MODERN WIRELESS

June

1/-

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PORTABLE SETS AND THEIR USES

By PERCY W. HARRIS, M.I.R.E.

HOW TO MAKE A FOUR-VALVE TRI-COIL RECEIVER. *By C. P. Allinson.*

A TWO-VALVE PORTABLE SET. *By A. S. Clark.*

A SINGLE-VALVE SET WITH REINARTZ COUPLING. *By Stanley G. Rattee, M.I.R.E.*

A ONE-VALVE RESISTANCE AMPLIFIER. *By John Underdown.*

A SPADE-TUNED CRYSTAL SET. *By E. J. Marriott.*

A NINE-VALVE SUPERSONIC HETERODYNE RECEIVER (Contd.). *By John Scott-Taggart, F.Inst.P., A.M.I.E.E.*

ADAPTING YOUR RECEIVER FOR KDKA. *By G. P. Kendall, B.Sc.*

FAULT FINDING. AERIAL SWITCHING.

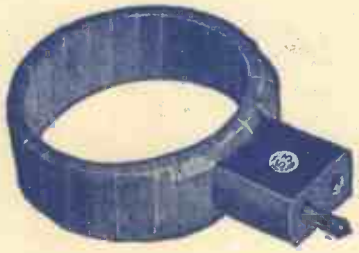
Coil No.	True Inductance — Microhenries	Distributed Capacity — Micro-Microfds.	Primary Tuning on Average P.M.G. Aerial with ·001 Condenser or Burndept Tuner: Condenser in Series min.	Condenser in Series max.	Condenser in Parallel min.	Condenser in Parallel max.	Condenser in Parallel with Coil: Secondary Circuits (Burndept Tuner = .0005 mfd.) min.	max. ·0005	max. ·00075	max ·001	Tuned Anode Circuits. min.	max. ·0002	Price (Mounted). A
A	1·6	7	80	150	—	—	—	—	—	—	—	—	4/3
B	13	8	110	190	—	—	75	170	210	240	45	110	4/3
C	22	10	130	220	235	325	90	215	270	305	60	140	4/3
S1	36	10	150	260	300	415	120	280	330	375	80	175	4/3
S2	64	10	175	300	360	550	160	375	440	500	105	230	4/3
S3	110	9·5	200	360	420	700	210	490	580	655	130	305	4/3
S4	200	9·5	250	450	560	940	285	660	780	885	190	405	4/3
S5	350	10·5	330	600	740	1250	380	865	1035	1175	255	535	4/6
100	583	27	450	750	950	1600	525	1150	1350	1530	375	730	5/-
150	1193	22	650	1050	1300	2300	730	1625	1930	2180	520	1035	6/-
200	2300	21	900	1450	1900	3300	1010	2260	2670	3020	710	1420	7/-
300	4770	17	1250	2000	2600	4500	1430	3250	3850	4350	1000	2050	8/-
400	9600	17	1750	2900	3700	6500	2030	4600	5450	6200	1420	2900	9/-
500	23550	20·5	2600	4300	5500	10000	3235	7250	8600	9750	2320	4550	10/-
750	53250	19	4000	6600	8500	15000	4840	11000	13000	14600	3400	6900	12/-
1000	104650	17·5	—	—	12500	23000	6750	15300	18200	20500	4700	9650	15/-
1500	182000	22	—	—	16500	30000	9040	20200	23800	27000	6400	12800	24/-

Extra Short Wave Coils Set of 4 16/-

Concert Coils Set of 4 16/-A

Sets of 9 Coils S 5 to 1000 £3 16 6A

A handy table about Burndept Coils



A Burndept single-layer Coil. Notice how neatly the coil is wrapped and how clearly its number is marked on the plug. The windings are well protected.

REDUCED PRICES.

No. 133. Two-Coil Holder, unmounted **15/-**

No. 135. Three-Coil Holder, unmounted **20/-**

The backs of Burndept Coil Holders are open so that all wiring may be kept out of sight. The handsome appearance of these Coil Holders, therefore, need not be spoilt by untidy wires.

IN the above table, prepared in the Burndept Research Laboratories, there is useful information which should be of assistance to you in choosing Burndept Coils. As the figures show, Burndept Coils have extremely low distributed capacity and high-frequency resistance. They cover all wavelengths from 80 metres upwards. Purchasers may definitely rely upon each Coil covering the range indicated with a margin to spare both up and down. Each Coil is mounted on a non-reversible plug with spring contact pins.

Burndept Coil Holders are moulded in solid black bakelite, highly polished and beautifully finished. The moving holders are operated by means of 5 to 1 gears, the action being particularly smooth. Fine adjustments are made with ease. ***Note the price reductions.***

Write for Publication No. 44, which gives full particulars of Burndept Coils, Coil Holders and Standard Variable Condensers.

BURNDEPT WIRELESS LIMITED

Aldine House, Bedford Street, Strand, London, W.C.2.

BRANCHES *at Manchester, Leeds, Birmingham, Cardiff, Northampton and Newcastle.*

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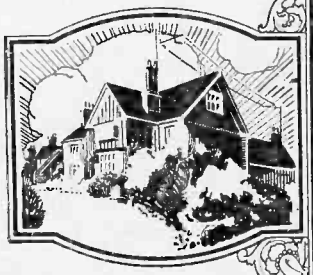

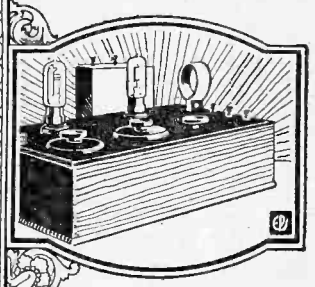

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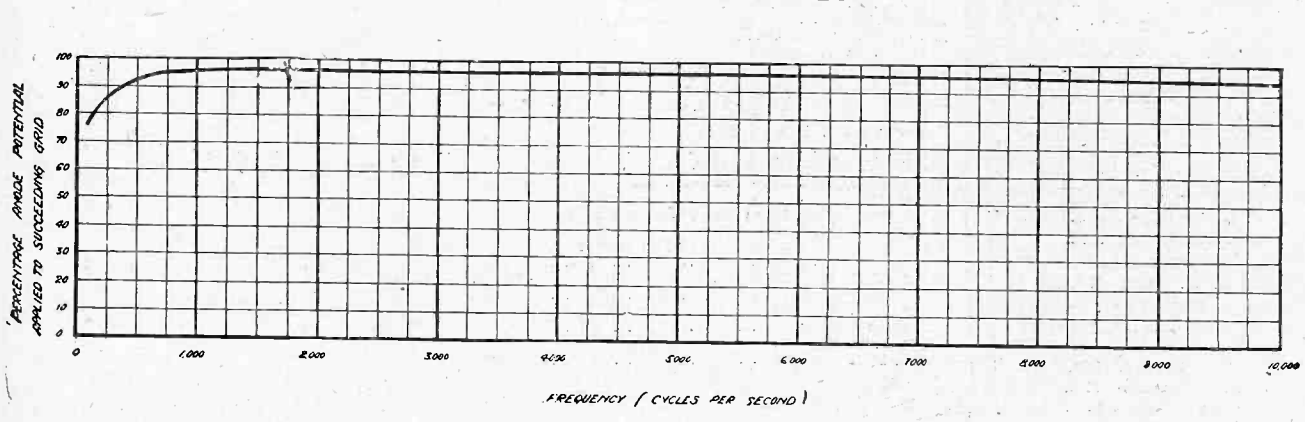
Resistance-Capacity Coupling and its merits



IN some previous notes on the subject of distortionless amplification by R.C.C. units, stress was laid on the pre-eminence of a resistance in the anode circuit as a means of obtaining e.m.f.s for application to the grid of the next valve.

The R.C.C. unit consists electrically of three elements, namely :—

(*a*) An anode resistance,
(*b*) A coupling condenser, and
(*c*) A grid leak.

Let us now consider the functions of each element and the reasons prompting the choice of electrical values.

(*a*) THE ANODE RESISTANCE.

(i.) It must be wire-wound in order to avoid extraneous noises.
(ii.) It must be capable of working on high voltages.
(iii.) The temperature rise must be safe.
(iv.) The resistance value must be such that the amplification per stage is as great as freedom from distortion will permit.

If the resistance is gradually increased, we find that at first the amplification increases rapidly, but there comes a point where hardly any improvement results.

Moreover, if the resistance is increased greatly, some distortion is introduced by capacity currents to the valve electrodes, and also that due to accidental grid current is increased.

(v.) A moderately high resistance is more reliable than a very high one.

(*b*) THE COUPLING CONDENSER

The functions of this are two-fold, namely, to communicate the voltage ripples on the anode of one valve to the grid of the next, and to insulate the grid conductively from the H.T. supply so that the grid may be biased at some suitable datum potential.

For the latter purpose it is necessary to use a unit of the highest quality, having mica dielectric.

The insulation must be very good to prevent the grid bias being upset by leak from the H.T. supply.

Mica condensers are costly for large sizes, therefore it is unsound to use a higher capacity than is necessary. The coupling condenser has to feed two impedances in parallel, namely, the capacity of the grid and the resistance of the grid leak.

The former varies with frequency in the same way as does the coupling condenser, hence there is no frequency preference introduced from this cause.

The impedance of the grid leak is, however, constant, and the capacity of the coupling condenser must therefore be such that even at low frequencies its impedance does not begin to be comparable with that of the grid leak.

This point has been the subject of very extensive test, and the curve reproduced above shows how constant is the coupling at all audible frequencies.

As an instance of the adequacy of the coupling condenser fitted in the R.C.C. unit, it may be mentioned that even if it is changed to one having 100 times the capacity, no material difference can be detected in the quality of reproduction.

(*c*) THE GRID LEAK.

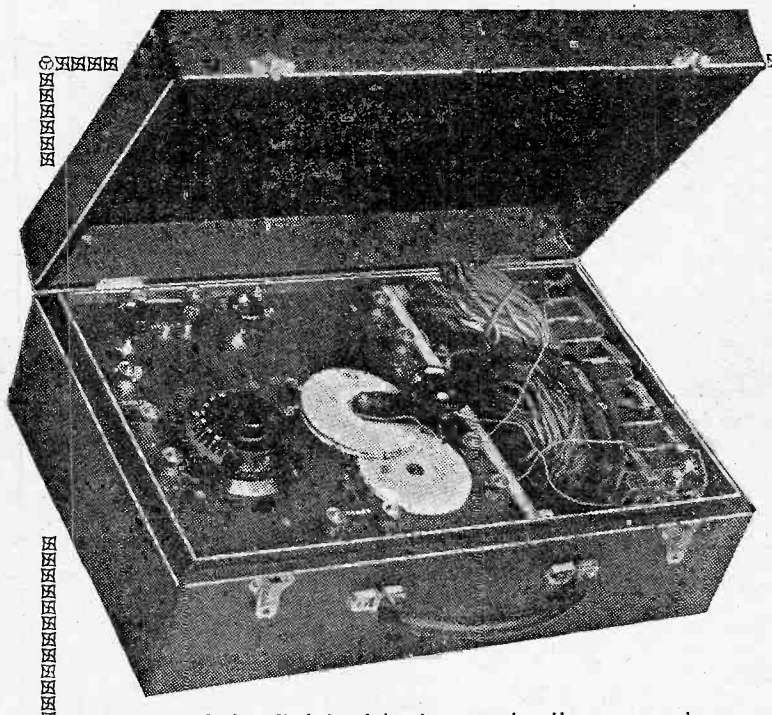
This must be high enough to avoid poor amplification, especially at low frequencies. It must be low enough to be reliable and to prevent accidental leakages elsewhere in the circuit, upsetting the grid bias, and so causing distortion.

* * *

The care taken in the design of R.C.C. units makes it possible to obtain fine reproduction at low cost.

Norman Lea

Chief Engineer,
Radio Communication Co., Ltd., London, W.C.2.



A view of the finished instrument, all accessories being included in the case.

The All-in Portable Receiver

By
A. S. CLARK

Now that the summer is with us this receiver will make a strong appeal to the open-air loving public.

ALTHOUGH the summer is now here, the real wireless enthusiast has not lost any interest in his hobby; but many like to enjoy the open air as well as their wireless. To these the two-valve portable receiver to be described will make a definite appeal. As can be gathered from the photograph, it is of reasonable size for its purpose, and from the title it will be seen that there are no accessories whatever which have to be carried outside the cabinet.

It was designed principally with the object of giving really loud 'phone signals from some station, wherever it may be used. This it fulfils absolutely, as a glance at the test report at the end of this article will show. It will also be seen that not only did it also give fair loud-speaking near to a broadcasting station, but that several stations were obtained at good telephone strength at one place.

Aerial and Earth

The "pick-up" system consists of two 75 ft. lengths of rubber insulated flexible wire, which, as will be seen later, can always be rigged up so as to give signals. The set may be left for quite long periods without attention as there are no accumulators to suffer in these circumstances, and when desired it can be used as a very efficient indoor set with a secondary battery connected to the L.T. terminals provided, instead of working with the dry battery. Thus the time and trouble spent in constructing the instrument should be amply repaid.

Components

The components used are given in the following list, and their makes are indicated, but, of course, it is not necessary that the actual makes specified be used providing that the values mentioned are adhered to, and components of good quality purchased.

One suitable carrying case with handle, 9 in. by 15 in. by 5 in. inside measurements. (Carrington Mfg. Co., Ltd.)

Ebonite panel, 9 in. by 9 in. by ¼ in. (Paragon.)

Two .06 type valves.

One Dial-o-denser. (Portable Utilities Co., Ltd.)

One Gambrell first stage L.F. transformer. (Gambrell Bros., Ltd.)

Two Microstats. (Wates Bros.)

One Chelmsford loading coil. (Josephs and Sons.)

Plug and socket for same.

Two Magnum "Vibro" anti-capacity valve holders. (Burne-Jones and Co., Ltd.)

One .0001μF fixed condenser. (Paragon.)

One .0005μF fixed condenser. (Paragon.)

One .0003μF fixed condenser with grid leak clips. (Dubilier.)

One 2-megohm grid leak. (Dubilier.)

Twelve nickelled terminals. (Burne-Jones and Co., Ltd.)

¼ lb. 26 d.c.c. wire.
2 B.A. rod, bush, knob, etc.
Packet Radio Press panel transfers.
Quantity square wire, nuts, bolts and screws.
Thirteen standard flash-lamp batteries.
One 1½-volt grid bias cell Ever-Ready U.W. 1.
One Ever-Ready 4½-volt dry battery, No. L.T. 3.
One 1μF T.C.C. condenser.
Fifty yards rubber flex.

Notes on Components

There is no reason why components of other makes than those mentioned should not be used, providing they are of good quality. But there is a point to which attention should be paid if different components are employed, and that is their sizes. Make sure before purchasing that there is room for the components, for with those used it was necessary in two cases to cut them a little in order to get them in.

The carrying case used is made of wood covered with a black leatherette cloth, and is ideal for the purpose. It is water-proof and the fact that it is of wood makes it quite simple to fit in the partition and fillets. The positions for these can be seen from Fig. 2.

The ebonite panel is held in place by means of two fillets placed so that their upper edges are 3¼ in. from the bottom of the box. The positions of these fillets can be seen from the diagram just mentioned. The tuning coils, which are home-made, will be found quite efficient. Fig. 3 shows how they are mounted on the coil holder.

Grid Bias and L.T. Batteries

The grid bias cell will not always be found necessary. Although the filament current taken by the two valves is a little heavy for the particular L.T. battery used, this will last quite a reasonable time, and in a portable set the weight and size of a larger one would be a serious disadvantage.

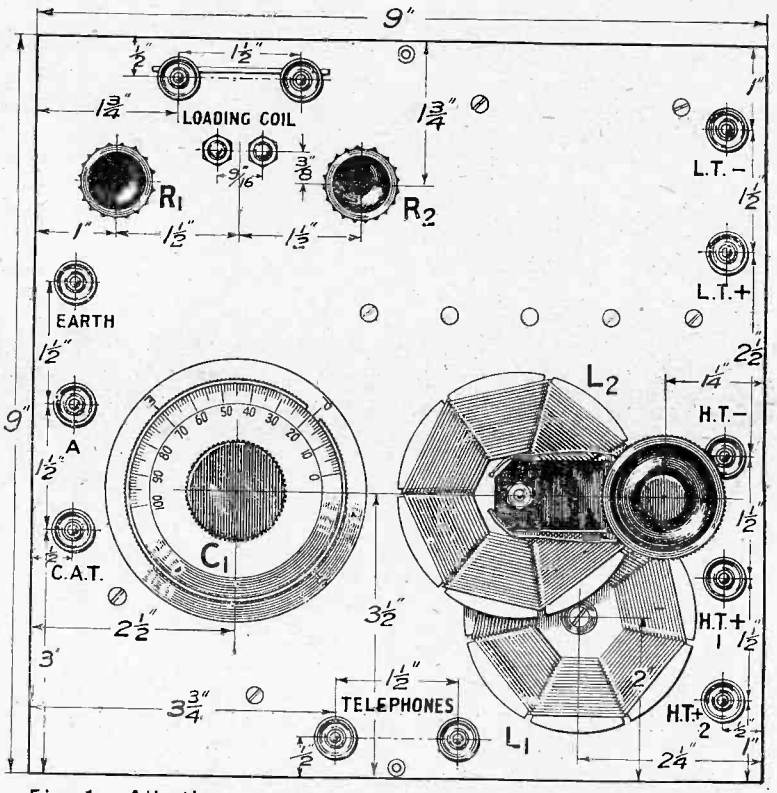


Fig. 1.—All the necessary dimensions for drilling the panel will be found in the above diagram. Blueprint No. 118a, post free 1s. 6d.

Construction

The construction of this set is not quite so straightforward as that of a set of the ordinary type. This is due to the need of getting all the parts into a small compass, which naturally requires a little care. Also there is not much room for the wiring, and therefore a little patience is required when doing this part of the work. Having collected all the necessary apparatus together, the making of the set can be commenced.

Drilling the Panel

The first thing to do is to drill the ebonite panel to the dimensions given in the drilling diagram. Do this carefully, making sure that all the holes are in their correct positions. A little extra time taken on the drilling will probably save trouble later on. Remember that the drilling diagram is of the

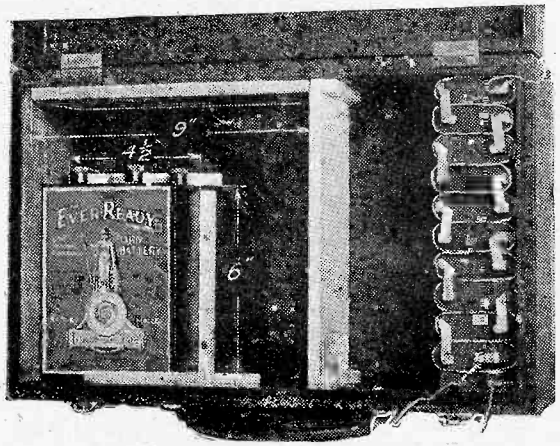


Fig. 2.—This photograph will be very helpful when fitting the fillets.

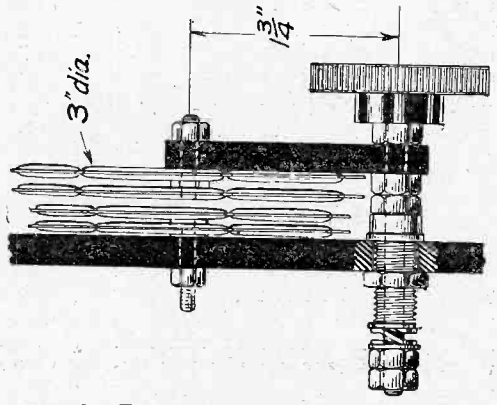


Fig. 3.—The method of mounting the coils is here shown clearly.

front of the panel, and that if the holes are marked out on the back of the panel they must all be reversed. The next step is to apply the panel transfers and then the panel may be put aside for a little while.

The Wooden Panel

On looking at the photographs of the back of the panel it will be seen that the valve holders and the transformer are attached to a small wooden panel which is screwed to the ebonite panel. In Fig. 6 the dimensions for this wooden panel are given. It is made out of ⅜ in. white wood. In the top right-hand corner a small piece is cut out this is to accommodate wires, as shown in the photographs. The projecting piece at the bottom right-hand corner is so arranged that it will hold the L.T. battery against the bottom of the containing box and thus prevent it shaking about.

When this piece of wood has been cut to the right size the valve holders can be screwed to it. In order to get these two holders on easily it was found necessary to cut their edges a little flat at one part; this is clearly shown in the diagram. The transformer is attached to the back of this piece of wood, and it was also found necessary to cut the shanks of the terminals off and to solder flexible wires straight on to the remaining portions of them. These wires should be soldered into place before the transformer is screwed to the piece of wood. Having done all that is necessary with this piece of wood we can now go back to the ebonite panel.

Mounting the Components

The first thing which is fixed to the panel is the piece of prepared wood. This is fixed by means of five long thin wood screws to the panel in the position shown on the wiring diagram. Now mount all the other components, except the coil-holder, which we have yet to make. The .0001μF C.A.T. condenser is held in place by the soldered wires only, and therefore has no fixing screws. The pin and socket of the loading coil are mounted on the panel so that the coil is on the underside when fitted, and two pieces of thin cotton-covered wire are twisted under them before the nuts are screwed down tight. In order that they may clear the battery it is necessary to bend the grid leak clips over and to solder the grid leak to them. This should be done with a very hot iron and before the grid condenser is mounted.

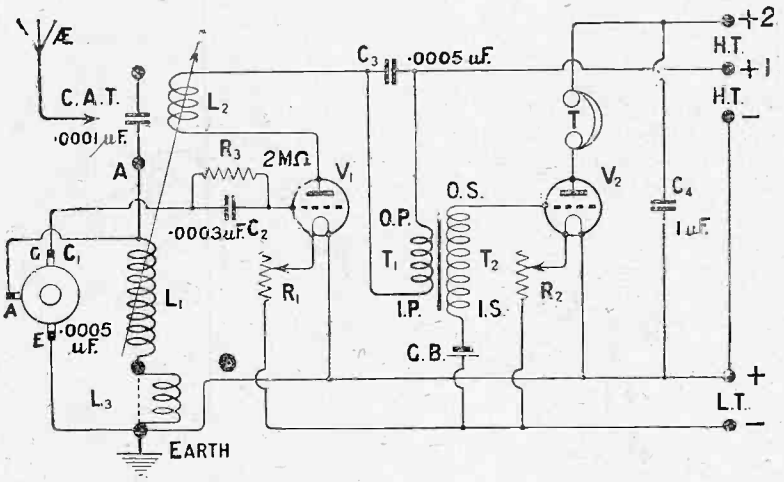


Fig. 4.—Theoretical circuit diagram showing the connections to the aerial tuning condenser.

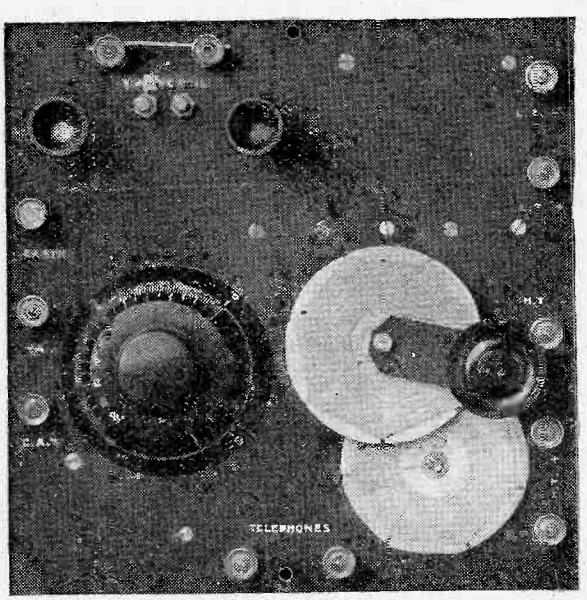
The Coils

Having mounted all but the coil-holder and coils, our attention must be directed to these. The coils are of the spider type of basket coil, wound on a permanent former made out of cardboard. Four discs are cut to a diameter of 3 in. and these are wound with No. 26 d.c.c. wire. Two of them, which are required for the reaction coil, are wound with as many turns as will go on, whilst the other two have 30 turns put on each. All four coils are to be wound in the same direction and are finished off by pushing the outer end of the wire under all the other turns at some point and then threading through a small hole in the cardboard. The two reaction and the two aerial coils are joined in series, the outer turn of one going to the inner of the other in both cases. The formers of the smaller coils may afterwards be trimmed if desired.

A small piece of ebonite must be cut to the size indicated in Fig. 3, and the coils assembled on it as shown in this diagram, which also makes clear how the coils and coil-holder are fitted to the panel. The leads from the coils are taken through the panel by means of two small holes. The hole through which the reaction leads are taken should afterwards be plugged with a match in order to prevent any strain on the soldered joints when the coil is swung.

Wiring

Wiring is now commenced and must be done as shown in the wiring diagram. The positions of the wires should be kept as near to the actual wiring shown as is possible by constant reference to the photographs of the



Series or parallel tuning can be obtained by turning the knurled ring incorporated in the A.T.C. base through 90°.

