B.Sc.</td>
<td>3</td>
<td>2/6</td>
<td>2/9</td>
</tr>
<tr>
<td>&quot;How To Build The All Concert De Luxe Receiver.&quot;</td>
<td>Percy W. Harris.</td>
<td>4</td>
<td>2/6</td>
<td>2/9</td>
</tr>
<tr>
<td>&quot;A Single Valve Reflex Receiver.&quot;</td>
<td>Herbert K. Simpson.</td>
<td>8</td>
<td>1/6</td>
<td>1/9</td>
</tr>
<tr>
<td>&quot;An Efficient Single Valve Receiver.&quot;</td>
<td>Herbert K. Simpson.</td>
<td>9</td>
<td>1/-</td>
<td>1/9</td>
</tr>
</tbody>
</table>

**SIMPLEX WIRING CHARTS.**

<table>
<thead>
<tr>
<th>&quot;For 2-Valve Set.&quot;</th>
<th>Chart No.</th>
<th>Price.</th>
<th>Postage.</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;For 4-Valve Set.&quot;</td>
<td>1</td>
<td>1/-</td>
<td>1/3</td>
</tr>
<tr>
<td>&quot;For 3-Valve Set.&quot;</td>
<td>2</td>
<td>1/-</td>
<td>1/3</td>
</tr>
<tr>
<td>&quot;For 4-Valve Set.&quot;</td>
<td>3</td>
<td>1/-</td>
<td>1/3</td>
</tr>
</tbody>
</table>

**RADIO PRESS WIRELESS PANEL TRANSFERS**

I enclose remittance for (necessary where goods are ordered by post).

**NAME** ..........................................................  
**ADDRESS** ..........................................................

722  
**In replying to Advertisers, please use Order Form enclosed.**  
Barclays Ad. 1173
A real Square Law Condenser at a moderate price—

Although every experimenter realises the tremendous advantages of square law Condensers many who would otherwise use them are deterred by the necessarily higher price. The new Peto-Scott square Law Condenser shown here is an attempt to place on the market a really good instrument possessing most of the advantages of higher priced condensers at a figure within the reach of all.

It is substantially made with fine spacing washers and solid ebonite end pieces—both ends of which are brass bushed to prevent wear. It is affixed to the panel with one hole only—a great convenience to the home constructor.

A special feature is its two-piece dial which is absolutely self-centring. Any dial that must be set on its shaft with some form of set screw cannot be true and develops an unsightly wobble.

Remember that such authorities as Mr. Percy W. Harris and others emphatically state that every Variable Condenser ought to be of the square law type.

**PRICES:**

<table>
<thead>
<tr>
<th>Capacity (mfd.)</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>.0001</td>
<td>7/-</td>
</tr>
<tr>
<td>.0002</td>
<td>8/6</td>
</tr>
<tr>
<td>.0003</td>
<td>10/-</td>
</tr>
<tr>
<td>.0005</td>
<td>10/6</td>
</tr>
<tr>
<td>.001</td>
<td>11/6</td>
</tr>
<tr>
<td>Dual Condenser for two stages of H.F.</td>
<td>15/6</td>
</tr>
</tbody>
</table>

Note the novel design of the special Peto-Scott Square Law Plate (registered design No. 707587). Actual tests have proved that the Peto-Scott Square Law Condenser gives absolute straight line reading over the whole of the Dual.

The SUPER Transformer

IN QUALITY—EFFICIENCY and TONE

**Super U.S. Super**

Compare it against any other L.F. on the Market! Note its Price! Note its Finish!!!

Made and tested by experts only.

Ratio 5-1

Is 5 to 1

U.S. No. 1

14/6

Ratio 5-1

18/6 each

The Secret of the U.S. Super's Success

They are wound by experienced winder, with the correct amount of the right gauge wire. They are packed with Shirley iron of sufficient quantity to allow the transformer its maximum amplification. No part of this exceptionally fine instrument is neglected.

If your dealer cannot supply you, write to U.S. Radio Co. Ltd., Wireless Component Manufacturers, 125, HIGH STREET, LEMBERG, LONDON, E.12. Phone, Lee Green, 1246.