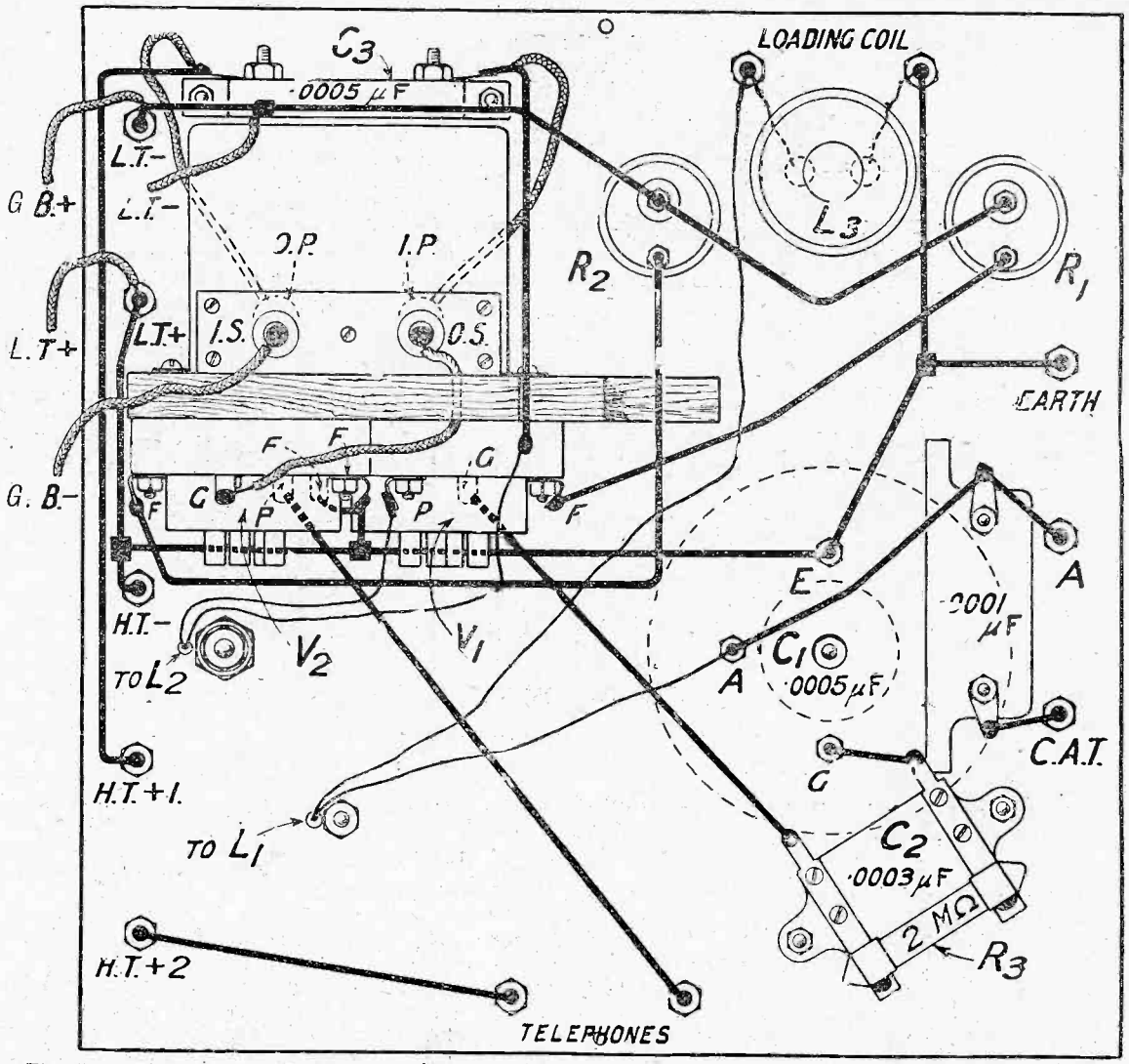
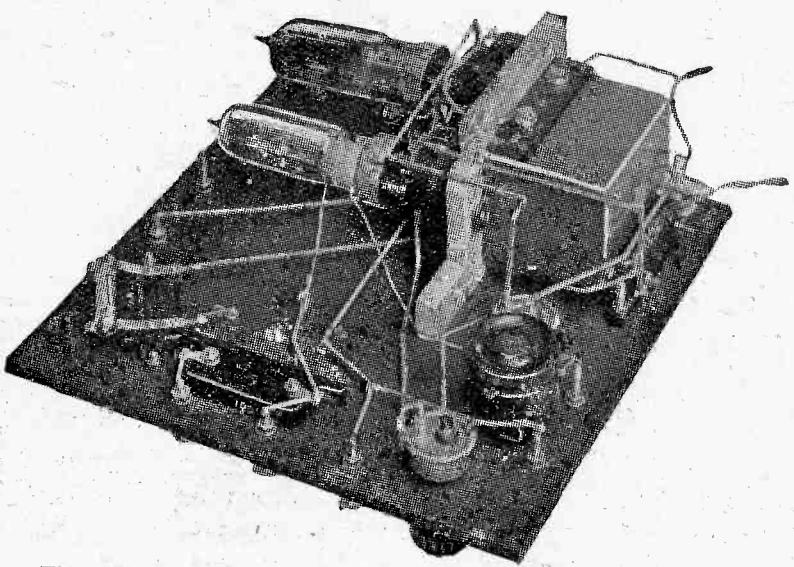


Fig. 5.—Back of panel diagram which should be used in conjunction with the photographs when wiring. Full size blue print, No. 118b, 1s. 6d. post free.

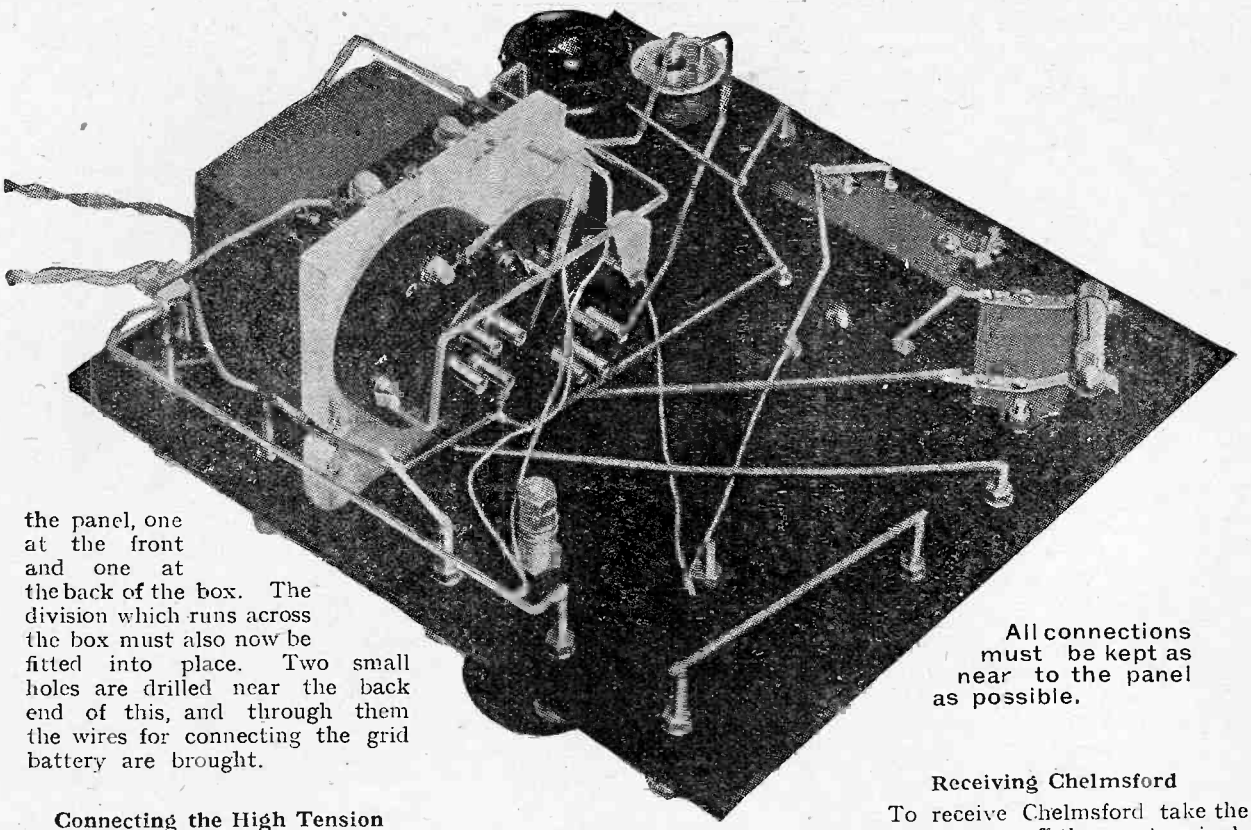


The wiring should be carried out in such a manner as to allow sufficient clearance for the valves to be inserted or removed.

back of the panel and by means of Figs. 5 and 6, the latter showing the connections from the two valve holders. All the wires which are situated over the dry battery must be kept as near to the panel as possible, and in any case must not be more than ¾ in. from it. Also care must be taken to see that no wires are placed so as to be in the way when the valves are being inserted. The loading coil should be inserted before the wires that run near it are connected. Flexible leads are used for making connections to the dry battery and also to the grid battery.

The Carrying Case

Now that the wiring is complete we can turn our attention to the box. Two small fillets are fixed so that the dry battery may be held in place and are shown in the dimensioned photograph. Fix these, and also the two fillets already mentioned for supporting



All connections must be kept as near to the panel as possible.

the panel, one at the front and one at the back of the box. The division which runs across the box must also now be fitted into place. Two small holes are drilled near the back end of this, and through them the wires for connecting the grid battery are brought.

Connecting the High Tension

The high-tension battery must now receive attention. Three of the flash-lamp batteries are connected flat on the bottom of the box and the others above them as shown. Those on top are jammed into place by means of the 1 μF shunting condenser, which is connected across the whole of the H.T. battery. The whole of the H.T. must be connected between the terminals H.T. plus 2 and H.T. negative, and the value for the terminal H.T. 1 which supplies the detector valve must be found by trial. When once found the lead may be permanently connected.

Finishing the Receiver

Now put the valves in place, thread the grid bias wires through the holes provided, connect the L.T., and screw the panel down. Connect up the H.T. and the grid bias, which latter should only be used, however, if found of advantage when working the set. Connect the telephones, and the receiver may now be tested. The aerial wire is connected to the C.A.T. terminal and the earth wire to the earth terminal. The earth wire is just laid out on the ground and the aerial wire is attached as high as possible to the nearest tree or fence. If desired the aerial wire may be connected to the terminal A and the condenser used in the series or parallel position by turning the incorporated switch round until it indicates the desired connection. In cases where the aerial wire is suspended very low, the earth wire will not be found necessary. If there is no means of suspending the aerial wire, one length laid on the ground should be connected to the terminal C.A.T., and no other wire connected.

Receiving Chelmsford

To receive Chelmsford take the shorting strap off the two terminals marked "loading coil" and using the condenser in parallel connect the aerial to the terminal A. Always make sure that the filament resistances are turned right to the off position, *i.e.*, as far to the left as possible, before packing up the set.

Test Report

This receiver has been tested out under varying conditions, and proved satisfactory in all cases

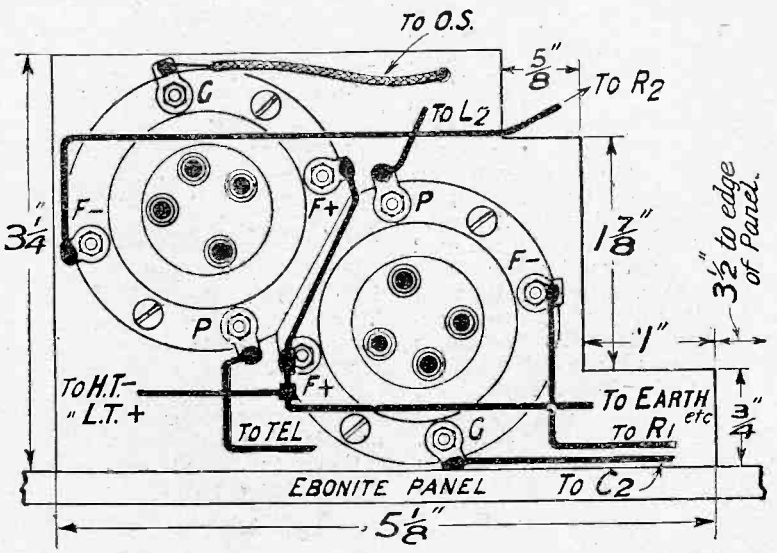


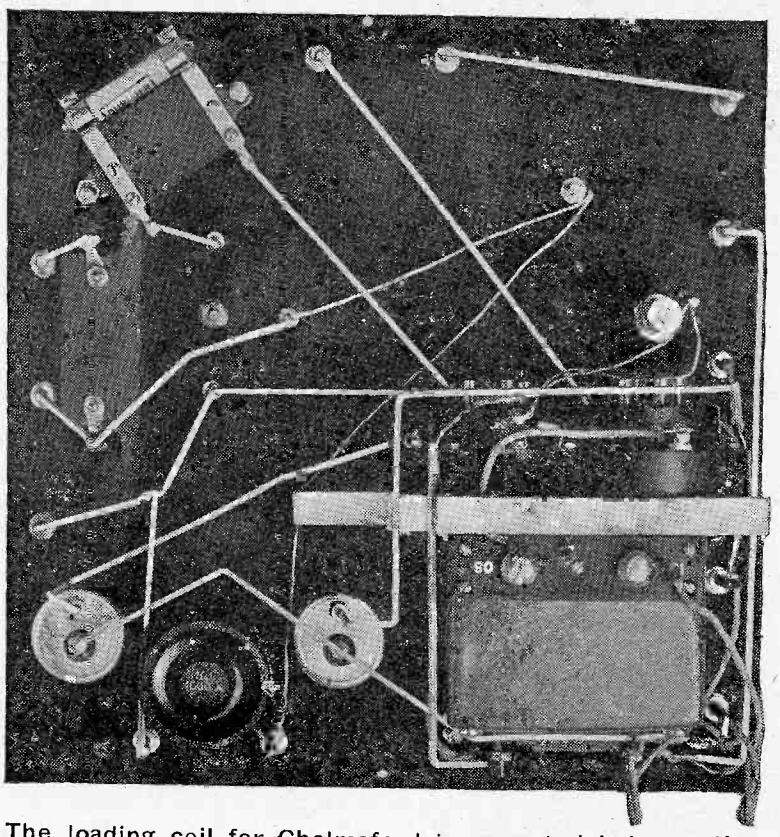
Fig. 6.—When making connections to ne valve holders this diagram will be found helpful.

At about 10 miles S.W. of 2LO, with the aerial flex supported in trees at a height of approximately 6 feet, and with the earth flex lying on the ground, signals were extremely loud in the telephones; and when a loud-speaker was connected, moderate loud-speaking resulted. Chelmsford was also received at fair 'phone strength.

With the aerial flex secured at such a short distance from the ground, signals were of practically the same strength, whether the earth flex was connected or not. It was also possible to receive London using the aerial flex only, when it was just laid on the ground, and this station was even tuned in to be just audible without any aerial or earth wires whatever.

The set was next tried with the aerial fixed to a tree about 40 feet high, the earth flex going to an earthed object. Signals were then considerably stronger than before, and several other stations were received, two of the identified ones being Ecole Supérieure and Birmingham.

When tried inside Bush House, a building where it is almost impossible to hear any signals at all, due to the iron and steel framework, telephony was comfortably audible in the head receivers.



The loading coil for Chelmsford is mounted between the filament rheostats underneath the panel.

The "Transatlantic" Receiver.

SIR,—I am writing to let you know that I succeeded in picking up the American station WGY one morning at good strength between 4 a.m. and 5.30 a.m. B.S.T. I listened to them for the whole of this period. The items broadcast were pianoforte solo, orchestral pieces, tenor songs and jazz band. Atmospherics were not too bad, and I also experienced very little fading. The set I was using was the three-valve "Transatlantic" as described in Mr. Percy Harris' book, "Twelve Tested Wireless Sets." I used Cossor P2 valves for the high-frequency side. The potentiometer and filament controls to the high-frequency valves were very critical; in fact, it was not until I took a rheostat of the cheaper variety out and installed one of good make that I succeeded in my endeavours.

As a change from what one generally reads, I would add that my aerial is not a bad one. It is over 50 ft. high at the free end and about 40 ft. at the lead-in end, and it faces due East and West, with the lead-in at the West end. It is a single "Electron" wire and practically unscreened.

The surprising part about the reception was that when I retired for the "night" at 5.30 a.m., it was to all intents and purposes practically daylight, and yet the station could still be heard plainly, although, of course, with less strength.

Wishing your journal every success, and thanking you for the help you have given me in the past.—Yours truly,

Southall. FRED VINCENT.

The S.T. 100.

SIR,—S.T. 100 (Radio Press Envelope No. 1, by Mr. John Scott-Taggart), with home-made condensers, coils and crystal detector—just received Madrid—700 miles—comfortably on 'phones—*small* loud-speaker quietly—but audible.

Congratulations to you, and may your shadow never grow less.—Yours truly, C. A. MCKEON.

Wareham, Dorset.

P.S.—No "brutal" reaction. Aerial and anode coils maximum distance apart.

The Four-Valve Family Receiver.

SIR,—Having recently constructed the 4-Valve Family Receiver (described by Mr. Percy W. Harris in Radio Press Envelope No. 2), I should like to congratulate you on this circuit. When using detector only, on an indoor aerial 6 ft. long, I receive London at good strength on headphones, 4,000 ohms. Using detector and 1 L.F. valve, it works a loud-speaker (Amplion Junior) with sufficient volume to be comfortable in a room 16 feet square. I think this is remarkable. Using 3 valves, H.F., Det. and L.F., I get all B.B.C. stations on same aerial. On outdoor aerial at Eastbourne, with 3 valves, H.F., Det. and L.F., I receive Cardiff, Bournemouth, London, and other stations at loud-speaker strength. I use all "Cossor" valves, and find them admirable for this circuit. I might add I have received also several Continental stations and amateurs. I am a regular reader of M.W. Wishing your paper every success.—Yours truly,

W. DURBAN.

West Hampstead.

Fault Finding

By G. P. KENDALL, B.Sc., *Staff Editor*

An account of some simple and effective tests for fixed condensers.

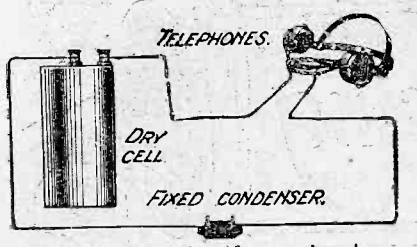


Fig. 1.—Testing for a short circuit or leakage.

THE testing of complete receivers is sometimes an easier matter than the individual testing of certain of the components; thus it may be easier to say that a fault is present in, say, a high frequency transformer, than to say exactly what is the nature of the fault. Of all the components in common use, probably fixed condensers of small or medium capacity are the most difficult to test satisfactorily, and it is usually recommended that the substitution method be employed; that is to say, if there is any reason to suspect that, for example, a grid condenser is defective, it should be taken out and replaced by one in known condition, any alteration which is thereby produced in the behaviour of the set being noted.

The most obvious fault in a condenser is that of defective or entirely broken down insulation between the two sets of plates, and this, of course, is quite easily identified whatever the capacity of the condenser should be when in normal condition. All that is required is to discover whether a direct current will flow between one terminal and the other, and there are a variety of ways available in which this test may be carried out.

Testing for Insulation

Those who possess a galvanometer will find it quite easy to ascertain whether the two sets of plates are properly insulated from one another, by joining the condenser, the galvanometer and a single dry cell all in series. If the insulation of the condenser is entirely broken down, any sort of galvanometer will serve to show that the fault is present, but cases are occasionally met with where the fault takes the form merely of a leak between the two sets of plates, and here a fairly sensitive instrument may be needed to show that a defect exists. Probably the best procedure to adopt is something like this: Assuming that the galvanometer possessed by the experimenter is not sufficiently sensitive to show a deflection with the very minute current flowing through the condenser, the single dry cell should be replaced by a tapped high tension battery and the testing voltage should be gradually increased up to the maximum available, until either a definite reading is obtained, or the experimenter becomes convinced that such leakage as may be taking place is too minute to be revealed by his galvanometer, even with the aid of the maximum available voltage.

An Effective Way

Personally, however, I prefer the crude but highly effective method of using a pair of telephones as the indicating device, since in this way very minute leaks can be detected and one only requires such testing apparatus as will be in the hands of every experimenter. Fig. 1 shows how the test may be carried out, and it will be observed that, as before, the condenser under test, a dry cell and the indicating instrument—in this case a pair of telephones—are all joined in series. The procedure is to touch one of the tags of the telephones upon one side of the fixed condenser, the other side being connected to the dry cell, and note whether clicks are heard or not. A very faint click should be heard upon making the circuit the first time, and practically no click upon breaking the circuit or remaking it if the condenser is not defective. The nature of the actual clicks heard should be discovered by testing a condenser which is known to be in good order, and which is of somewhat similar capacity to the suspected specimen.

The most troublesome fault to identify is that of an internal disconnection. Various methods of discovering such a fault have been suggested, but most of them are decidedly difficult for the ordinary user to carry out, and I think the one illustrated in Fig. 2 will be found preferable in most cases. Here it will be seen that no special apparatus is called for, the necessary adjuncts being merely a high tension battery, a double-pole change-over switch upon a really well insulated base such as the large porcelain type used for aerial and earth switching, and a pair of telephones.

The Method

The procedure in carrying out the test is extremely simple and consists merely in turning the switch over to one side so that the condenser becomes charged to the potential of the H.T. battery and then turning it over to the other, so that the condenser is discharged through the telephones. Quite a strong click should be heard in

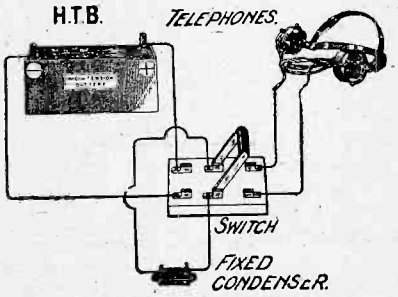


Fig. 2.—How to tell if connection is made to the plates in a small fixed condenser.

the case of a condenser of such a capacity as is used across the telephones, and a rather fainter one in the case of, say, a grid condenser. This test, also, should be carried out first of all as a preliminary measure, with one of known condition and capacity, in order that an idea can be obtained as to the exact indication which will be given by a condenser in good order.

We have so far considered fixed condensers of rather small capacity, such as grid condensers and telephone condensers, but the same method may be used in the case of large reservoir condensers, of the Mansbridge type. Since the charge stored by one of these condensers is relatively large, however, it must be remembered that injury to the phones may result if a high tension battery be used as in the Fig. 2 test. Three volts will be found quite adequate.

A Dilemma

I DO not really know quite what we are going to do about it. The whole thing happened through our being fools enough at the wireless club to appoint that ass Snaggsby a member of the team commissioned to attend an auction sale of ex-Army surplus wireless goods and to bid on our behalf for certain small lots of useful stuff. In the ordinary way I have not a word to say against Snaggsby, except possibly that I suspect him of being a secret oscillator, that he does not know a thing about wireless though he thinks he does, and that he cannot build receiving sets for nuts.

A Cat-astrophe

There are rumours that he drinks his own bath water, but this I do not believe, my own view being that it is impossible for him to do so since he never has a bath. But to return to the present troubles of the Little Puddleton wireless club. Not long ago Poddleby came rushing into the club house waving a newspaper wildly round his head. If you have never seen Poddleby rush, and I do not suppose that you have, you may take it from me that you have missed something. What he lacks in height he makes up for amply in girth, and when these little fat fellows get really under way it is a bad look out for anybody that they happen to meet in transit. On this occasion Poddleby had a free course across the club house, for we all got hastily out of the way when we saw him coming; but the place was so shaken by his bounds across the room that the leads of our largest high-tension battery fell from their safe resting place and landed upon Priscilla. Priscilla is the club cat, her job being to prevent mice from making their little nests amidst the mazy coils of the spare inductances.

Priscilla Electrified

Normally Priscilla is exceedingly well behaved, but apparently 200 volts is a higher potential than can be safely applied to her. She fled across the floor with every hair standing on end and catching sight of Gubbsworthy's new Oxford trousers went to ground in the left leg. Instead of soothing the frightened animal Gubbsworthy went on like a perfect idiot; in fact it took half a dozen of us to hold him down. I was all for making use of little Bingo, who had at that moment arrived with Professor Goop, to bolt Priscilla, but

One half like a Boy Scout.

this suggestion was not accepted. Finally Bumpleby Brown performed the work of rescue. Priscilla was located upon the calf of the leg to which Gubbsworthy assured us she was attached by every claw in her armcury. I therefore held the trouser leg tightly round Gubbsworthy's knee whilst Bumpleby Brown cut away the lower portion with his penknife. Gubbsworthy's subsequent progress down the High Street created quite a stir. Seen from the left he looked like a boy scout, whilst from the right he was a passable imitation of a rowing blue.

The Fateful Meeting

It was resolved to postpone the opening of the meeting for half an hour in order to give Gubbsworthy time to return. When he did so I noticed that he was wearing riding breeches and that he gave Priscilla a very wide berth. As soon as we were assembled round the table Poddleby rose and called our attention to an announcement in the newspaper which he was carrying. It appeared that there was shortly to be held a vast auction sale of war surplus wireless gear and that some of the lots offered were most attractive. After a good deal of discussion the treasurer was asked to state the condition of the club's finances. These, it seemed, were eminently satisfactory owing to the steady stream of vice-presidents at ten pounds a head which continued to flow in. This being so, it was determined that the club should send two representatives with power to bid for one or two especially attractive lots.

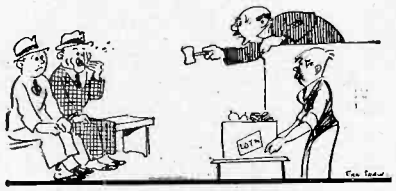
Selecting Delegates

The next point to be decided was the selection of the pair who should enter the lists on behalf of Little Puddleton and do battle by bids against Bilgewater Magna and other clubs in the vicinity, who, we felt sure, would also be there. The chairman, General Blood Thunderby, said that he would volunteer to go himself, but that he had no experience of auctions. Admiral Whiskerton Cuttle stated that he had frequently played auction bridge, but this was not deemed a sufficient qualification. Eventually the choice fell upon Snaggsby, who had once won a

We preserved a gentlemanly silence.

raffle, and myself. You will admit that so far as one of the team was concerned—my modesty prevents me from saying which—there could have been no better choice. It was decided that I should do the actual bidding and that Snaggsby

should sit by me at the sale in an advisory capacity, as well as to make sure that I should not be so far carried away by my enthusiasm as to let my offers run into very large figures. I may say that I regarded Snaggsby's presence as entirely unnecessary, but to humour my fellow members I raised no objection to his being associated with me. It was a sad thing for the club that I did not.



The auctioneer stuck on a further pound.

Other Richards in the Field

On the appointed day Snaggsby and I were seen off at the station by the entire club amidst the waving of hands, hats and handkerchiefs. At Bilgewater Magna two nasty looking fellows got in who promptly began to talk wireless shop. Obviously a rival team. I nudged Snaggsby, whilst simultaneously he nudged me, with the result that our funny bones met. Neither of us of course *meant* to land upon the toes of our adversaries as we descended from our leap, and if they had any decent feeling they would have realised this. As it was they began to talk in the most ill-bred way about hooligans and even worse things than that. Since both of them were several sizes larger than either of us Snaggsby and I preserved a gentlemanly silence, merely treating their rude remarks with the contempt which they deserved.

More Rivals

At each succeeding station down the line other teams got in, and it was obvious that the contest was going to be a keen one. We reached our destination without further adventure, arriving at the sale room a little before the time when the sale was supposed to begin, in order to have a look round. I examined the lots that were to be ours and found that they contained exactly what we wanted. "Snaggsby," I said, clasping his hand, "the honour of Little Puddleton is to-day in our hands. I shall bid as I have never bud before, combining the gentleness of the dove with the cunning of the serpent." Filled with the noblest resolves we made our way to seats in the front row and awaited the opening of the sale with what calmness we could.

The Sale

The room rapidly filled with representatives of other clubs, and presently the auctioneer took his place. The first lot offered was one thousand miles of telephone cable, not guaranteed in good condition. Somebody at the back of the room offered two pounds, and though I did not hear a following bid the auctioneer called "Three pounds. Going, going . . . ." "Five," said a voice from the back of the room, and then things really got going, the lot being finally knocked down to some silent bidder who apparently knew the game so well that it was unnecessary for him to say anything. At that moment a man whom I took to be a reporter collecting for the local paper the names of such celebrities as were present asked Snaggsby his name. He gave it and I added mine, explaining that we were representatives of the Little Puddleton Club. I noticed with some satisfaction that the reporter fellow did not bother about the Bilgewater Magna team, who were sitting next door to us. The next lot put up was 200 portable transmitting sets. The bidding started at a respectable figure here and leaped up five pounds at a time. The transmitters went in the end for seventy-five pounds. "Mr. Snaggsby," said the auctioneer: "Funny thing that you should have a namesake here," I said to Snaggsby. "Isn't it?" he said, and as he did so his head gave a funny little twitch.

On the Nod

Subsequent large lots of telephones, valves, cabinets, inert cells, dynamos and so on were all bought by the rival Mr. Snaggsby. And then came the first lot for which we were to bid. I started in a loud clear voice at ten shillings, which was immediately raised to a pound by the unknown silent bidder. The Bilgewater Magna and other representatives ran things up to a fiver and then seemed prepared to drop out. Only the silent bidder and myself were left. I turned to Snaggsby to ask him in a whisper if he thought that I ought to go any further. Just then his head gave another little twitch and the auctioneer stuck on a further pound. A fresh bidder behind me went one better and Snaggsby twitched again. The horrid truth was borne in upon me. "Do you suffer from St. Vitus's dance?" I whispered hoarsely in his ear. "Only when I am excited," said Snaggsby with a violent twitch which caused the addition of a further pound to our score.

Presence of Mind

With great presence of mind I seized Snaggsby by the hair at the scruff of his neck, so as to prevent his doing any more damage by nodding. The tweak that I gave to his coiffure caused him to jerk his head backwards, and a further pound was called. Hastily I forced his head between his knees, though this cost yet another Fisher and secured the lot for us. Before the next lot could be put up I fairly ran Snaggsby out of the building. But the auctioneer's clerk, the fellow whom I had taken for a reporter, was after us like a flash, insisting upon a payment down on account of lots purchased by Snaggsby. There was nothing for it. We had to part with all our funds and to say that we would take delivery on the following day.

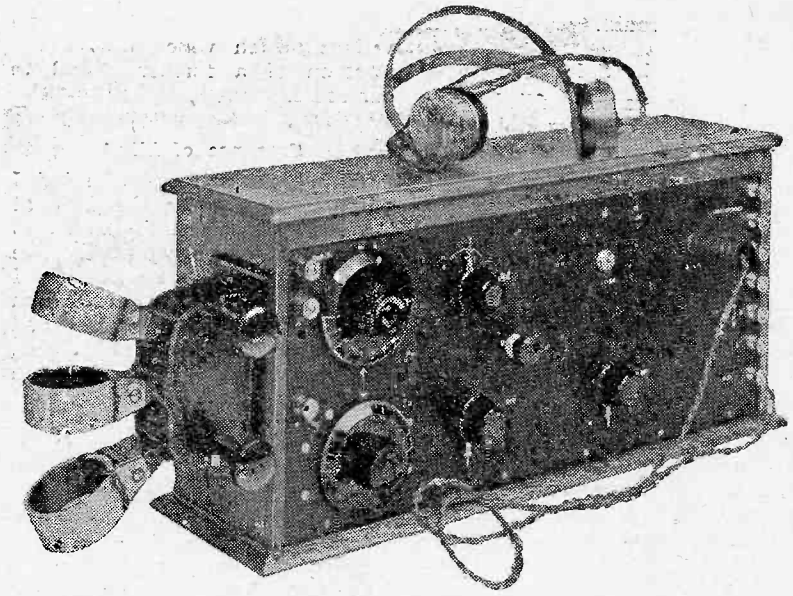
White Elephants

And now the club is in a terrible condition. Our hut is filled from floor to ceiling with truck loads of gear for which we can have no possible use, the war chest is empty and the bank is clamouring loudly that our overdraft should be paid off. We are proposing shortly to hold a disposals sale of our own, so if you want a few hundred miles

I seized him at the scruff of his neck.

of wire or a dynamo or two or any little thing of that kind I trust that you will not fail to attend, bringing with you if possible some friend afflicted in moments of excitement with a head that will not keep still. Meantime we are trying to persuade Snaggsby to become at all events a temporary member of the Bilgewater Magna wireless club.

THE LISTENER-IN.



The completed receiver has an imposing appearance.

A Four Valve Tri-Coil Receiver

By C. P. ALLINSON

IT is generally accepted that the use of a stage of high frequency amplification is desirable for the reception of distant stations, especially when the receiver is installed in a locality that is not too good for reception, or if a short and screened aerial is employed. There are many forms of H.F. coupling that may be employed, and one that is especially to be recommended and which has achieved decided popularity is that known as the Tri-Coil method, which was evolved by Mr. John Scott-Taggart, F.Inst.P., A.M.I.E.E. The September, 1924, issue of MODERN WIRELESS contained an article in which this scheme of H.F. coupling was thoroughly dealt with.

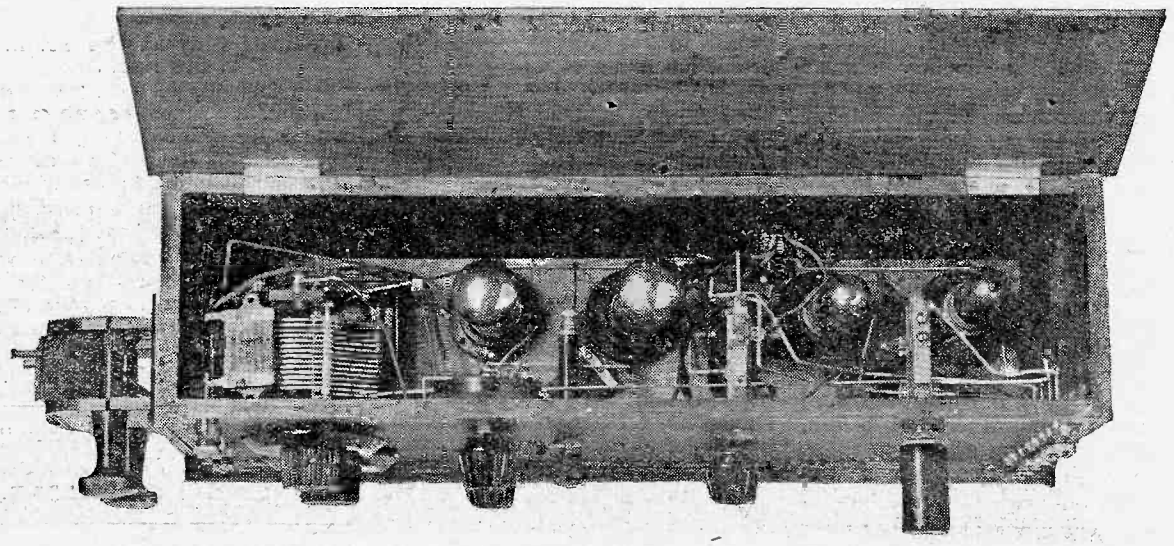
Summer Requirements.

Now that the summer months are here, and conditions with regard to reception are not too satisfactory, the use of H.F. is more or less essential for long distance working, and the above-mentioned method is used in the receiver about to be described. For loud-speaker work on the local station the inclusion of a stage or two of L.F. is required, and as it was desired to assure faithful reproduction, resistance-capacity coupling was employed.

There is on the market a very compact unit which contains the necessary coupling condenser and resistances and this has been employed with excellent results. If the constructor already has other components by him they may, of course, be used, but it would probably be necessary to enlarge the panel in order to accommodate them. If this is done, care should be taken not to alter the layout of the H.F. side in any particular, or loss of efficiency may result.

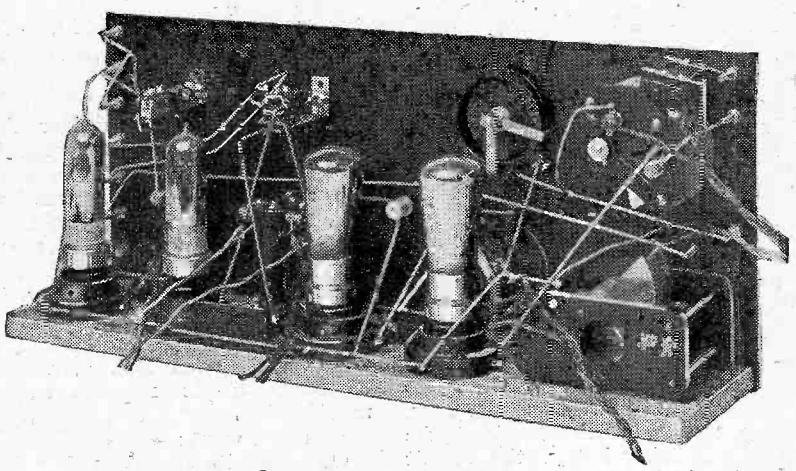
Simple Construction

An examination of the photographs will show that the set has been made very compact, a great advantage when it is desired to move it about. As with the modern dull emitter valve it is very seldom possible to see the filament when it is alight, except through the pip of the valve, it was decided not to use valve windows. This also simplifies the preparation of the ebonite panel carrying the controls, as it is not every constructor who has the



The set does not require much room, since a narrow cabinet is employed

The receiver described in the following article employs the Tri-coil method of H.F. coupling developed by John Scott-Taggart, F.Inst.P., A.M.I.E.E., and described by him in the September issue of "Modern Wireless." Two stages of resistance capacity L.F. amplification are used.



A photograph showing the positions of the valves.

tools necessary for cutting large circular holes.

Jacks have been used to enable two or four valves to be used. When the phones are plugged into the first jack (i.e., the one on the left) they are inserted into the plate circuit of the detector valve in place of the anode resistance. As the resistance of the phones is far lower than that of the coupling resistance, the filament control contacts on the jack have been used to form a two-way switch so that a different value of H.T. may be applied. By this means the effective voltage actually applied to the valve can be made the same whether phones or coupling resistance are in the plate circuit. Terminal H.T. + 2 (Fig. 1) supplies H.T. when the phones are in circuit, and H.T. + 3 when the resistance is in circuit.

Advantages of Jacks

Further, the use of a jack allows a station to be tuned in on the phones, and due to their position in the plate circuit of the detector valve the phones act as a choke coupling, thereby enabling signals to be heard in the loud-speaker when the last two valves are turned on, while the operator is actually tuning them in. The loud-speaker may either be plugged into the second jack or connected to two terminals that are provided and connected across the jack contacts.

If the loud-speaker is connected to the terminals, the phones may be transferred straight to the plate circuit of the second L.F. valve should signals prove too weak with them after the detector only.

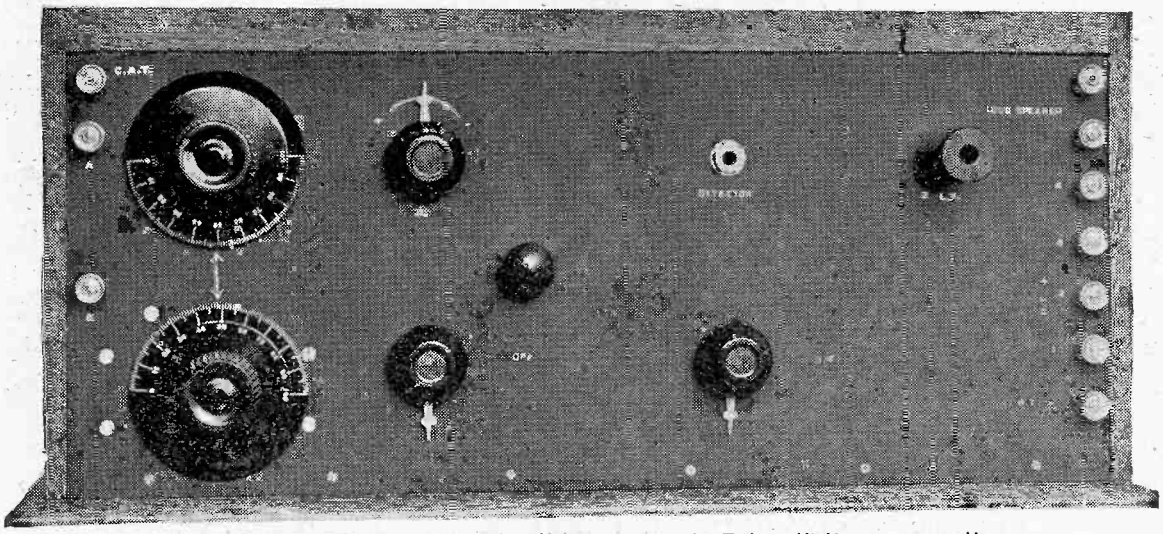
The theoretical circuit diagram is shown in Fig. 1, and should make all the points dealt with in the preceding paragraphs clear. Although at first sight the connections going to jack No. 1 may seem rather involved, a careful examination will show that they are really quite simple, and no difficulty need be experienced when making them.

Aerial Arrangements

It will be seen that either C.A.T. (constant aerial tuning) or plain aerial tuning may be used. The use of the former will, of course, make the receiver more selective, and eliminates the effect upon tuning of variations in aerials and earths. The value of the C.A.T. condenser is marked and it is important that this condenser be of good make, or else it may introduce serious losses into the aerial circuit.

The Circuit

The aerial coil L_1 is tuned by the variable condenser C_1 and variably coupled to L_2, which is an untuned coil in the anode circuit



This close-up view of the panel shows its simplicity very well.

of the H.F. valve. L_2 in turn is coupled to L_3, which is the grid coil of the detector valve and is tuned by a variable condenser C_2. Reaction is obtained by tightening the coupling between L_1 and L_2, while the coupling between L_2 and L_3 has a double function. When this coupling is as tight as possible, tuning L_3 will be practically equivalent to tuning L_2 and results similar to tuned anode coupling will be obtained, with its liability to self oscillation. As the coupling between these two coils is loosened and L_2 becomes more and more truly aperiodic, the tendency to self oscillation will become less, while at the same time, owing to the coupling being looser, the circuit L_3 C_2 will become more selective.

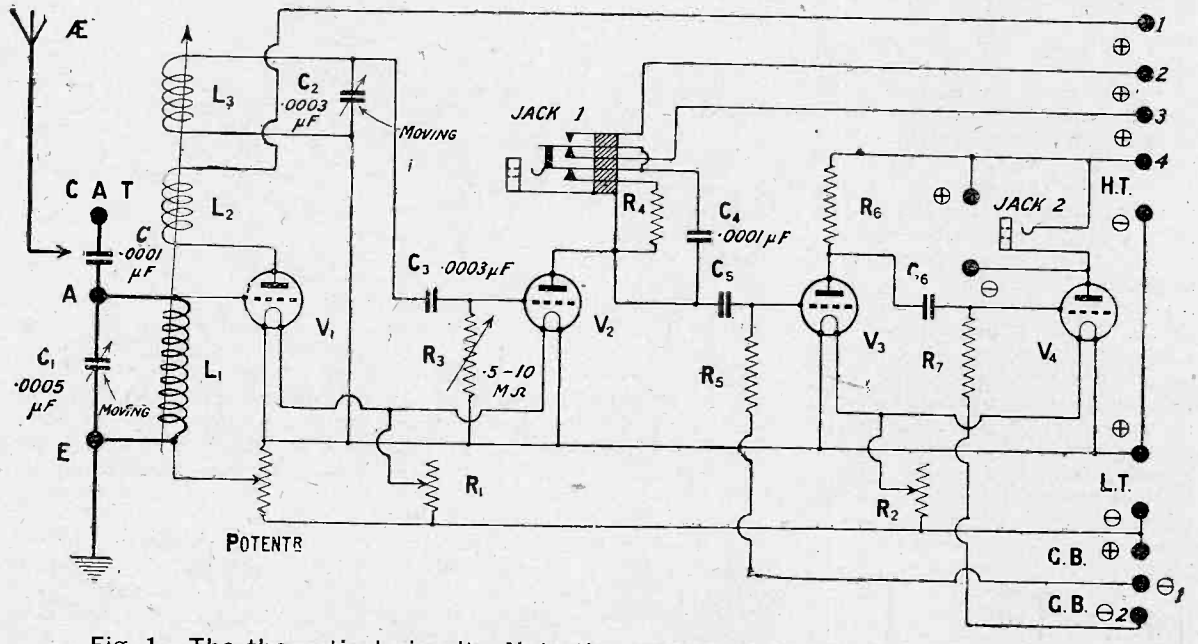


Fig. 1.—The theoretical circuit. Note the method of Jack switching employed.

When the coupling is made still looser, the tuning of the grid coil may become very critical and a little difficult to operate, at least to the novice.

Handling

It will be found that this circuit is different to handle from any of the more usual types of H.F. coupling, and a little practice will be required in order to get the best out of it. A study of the various effects obtained with different degrees of coupling is most interesting, and will give valuable experience even to the more advanced experimenter. Even with plain aerial tuning the setting of the aerial condenser will be found to be quite critical, and if the constructor is in any doubt as to his skill in tuning, it may be advisable to fit a condenser with some form of vernier control.

Components Required

To construct this receiver the following components are needed, and the makers' names have been given as is the usual practice. As long, however, as components of equal quality are used, it is not necessary to adhere strictly to the makes given. The beginner is generally advised to do so, as he can then exactly follow the layout which is given in Fig. 2, which otherwise might require slight modification.

You will want:—

One ebonite panel 18 in. by 7½ in. by ¼ in. (Peter Curtis, Ltd.).

One cabinet for same with a loose baseboard not less than 4¼ in. deep.

One three-coil holder (Burndept Wireless, Ltd.).

One ·0005 μF square law variable condenser (Collinson's Precision Screw Co., Ltd.)

One ·0003 μF square law variable condenser (Success "No loss"). (Beard and Fitch, Ltd.).

One Radion Dial. This was fitted to the "Success" condenser so as to make the appearance of the finished receiver uniform. (American Hard Rubber Co., Ltd.)

Two filament resistances. The dull emitter type has been used here, but if it is intended to use only bright emitter valves suitable resistances may be employed instead (R. A. Rothermel, Ltd.).

One potentiometer (R. A. Rothermel, Ltd.).

Four valve holders. Antiphonics have been used not only to obviate microphonic noises when dull emitters are used, but also to protect the valve filaments from vibration or shock (Burndept Wireless, Ltd.)

Two Polar resistance capacity coupling units (Radio Communication Co., Ltd.).

One ·0003 μF fixed condenser (Dubilier Condenser Co., Ltd.).

One ·0001 μF fixed condenser (Dubilier Condenser Co., Ltd.).

One ·0001 μF fixed condenser (Peter Curtis, Ltd.).

One variable grid leak (Bretwood, Ltd.).

One double circuit, double filament control jack (Elwell Wireless, Ltd.).

One single circuit jack (Elwell Wireless, Ltd.).

One plug (Elwell Wireless, Ltd.).

Ten nickel terminals W.O. type (Burne-Jones & Co., Ltd.).

A quantity of tinned copper wire, flex, etc., for connections.

One set Radio Press Panel Transfers.

Construction

First the ebonite panel must be prepared, and here the constructor may save himself much trouble by obtaining ebonite that is guaranteed free from leakage. Not only can he then be confident that no losses will result, but time and bother will be saved by not having to rub down both sides of the panel with glass paper.

The panel should be drilled in accordance with the layout shown

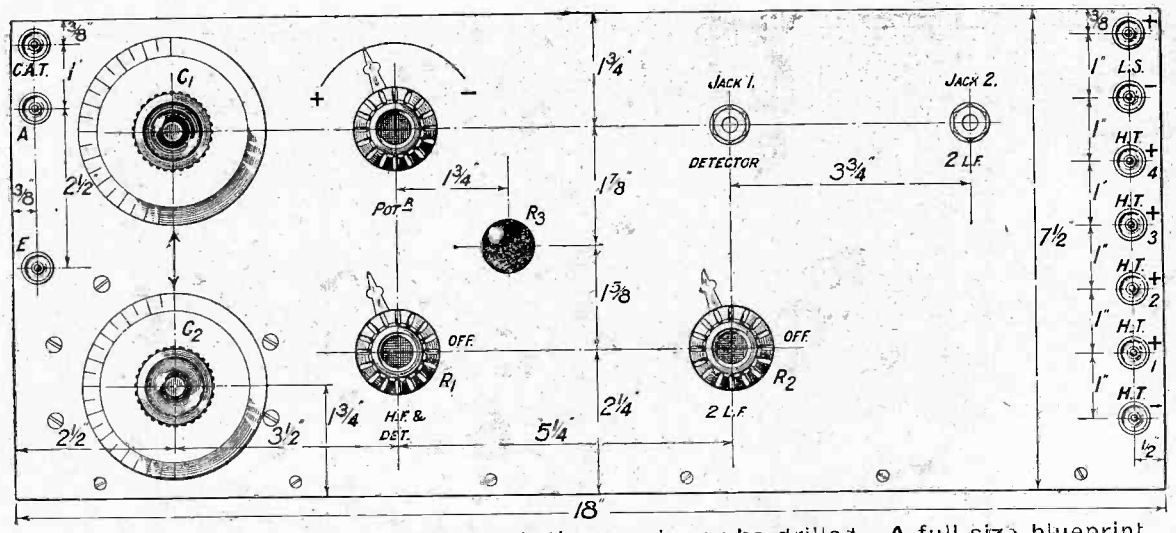


Fig. 2.—From this diagram of the layout, the panel may be drilled. A full-size blueprint, No. 117a, may be obtained for 1s. 6d. post free.

in Fig. 2, and the transfers affixed. Then mount the components and temporarily fasten the panel to the loose baseboard. Follow the layout of the baseboard shown in the wiring diagram, Fig. 3, and place the components that are to be fixed to the baseboard in position and screw them down. Actual measurements may be obtained from Fig. 3, as this is exactly to scale and a simple calculation will give the required dimensions.

Wiring

Remove the panel from the baseboard and make all the connections possible on the former, taking particular care that the connections to the jacks leave ample room to insert and remove valves. Next make as many of the connections as possible on the baseboard and then fix the panel to it by means of six ½ in. No. 3 brass screws and complete the remaining connections. It should be noted that at the point marked "X" a 4 B.A. screw has been put through the panel to support the end of the long lead coming from H.T. + 1, which has a short length of flex soldered on to it to go to one side of L_2. The screw has no other function than that of supporting the lead. In order to make the leads going to jack No. 1 quite clear, a separate diagram is shown in Fig. 4, in which the contacts are numbered to correspond with those in the wiring diagram, and the points to which they should be connected are plainly marked. Before fitting the jacks they should be examined to make sure that when the plug is inserted contact between 2 and 3 is broken and 5 makes contact with 6 and breaks contact with 4. Occasionally the spring leaves are slightly bent and trouble may result that will be difficult to trace.

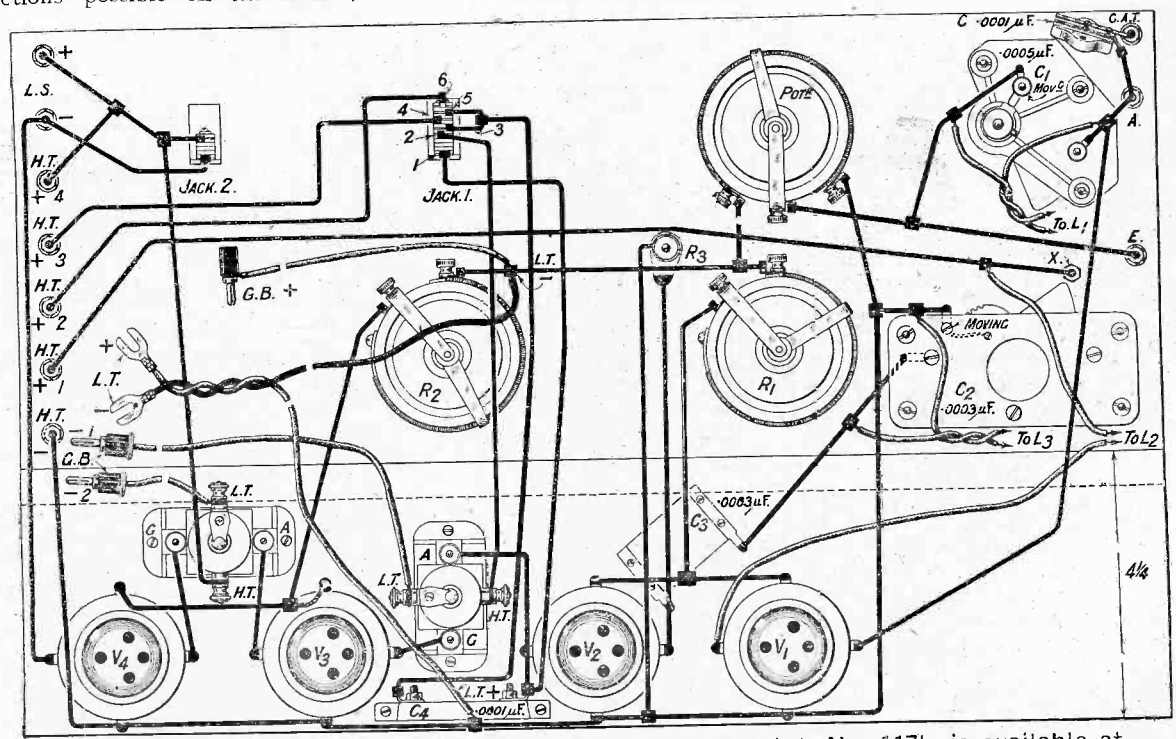
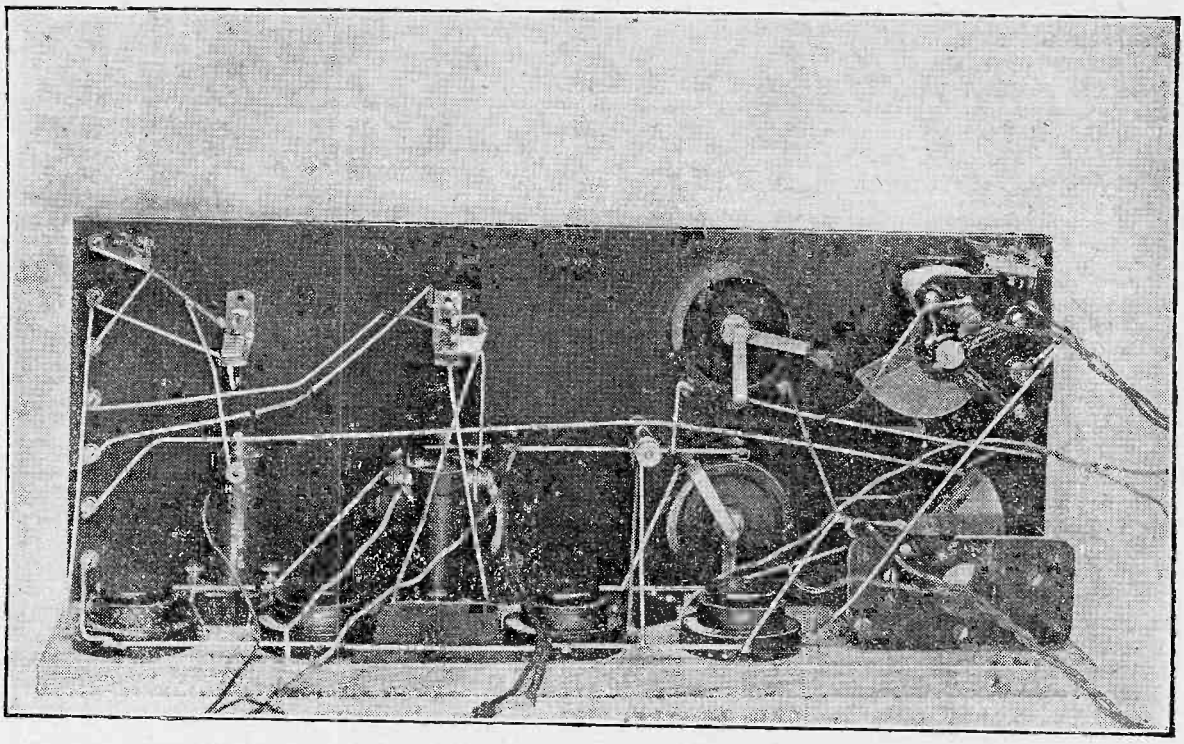


Fig. 3.—The wiring diagram, of which a full-size blueprint, No. 117b, is available at 1s. 6d. post free.