Blame your Transformer— if it isn't a Woodhall

If your Loud Speaker says " Burraturrump!" don't blame the announcer or the loud-speaker— if the soprano shrieks, don't blame the singer or wires- less. Think first of your Transformer.

Cheap Transformers may amplify, but they will not reproduce. "One-to-Five" implies nothing except a doubtful "step-up." In the "Woodhall No. 1" you have, with only a 1-25 ratio, a wonderfully faithful "tone," that is due to correct proportioning of impedance, uniform amplification, plenty of wire, heavy core, and a unique method of winding.

That method is the use of SILK, simultaneously wound with the wire—a method used in no other Transformer. It is costly, but remarkably efficient.

The "Woodhall No. 1" is sold by all Wireless Dealers, who can obtain supplies through their usual Factors. Sole Distributors: PRESSLAND ELECTRIC SUPPLIES, LTD., HAMPTON-ON-THE-AMES.


In replying to advertisers, please use Order Form enclosed.
Have you ever had any qualms? Qualms, I mean, about the correctness of advice given to you. The opinions of your friends may be safe in some directions, but everyone wants to be sure. Wireless components cost money, ebonite costs money, and time costs money. You cannot afford to rely on advice based on a very limited experience.

Competence and experience count as much in wireless as in medicine and surgery.

Radio Press, Ltd., are specialists. Unlike general publishers, their efforts are concentrated on maintaining the fullest confidence of the purely wireless public. You must realise that it pays to support people whose whole reputation depends on the accuracy of their articles, the technical supremacy of their sets and circuits.

Just think for a moment. Whom do you regard as the principal wireless writers in this country? What names are household words in every home where there is wireless? Yes, of course, and these people are those who have made the Radio Press by far the largest wireless publishers in the world.

These are their new offices—Bush House, Strand, London, W.C.2—many times the size of their old offices in Devereux Court.

They have succeeded because they have served YOU truly and faithfully. They have succeeded because thinking wireless workers have realised that it pays in the end to support specialists who, moreover, have had the experience gained by coming into contact with half a million readers. No other wireless publishers or general publishers possess the unique advantages of the Radio Press. None has proved so successful. There is a reason.

Think this over and you will realise why the Radio Press, Ltd., have done more than any other concerns (except, of course, the B.B.C.) to popularise radio in this Country.

In replying to advertisers, please use ORDER FORM enclosed.
A REVOLUTION IN H.T. EFFICIENCY

H.T. Batteries made up of units are recognised as the ideal. The H.O.V.M.O. connection solves the problem of joining units without soldering. The H.O.V.M.O. assures perfect "silent" working—no cracking—allows easy replacement of units—will take the ordinary wonder plug—makes it possible to keep your H.T. at an equal voltage. Is British made.

A. M. MOLBACK
27, High Healdon
H.H. 786.

November, 1924

MODERN WIRELESS

GENUINE LOW TENSION FOR THE FILAMENT LIGHTING

"The Best in the World"

The Batteries detailed below will be found to cover all the requirements of 5 different values.

Price List, H.T.

<table>
<thead>
<tr>
<th>Codeword</th>
<th>Volts</th>
<th>Capacity</th>
<th>Price Batteries</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLORY</td>
<td>3</td>
<td>6</td>
<td>3/-.</td>
</tr>
<tr>
<td>GLORY</td>
<td>3</td>
<td>12</td>
<td>6/-.</td>
</tr>
<tr>
<td>GLORY</td>
<td>4</td>
<td>6</td>
<td>4/-.</td>
</tr>
<tr>
<td>GLORY</td>
<td>4</td>
<td>12</td>
<td>8/-.</td>
</tr>
</tbody>
</table>

HELLENSE DRY BATTERIES FOR

HELLENSE DRY BATTERIES OF WIRELESS VALVES

"The Best in the World"

It is far easier to use one of the high capacity batteries than a number of the smaller types.

L.T. Price List.