This view of the wiring will be useful when connecting up.

Flexible Connections

It will be seen that permanent flex leads have been fixed to their respective points so as to connect the set to the L.T. supply and to allow of grid bias being applied to the two L.F. valves. Red and black flex have been used, so that no mistake need occur as to the polarity of the leads. These leads may be brought out through a hole drilled at a convenient position in the cabinet. Further holes will be required to bring out the leads going to L_1, L_2 and L_3 in the three-coil holder which is mounted on the left-hand side of the cabinet. This is shown in one of the photographs, and may be fixed where convenient. In the receiver here described L_1 is the top coil, L_2 the middle one, and L_3 the lowest.

Testing Out

First connect aerial and earth to the terminals marked A and E respectively. Connect the two L.T. leads to their terminals, seeing that the red lead goes to positive and the black to negative. Put the plug marked G.B. + into the positive end of the grid battery and the one marked G.B. − 1 into a socket giving, say, 1·5 volts negative and G.B. − 2 into one giving 6. Insert three coils into the coil holder. Suitable values will be L_1 25 or 35, L_2 75 and L_3 50 for the lower broadcast wavelengths; for the higher L_1 may be a 50, L_2 and L_3 each 75. As only two filament resistances are used the valves used must be similar pairs. Two ·06 valves will be suitable for V_1 and V_2, and two similar valves or two 5 volt valves will be suitable for V_3 and V_4. The writer actually used a D.E.5B for V_3 and a B7 for V_4, though other valves can be used successfully. Now put the valves into position and turn them on by means of the filament resistances. If they light correctly connect the various H.T. leads, first momentarily touching them across four or six volts. Should the filament brilliancy change it is obviously necessary to investigate. Suitable values of H.T. will be given by the makers, but the value of H.T. + 2 will need to be found later. For the moment H.T. + 2 and 3 may be strapped together. If everything is all right plug the phones into the detector jack and with L_1 well away from L_2, but with L_2 and L_3 close together, search for the local broadcast transmission. Having found it, gradually tighten the coupling between L_1 and L_2, retuning on the aerial condenser C_1 at the same time and trying the effect of adjustments on the grid coil tuning condenser C_2 as well. If signals do not get louder reverse the leads going to L_1 and try again. It should then be possible to get the set to oscillate, but the moment this occurs loosen the coupling between L_1 and L_2, or nearby listeners will be interfered with.

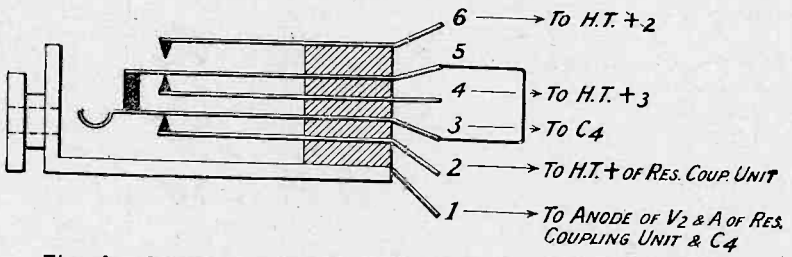
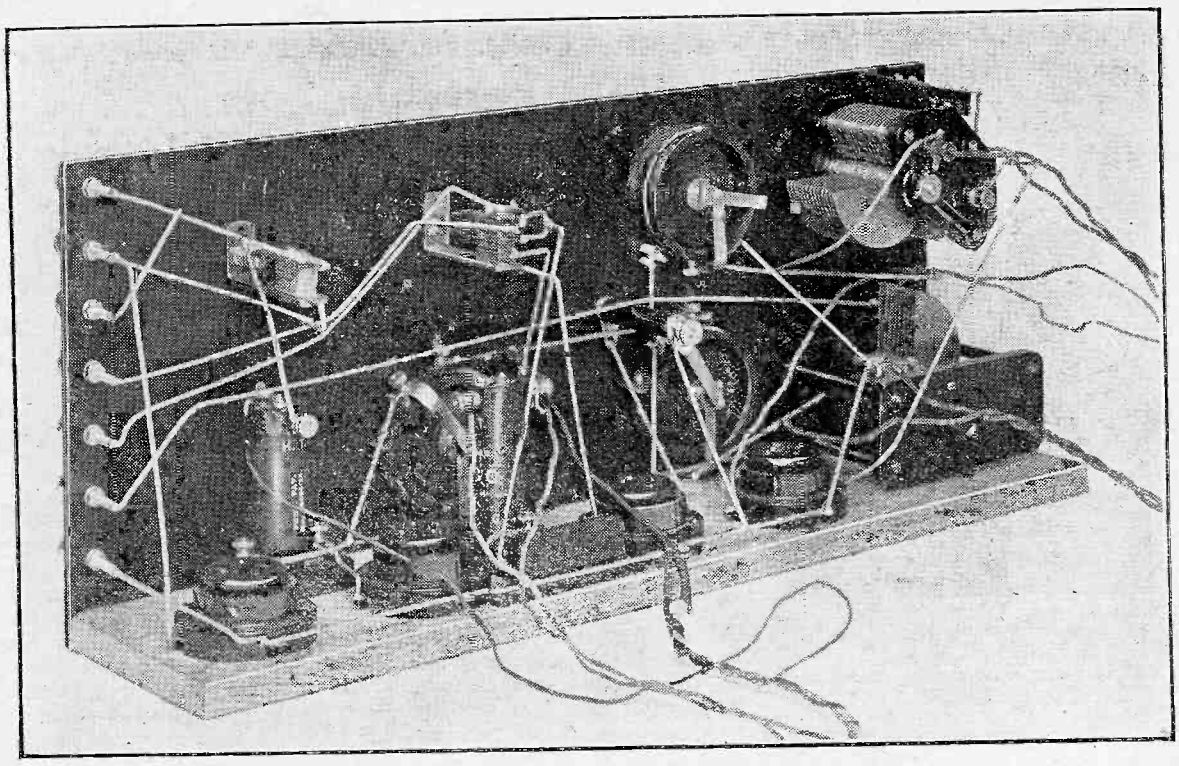


Fig. 4.—A diagram which will make the wiring of Jack L quite easy.

Reversing Leads

The effect of reversing the leads going to L_3 may also be tried, but this should preferably be tried when receiving a distant transmission, so that should the effect



A photograph of the back of the panel which shows the flexible battery connections.

not be very marked, it will be more noticeable than when strong signals are being received.

Having tuned in the transmission as loud as possible in the phones, turn on the two L.F. valves with the loud-speaker either connected to the terminals provided, or else plugged into jack No. 2. For best loud-speaking results the value of H.T. + 4 should not be less than 100 volts and the grid battery tappings should be made as negative as possible without a distortion of the signals occurring. This not only ensures purity of reproduction but also makes for economy of H.T. current.

Adjusting the H.T.

Now comes the question of adjusting H.T. + 2. Having found the best value for H.T. + 3 by experiment, bring the set just off the oscillation point. Take a lead from H.T. + 2 to any convenient tapping and plug the phones into jack No. 1. If the set breaks into oscillation the tapping going to H.T. + 2 should be adjusted till the receiver is just off the oscillation point. This then ensures that when a station has been tuned in on the headphones, these being in the plate circuit of the detector valve, the two stages of L.F. may be switched in without the set either going into oscillation or the station being received going right out. As reaction from the detector valve is not used this adjustment will probably not be found to be critical.

Distant Stations

The experimenter may now search for distant stations and great care should be taken not to cause undue oscillation to the annoyance of listeners in the immediate vicinity. A little patience will be required, but as experience in handling this set is acquired, the B.B.C. and foreign transmissions will be picked up at varying strengths. If operated within ten or fifteen miles of 2LO, especially now that this station is working on increased power, difficulty may be experienced in cutting out interference from this station. In this case the reader is advised to construct a wave trap if he wishes fully to overcome this trouble. A very useful type is the A.B.C. trap described by G. P. Kendall, B.Sc., in Envelope No. 6, which gives complete details for constructing a wave trap that can be used in three different ways.

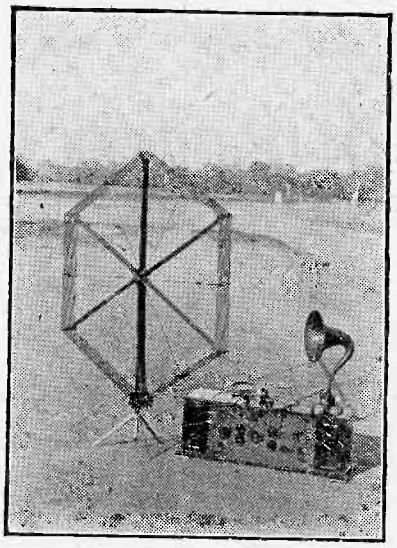
If it is desired to tune in the Chelmsford station, a No. 150 coil should be used for L_1, and a No. 250 for L_2 and L_3

The Local Station

When tried out on a short aerial at about 6 miles from 2LO this station was too loud for comfort, and slight distortion resulted from overloading. When tuned down quality was really excellent, and one could appreciate the fine shades of tone in music more easily. Speech was exceptionally clear, sibilants being well marked. Difficulty was experienced in receiving either Glasgow or Newcastle free from interference, as well as Bournemouth and Manchester. Birmingham, however, was received at fair strength on the loud-speaker, as were also a couple of Continental stations which were not identified. FPTT was only fair strength in the phones. Hamburg, however, was coming in well as usual, and in the course of an hour's search twelve to fifteen transmissions were heard though not all free from interference from 2LO.

Indoor Aerial

On an indoor aerial fifteen feet long, and a counterpoise earth consisting of a piece of wire ten feet long on the floor, 2LO was comfortable loud-speaker strength. At least half a dozen stations were heard in the phones in the course of a short test on this indoor aerial, some being at quite good strength.



Portable Sets

A Chat on "Wireless in the Open Air"

By PERCY W. HARRIS, Member I.R.E., Assistant Editor.

Just what a portable set will, and will not do, is discussed by Mr. Harris in this article, which will help readers to view open air wireless in the right perspective

EACH year when the season of fine weather comes round there is a great deal of talk about portable sets and open-air radio. In every wireless society you will find the man who has built a wonderful portable set which will get "all stations on the loud-speaker" using a couple of valves and a frame aerial in the lid of the box. In fact, portable wireless sets are discussed in such a way as to lead the beginner to think that portable wireless is a distinct class of the art, with its own special technique.

Preliminary Considerations

If you are considering the question of building or buying a portable set, it is just as well to get rid of the impression that there is anything strange or wonderful about a portable receiver. Many people who should know better have written a great deal of nonsense on the subject, and this article is an attempt to clear up many difficulties which worry the beginner who wants to know just what a portable set can do.

The first portable set was undoubtedly that which Senator Marconi brought to England in 1896. The transmitting portion was certainly on the heavy side, but the receiving part of the outfit would compare favourably in weight with many of the alleged portable sets which are sold to-day. For that matter, almost any wireless set is readily portable, save those which are built into cabinets as big as grand pianos. What we generally mean when we refer to a portable wireless receiver is one which, besides being portable, is capable of standing a fair amount of hard usage and shock and which is contained in a box with both high and low-tension batteries. Sometimes, too, the box may contain a form of frame aerial, thus saving the trouble of erecting a special aerial at the point where the set is put into use. "But," you will say, "I heard of a set the other day which with only two valves gave splendid signals from nearly all of the broadcasting stations on an aerial consisting of a few feet of wire thrown over a tree. My two-valve set at home, on quite a big outside aerial, will not do anything like so well!" Quite likely. But have you considered the entirely different circumstances under which the sets were used? Most of us are forced by circumstances beyond our control to live in districts or in areas where there are a large number of other houses, and where absorption and screening effects are generally quite marked. If we go for a picnic or a joy-ride, or a club outing, ten chances to one we shall choose a spot away out in the open country, perhaps on the hilltop, and in any case far removed from the rows of houses where most indoor wireless sets are used. Had you taken your own two-valve set to the spot in question and connected it to the same small aerial, it is most probable that the results would have been just as good. In the same way, if you were to connect this "portable" set to your home aerial, the results, compared with those obtained in the open country, might be distinctly disappointing.

Withstanding Shocks

A point that is too often overlooked in the design of a portable set (and in saying this I am referring to both home-built and commercial sets) is the necessity for designing every part to stand jolts, jars and shocks. The best of valve filaments are fragile enough, and crystal detectors are most easily deranged by even the smallest blow on the side of the cabinet. Fortunately there exist several good makes of shock-absorbing valve sockets, and every portable set should make use of them. It is well, too, that the panel carrying the component parts should be mounted on some shock-absorbing supports (spongy-rubber, for example) and all soldered joints should be of the firmest character. A good method of securing wires in portable sets is that described in the following lines. The end of the wire is bent into a loop and held between two lock-nuts, the whole then being soldered together. In this way the risk of vibration jolting off the soldered wire from the point of connection is obviated.

Batteries

The battery equipment of a portable set is usually somewhat of a problem, for both high and low-tension batteries are very heavy. Do not try to economise in weight by buying the smallest possible high-tension batteries. These are never satisfactory, and your enjoyment of a programme may be completely spoiled by noises sounding like atmospherics but really originating in the battery itself. The low-tension supply is worth a little consideration as there are several ways of providing this. At first sight it might appear that dry batteries would be ideal, for they are unspillable and will work in any position. Save for the .06 ampere type of valve, however, the use of dry cells for proper filament lighting is not recommended; and if you have a three-valve set, for example, the weight of dry batteries to give current of the correct voltage (this means a minimum of three cells) will be probably

greater than that of a suitable unspillable accumulator. Remember that with the ·06 ampere type of valve your accumulator can be quite small. Considering again for a moment a three-valve set, the total current consumption will be ·18 ampere. A portable and unspillable accumulator (such as a Lithanode or Oldham) of 10 ampere hours actual capacity will run such a set for over 50 hours on one charge. If you are a car owner and understand electrical matters, you will find it quite simple to run your valves from the car lighting accumulator, thus saving yourself the trouble of carrying around special accumulators for the set.

The Object of the Set

If you are thinking of building for yourself a portable set, I would advise you to have clearly in your mind at the outset exactly what you want the set to do. Having decided on what you require (and do not make your requirements too great!) make the set as simple as possible to comply with these requirements. Do not try to make your portable receiver do everything that a fully equipped indoor set will do. Unless you are desirous of carrying out special experiments, you and your family will probably require the set mainly for listening to the broadcasting station—for getting the news items, sport summaries, and the evening's music after a hot summer day. A properly designed single-valve set with suitable reaction control will give you good telephone strength signals from the nearest broadcasting station in most situations on 20 or 30 feet of insulated wire thrown over the nearest tree, with an earth connection consisting of copper rod driven into the soft ground. Furthermore, there are many beauty spots within crystal range of a broadcasting station, now that relays have been liberally distributed about the country.

Loud-Speaking

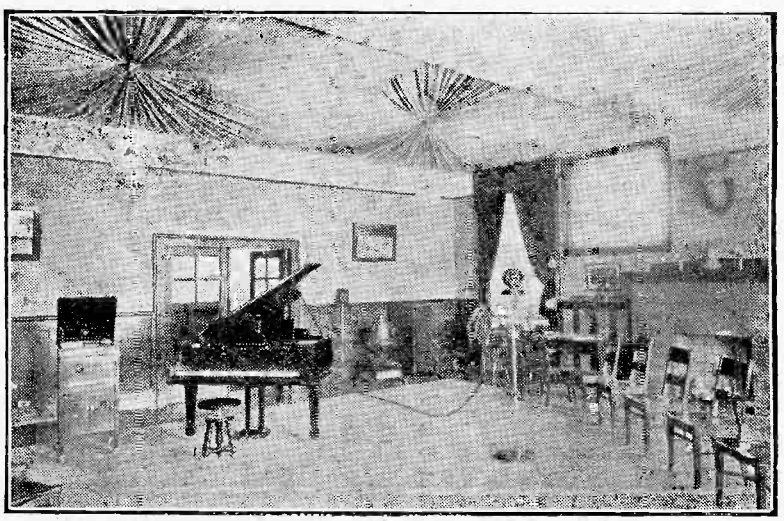
For loud-speaker work a couple of stages of note magnification added to the above set will give all the volume you require without any additional complication of control. This may not worry you personally if you are used to manipulating wireless receivers, but remember that portable sets are much prized by the less technical members of the family, who may like to take it out during the day when you are at business. A detector with reaction and two stages of note magnification is very simple to handle, for one has just to tune the aerial condenser by turning the knob and varying the reaction control, both of which can be taught to even young children within a very short time. Two stages of high frequency would, of course, bring you in a great deal which the receiver mentioned above could not hope to raise, but to get the best out of it would require more skill than is possessed by every member of the family.

Special Circuits

So far I have dealt with what are generally termed "straight" circuits. We have yet to consider reflex and other special circuits which will give a great deal of volume with a limited number of valves, combined with a crystal maybe. Such circuits, when well designed and carefully made, are highly efficient; and if you are used to handling them at home and are acquainted with their peculiarities, there is no reason why such a circuit should not be incorporated in a portable receiver. In addition to reflex, there are a number of special circuits of the "trigger" type, such as super-regenerative and Flewelling circuits, which, after enjoying a burst of popularity, rapidly lost their hold on the radio public and are now "back numbers." Nevertheless, there are one or two commercial sets employing such circuits which operate very satisfactorily. Good headphone signals from two or three broadcasting stations on quite a small frame aerial can be obtained with such receivers in favourable conditions.

The Supersonic Heterodyne

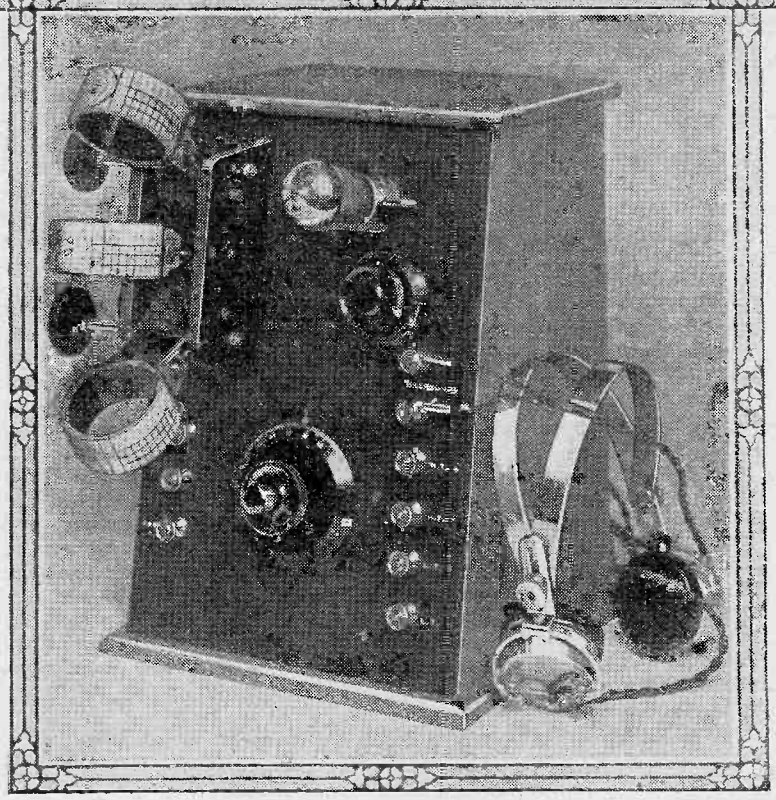
Of course the portable set de-luxe is undoubtedly the Armstrong supersonic heterodyne. Such a receiver, when properly designed, will give full loud-speaker strength from dozens of stations. My own supersonic heterodyne receiver, which I have recently completed, and which is designed with all-British parts to work with British valves, is eminently suitable. With this receiver and a small frame aerial I have received 28 stations on the loud-speaker in one evening. Such a set will, of course, give you all you can possibly require; but if you only need the local station there is no point in taking such an elaborate set with you. Furthermore, it will not give you any better signals from the local station than you can get with a far simpler and less expensive piece of apparatus; and in nine cases out of ten, as I have indicated above, the local station is all you will require, which brings me back again to an earlier point. Make sure you understand the requirements and build your set to meet them and these only. In this way you will get simplicity, the greatest portability, and good results with a minimum of expense. If you want to get the maximum number of stations on the loud-speaker, build a good super-heterodyne; but if the local station in the telephones will satisfy you a one or two-valve set is ample.



The studio of the Canadian National Railways' broadcasting station CNRA, at Moncton, New Brunswick. The scheme of interior decoration is distinctly novel and pleasing.

REINARTZ COUPLING WITH STANDARD COILS

By Stanley G. Rattee, M.I.R.E.



IN those cases where a single-valve regenerative receiver is used for the reception of several B.B.C. stations, it is not unusual to experience some difficulty in eliminating the nearest station, unless some form of selective tuning is incorporated in the receiver.

The manner in which this selectivity may be obtained is largely a matter of personal preference, in that several arrangements are possible, as, for instance, loose-coupling, auto-coupling, wave-traps, and semi-aperiodic, or Reinartz, coupling.

In the receiver illustrated, which is designed for the purpose of eliminating local interference of not too great a strength for the reception of more distant transmission, this latter form of coupling is employed.

The Circuit

On referring to the theoretical circuit diagram, many readers will recognise that this circuit bears very considerable resemblance to one used in my "Single-Valve Receiver for KDKA," described in the March, 1925, issue of MODERN WIRELESS, the main essential difference being that the coupling between the aerial and secondary coils is, in the present instance, variable. Further, whereas in the KDKA receiver special coils were used, the set under description is used with standard plug-in coils, and is not in any way guaranteed to receive American broadcasting.

The form of coupling employed is that used in the well-known Reinartz circuit, though in the latter the aerial and secondary coils are usually wound as one coil, with the aerial connection made to a convenient tapping. This form of coupling, which is very popular in America, was first introduced into this country by Mr. Percy W. Harris, who is also responsible for adapting the circuit for use with plug-in coils.

Aerial Terminals

With this arrangement the aerial coil is represented in the circuit diagram by L_1, whilst L_2 represents the secondary coil, and, as will be noted, this latter is tuned by the variable condenser C_1.

The reaction coil, which is used in the ordinary manner, is shown at L_3. It will be further noticed that in the circuit diagram there are shown two points marked A_1 and A_2, which serve the following purpose. With the aerial connection made to A_1 and the earth connected to E, the circuit is one incorporating semi-aperiodic aerial coupling, whilst with the aerial connected to A_2, with the earth still connected to E, the circuit becomes the straightforward direct-coupled arrangement with which many readers will be familiar.

This inclusion of the two terminals, A_1 and A_2, therefore, permits the comparison of the two possible tuning arrangements, both in the matter of signal strength and selectivity, upon any of the B.B.C. or other wavelengths, exclusive of the ultra-short waves.

The first photograph shows the neat and dignified appearance of the receiver, whilst the telephones alongside give some comparative indication of size. The three-coil holder in the top left-hand corner holds the three standard coils, the lowest being the aerial coil L_1, the centre one holds the secondary coil L_2, which is tuned by the variable condenser shown in the centre of the panel, whilst the third coil is the reaction coil L_3.

The three terminals situated beneath the coil holder are, reading

upwards from the bottom of the panel, the earth terminal E, A_2 for the aerial when direct coupling is used, and A_1 for semi-aperiodic aerial coupling. The valve and its rheostat for filament current control are also easily recognised in the photograph, whilst the terminals on the right-hand side of the panel are for the telephones and batteries.

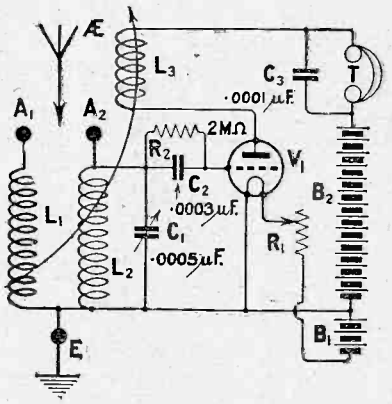
Materials and Components

In order to build a receiver to the design here given, the following components and materials are required, and, as is usual with Radio Press constructional articles, the names of the manufacturers of the actual components incorporated in the receiver illustrated are also given. This latter information is intended for those readers who wish to adhere in every detail in the duplication of the original receiver, and does not necessarily mean that the makes mentioned must be used before results can be obtained, neither is it intended to convey the impression that other makes will not serve equally well:—

One ebonite panel, measuring 8 in. by 11¼ in. by ¼ in. (Paragon). This should be of guaranteed material, and may have either a matt or polished finish.

One three-way coil holder (Peto-Scott Co., Ltd.).

One variable square-law ·0005 μF condenser with vernier (Radio Instruments, Ltd.).



The theoretical circuit.

One dual rheostat (L. McMichael, Ltd.).

One fixed condenser, clip-in type, of ·0001 μF (L. McMichael, Ltd.).

One grid-condenser, ·0003 μF (Dorwood Precision).

One grid-leak of 2 megohms (Dubilier).

Nine nickel-plated terminals (Burne-Jones & Co., Ltd.).

Four nickel-plated valve sockets for panel mounting (Burne-Jones & Co., Ltd.).

Packet Radio Press panel transfers.

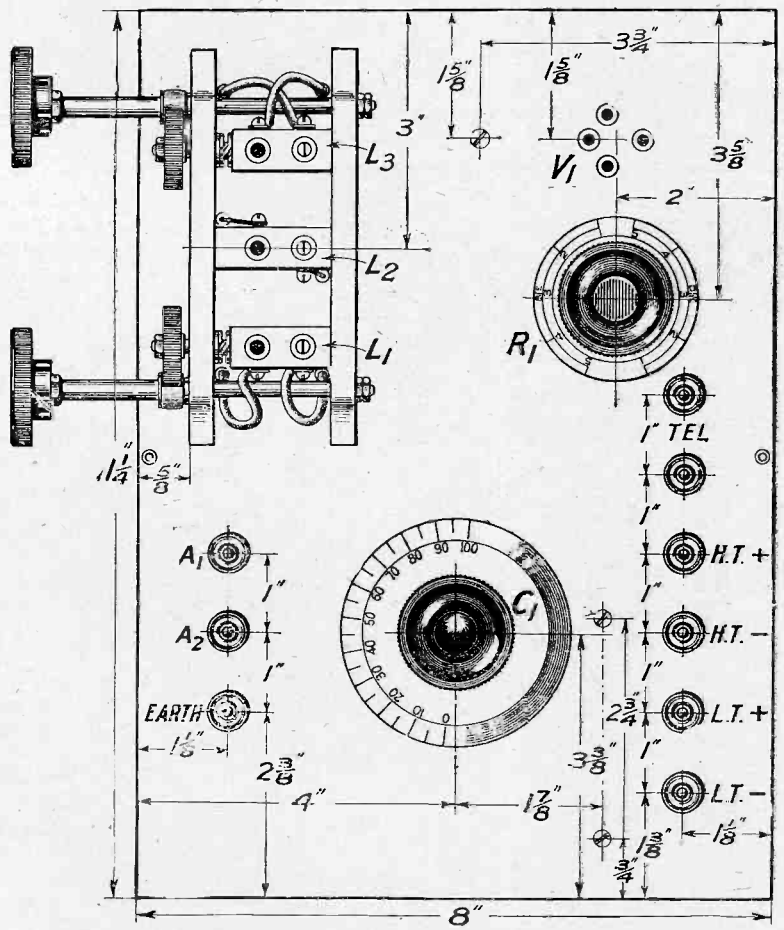
One containing box (Pickett Bros.).

Quantity of square section tinned copper connecting wire.

The Panel

The illustration showing the lay-out indicates also all the necessary dimensions for marking and drilling the panel. When purchasing ebonite for this, it is advisable to obtain the material already squared up to the correct dimensions, otherwise considerable difficulty may result in filing to the desired size unless the constructor has suitable tools in his possession. As pointed out in the list of components, it is as well to ascertain that the material supplied is of the guaranteed variety, that is to say, is free from surface leakage, for otherwise, to ensure that no ill-effects will result from the use of unguaranteed material, it becomes necessary to treat both sides of the panel with a vigorous rubbing of fine emery paper in order to remove the surface skin; the deep black finish which is associated with ebonite may be retrieved by a final rubbing with a soft rag and a drop of oil.

After the panel has been drilled in accordance with the instructions, so long as the components given above are used, it will be necessary to countersink those holes which are intended for the Dorwood Precision and McMichael clip-in condensers.

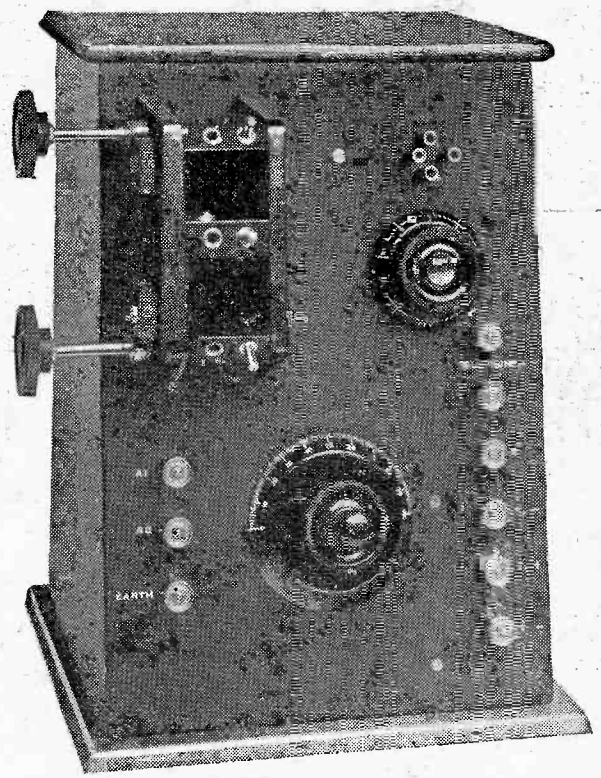


This front of panel diagram gives the necessary dimensions for drilling.

Wiring Up

With all the components mounted in their respective positions, the business of wiring should be commenced, and the design of the receiver is such that there should be no difficulty in this work. The well-spaced components allow of easy accessibility, and all connections are perfectly straightforward, as indicated in the wiring diagram.

When making the connections to the three-coil holder, particular attention should be paid to see that the connections are made to the right coils, and also the right way round to each of the coils, otherwise some difficulty will be experienced when the receiver is tested. The grid-condenser may, if a Dorwood is chosen, at first



With coils and valve removed the convenient position of the tuning controls is better appreciated.

appear a little difficult to understand in the matter of connections, but since complete instructions are given with each component, any slight confusion will be quickly overcome.

Valves

The receiver is fitted with a dual rheostat, thus permitting the use of either a bright or dull emitter valve, and in this connection particular attention should be paid to the value of H.T. voltage applied across the H.T. terminals provided, as any excess in this value will cause the receiver to oscillate most freely and render reaction control a highly difficult operation, particularly when the aerial is connected to the A_1 terminal. For most valves of British manufacture, it will be found that quite a suitable value for good all-round control of the receiver is in the vicinity of 40 volts, for both bright or dull emitter valves.

Testing and Operating

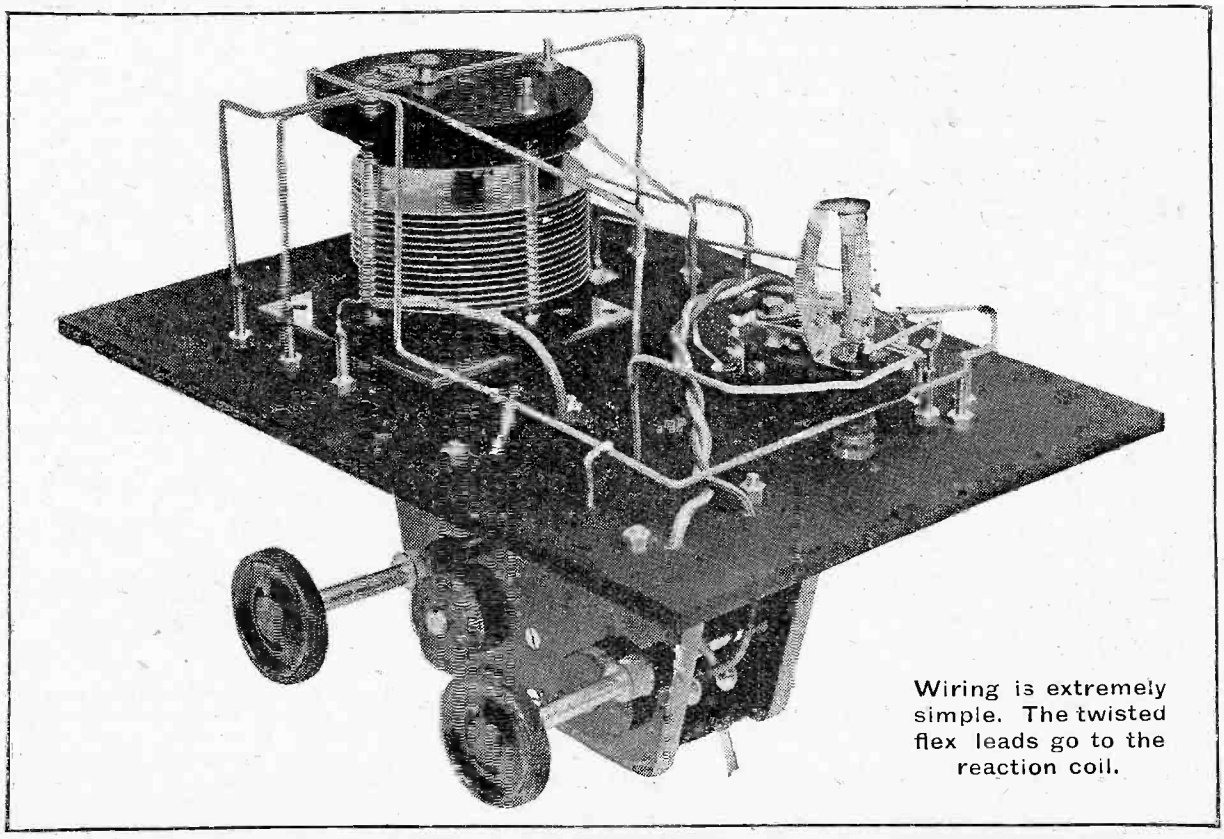
When first testing the set, it is as well to use the direct-coupled arrangement, and after the batteries and telephones have been connected to their proper terminals, as indicated in the illustration of the panel layout, the valve should be inserted in its sockets, having first turned the filament resistance to the "off" position. Using this form of coupling, the centre coil-holder will hold the aerial coil (L_2), whilst the reaction coil will be in the top socket. The aerial, therefore, should be connected to A_2 and the earth to E, leaving the A_1 terminal free and the bottom coil socket empty.

In order that we may tune to those B.B.C. stations whose wave-lengths do not exceed 400 metres, a No. 25 or 35 coil will be required for L_2 (the exact number will depend upon the aerial to which the set in connected), and a No. 50 for reaction. For wave-lengths of B.B.C. stations above 400 metres, excluding Chelmsford, a No. 50 should be used for L_2, with a No. 75 as the reaction coil.

For the reception of Chelmsford or Radio Paris, a No. 150 coil should be chosen for the aerial with a No. 150 or 200 for reaction.

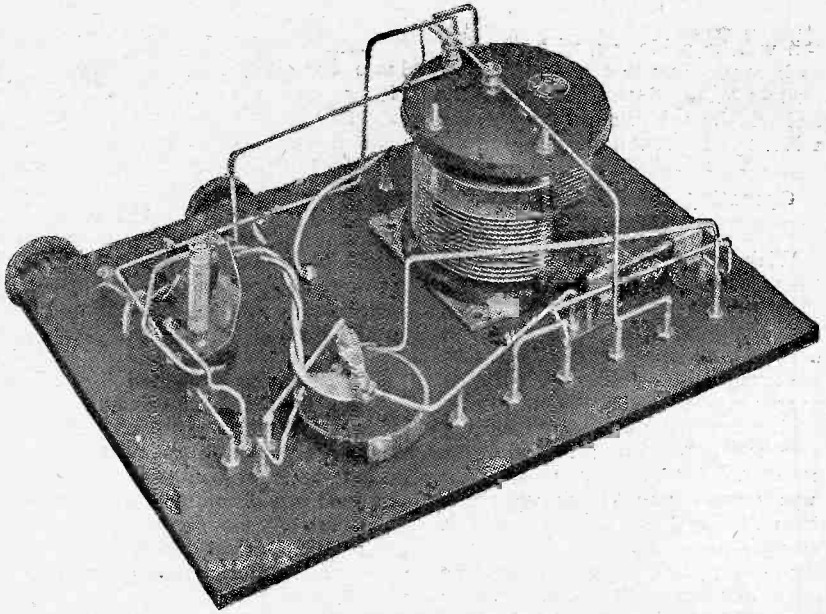
Tuning the Set

With suitable coils inserted in the coil-holder to serve as L_2 and L_3, the actual sizes depending upon

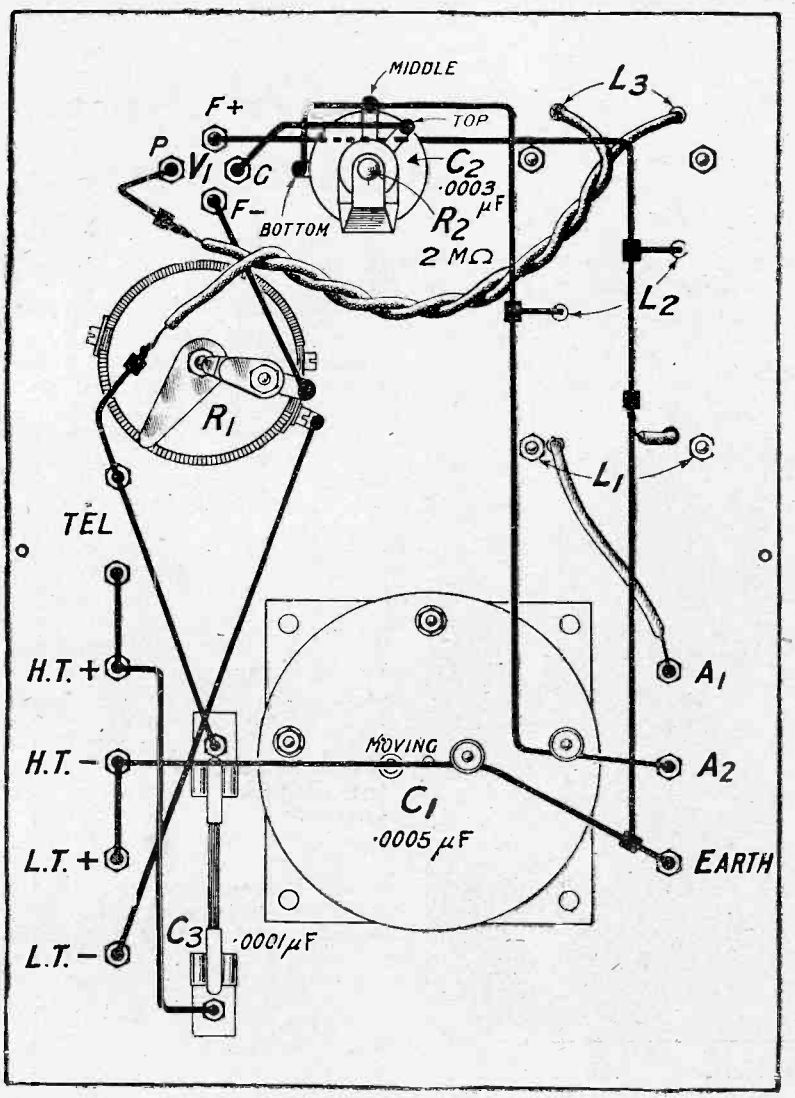


Wiring is extremely simple. The twisted flex leads go to the reaction coil.

the wavelength of the station it is desired to receive (preferably that of the nearest station during the testing operation), the reaction coil should be separated as much as possible from the aerial coil before lighting the valve. With this done, light the valve to a suitable degree of brilliancy, and slowly turn the condenser C_1 until the desired station is heard. If nothing at all is received, move the reaction coil a little nearer to the fixed coil and try once again tuning upon the condenser. When signals have been tuned-in, even though weak, the condenser should be set to the best position for the loudest results, and the reaction coil moved a little nearer the fixed coil until signals become a little louder, taking great care that the set is not made to oscillate. If the adjustment of the reaction coil does not increase signal strength, then the connections to this coil should be reversed. Now leave the reaction coil and readjust the condenser C_1. Again move the reaction coil a little nearer to the aerial coil, making further slight adjustments upon C_1. In making these operations, the movements given to the reaction coil should be through a very small angle, and once the reaction effect is noticed, the adjustments to both reaction coil and condenser should be made with extreme care to avoid oscillating.



This photograph should be used in conjunction with the wiring diagram as a guide to the correct placing of the leads.



The operation of tuning with this direct-coupled method is precisely the same irrespective of wavelength, and once the correct handling of the receiver is mastered the movements of reaction coil and condenser will become a simultaneous operation.

Semi-aperiodic Aerial Coupling

Once the single-circuit arrangement can be operated with success and without annoyance to neighbours, the aerial should be connected to the terminal A_1, leaving A_2 free, with the earth still connected to E, whereupon the receiver becomes a semi-aperiodic aerial coupled arrangement. In this case the bottom coil socket becomes the aerial coil, with the fixed socket as the secondary coil and reaction as before. Coils for this method of tuning are, in the case of the aerial coil, best found by experiment, using for the shorter B.B.C. wavelengths a No. 25, 35 or 50 for the aerial, and a No. 150 coil for Chelmsford and Radio Paris.

For B.B.C. wavelengths up to 400 metres, the secondary coil will be a No. 50 or 75, with a No. 50 for reaction. For the B.B.C. stations up to 500 metres, the secondary

coil will be a No. 75, with reaction as before. In the case of Chelmsford and Radio Paris, the secondary coil will be a No. 200 or 250, with a No. 150 for reaction.

Operating the Loose-coupled Circuit

With a suitable combination of coils, set L_2 and L_3 at right angles to each other, place L_1 near to L_2, and tune with the condenser C_1; if no signals are heard, move both the aerial and reaction coils a little nearer to the fixed coil, again tuning upon the condenser, taking care not to oscillate; in the event of oscillation taking place, the reaction coil should be moved away from the fixed coil. Proceed in this manner until the desired signal is tuned in, whereupon move the aerial coil nearer to or farther away from the fixed coil, according to results, at the same time making slight adjustments upon the variable condenser.

With careful handling of the loose coupling, the result will be either the total elimination of interference or else its reduction to such a strength that the desired signals will be heard above it, usually, however, with a certain loss in signal strength of the desired station. In the majority of cases it will be found that this condition is obtained by the separating of the aerial and secondary coils as much as the desired signals will permit.

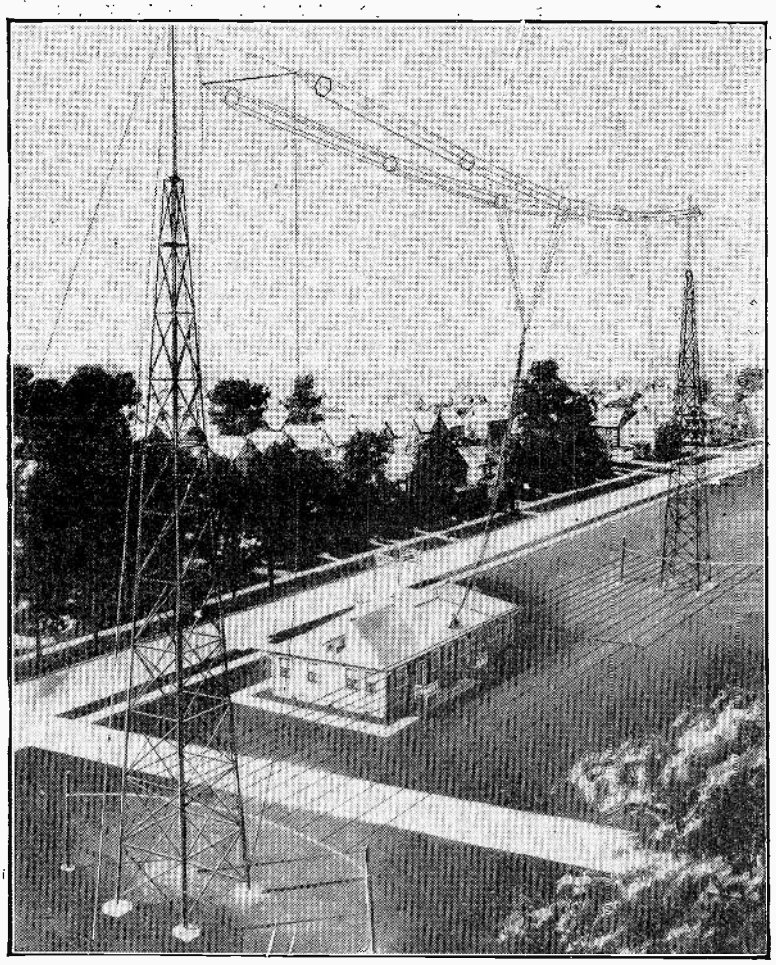
Results Obtained

Using the receiver upon an aerial in S.E. London, excellent results were obtained with the aerial connected to A_1, good signals being obtained from London, Birmingham, Bournemouth, two German stations, and Petit Parisien; the tuning is sharp and somewhat difficult. The reception of Chelmsford was also good, and after loosening the coupling, signals from Radio Paris were also obtained.

With the receiver used as a loose-coupled arrangement, there is a marked tendency for the set to oscillate, a condition which is to be expected, though by keeping the reaction coil as small as possible, reasonable control is obtained. With direct coupling, the receiver behaves in the ordinary manner, though the elimination of 2LO some eight miles from the London station is extremely difficult, and on some wavelengths impossible.

Test Department

The popularity of this department has necessitated greatly increased staff, and, while it is not intended that the department should pay for itself, this fact, together with the high cost of the necessary standard testing instruments, compels us reluctantly to increase the cost of testing to 5/- per valve in a "straight" receiver, to/- being charged for a "dual" valve. In addition, we cannot undertake to test any set in which a departure from Radio Press design has been made. All cheques and postal orders should be made payable to RADIO PRESS SERVICE DEPARTMENT, LTD., and crossed "Not negotiable, Barclay's Bank Ltd., a/c Payee only."

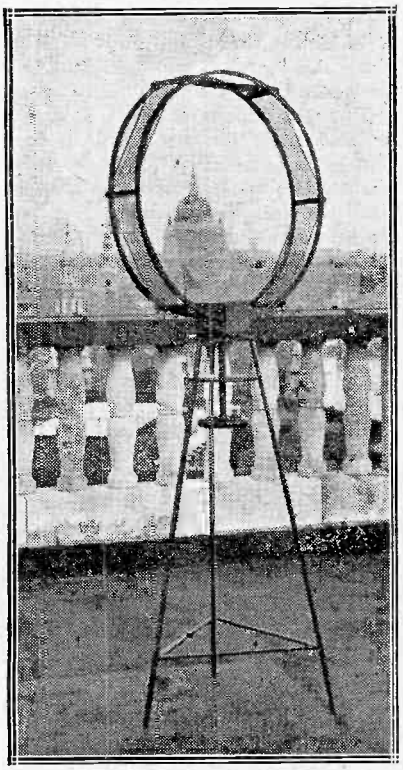


The transmitting station and aerial at WTAM, Cleveland, Ohio.

A Music Lover's Puriflex.

SIR,—I have recently constructed the Music Lover's Puriflex Circuit as described in MODERN WIRELESS for February. Having experimented in wireless since the early days of the Nicol Coherer, I have learnt enough to discover how very little I know about these wonderful Ether Waves, but I must say, until I constructed this circuit, I had listened to no loud-speaker that did not remind one of the gramophone twang (with apologies to the gramophone) and I tried many circuits to get rid of it, but without success until I tried this, and I must say it is a real pleasure to listen to, in conjunction with a Primax loud-speaker and one of the latest R.I. crystal detectors; I don't think the tone can be improved, for the sound vibrations radiate into the room as if the sound waves came direct from the instruments themselves, and it gives me much pleasure in thanking both Mr. Percy Harris, the originator of the circuit, and Mr. Donald Straker, the writer of the article.

Yours truly,
LEONARD R. JONES.
London, E.C.4.



A photograph of the frame aerial taken on the roof of Bush House. St. Paul's may be faintly seen through the loop.

Operating the Nine-Valve Supersonic Heterodyne Receiver

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

(Concluded from p. 486 of the last issue.)

In the conclusion of his article on the nine-valve set Mr. Scott-Taggart gives a detailed account of the working of the instrument and the reader is provided with complete instructions for building the frame aerial.

THE operation of the receiver described in last month's MODERN WIRELESS is not nearly as difficult a matter as might be supposed from the multiplicity of tuning condensers. The four condensers on the top of the panel are not critically adjusted, and the only reasons for using these condensers are that, in the first place, at the time the set was designed, there were no suitable transformers of British manufacture. Moreover, there is always the difficulty of the long-wave side of the apparatus picking up long-wave stations direct, this causing very considerable interference. To avoid this interference, which may vary in different parts of the country, an adjustment of the four condensers may be made so that a different wavelength is employed on the long-wave side of the superheterodyne receiver.

Long-wave Adjustments

If these condensers are set to about 160 deg., no difficulty whatever will be experienced in the working of the set, and any fine adjustments made afterwards are merely a matter of small improvement. Different points on the four condensers may be tried later when experience has been obtained in handling the set, and it will be found that each condenser will have to be adjusted roughly to the same point. Any alteration of these condensers, of course, will necessitate an alteration of the oscillator condenser on the front panel to bring the station back again.

Choice of Valves

The valves recommended for this set are of the A.R. type manufactured by the Edison Swan Electric Company. The recent reduction in price of general purpose valves makes the set come within the scope of many experimenters who already have four or five valves and who wish to build a set using these for supersonic heterodyne purposes. Those who desire to use dull emitter valves will require to make certain modifications in the wiring to ensure proper stability on the high-frequency stages. The initial experiments indicate that a set using the circuit and the components described could not be used for any and every type of valve. It was consequently decided to use the general purpose valve. A disadvantage of the ·06 valve is that it is by no means thoroughly standard as regards its characteristics, and there is a general feeling of nervousness abroad which valve manufacturers will do well to counteract by narrowing the limits in their tests.