<table>
<thead>
<tr>
<th>Batteries</th>
<th>Codeword</th>
<th>Volts</th>
<th>Capacity</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLOAT</td>
<td>1</td>
<td>50</td>
<td>6/-.</td>
<td></td>
</tr>
<tr>
<td>GLOAT</td>
<td>2</td>
<td>60</td>
<td>8/-.</td>
<td></td>
</tr>
<tr>
<td>GLPULL</td>
<td>3</td>
<td>60</td>
<td>10/-.</td>
<td></td>
</tr>
<tr>
<td>GLPULL</td>
<td>4</td>
<td>60</td>
<td>12/-.</td>
<td></td>
</tr>
</tbody>
</table>

A. H. HUNT, Ltd.

RADIO STOCKS (B. Haine, Sole and New Proprietor), RADIO HOUSE, NEWMAN STREET,

PHONE: MUSEUM 3205,
OXFORD ST., LONDON, W. 1.

"EVERYTHING WIRELESS AT LOWEST PRICES.
Send for Free List.

THE QUALITY OF OUR COMPONENTS IS GUARANTEED, AND OUR PRICES ARE THE BEST AVAILABLE.

FIRST CLASS VARIABLE CONDENSERS.

Best British Make. Absolutely Best Value Obtainable.

SPECIAL OFFER OF MANSBRIDGE CONDENSERS.
OCTOBER 30TH.
Best Make. Guaranteed Second to None.

SEND YOUR ORDER WITH POSTAGE.

ALL GOODS ON 24 HOURS' DELIVERY.
Send for Free List.

EVERYTHING WIRELESS AT LOWEST PRICES.
Send for Free List.

PHONE: MUSEUM 3205.
OXFORD ST., LONDON, W. 1.

RICHARD MELNUSH, Ltd.,

In replying to Advertisers, please use Order Form enclosed.

The "Gramaphone" Loud Speaker

A most efficient device to which wireless telephones are clipped by simple pressure on the snap clasp."

Horns to Mount on Gramaphone."

The "Gramaphone" Loud-Speaker

RICHARD MELNUSH, Ltd.,

Est. 1885.
MODERN WIRELESS

November, 1924

Why I read "Wireless Weekly"

1. BECAUSE, chiefly, I feel safe. I know that behind this paper is the Radio Press, the largest Wireless Publishing concern in the World, and this is their weekly.

2. BECAUSE the Editor is John Scott Taggart, F.Inst.P., A.M.I.E.E., and the Assistant Editor is Percy W. Harris, and because this is the only paper which contains articles by such other well-known writers as Cowper, Hallows, Kendall, Lattee, Redpath, etc., etc.

3. BECAUSE it is beautifully printed on the finest quality paper, and all the photographs come out clearly and not as smudges, as is so often the case.

4. BECAUSE of the regular "Valve Notes" which appear weekly and are written by the Editor. Nothing like these appears anywhere else. Wireless Weekly appeals to me because I am a valve man, and the paper caters very largely for the valve man.

5. BECAUSE I thoroughly enjoy "Jottings By the Way," a very witty weekly feature (now illustrated, by the way).

6. BECAUSE new circuits and designs appear regularly and many of them never appear elsewhere. I know that if I miss my Wireless Weekly I shall miss something new.

7. BECAUSE I am pleased to reply Wireless Weekly when my friends ask me what I read. I know that they know that Wireless Weekly is a paper in a class by itself. Its price is the highest of the weeklies, and though not a snob, I don't mind my friends knowing that I want the best—and get it.

8. BECAUSE it's a "live" paper. It does things. It's the most virile of the Radio Press periodicals. It criticises fearlessly on wireless topics of the day. Its test reports on wireless apparatus are equally fearless. If something new comes along, whether it is oscillating crystals, a new circuit, a new move by the Post Office, every keen wireless man wants to know "what Wireless Weekly has to say about it"—and they are never disappointed.

PLACE AN ORDER FOR "WIRELESS WEEKLY" WITH YOUR NEWSAGENT TO DAY. A FINE SERIES OF ARTICLES ON SUPERSONIC HETERODYNE RECEPTION HAS JUST COMMENCED.

ORDER FORM

Please ( ) deliver ( ) reserve WIRELESS WEEKLY (6d. weekly) until further notice.