It is a much simpler matter to use the ·06 valves if no initial stage of high frequency is used, the first valve being cut out. B5 valves were found to work quite satisfactorily. I would, however, like to reiterate the remarks I made at the beginning of my last month's article.

Connecting the Batteries

Assuming that we have inserted 7 A.R. valves and, say, 2 B4 valves in the last two stages, or 2 general purpose valves of reputable type, it is best to connect up the filament accumulator, which is of the 6 volt pattern, and to test out each valve to see that it lights up properly. The high-tension battery leads are then connected to the terminals, but the plug is not inserted in the positive socket of the high-tension battery until all the valves have been taken out again. Then take one of the valves and insert it in each of the valve sockets in turn. This is merely to avoid any possible risk of burning out the whole of the valves by some error in the wiring. The use of a voltmeter or some other device is, of course, preferable to using a valve as a means of seeing that the circuit is safe. Before carrying out the test with the valve or voltmeter, the anode plug is, of course, placed in the positive terminal of the battery.

H.T. Supply

As regards the H.T. battery used, I recommend an accumulator as some 20 milliamperes are taken by all the valves. A high-tension accumulator, however, is not vital and dry batteries were used with success, although their life, of course, would not be very long if continual use were made of the set. There are two high-tension positive terminals, the H.T. + 1, feeding all but the last two valves, and these latter are fed from the H.T. + 2 terminal. Owing to the signal strength obtainable with the set, the anode voltages were kept fairly low, the H.T.1 voltage being 60 volts, while the H.T.2 voltage was 80 volts. The grid bias terminals shown as G.B – and G.B. + on page 414 of the May issue of MODERN WIRELESS should be short-circuited during the initial experiments. The transformers, it is assumed, are those specified in the original article and for the ordinary broadcast waveband the first transformer on the left of the photograph on page 412 in our last issue is a 300-600 metre McMichael transformer, while the four transformers on the right are of the 2,500-7,000 metre McMichael type (preferably obtained from the makers matched). The oscillator

is of the 300-600 metre pattern, and was designed by myself and made for me by Peto-Scott Company, Limited. It should be seen that the two terminals on the top of this oscillator unit are connected by leads to the two terminals on the top panel designed for these leads. These two terminals are directly beneath the detector valve in Fig. 2, on page 414. When the two small terminals on top of the oscillator unit are connected to the two terminals on the panel, the coupling coil which forms part of the oscillator unit is in the grid circuit of the second valve of the set, the third being the oscillating valve itself.

Connections to the Frame

The frame aerial terminals are now connected across the whole of the frame aerial, a description of which appears later in the article. Instead of this frame aerial it is better to buy a collapsible frame, and I have used with great success a frame aerial placed on the market by the Eureka transformer people (Portable Utilities Company, Ltd.).

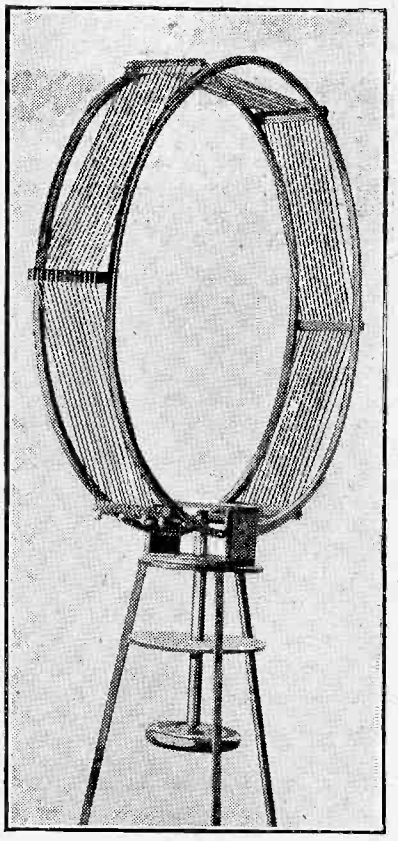
A loud-speaker may be connected on to the loud-speaker terminals of the set, and telephones, if desired, may be connected across the appropriate terminals on the front panel. The amplifier switch is pulled down to the "on" position and the L.T. switch is also pulled down to the "on" position. The change-over switch on the right of the front panel is left in the loud-speaker position.

Reaction Adjustment

Adjust the four variable condensers on top of the panel to 160 deg. and adjust the short wave and long wave potentiometers on the front panel so that neither the short-wave high-frequency amplifier (*i.e.*, the first valve) nor the long-wave valves oscillate. A good test to find out whether either of these two *is* oscillating is to turn round the condenser of the local oscillator, *i.e.*, the right hand variable condenser on the front panel looking at the set from the front. If a large number of chirps are heard as this condenser is turned round, the chances are that the long-wave side is oscillating, but if there are only one or two chirps, it is more than likely to be the first H.F. valve which is oscillating. A little experience will indicate the best position of these potentiometers to avoid either the short or long-wave amplifiers oscillating.

Tuning Up

Having seen that the two amplifiers are quite stable, the left hand and middle variable condenser, on the front panel are adjusted more or less together so as to tune in to a definite wavelength, and the oscillator is then turned round across the whole scale until signals are received. When a signal is heard the left hand and middle variable condensers on the front panel are more accurately adjusted. A final adjustment may then be made on the oscillator condenser. There should be two points fairly close together on the oscillator dial at which signals come in and it is a matter of choice which of these is used for the reception of signals. If there is not a distinct point at which signals come in as the oscillator condenser is turned there is something wrong with the set.



The frame aerial is mounted upon a turn-table type of stand.

Oscillator Connections

A possible, but very improbable fault is that one of the windings of the oscillator unit is connected the wrong way round, but the manufacturers should, of course, and undoubtedly will, turn out these oscillator units correctly wired.

Having obtained signals on the set, the next procedure is to rotate the frame until the loudest results are obtained. The set may now be adjusted to its maximum sensitivity by means of the two potentiometers. The left-hand one controls the reaction on the frame while the other effects the reaction on the long-wave amplifier. Any alteration on the first potentiometer should be accompanied by slight retuning of the left-hand and middle variable condensers on the front panel. A change in the long-wave potentiometer will not require much retuning of the individual stages of the long-wave amplifier, although it is always best to make sure that the four variable condensers on the top panel are accurately adjusted.

In order to obtain the purest reception, a grid bias battery of variable value may be connected across the grid bias terminals, which during the preliminary tests will be kept short-circuited.

Final Adjustments

Under ordinary conditions the lid of the set will be kept closed and all adjustments made on the three variable condensers on the front panel, the final signal being obtained with the two potentiometers. It is assumed, of course, that the best results have been obtained with the rheostats, variable condensers, etc., on the top panel. It is to be noted that the rheostats will affect, to some degree, the reaction effect and they are of value as a means of adjusting the inherent reaction on the long-wave side, provided by each valve. Lowering the filament current of the long-wave amplifying valves will up to a certain limit tend, in most cases, to increase rather than decrease the reaction effect.

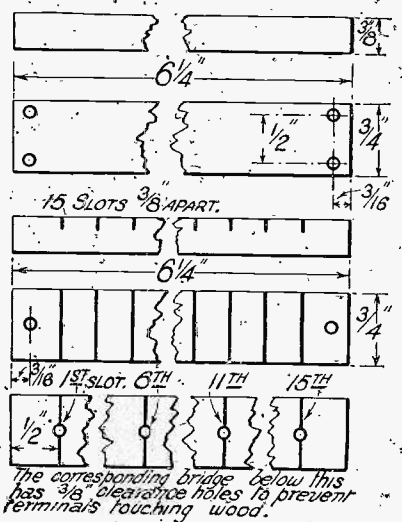
The Frame Aerial

The following description of a frame aerial suitable for use with the nine-valve supersonic heterodyne receiver described in our last month's issue should interest all who require an efficient aerial of this type.

The frame is easily and cheaply constructed, and the design permits ease of manipulation by a circular handle seen in the photographs. The frame itself consists of two wooden hoops of the type used by children, spaced by pieces of wood upon which are mounted ebonite strips suitably slotted to receive the winding.

The list of parts required to build the loop portion of the frame is as follows:—

Two children's hoops, 2 ft. 9 in. diameter.



Figs. 1, 2, 3, illustrating the wooden strips, the ebonite bridges and position of terminals.

Six pieces of wood 6¼ in. long by ¾ in. wide by ⅜ in. thick.

Six pieces of ebonite 6¼ in. long by ¾ in. wide by ⅛ in. thick.

Three doz. ½ in. No. 4 wood screws.

Forty-eight yards rubber-covered flex.

A bottle of varnish stain.

The Hoops

There will be no difficulty in obtaining the hoops, since most toy shops sell these; but it may not be easy to obtain two of exactly the same diameter. If such proves to be the case, two hoops of approximately the same diameter should be purchased, and the exact circumference of the smaller one ascertained by passing a piece of string round its outside edge.

The larger hoop is then taken to pieces by withdrawing the nails at one of the joints in the hoop. The piece of string is then passed round the edge of the hoop and the overlapping strips marked. These pieces are then cut off and the hoop rejoined.

It is now necessary to mark each hoop into six equal parts round the circumference. This may be accomplished by folding a string of the same length as the circumference of the hoops into six equal lengths and utilising one of these lengths as a measure. The measurements should be checked carefully, for it is essential that they be accurate.

The Wood Strips

Fig. 1 illustrates the preparation of the pieces of wood mentioned previously, the holes shown being for use when securing to the hoops. The six pieces are now fixed to the hoops, taking care to space them equally by means of the markings round the circumferences.

It is advisable to fix two bridges on one hoop, one at each side, then fix the other hoop to these. The other bridges are then secured in order round the hoops. At this stage give the loop a good coat of the varnish stain, which will be drying while the other parts are proceeded with.

The Ebonite Bridges

Fig. 2 shows the construction of the ebonite strips. The slots should be cut carefully with a hack-saw, and then slightly widened with the aid of a ward file. This may be obtained from any ironmonger for a few pence. The pieces of ebonite are fitted to the wooden bridge pieces by means of screws, the slots of the former facing outwards.

One of the ebonite pieces carries four terminal tappings from the loop, including the ends of the winding, and Fig. 3 shows where the holes for these terminals are drilled. The holes should, of course, be drilled before fixing the ebonite strip to the bridge piece. The bridge piece to which this is fitted will need to have four ⅝ in. holes drilled into it to clear the ends of the terminals.

The Cradle

The next step is to construct the cradle, which is simply a box to which the frame is fitted.

The materials required for this are as follows:—

One disc of wood ⅜ in. thick, 8 in. diameter.

Two pieces of wood 4 in. by 3½ in. by ⅜ in. thick.

One piece of wood 4 in. by 7 in. by ⅜ in. thick.

A few 1 in. No. 4 wood screws.

In the middle of the disc a 1-in. hole is cut with a centre bit. The two side pieces are then secured to the disc by means of screws, as shown in Fig. 4. In the present model the overlapping pieces have been cut off, but this is not essential. The top piece may now be secured temporarily, and the whole instrument (so far as its construction has proceeded) given a coat of varnish stain.

The Winding

When the loop is dry the wire may be wound on, rubber-covered flex being employed as indicated in the list of materials. The beginning of the wire is placed under the first terminal, which is then tightened down. The first turn is then wound on in the first section of slots, and the winding continued until the second terminal is reached. At this point the wire is bared and secured under the terminal by tightening the latter down. Proceed in this manner until the loop is filled, the 14th turn concluding the winding.

The frame should now be secured to the cradle. Remove the top, place the loop between the sides, and then replace the top. Four screws, whose positions will be seen in Fig. 5, serve to secure the frame to the cradle.

The Stand

The stand requires the following pieces of wood:—

One disc 9 in. diameter.

One disc 10 in. diameter.

Three pieces ½ in. by ½ in. by 4 ft. 3 in. long.

Three pieces ⅜ in. by ¾ in. by 21½ in. long.

One dozen small brass brackets.

Six 1 in. No. 6 wood screws.

Four dozen ⅜ in. No. 4 wood screws.

The two discs may be cut from ⅜ in. wood with a fretsaw, and in the centre of each a 1 in. hole is drilled. The long pieces of wood have their ends cut at a slight angle, and are secured to the 9 in. disc with the 1 in. screws spaced equidistant round the edge of the disc. The second disc is fixed between the legs 5 in. below the top disc, also with the 1 in. screws.

The bottom struts are cut as in Fig. 7, and are secured 9 in. from the bottoms of the legs by small

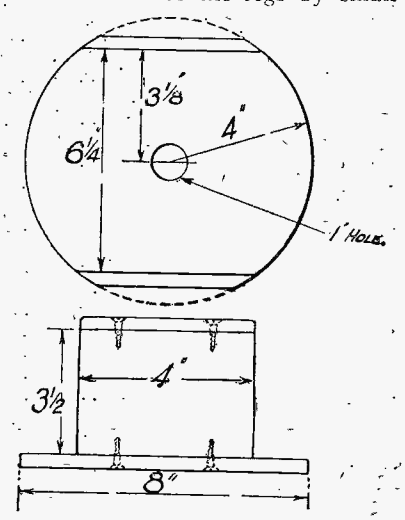
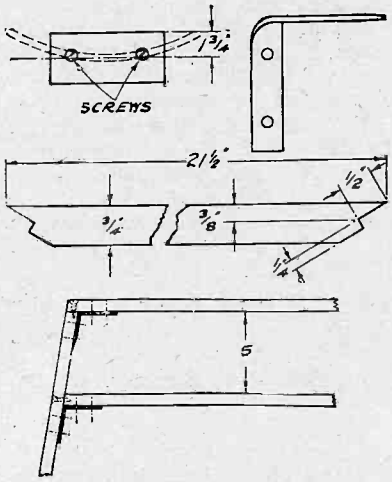


Fig. 4.—Constructional details of the disc and side pieces.

pins or nails. Six brass brackets, bent as in Fig. 6, serve to render the joints more rigid. The brackets are screwed to the wood by means of ⅜ in. screws. Fig. 8 shows how the six remaining brackets are secured to the discs and the legs.

The stand may then be given a coat of varnish stain, and while this is drying, the turning gear may be built.



Figs. 5, 6, 7, 8 showing how the loop is secured to the cradle, the dimensions of struts, the inverted L-shaped brackets, how the discs and legs are secured.

The Turning Gear

This consists of a piece of broom-handle, or other round wood 1 in. in diameter, one end being cut as shown in Fig. 9. To the other end is fixed a wooden handle by which the frame can be rotated. In the present model this handle is in the form of a wheel which was shaped with the aid of a lathe, but other types of handles may be employed with equal effect. A disc of wood ½ in. thick and 7 in. in diameter will be quite suitable. In the centre of the disc drill a 3/16 in. hole, and pass through a 2 in. No. 10 wood screw. Screw the latter firmly into the end of the shaft.

Now cut out a small wooden ring from ⅜ in. wood, 1¾ in. outside diameter and 1 in. inside.

Assembling the Frame

When everything is ready place the loop on the top of the stand so that the holes in the two adjacent discs coincide, the small wooden ring being placed between them. Insert the shaft from the underside of the bottom disc and pass upwards through all the holes until the top of the cradle is reached. A 2 in. No. 10 wood screw then secures the shaft to the cradle, this completing the frame.

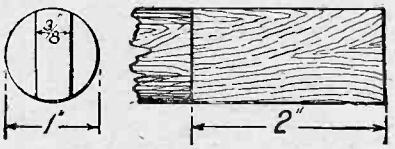


Fig. 9.—The cradle end of the turning shaft.

It may be found that the loop runs a trifle stiffly in its bearings, in which case a little blacklead should be applied to the moving parts, giving special attention to the wooden bearing ring.

TEST REPORT.

Call sign and wavelength	Name	Frame condenser in degrees	H.F. condenser in degrees.	Oscillator condenser in degrees.	Results.
6ST 306 metres	Stoke-on-Trent ..	19	29	48½	Moderately loud 'phone signals (in daylight).
6LV 315 metres	Liverpool	28	40	53	Moderate loud speaking (in daylight).
5NG 328 metres	Nottingham ..	37½	51½	61½	Moderate loud speaking (in daylight).
2DE 331 metres	Dundee	38½	53	63½	Full loud speaking.
5WA 353 metres	Cardiff	49	67	77	Medium loud speaking.
2LO 365 metres	London	56	75	86	Very good loud speaking.
2ZY 375 metres	Manchester ..	61	80	94	Excellent loud speaking. Good loud speaking without 1st H.F.
6BM 385 metres	Bournemouth ..	67	87	101	Full loud speaking. Loud speaking without 1st H.F.
5NO 403 metres	Newcastle* ..	73	95	113	Good loud speaking (in daylight).
5SC 420 metres	Glasgow	80	104	125	Very good loud speaking (in daylight).
2BE 439 metres	Belfast*	87	113	135	Loud speaking (in daylight).
FPTT 450 metres	Ecole Sup.* ..	94	122	145	Good loud speaking (in daylight).
5IT 475 metres	Birmingham ..	98½	129	152	Good loud speaking.
5SX 482 metres	Swansea*	100	132	154	Good 'phone strength (in daylight).
2BD 495 metres	Aberdeen	103	138	159	Good loud speaking.

Valves used in Test :—

First eight valves Ediswan A.R., ninth valve B.T.H. B4. H.T. 1—60 volts. H.T. 2—80 volts.

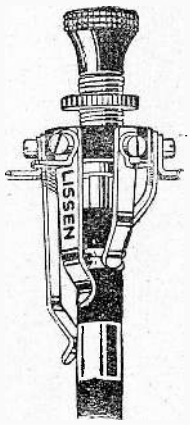
Settings of long wave condensers :—

No. 1 .. 160. No. 2 .. 160. No. 3 .. 160. No. 4 .. 160

* These stations were received during a special daylight test under particularly adverse conditions. A different set of valves was in use, and the condenser readings therefore diverged somewhat from the main series. The readings given in this table were later worked out on the basis of the original series, and are intended to provide the reader with a true idea of the distribution of the stations a round the dials.

LISSENIUM.

WHAT the LISSEN 5-POINT SWITCH DOES



(a) Switches off one stage of L.F. without touching the filament control—a separate switch for each stage.

(b) Connects the telephones to the plate of whichever valve it is desired to use, and at the same time switches off the L.T. current from the unused valve.

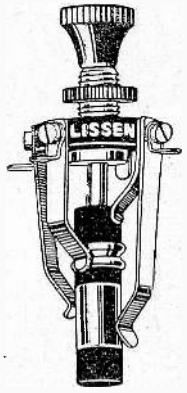
(c) Cuts out a stage of H.F. in the same way as it does L.F. (we do not recommend any switching in H.F. circuits where it can be avoided, but where it is desired to use a switch, this is the switch to use).

(d) Will also disconnect both the H.T. and L.T. batteries, and short the aerial to earth so that the receiver can be left adjusted ready for switching instantly into commission next time. With diagram **4/-**

SWITCHES with a multitude of uses

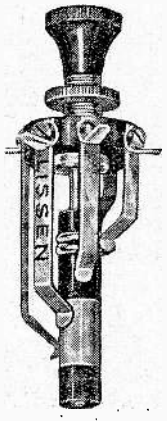
For all switching purposes there is now a LISSEN SWITCH. Each one as small as an efficient switch can possibly be—each one with negligible capacity—each one quickly fitted in an inch of space—LISSEN ONE-HOLE FIXING, OF COURSE. You just gently pull or push and you hear these little switches make with a reassuring click. The contacts do not short when changing over—they are self-cleaning—there are no neater or handier switches.

LISSEN REVERSING SWITCH

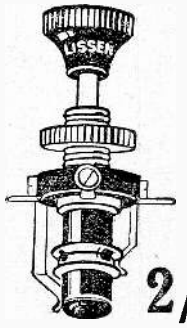


Particularly useful when the LISSEN 5-point switch is used for cutting out one stage of H.F. When a H.F. stage is cut out and reaction is being taken off the aerial circuit, it is necessary to reverse the reaction coil connections for each H.F. stage cut out, and this new LISSEN switch conveniently does it. Can also be used anywhere when it is necessary to reverse the connections of a battery, a coil, or a condenser, for instance, VERY USEFUL FOR COMPARATIVE TESTS. With diagram **4/-**

THE LATEST ADDITION to the LISSEN Family of SWITCHES — the LISSEN Double Pole, Double Throw



This is the very newest of the series, retaining all the neatness of the others, providing in a compact form the means for making all the connections required of d.p., d.t. switch. As good as the rest. LISSEN ONE-HOLE FIXING, OF COURSE. Price **4/-**



2/9

LISSEN 2-WAY SWITCH

Send for TEXT Book of LISSEN Parts— FREE to readers of "Modern Wireless."

CHANGE OF ADDRESS

Our Works at Shepherd's Bush were quite inadequate for satisfactorily dealing with our rapidly increasing production of LISSEN PARTS. We have consequently acquired much larger and more convenient premises from which we shall be able to give even better service and immediate delivery. No wireless dealer should be without an ample stock of LISSEN PARTS, and we should like any reader of this publication who experiences any difficulty in obtaining his requirements to write to us mentioning the name of his usual wireless dealer. Dealers also are asked to send for a copy of our latest TEXT BOOK. OUR NEW ADDRESS IS :—

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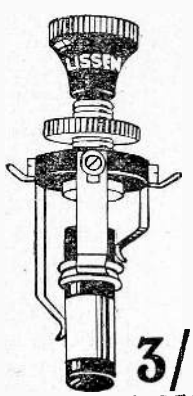

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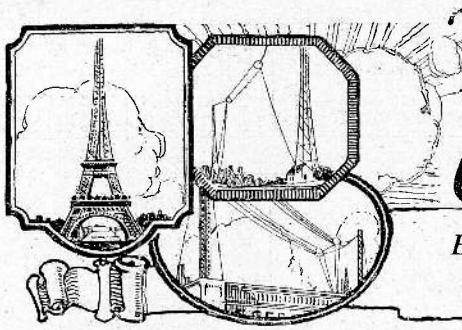
LISSEN SERIES PARALLEL SWITCH



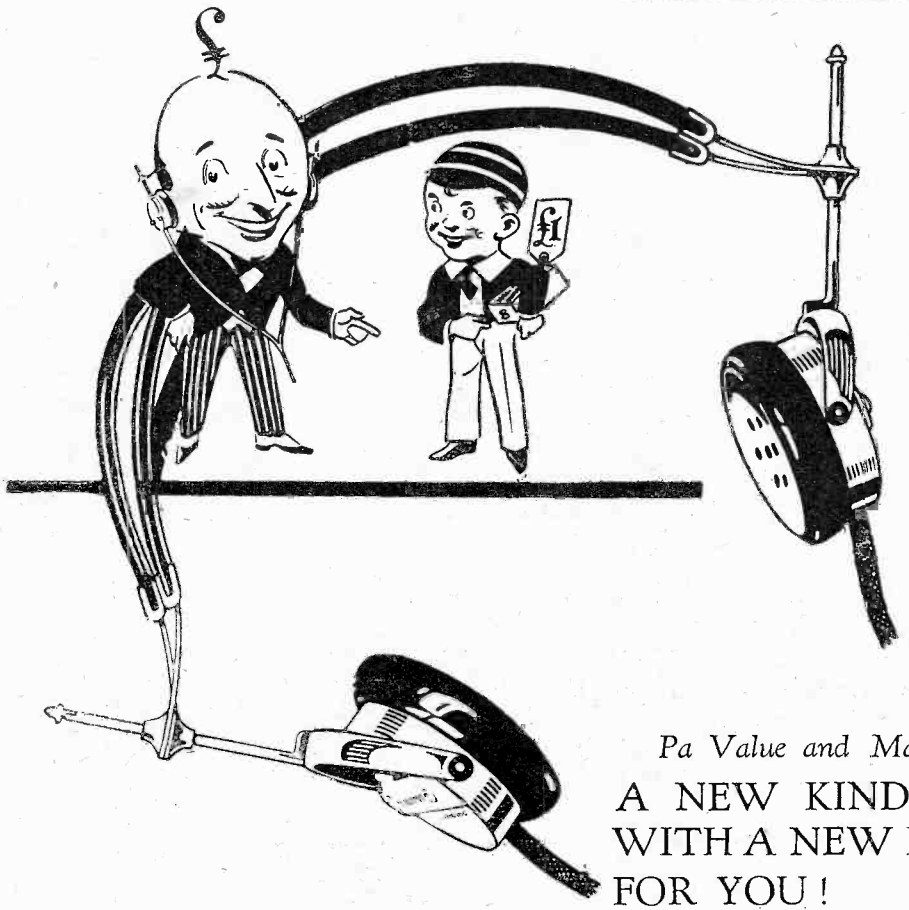
Regular Programmes from Continental Broadcast Stations

Edited by CAPTAIN L. F. PLUGGE, *B.Sc., F.R.Ae.S., F.R.Met.S.*

All Hours of Transmissions reduced to British Summer Time.