NAME

ADDRESS

In replying to Advertisers, please use Order Form enclosed.
HUNT'S "H.A.H." CRYSTAL

Fig. No. 922.

The Fig. 922 Crystal detector is supplied with a spare Crystal cup so that in a few moments it is changed from a cats-whisker type to a double crystal type detector.

SAFETY WONDER PLUG.

Price 2/- each. Complete as illustrated.

A. H. HUNT, LTD.

Ask your Local Retailer for the "MORRIS" (ALL STEEL) VALVE TEMPLATE

Marks out the position of your valve legs.
No centre punch required, no dividers. Saves time, temper and Ebonite.
Post 10d. Free

J. O. NICHOL & Co., 46, Lancaster Ave., Fennel St., Manchester

THE "MIRACLE" MASTER VALVE RECEIVING SETS

THE WORLD'S BEST RECEIVING SETS THAT HAVE BEEN PERFECTED FOLLOWING CONSIDERABLE RESEARCH AND EXPERIMENT.

DESIGNED FOR RECEIVING ANY WAVELENGTH, 1, 2, 3 and 4 VALVES.

1 VALVE . . . . . . . 62 0 0
2 " " . . . . . . . 63 12 6 Including B.B.C. Calls
3 " " . . . . . . . 64 17 6 Plus Marconi Royalties
4 " " . . . . . . . 65 10 0

Winding cannot be damaged by ordinary use.
Size, 1½ in. diameter, ¼ in. high.

WANTED IN GREAT DEMAND.

The Bedford Electrical & Radio Co., Ltd.,
Electrical Engineers & Manufacturers,
22, Campbell Road, Bedford.

MAGNIFLEX GETS AMERICA ON ONE VALVE!

On 29th September last, in London district, a user of MAGNIFLEX successfully tuned in WEZ, using a single valve. This performance has been repeated many times since. WGY has also been clearly received several times on the same MAGNIFLEX AERIAL and set.

GUARANTEE. — Provided our recommendations are carried out and you do not experience sufficient increase in range and strength to warrant the additional cost of MAGNIFLEX, please return it in good condition. Your money will be refunded.

High tensile phosphor-bronze wire gauze. "Strong as Steel."


If your dealer does not stock them, send direct to us.

HELIXO LTD., HENRY BUILDINGS, GOSE STREET, RATHBONE PLACE, LONDON, W.1.

WATCH THIS SPACE FOR ADDITIONAL "MAGNIFLEX" RESULTS NEXT MONTH.

In replying to Advertisers, please use Order Form enclosed.
THREE "BEST SELLERS"

BY JOHN SCOTT-TAGGART, F.INST.P., A.M.I.E.E.

Editor of "Modern Wireless" and "Wireless Weekly."

No other writer has done more to instruct the Experimenter than the Author of these books, which are read by all who are not mere mechanics. They are not text-books in the ordinary sense, but are helpful guides which presume a negligible amount of knowledge on the part of the reader.

"S.T." Circuits are too well known to need any introduction. This is the latest book of them:

More Practical Valve Circuits

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

Price 3/6 (3/8 post. free.)

The ST100 circuit is full of dozens of original circuits which you will find nowhere else, as they are copyright. Circuits ST68 to ST151 appear in this extremely useful volume which has had an enormous sale amongst experimenters.

All component values are given in these two editions of:

THESE TWO CIRCUIT BOOKS.

This is the first book of ST circuits and is called Practical Wireless Valve Circuits, by John Scott-Taggart, F.Inst.P., A.M.I.E.E. Price 2/6 (post free 2/8). Circuits ST1 to ST61 are published in this book, which is selling as well today as when it was published. No experimenter worthy of the name can afford to be without the two ST Circuit Books. They are friends which will never lead you astray. Each circuit in both books is fully described and criticised.

Mr. Scott-Taggart has stated that he regards this as his best book on the Valve from the point of view of the beginner. Radio Valves and How To Use Them, by John Scott-Taggart, F.Inst.P., A.M.I.E.E. Price 2/6 (post free 2/8). This book is by far the largest published by Radio Press, Ltd., at 2/6, and is full of very valuable information. The reader is presumed to know only what is contained in our Books, "Wireless For All," and "Simplified Wireless."

In replying to Advertisers, please use Order Form enclosed.
3 Additional Models to the AMPLION "Dragon" Range

REPRESENTING a most important advance in the production of small and medium size Loud Speakers, the three new AMPLION models illustrated and briefly described will be found of exceptional interest to the Technician, the Wireless Enthusiast and to the Listener in desirous of "Better Radio Reproduction."

Although all the advantageous constructional features distinguishing Standard AMPLION models are provided in these designs, the prices are not merely moderate but extraordinarily low, and possible only by manufacture at the hands of specialists upon the most approved lines experience can suggest.

The 'NEW' Dragonfly (An Amplion Baby)

A perfect replica on a reduced scale of the famous "Standard" Dragon model. For a miniature Loud Speaker the "Dragonfly" is outstanding in its efficiency—affording considerable volume, coupled with extreme clarity and "full" tone. The electromagnetic unit incorporating the new "floating" diaphragm, and the non-resonating sound conduit, are exclusive Amplion features.

The 'NEW' JUNIOR

In performance the "New" Junior is actually a "Senior" Loud Speaker, and compares favourably with instruments listed at twice and thrice the figure. All the latest improvements are embodied in the assembly, which reveals an efficiency not previously considered possible in a model so reasonably priced.

The 'NEW' JUNIOR De Luxe

A Loud Speaker of high degree, the "New" Junior-de-Luxe can best be described as an aristocrat of Loud Speakers sold at a decidedly democratic price. Corresponding in proportions to the "New" Junior type, the de luxe edition is provided with a wood trumpet of unique design. In this horn the oak or mahogany panels, as the case may be, are united by a series of metal ribs, affording an assembly of particularly attractive appearance.

The World's Standard Wireless Loud Speaker

Obtainable from all Wireless Dealers of repute.

ALFRED GRAHAM & COMPANY,
(E. A. GRAHAM)
St. Andrew's Works, Crofton Park,
LONDON, S.E.4.

In replying to advertisers, use COUPON

www.americanradiohistory.com
Your Wireless Dealer Sells
Radio Press Books, Envelopes, Panel Transfers, etc.,

See Him!

To New Wireless Dealers. Radio Press books, etc., are now being issued to wireless dealers at a flat rate of 25% discount and the distribution is being effected through trade factors and wholesalers. Place all your orders through your usual trade channels.

Lists, prices, and all particulars are obtainable by dealers or factors from

A huge business is done in these publications. Why miss it? It will help your ordinary business.
SUPRA L.F. Transformer.

Results with this instrument are remarkable, owing to its unique construction. Each layer has six insulated sections, and we guarantee this method of winding to give maximum amplification, while distortion is reduced to an absolute negligible minimum. The iron core has 38 laminations and accommodates two angles for fixing minimum amplification, this method allowing for insulated sections, and is remarkable.

DOMINOE CONNECTOR AND KWIKPINS.

Labour saving, quick, clean and neat. You can get any combination of series or parallel up to four pairs of headphones in a moment. Nothing can be more simple or more efficient. Also useful for connecting up extra condensers, inductances, etc.

KWIKPINS - 3d. each.

CABINETS YOU WANT

PICKETT'S Cabinets—they are good value, from 1/6 each, highly polished. Cabinet Works, Albion Rd., Bexley

Hath. S.E.1. Works: LONDON, BIRMINGHAM AND SOUTHWEND.

IT’S THE LEAK THAT DOES IT

The "Btech" Grid Leak (Guaranteed) will catch a carrier wave from the filament point up. The "Bat" Wood is recognised by highest experts and experimenters as the only surviving and reliable Grid Leaks.

If you are not satisfied within 7 days money will be refunded.


HULLO, GIRLS! HULLO, BOYS!

THE BEST CHRISTMAS ANNUALS FOR 1924.

Specially written by the Aunties and Uncles of the B.B.C. Stations.

Magnificently Illustrated.

3/- each, nett.

ASK YOUR WIRELESS DEALER FOR THEM.