Ref. No.	B.S.T.	Name of Station.	Call Sign and Wave-length.	Situation.	Nature of Transmission.	Closing Time or Approx. Duration.	Approx. Power used.
			WEEK DAYS.				
	a.m.						
1	6.55	Hamburg ..	—— 395 m.	Germany ..	Time Signal in C.E.T.	5 mins.	1.5 Kw.
2	7.40	Eiffel Tower ..	FL 2650 m...	Paris ..	Weather Forecast	5 mins.	5 Kw.
4	8.05	Lausanne ..	HB2 850 m.	Switzerland	Weather Report	5 mins.	300 Watts
211	9.0	Radio-Wien ..	—— 530 m.	Austria ..	Market Prices	10 mins.	1 Kw.
9	8.55	Vaz Diaz ..	PCFF 1950 m	Amsterdam	Stocks, Shares and News ..	10 mins.	2 Kw.
8	10.23	Eiffel Tower ..	FL 2650 m.	Paris ..	Time Signal in G.M.T. (Spark) ..	3 mins.	60 Kw.
238	10.55	Vaz Diaz ..	PCFF 1950 m	Amsterdam	Time Signal	3 mins.	2 Kw.
10	11.0	Eiffel Tower ..	FL 2650 m..	Paris ..	Time Signal in Greenwich Sidereal Time (Spark)	5 mins.	60 Watts.
18	11.14	Eiffel Tower ..	FL 2650 m...	Paris ..	Time Signal in Greenwich Time (spoken) followed by Weather Forecast	5 mins.	5 Kw.
180	11.15	Breslau ..	—— 418 m.	Silesia ..	Weather Report—Exchange ..	10 mins.	1.5 Kw.
13	11.44	Eiffel Tower ..	FL 2650 m.	Paris ..	Time Signal in G.M.T. (Spark) ..	3 mins.	60 Kw.
14	11.55	Eiffel Tower ..	FL 2650 m...	Paris ..	Fish Market Quotations, Cotton Exchange (Monday excepted)	10 mins.	5 Kw.
15	11.55	Frankfurt ..	—— 470 m.	Frankfurt ..	Time Signal in C.E.T. (Spoken), followed by News	5 mins.	1 Kw.
	Noon.						
182	12.0	Leipzig ..	—— 454 m.	Germany ..	Concert	12.50 p.m.	700 Watts.
184	12.0	Zurich ..	—— 515 m.	Switzerland	Weather Report	5 mins.	500 Watts.
24	12.0	Vaz Diaz ..	PCFF 1950 m	Amsterdam	Stocks and Shares	8 mins.	2 Kw.
	p.m.						
249	12.5	Breslau ..	—— 418 m.	Silesia ..	Morning Concert...	12.55 p.m.	1.5 Kw.
20	12.15	Voxhaus ..	—— 505 m.	Berlin ..	Exchange Opening Prices ..	5 mins.	1.5 Kw.
30	12.30	Stockholm ..	SASA 430 m.	Sweden ..	Weather Forecast, followed by Exch. and Time Sig. from Nauen	1 p.m.	750 Watts.
32	12.30	Radio-Paris ..	SFR 1780 m.	Clichy ..	Concert, followed by News ..	2 p.m.	8 Kw.
31	12.45	Vaz Diaz ..	PCFF 1950 m	Amsterdam	Stocks and Shares	10 mins.	2 Kw.
251	12.45	Lyons	—— 290 m.	France ..	Concert	1.30 p.m.	300 Watts.
23	12.57	Nauen ..	POZ 3000 m.	Berlin ..	Time Signal in G.M.T. (Spark), This Signal is relayed by Zurich and all German stations except Munich and Stuttgart	8 mins.	50 Kw.
157	1.0	Zurich	—— 515 m.	Switzerland	Weather Forecast, Shares&News	5 mins.	500 Watts.
33	1.0	Haeren ..	BAV 1100 m.	Brussels ..	Weather Forecast in French and English.	8 mins.	150 Watts.
26	1.15	Geneva ..	HB1 1100 m.	Switzerland	Lecture	1.45 p.m.	300 Watts.
27	1.30	Lausanne ..	HB2 850 m.	Switzerland	Weather Report, Time Signal in C.E.T. and News.	15 mins.	300 Watts.
34	2.0	Munich ..	—— 485 m.	Bavaria ..	News and Weather Report ..	10 mins.	1 Kw.
35	2.0	Komarow ..	—— 1800 m	Czecho-slovakia	Stock Exchange and late News	10 mins.	1 Kw.
37	2.15	Voxhaus ..	—— 505 m.	Berlin ..	Stock Exchange News	5 mins.	1.5 Kw.
39	2.45	Eiffel Tower ..	FL 2600 m.	Paris ..	Exchange Opening Prices (Saturday excepted).	8 mins.	5 Kw.
181	3.0	Breslau ..	—— 418 m.	Silesia ..	News and Exchange Quotations	10 mins.	1.5 Kw.
40	3.30	Munster ..	—— 410 m.	Westphalia	Stocks, Shares and News ..	10 mins.	1.5 Kw.
47	3.34	Eiffel Tower ..	FL 2650 m.	Paris ..	Exch. Quotations (Sat. excepted)	5 mins.	5 Kw.
38	3.40	Vaz Diaz ..	PCFF 1950 m	Amsterdam	Stocks, Shares and News ..	10 mins.	2 Kw.
202	4.0	Munster ..	—— 410 m.	Westphalia	Concert or Lecture	5 p.m.	1.5 Kw.
159	4.0	Radio-Wien ..	—— 530 m.	Vienna ..	News, followed by Concert ..	6 p.m.	1.5 Kw.
239	4.25	Royal Dutch Meteorological Inst.	—— 1100 m.	Utrecht (De Bilt)	Night Frost Reports	10 mins.	2 Kw.

Ref. No.	B. S. T.	Name of Station.	Call Sign and Wave-length	Situation.	Nature of Transmission.	Closing Time or Approx. Duration.	Approx. Power used.
			WEEK DAYS (Contd.)				
	p.m.						
42	4.30	Frankfurt ..	—— 470 m.	Germany ..	Light Orchestra	6 p.m.	1 Kw.
43	4.30	Konigsberg ..	—— 463 m.	East Prussia	Light Orchestra (Wed. and Sat., Children's Hour)	6 p.m.	1.5 Kw.
44	4.30	Voxhaus ..	—— 505 m.	Berlin ..	Concert, followed by News ..	6 p.m.	700 Watts.
46	4.30	Leipzig ..	—— 454 m.	Germany ..	Concert	6 p.m.	700 Watts.
52	4.30	Eiffel Tower ..	FL 2650 m.	Paris ..	Exch. Closing Prices (except Sat.)	8 mins.	5 Kw.
250	4.30	Munich ..	—— 485 m.	Bavaria ..	Concert	5.30 p.m.	1 Kw.
158	5.0	Zurich ..	—— 515 m.	Switzerland	Concert by Hotel Baur-au-Lac relayed ..	6 p.m.	500 Watts.
254	5.0	Radio-Toulouse	—— 300 m.	France ..	Concert Tests	5.30 p.m.	400 Watts.
160	5.0	Breslau ..	—— 418 m.	Silesia ..	Light Orchestra	6 p.m.	1.5 Kw.
226	5.0	Stuttgart ..	—— 443 m.	Wurtemburg	Concert	6.30 p.m.	1 Kw.
54	5.0	Radio-Belge ..	SBR 265 m.	Brussels ..	Concert, followed by News ..	6 p.m.	2.5 Kw.
240	5.10	Vaz Diaz ..	PCFF 1950 m	Amsterdam	Time Signal	3 mins.	2 Kw.
186	6.0	Frankfurt ..	—— 470 m.	Germany ..	Lectures	7.30 p.m.	1 Kw.
187	6.0	Hamburg ..	—— 395 m.	Germany ..	Music or Lecture	7.0 p.m.	1.5 Kw.
241	6.0	Warsaw ..	PTR 385 m.	Poland ..	Concert	7.0 p.m.	——
247	6.10	Hilversum ..	NSF 1050 m.	Holland ..	Concert	8.10 p.m.	4 Kw.
162	6.15	Eiffel Tower ..	FL 2650 m.	Paris ..	Concert, followed by News Bulletin	7.10 p.m.	5 Kw.
161	6.30	Munich ..	—— 485 m.	Bavaria ..	Lecture	7.15 p.m.	1 Kw.
177	7.0	Radio-Barcelona	EAJ1 325 m.	Barcelona	Concert	Midnight	650 Watts.
63	7.30	Stuttgart ..	—— 443 m.	Wurtemburg	Lecture, followed by Evening Programme.	11 p.m.	1 Kw.
234	7.30	Strassnice ..	—— 550 m.	Prague ..	Concert	10 p.m.	1 Kw.
58	8 0	Eiffel Tower ..	FL 2650 m.	Paris ..	General Weather Forecast ..	8 mins.	5 Kw.
188	8.0	Frankfurt ..	—— 470 m.	Germany ..	Lecture	8.30 p.m.	1 Kw.
61	8.0	Konigsberg ..	—— 463 m.	East Prussia	Concert and Late News ..	10 p.m.	1.5 Kw.
62	8.0	Hamburg ..	—— 395 m.	Germany ..	Concert, Late News and Dance Music.	11 p.m.	1.5 Kw.
66	8.0	Lausanne ..	HB2 850 m.	Switzerland	Concert (Wednesdays excepted)	9.30 p.m.	300 Watts.
74	8.15	Radio-Belge ..	SBR 265 m.	Brussels ..	Concert, preceded and followed by News.	10.10 p.m.	2.5 Kw.
64	8.15	Zurich ..	—— 515 m.	Switzerland	Concert, followed by Late News	10 p.m.	500 Watts.
65	8.15	Leipzig ..	—— 454 m.	Germany ..	Concert and News (3 days a week until 11.30 p.m.)	10 p.m.	700 Watts.
76	8.15	Radio-Paris ..	SFR 1780 m.	Clichy ..	Detailed News Bulletin	8.45 p.m.	8 Kw.
242	8.25	Royal Dutch Meteorological Inst.	—— 1100 m.	Utrecht ..	Night Frost Report	5 mins.	2 Kw.
164	8.30	Radiofonica Italiana	—— 425 m.	Rome ..	Concert, followed by News and Dance Music	11.0 p.m.	4 Kw.
67	8.30	Frankfurt ..	—— 470 m.	Germany ..	Concert and News	11 p.m.	1 Kw.
59	8.30	Munster ..	—— 410 m.	Westphalia	Concert, followed by News ..	10.45 p.m.	1 Kw.
72	8.30	Voxhaus ..	—— 505 m.	Berlin ..	Concert, followed by News and Weather Report	10.30 p.m.	1.5 Kw.
73	8.30	Munich ..	—— 485 m.	Bavaria ..	Concert and News	11 p.m.	1 Kw.
69	8.30	Breslau ..	—— 418 m.	Silesia ..	Concert	10 p.m.	1.5 Kw.
253	8.30	Agen	—— 318 m.	France ..	Exchange Quotations and News Bulletin (Concert once a week)	9 p.m.	250 Watts.
60	8.30	Radio-Wien ..	—— 530 m.	Vienna ..	Evening Programme	10 p.m.	1.5 Kw.
77	8.45	Radio-Paris ..	SFR 1780 m	Clichy ..	Time Signal, followed by Concert	10 p.m.	8 Kw.
228	8 50	Hilversum ..	NSF 1050 m.	Holland ..	Concert	10.50 p.m.	4 Kw.
75	9.0	Ecole Sup. ..	FPTT 450 m.	Paris ..	Concert, sometimes preceded by Lecture, relayed every evening by Lyons on 485 m., 500 w.	11 p.m.	500 Watts.
245	9.0	Lyngby ..	—— 2400 m	Denmark ..	Press News	9.15 p.m.	——
252	9 0	Lyons	—— 290 m.	France ..	Concert	10 p.m.	300 Watts.
78	10.0	Radio-Iberica .	RI 392 m...	Madrid ..	Concert and Advertisements ..	1.0 a.m.	3 Kw.
79	11.0	Eiffel Tower ..	FL 2650 m...	Paris ..	Time Signal in Greenwich Sidereal Time (Spark)	5 mins.	60 Kw.
80	11.10	Eiffel Tower ..	FL 2650 m...	Paris ..	Weather Forecast	5 mins.	5 Kw.
81	11.44	Eiffel Tower ..	FL 2650 m...	Paris ..	Time Signal in G.M.T. (Spark) ..	3 mins.	60 Kw.
82	12.57	Nauen ..	POZ 3000 m.	Berlin ..	Time Signal in G.M.T. (Spark) ..	8 mins.	50 Kw.
			SUNDAYS.				
	a.m.						
83	8.0	Frankfurt ..	—— 470 m.	Germany ..	Morning Prayer	1 hour	1 Kw.
85	8.30	Leipzig ..	—— 454 m.	Germany ..	Morning Prayer	10.0 a.m.	700 Watts.
165	9.0	Konigsberg ..	—— 463 m.	E. Prussia	Morning Prayer	9.45 a.m.	1.5 Kw.
212	9.0	Voxhaus ..	—— 505 m.	Berlin ..	Morning Prayer	10 a.m.	1.5 Kw.



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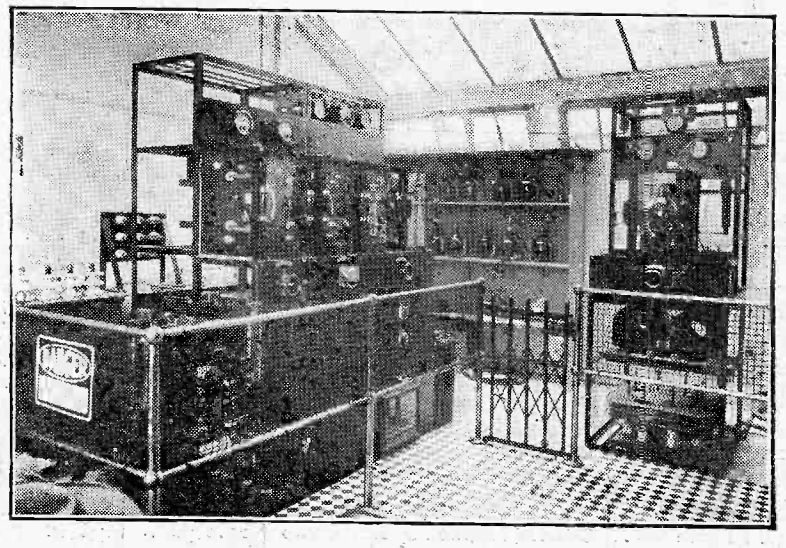
SUNDAYS (Contd.)

Ref. No.	B. S. T.	Name of Station.	Call Sign and Wave-length.	Situation.	Nature of Transmission.	Closing Time or Approx. Duration.	Approx. Power used.
	a.m.						
86	10.0	Komarow ..	—— 1800 m.	Czecho-slovakia	Sacred Concert	1 hour	1 Kw.
256	10.0	Copenhagen ..	—— 775 m.	Denmark ..	Divine Service	11.15 a.m.	1.5 Kw.
87	10.23	Eiffel Tower ..	FL 2650 m.	Paris ..	Time Signal in G.M.T. (Spark) ..	3 mins.	60 Kw.
213	10.40	Bloemendaal ..	—— 345 m.	Holland ..	Divine Service	1 hour	——
89	11.0	Eiffel Tower ..	FL 2650 m.	Paris ..	Time Signal in Greenwich Sidereal Time (Spark)	5 mins.	60 Kw.
97	10.55	Eiffel Tower ..	FL 2650 m.	Paris ..	Fish Market Quotations ..	4 mins.	5 Kw.
90	11.0	Strasnice ..	—— 550 m.	Prague ..	Classical Music	1 hour	1 Kw.
92	11.0	Radio-Wien ..	—— 530 m.	Vienna ..	Concert	12.50 p.m.	1.5 Kw.
94	11.30	Stuttgart ..	—— 443 m.	Wurtemberg	Classical Concert..	1 hour	1 Kw.
192	11.30	Munich ..	—— 485 m.	Bavaria ..	Sacred Concert	12.30 p.m.	1 Kw.
96	11.30	Konigswusterhausen	LP 1500 m.	Berlin ..	Concert	12.50 p.m.	6 Kw.
95	11.44	Eiffel Tower ..	FL 2650 m.	Paris ..	Time Signal in G.M.T. (Spark)	3 mins.	60 Kw.
	Noon						
214	12.0	Munster ..	—— 410 m.	Westphalia	Morning Prayer	1.0 p.m.	1.5 Kw.
98	12.0	Stockholm ..	—— 440 m.	Sweden ..	Divine Service	1.15 p.m.	500 Kw
256	12.0	Breslau ..	—— 418 m.	Silesia ..	Sacred Concert	12.55 p.m.	1.5 Kw.
	p.m.						
102	12.45	Radio-Paris ..	SFR 1750 m.	Clichy ..	Concert, followed by News ..	1.45 p.m.	8 Kw.
101	12.57	Nauen ..	POZ 3000 m.	Berlin ..	Time Signal in G.M.T. (Spark)	3 mins.	——
216	3.0	Lyngby ..	—— 2400 m.	Denmark ..	News	10 mins.	500 Watts.
108	4.0	Munich ..	—— 485 m.	Bavaria ..	Concert	5.0 p.m.	1.5 Kw.
215	4.0	Munster ..	—— 410 m.	Westphalia	Concert	6.0 p.m.	1.5 Kw.
104	4.0	Breslau ..	—— 418 m.	Silesia ..	Children's Stories, followed by concert	6.30 p.m.	1.5 Kw.
107	4.0	Frankfurt ..	—— 470 m.	Germany ..	Children's Corner	5.0 p.m.	1 Kw.
167	4.0	Zurich	—— 515 m.	Switzerland	Hotel Baur au lac, Concert relayed	6.0 p.m.	500 Watts.
106	4.0	Radio-Wien ..	—— 530 m.	Vienna ..	Afternoon Concert	6.0 p.m.	1.5 Kw.
169	4.30	Voxhaus ..	—— 505 m.	Berlin ..	Light Orchestra	6.0 p.m.	1.5 Kw.
170	4.30	Leipzig ..	—— 454 m.	Germany ..	Light Orchestra	6.0 p.m.	700 Watts.
110	4.45	Radio-Paris ..	SFR 1750 m.	Clichy ..	Concert, followed by News ..	1 hour	8 Kw.
105	5.0	Stuttgart ..	—— 443 m.	Wurtemberg	Light Orchestra	6.30 p.m.	1 Kw.
171	5.0	Frankfurt ..	—— 470 m.	Germany ..	Light Orchestra	6.0 p.m.	1 Kw.
168	5.0	Konigsberg ..	—— 463 m.	East Prussia	Light Orchestra	6.0 p.m.	1.5 Kw.
111	5.0	Radio-Belge ..	SBR 265 m.	Brussels ..	Concert	1 hour	2.5 Kw.
217	5.40	Bloemendaal ..	—— 345 m.	Holland ..	Divine Service	6.40 p.m.	——
257	6.0	Hamburg ..	—— 395 m.	Germany ..	Concert	7.0 p.m.	1.5 Kw.
219	6.0	Malmo ..	SASC 270 m.	Sweden ..	Concert	8.0 p.m.	500 Watts.
112	6.15	Eiffel Tower ..	FL 2650 m.	Paris ..	Concert, followed by News ..	1 hour	5 Kw.
237	7.0	Strasnice ..	—— 550 m.	Czecho-slovakia	Concert	9.0 p.m.	1 Kw.
176	8.0	Copenhagen ..	—— 775 m.	Denmark ..	Concert, followed by News ..	9.30 p.m.	1.5 Kw.
114	8.0	Radio-Wien ..	—— 530 m.	Vienna ..	Concert	10.0 p.m.	1 Kw.
118	8.0	Konigsberg ..	—— 463 m.	E. Prussia	Concert	10.0 p.m.	1.5 Kw.
173	8.0	Frankfurt ..	—— 470 m.	Germany ..	Lecture, followed by evening programme	10.0 p.m.	1 Kw.
119	8.0	Hamburg ..	—— 395 m.	Germany ..	Concert, followed by News ..	11.0 p.m.	1.5 Kw.
120	8.0	Eiffel Tower ..	FL 2650 m.	Paris ..	General Weather Forecast ..	8 mins.	5 Kw.
125	8.0	Stuttgart ..	—— 443 m.	Wurtemberg	Concert, Dance Music from 10.0 p.m.	11 p.m.	1 Kw.
174	8.0	Munich ..	—— 485 m.	Bavaria ..	Concert	11.0 p.m.	1 Kw.
124	8.0	Breslau ..	—— 418 m.	Silesia ..	Light Orchestra, Dance Music at 10.0 p.m.	10.30 p.m.	1.5 Kw.
257	8.0	Copenhagen ..	—— 775 m.	Denmark ..	Concert	9.30 p.m.	1.5 Kw.
121	8.0	Lausanne ..	HB2 850 m.	Switzerland	Concert or Talk	9.30 p.m.	300 Watts.
180	8.0	Barcelona ..	EAJ1 325 m.	Spain ..	Concert	10.30 p.m.	650 Watts.
128	8.15	Radio-Paris ..	SFR 1750 m.	Clichy ..	Detailed News Bulletin	9.0 p.m.	8 Kw.
122	8.15	Zurich ..	—— 515 m.	Switzerland	Concert	10.0 p.m.	500 Watts.
123	8.15	Leipzig ..	—— 454 m.	Germany ..	Symphony Concert	10.0 p.m.	700 Watts.
127	8.30	Radio-Belge ..	SBR 265 m.	Brussels ..	Concert, followed by News ..	10.10 p.m.	2.5 Kw.
116	8.30	Munster ..	—— 410 m.	Westphalia	Classical Concert..	10.0 p.m.	1.5 Kw.
220	8.30	Voxhaus ..	—— 505 m.	Berlin ..	Evening Programme, Dance Music relayed from 10.30 p.m.	Midnight	1.5 Kw.
129	8.30	Ecole Superieure	FPTT 458 m.	Paris ..	Concert or Lecture (May begin 15 mins. earlier or later)	10.30 p.m.	5 Kw.
175	8.30	Radiofonica-Italiana	—— 425 m.	Rome ..	Concert, followed by Late News	11.0 p.m.	4 Kw.
130	8.45	Radio-Paris ..	SFR 1750 m.	Clichy ..	Concert, followed by Dance Music	11.0 p.m.	8 Kw.
236	8.55	Hilversum ..	NSF 1050 m.	Holland ..	Concert	10.30 p.m.	3 Kw.

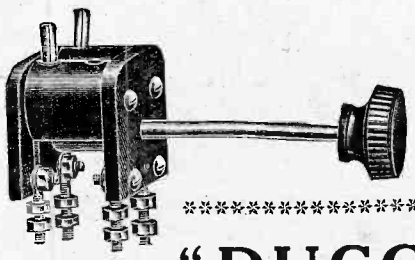
Ref. No.	B S. T.	Name of Station.	Call Sign and Wave-length.	Situation.	Nature of Transmission.	Closing Time or Approx. Duration.	Approx. Power used.
			SUNDAYS (Contd.)				
	p.m.						
131	9.30	Petit-Parisien ..	—— 345 m.	Paris ..	Concert (items announced in English as well as French)	11.0 p.m.	500 Watts.
132	10.0	Radio-Iberica ..	RI 392 m.	Spain ..	Concert	1.0 a.m.	3 Kw.
133	11.0	Eiffel Tower ..	FL 2650 m.	Paris ..	Time Signal in Greenwich Sidereal Time (Spark)	3 mins.	60 Kw.
134	11.44	Eiffel Tower ..	FL 2650 m.	Paris ..	Time Signal in Greenwich Mean Time (Spark)	3 mins.	60 Kw.
135	12.57	Nauen ..	POZ 3000 m.	Berlin ..	Time Signal in G.M.T. (Spark) ..	8 mins.	50 Kw.
			SPECIAL DAYS.				
	a.m.						
156	11.0	Radio-Wien ..	—— 530 m.	Austria ..	Tues., Thurs., Sat., Concert ..	12.50 p.m.	1.5 Kw.
	p.m.						
224	5.0	Munich ..	—— 485 m.	Bavaria ..	Wed., Children's Corner ..	1 hour	1 Kw.
142	5.40	Ned. Seintoos-Fabriek	NSF 1060 m.	Hilversum	Mon., Children's Hour	6.40 p.m.	3 Kw.
203	6.0	Gotenborg ..	SMZX 460 m.	Sweden ..	Tues., Concert	8 p.m.	300 Watts.
137	6.15	Lausanne ..	HB2 850 m.	Switzerland	Wed., Children's Corner ..	1 hour	300 Watts.
180	6.30	Belgrade ..	HFF 1630 m.	Serbia ..	Tues., Thurs. and Sat., Concert ..	1 hour	500 Watts.
147	7.0	Stockholm ..	—— 440 m.	Sweden ..	Wed., Thurs., Fri., Sat., Concert	8 p.m.	——
221	8.0	Copenhagen ..	—— 775 m.	Denmark ..	Thurs. and Sat., Concert ..	9.30 p.m.	1.5 Kw.
258	8.0	Ravangen ..	—— 1095 m.	Denmark ..	Tues., Wed. and Fri., Concert	9 p.m.	800 Watts.
225	8.45	Le Matin ..	SFR 1750 m.	Paris ..	Sat., Special Gala Concert ..	11 p.m.	10 Kw.
223	9.0	Malmo ..	SASC 270 m.	Sweden ..	Thurs. and Sat., Dance Music	11 p.m.	500 Watts.
154	9.30	Petit-Parisien	—— 345 m.	Paris ..	Tues. and Thurs., Concert (items announced in English as well as French)	11.30 p.m.	500 Watts.
151	9.40	Amsterdam ..	PX9 1070 m.	Holland ..	Mondays, Concert	11.40 p.m.	600 Watts.
210	10.0	Radio-Wien ..	—— 530 m.	Vienna ..	Wed. and Sat., Dance Music ..	11.30 p.m.	1.5 Kw.
155	10.0	Radio-Paris ..	SFR 1780 m,	Clichy ..	Two evenings per week, Dance Music	10.45 p.m.	8 Kw.
232	10.0	Voxhaus ..	—— 505 m.	Berlin ..	Thurs. and Sat., Dance Music :	Midnight	1.5 Kw.

The following are German Relay Stations :—

Kassel, 288 m., 1 kw.; relays Frankfurt.
Dresden, 292 m.; mostly relays Leipzig.
Nuremberg, 340 m., 1 kw.; relays Munich.
Graz, 404 m.; relays Radio-Wien.
Bremen, 330 m., 1 kw.; and Hanover 296 m., 1 kw.; relay Hamburg.



An interesting view of some of the apparatus at the London Broadcasting Station.



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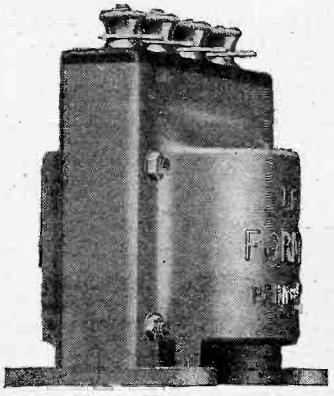

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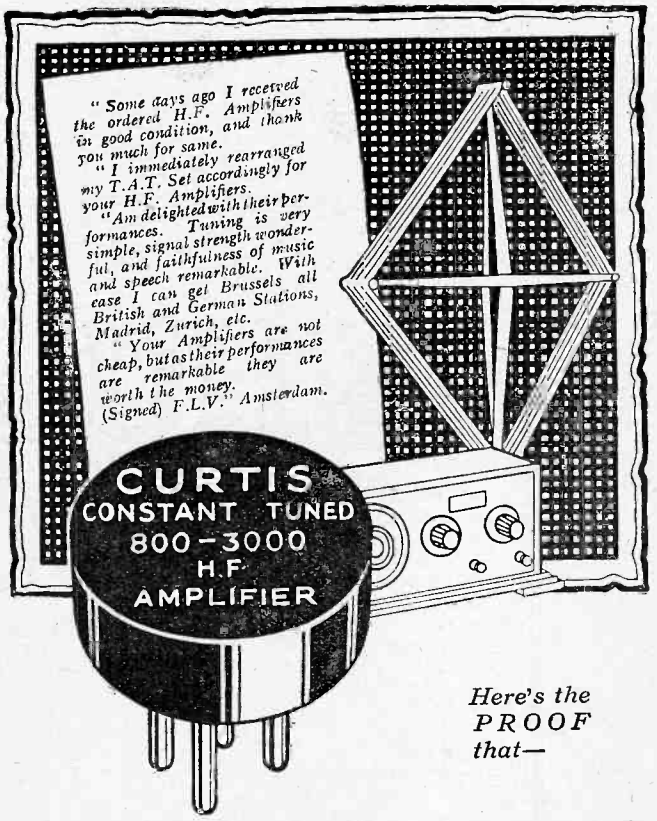

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Type C is especially designed for Super-Heterodynes.