Wireless Dealers who have not already received particulars of Trade Terms should apply at once to -

COMMERCIAL DISTRIBUTORS, Ltd., 223, HIGH HILL, LONDON, W.C.2

In replying to advertisers, please use Order Form enclosed.
Index to Advertisers

USE THIS COUPON
in writing to advertisers in "Modern Wireless."

Enclosed please find remittance of

If an open envelope is used in applying for catalogues a half-penny stamp will cover postage.

Date.

COUPON

Questions and Answers

In future this coupon must be accompanied with

"MODERN WIRELESS" November, 1924

WE HAVE MOVED

to more commodious and better appointed offices at

BUSH HOUSE, STRAND, LONDON, W.C.2

Barclays Advertising, Ltd.

WE HAVE MOVED

Modern Wireless & Wireless Weekly

Please address all communications respecting these media, in future, to:

Barclays Advertising, Ltd.,

BUSH HOUSE, STRAND, W.C.2

Modern Wireless & Wireless Weekly

MODERN WIRELESS & WIRELESS WEEKLY

WE HAVE MOVED

to more commodious and better appointed offices at

BUSH HOUSE, STRAND, LONDON, W.C.2

Barclays Advertising, Ltd.

WE HAVE MOVED

Modern Wireless & Wireless Weekly

Please address all communications respecting these media, in future, to:

Barclays Advertising, Ltd.,

BUSH HOUSE, STRAND, W.C.2

WE HAVE MOVED

to more commodious and better appointed offices at

BUSH HOUSE, STRAND, LONDON, W.C.2

Barclays Advertising, Ltd.

WE HAVE MOVED

Modern Wireless & Wireless Weekly

Please address all communications respecting these media, in future, to:

Barclays Advertising, Ltd.,

BUSH HOUSE, STRAND, W.C.2

WE HAVE MOVED

to more commodious and better appointed offices at

BUSH HOUSE, STRAND, LONDON, W.C.2

Barclays Advertising, Ltd.

WE HAVE MOVED

Modern Wireless & Wireless Weekly

Please address all communications respecting these media, in future, to:

Barclays Advertising, Ltd.,

BUSH HOUSE, STRAND, W.C.2

WE HAVE MOVED

to more commodious and better appointed offices at

BUSH HOUSE, STRAND, LONDON, W.C.2

Barclays Advertising, Ltd.

WE HAVE MOVED

Modern Wireless & Wireless Weekly

Please address all communications respecting these media, in future, to:

Barclays Advertising, Ltd.,

BUSH HOUSE, STRAND, W.C.2

WE HAVE MOVED

to more commodious and better appointed offices at

BUSH HOUSE, STRAND, LONDON, W.C.2

Barclays Advertising, Ltd.

WE HAVE MOVED

Modern Wireless & Wireless Weekly

Please address all communications respecting these media, in future, to:

Barclays Advertising, Ltd.,

BUSH HOUSE, STRAND, W.C.2
Give your set "that professional look!"

By using "Radio Press Wireless Panel Transfers" (6d. per large packet of 80 labels), you can give to your set that finished appearance which makes all the difference. Not only are these transfers the cheapest and best but they are officially issued by the Radio Press for their sets. Buy a packet or two from your wireless dealer. They are also obtainable through every bookseller, but get the title right if you want Radio Press quality.


Barclays Advi. 702
"Le dernier cri"

It hardly seems worth while going to that concert to-night. We can get all the best music from our Lyrianette without the least bother, and it is so much more comfortable to stay at home. I could rave about the wonder of that little Lyrianette—so compact, simple and beautiful, and yet so thoroughly efficient. No bother with accumulators—everything so neatly stowed away inside and no unsightly wires visible. Music comes so clearly from the Lyrianette. It seems futile to go out into the cold nights for entertainment when you can have it amidst your own home comforts.

The RI Lyrianette. 2 valve. Price £22 5s. 0d.
The RI Lyrianette. 3 valve. Price £28 5s. 0d.

Write for the New RI Catalogue.

Telephone: Regent 6214-5-6  telegrams: "Instradio London"

Radio Instruments Ltd.
12 Hyde Street, Oxford Street W.1.