The Curtis Constant-Tuned (Aperiodic) H.F. Amplifiers are obtainable from all dealers. If you have any difficulty please send direct giving name and address of dealer who could not supply.

A few old-fashioned and some very young people believe that multiplicity of tuning controls results in higher efficiency. The more knowledgeable know that multiplicity of controls increases instability and tendency to oscillate; thus efficiency is correspondingly reduced. Up-to-date wireless practice tends entirely to eliminate every possible moving control on a Receiver and aims at minimum control as the ideal.

High-frequency Aperiodic coupling (i.e., Constant-Tuned Amplifiers) being absolutely automatic in its action, represents the most modern Radio practice.

The Curtis Constant-Tuned H.F. (Aperiodic) Amplifier eliminates the potentiometer—that hopeless bludgeon of Radio efficiency—all the tendency to self-oscillate and guarantees absolute stability with maximum Radio efficiency. Indispensable for Maximum Efficiency and Purity of Reproduction, with all High Frequency and Super-Heterodyne Circuits.

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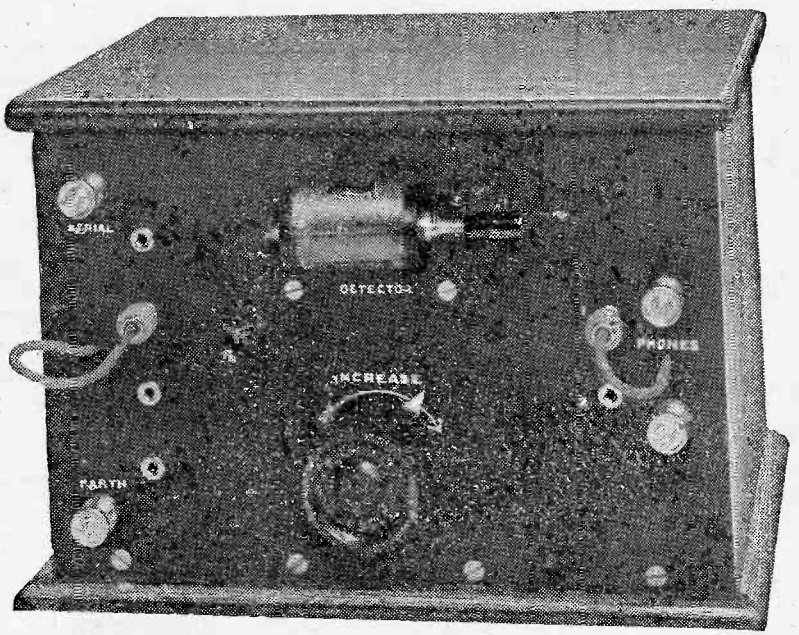
A Crystal Receiver with Eddy Current Tuning

By E. J. MARRIOTT.

The form of tuning employed in the receiver described below possesses several merits, the chief of these being ease of adjustment and immunity from trouble arising through bad contacts.



The finished instrument presents an unusually neat appearance.

IT is a well-known fact that out of the huge number of listeners to broadcast in Great Britain, the great majority use crystal receivers, owing possibly in some cases to the fact that the cost entailed by the upkeep of this type of set is practically negligible, and in others, the local station only being required on the 'phones, a crystal receiver serves admirably.

There are many cases, however, where a crystal is used in preference to a valve owing to the simplicity of the operation. One of the first receivers of the crystal type to be used for receiving broadcast utilised the coil and slider principle. This required only two adjustments — the crystal itself and the slider. But even in this case, the possibility of bad slider

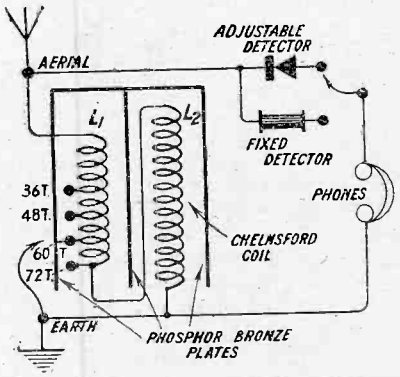


Fig. 1.—The theoretical circuit diagram of the receiver showing the arrangement of the coil tappings.

contact, with consequent bad reception, was always present.

Several other tuning arrangements have been advocated during the past two years, some being designed with the object of obtaining maximum signal strength, others aiming more towards obtaining simplicity of adjustments.

Eddy Current Tuning

In the set to be described an arrangement has been used for varying the wavelength of the aerial circuit, which, whilst doing this effectively, does not come into actual contact with any part of the circuit at all; thus the possibilities of bad contacts are reduced to a minimum.

The arrangement used is called eddy current tuning, and although this method is utilised by two or three commercial firms in their broadcast receivers, it has received very little attention from the amateur constructor.

In eddy current tuning we utilise the effect produced by bringing a copper, phosphor-bronze or other non-magnetic metal plate into the fluctuating field set up when high-frequency currents are passing through a coil.

A Simple Explanation

The plate of metal so used may be compared with a single turn of wire, which, on entering the field set up by high-frequency currents, has high-frequency currents induced in it in the opposite direction, and of considerable strength, due to the low resistance of the tuning spade. These currents cause a field of their own, which, being in the opposite direction, opposes the field around the coil and so reduces the inductance of it. The amount by which the inductance may be increased or decreased depends, within limits, upon the proximity of the plate to the coil.

The limits referred to, however, are rather small compared with other tuning methods, and constitute the main disadvantage of this method, but is somewhat counterbalanced by other advantages.

Component List

Now with regard to the actual construction of the receiver. Here is a complete list of the components actually used, and whilst the makers' names are given, any components of good quality may be substituted :—

Ebonite panel 9 in. by $5\frac{3}{4}$ in. by $\frac{1}{4}$ in. (Peter Curtis, Ltd.)
Cabinet (mahogany), with baseboard, to take panel. (Carrington Mfg. Co., Ltd.)
Six Clix sockets. (Autoveyors, Ltd.)
Two Clix plugs.
One fixed crystal detector. (Bronel), (Wm. R. Bowman, Ltd.)
One adjustable crystal detector. (Burndept Wireless, Ltd.)

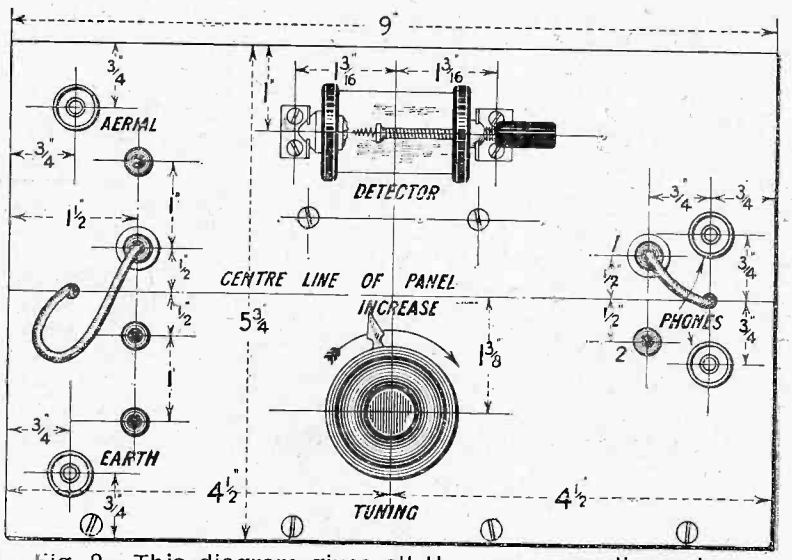


Fig. 2.—This diagram gives all the necessary dimensions for finding the positions of the holes to be drilled in the panel.

Four W.O. type brass terminals. (Burne-Jones and Co., Ltd.)

Sheet copper or phosphor bronze, 1–64 in. thick. A piece about 12 in. by 6 in. will be found sufficient. (Burne-Jones and Co., Ltd.)

Length of 2 B.A. threaded rod, nuts, washers, bush and one spring-washer.

One ebonite knob with brass pointer.

Wire for coils, 22 d.c.c. for small, 26 d.c.c. for 5XX coil.

Quantity of 16 gauge square section tinned copper wire.

One Packet Radio Press Panel Transfers.

The winding of the coils should first receive attention.

The coil for the ordinary broadcast station wavelengths is lattice-wound on a former of approximately 2 in. diameter, with two rows of pins ¾ in. apart and 15 pins in each row. The positions of opposite pins are, of course, staggered. A zigzag turn is first laid on, passing around the outside of each pin, and then a plain layer of turns. It will be found that 12 turns will just fil the space available. Another zigzag turn follows, and then another layer and so on, until 72 turns have been wound on.

The Tappings

The wire must be bared a little at the 36th, 48th and 60th turns, and tappings taken. Short lengths of 22 d.c.c. wire should preferably be used for making these tappings in order that the actual size of the soldered joint may be small, and not project out from the side of the coil. This point is important, as the phosphor-bronze plate must travel as near to the side of the coil as possible but not touch any part of it.

The Chelmsford coil may now be wound on the same former but with a smaller gauge wire, otherwise its bulk would be too great. No. 26 gauge d.c.c. may be used for this coil, and the winding should be commenced in a similar manner to the last, but in this case it will be found that 21 turns can be wound in one layer. When 180 turns have been wound on, the pins may be removed one at a time, and the small projecting loops bent upwards after each pin is taken out. In this way the turns will be well secured and the coil self supporting.

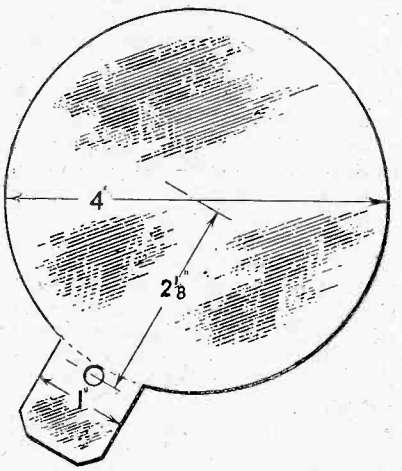
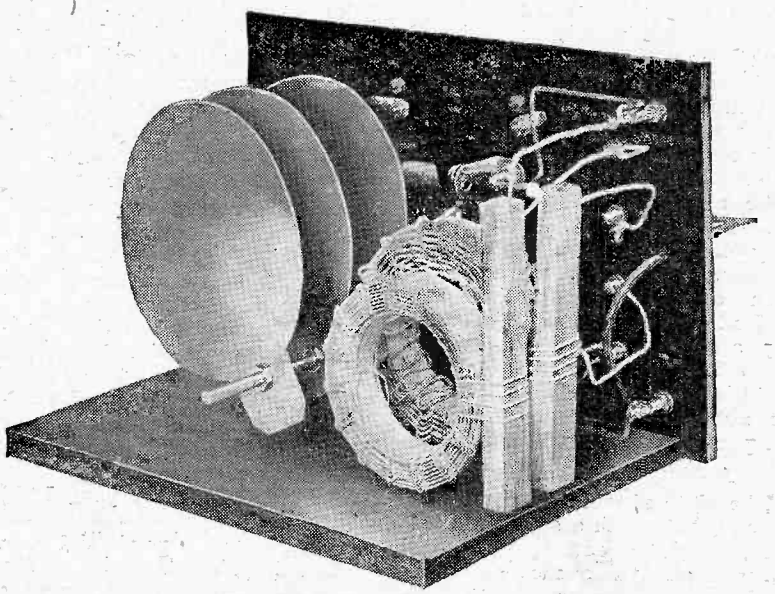


Fig. 3.—The metal tuning plates are cut to the dimensions given above.

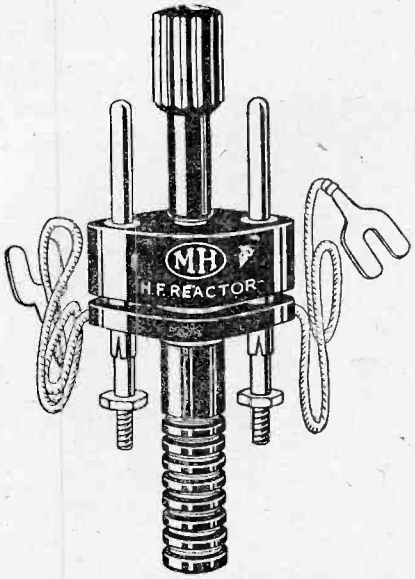
Regarding this long wave coil it was found that when this set was tested by various members of the staff, the adjustment for Chelmsford varied considerably with different aerials. It is therefore advisable to ascertain before finally fixing this coil that its size is correct for the specific aerial with which it is to be used.

Effect of Dampness

Care should be taken not to expose either of these coils to damp atmosphere or anywhere where the cotton insulation might absorb moisture, because, as the reader probably knows, if moisture is absorbed, the self-capacity of the coil will be considerably increased with consequent loss of efficiency. This subject was dealt with in a very comprehensive manner by G. P. Kendall, B.Sc., in *Wireless Weekly*, issued May 13th.



This photograph shows clearly the method of fixing the coils in position, while the disposition of the metal plates is also seen.



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THE *MH* H.F. REACTOR UNIT.

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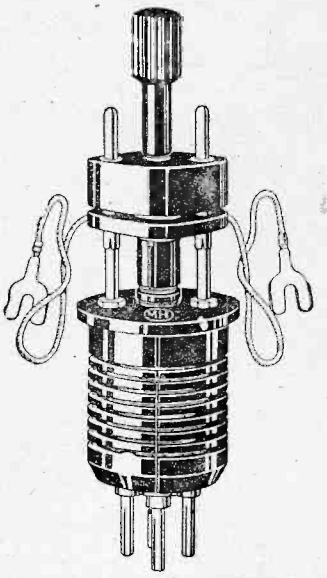
COMPONENTS

MH Reactor & *MH* Damper

The new devices illustrated which are auxiliaries to the MH H.F. Transformer are here introduced to the readers of "Modern Wireless."

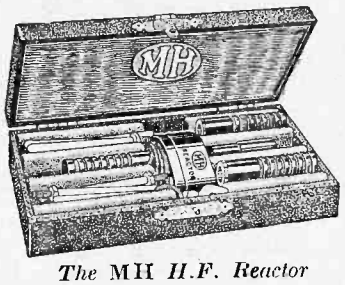


THE REACTOR INSERTED IN *MH* H.F. TRANSFORMER.

THE REACTOR is a patented device for applying reaction to the H.F. Transformer instead of to the aerial coil, thereby largely preventing "interference" with other users, with increased selectivity.

¶ A closer control with sharper tuning is more easily obtained by this method. The MH Reactor circuit is undoubtedly the most easily applied and flexible reaction system ever introduced to the public. This device can be applied to any high frequency receiver embodying MH H.F. transformers by simply fixing the two guides in place of the holding down screws of the engraved disc. The Vernier Carriage fits on these, being adjusted to its approximate position by sliding, precise adjustment being obtained by rotating the knob. The conventional reaction coil is then eliminated.

¶ Two flexible leads from the Vernier Carriage are taken to the conventional position for Reaction, the *Maroon* lead to the Anode and the blue to the other.



The MH *H.F. Reactor*

Is supplied complete in a handsome dustproof case with eight guide pins and three interchangeable barrels covering all wavelengths.

Price (as illustrated) **15/-**

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THE *MH* H.F. DAMPER

Price (as illustrated) **2/-**

THE DAMPER is a patented device, which, when inserted in the central hole of the transformer has the property of stabilising a circuit which otherwise would oscillate.

¶ The simple expedient of introducing the Damper into the MH H.F. Transformer will in nine cases out of ten, cure all oscillation troubles.

¶ It is a device which every user of MH H.F. Transformers should have by him, since its cost is low, and its general utility remarkable.

¶ The pre-eminent position of the MH H.F. Transformer is not a casual happening based on chance, but on sound technical knowledge and experimental work, backed up by high grade production.

¶ The unquestionable confidence which the public and trade have in the well-known MH H.F. Transformers will be fully reflected in the two new components here described.

WRITE FOR FULL DESCRIPTIVE AND EXPLANATORY LEAFLET.

MH H.F. TRANSFORMERS

increase the range of your set and also add to its selectivity.

Supplied in six ranges of wavelengths, covering 80 to 7,000 metres.
Price, **10/-** each.

Special MH Neutrodyne Units and Superheterodyne Couplers also supplied.

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Barclays Ad.

This luminous dial gives more light than my Wuncells

THE big feature about the Wuncell Dull Emitter is its extraordinary long life. And the secret of its longevity is to be found in its wonderful filament. The Wuncell filament is different to all others—when the Valve is working its glow is almost invisible. In fact, in daylight you must admit that it is invisible. Even at night time in a darkened room you will not see any more than the kind of glow you would expect from the luminous figures on a watch.

Compare this with bright Valves and even some Dull Emitters and you'll readily understand that a white hot filament must naturally be subjected to considerable strains and stresses. It must expand as it is heated and contract when the current is switched off. It is but a natural sequence, therefore, to find that inevitably such a filament gets brittle and breaks—thus rendering the Valve useless.

Not so the Wuncell. But we did not finish by providing a filament so productive in electron emission that a temperature of only 800 degrees is sufficient. We made it as robust as that used in ordinary bright valves. A filament that will readily withstand all the rough handling to which it is likely to be subjected throughout the whole of its long life.

Yes! you'll like the Wuncell and agree that its introduction provides yet another milestone in the progress of Cossor Valves.

A. C. Cossor, Ltd., Highbury, N.5

Wuncell Types W.1 and W.2

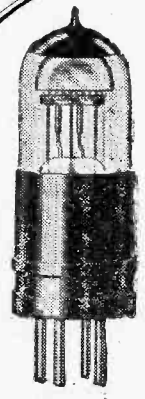
W.1 Corresponding in characteristics to the famous Cossor P.1, and the ideal Dull Emitter for use as a Detector or Low Frequency Amplifier.

W.2 With red top (as illustrated) for use as a High Frequency Amplifier.

All Wuncell valves supplied with the new low capacity bases.

Technical data:
Filament Voltage 1.2 to 1.8.
Filament consumption, .3 amps.
Plate voltage, 20 to 80.

18/-



Wuncell Types W.R.1 and W.R.2

These Valves are identical in working characteristics with the Wuncell W.1 and W.2. They are, however, fitted with an in-built resistance in series with the filament. A W.R.1 or W.R.2 Valve can thus be used with either a 2-, 4- or 6-volt accumulator without alteration to Set. When the Valve is required for use with a 2-volt accumulator the resistance can be short-circuited by means of the small screw shown.

20/-

the long life Dull Emitter. Cossor Wuncell

Gilbert Ad. 2807

Having finished the coils, attention may be given to the panel. If a guaranteed make of ebonite has been procured, as is advised by the writer, drilling may be immediately proceeded with.

This should present no difficulty at all if the drilling diagram (Fig. 2) is examined.

Drilling the Panel

If the ebonite purchased is not guaranteed free from surface leakage its surface on both sides should be removed by rubbing it with fine glasspaper or emery cloth. A black matt surface can now be retrieved by the application of a little oil on a soft cloth.

A drilling template is supplied with each Burndept crystal detector, and with regard to the fixed detector, this has an extension screw at one end which allows its length to be continuously varied for ½ in. over the length of the actual crystal detector itself, so that the clips for holding this may be placed centrally just beneath the adjustable detector's position, and at any convenient distance apart within this ½ in. limit.

The other holes to be drilled require no explanation whatever, reference to the diagram of the panel layout, which also gives all the dimensions necessary, making everything very clear.

Having drilled the panel the various components may be mounted, the length of 2 B.A. rod which is to carry the phosphor-bronze plates included.

Securing the Coils

The next thing is to fix two small wooden posts to the extreme left of the wooden sub-base, looking at it from the front edge, about ½ in. apart, and the front one about 2½ in. from the edge. A glance at the photographs will make this clear. The two posts are secured each by a single wood screw inserted from underneath the base itself.

The 72 turn coil may now be stood against the first post and tied to it with fine twine or thread, in such a manner that the tappings will be near to the post. The Chelmsford coil is similarly fixed to the other post.

Now the panel can be fixed to the base by four wood screws as shown in the photographs, and so long as both coils stand clear of the 2 B.A. rod, the tappings may be soldered to the Clix sockets, the first to the top socket, the second and third to sockets two and three respectively, and the end of the coil to the fourth. The starting end of the coil must be soldered to the aerial terminal. The inside end of the other coil is connected to the earth terminal, while the outside end connects to the fourth Clix socket with the end of the small coil.

The Tuning Plates

Having done this, the sheet of phosphor-bronze or copper may be taken and three pieces cut from it, as shown in Fig. 3, and a 2 B.A. clearance hole drilled, in the position shown, in each piece. An old pair of scissors will be found useful for cutting the metal. These three spades may now be mounted on the threaded rod and very tightly fixed with nuts, arranged as shown in the photographs. Their actual positions along the rod can be determined only by experiment. They must be placed so that when fully to the left they are as near as possible to the faces of the coils, without touching them. It will be found a simple matter to do this, and when completed the tension holding the 2 BA tapped rod should be adjusted so that the spades may be placed in any position without their own weight causing them to fall. The set is now ready for trying out.

I might mention here that both adjustable and fixed detectors were incorporated in this set in order that those who desire to listen to broadcast without the usual fiddling for a sensitive crystal spot may be accommodated, as well as the man who prefers to adjust his detector, always hoping to obtain stronger signals. To change from adjustable to fixed detector it is only necessary to remove the right-hand Clix plug from socket number 1 and plug into socket number 2. This is the work of a moment only and an interesting comparison between the two detectors can be made.

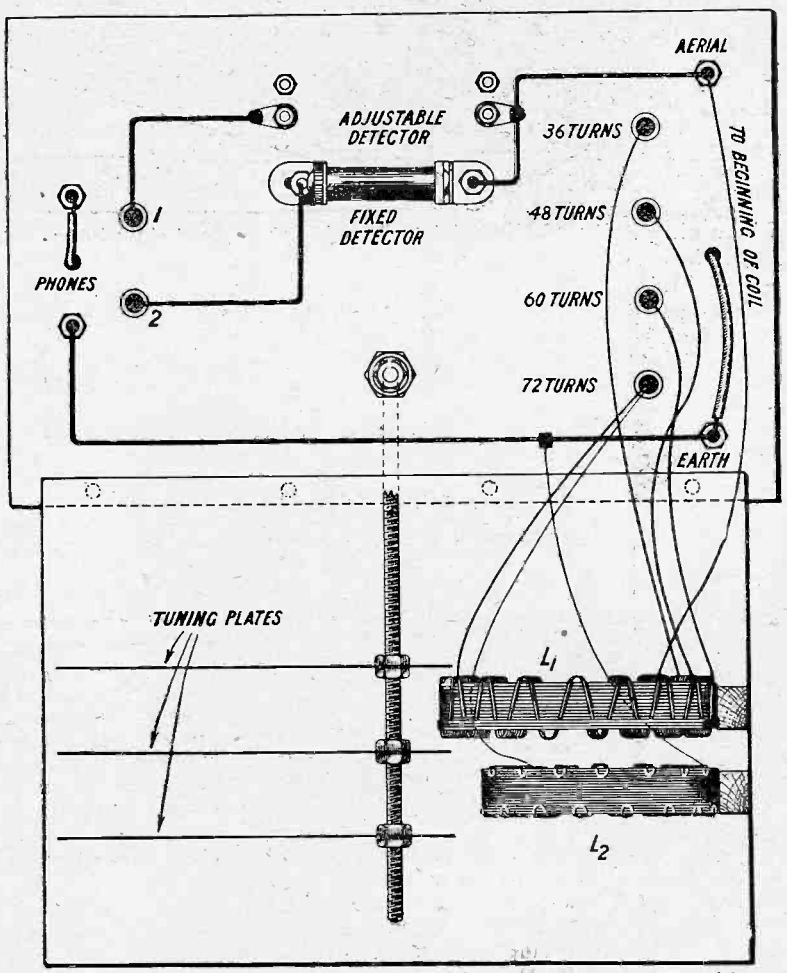
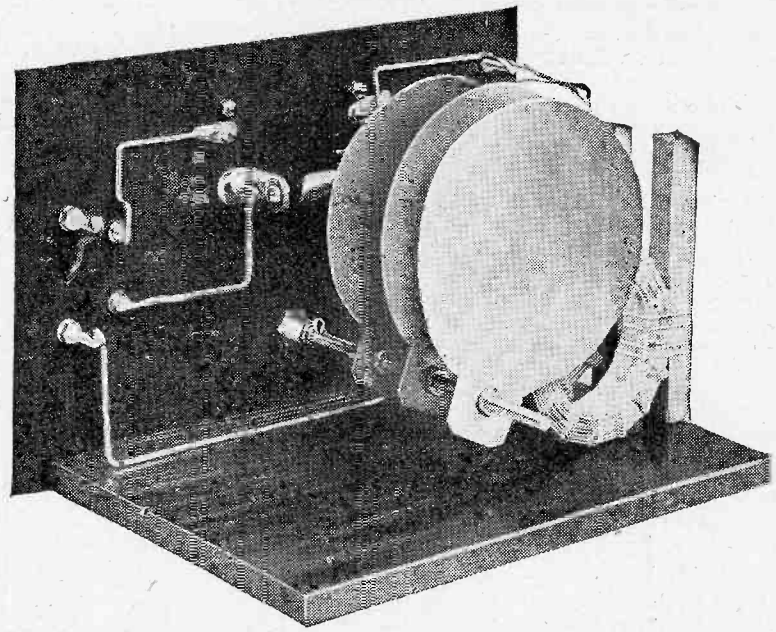


Fig. 4.—The wiring diagram. The coil tappings should be arranged so as to allow ample clearance for the spades.

Testing

In order to test the set during local broadcasting, the detector plug should be placed in socket number 2, the fixed detector being brought into use. The aerial and earth must, of course, be connected to their respective terminals on



The simplicity of the wiring is evident from this photograph. Comparison with the previous photograph indicates the paths taken by the tuning spades.

the left side of the panel, and the phones on the right. Place the left-hand plug into the top socket and rotate the three metal spades slowly from right to left. If no signals are heard, move the plug into the second socket and again rotate the spades. It will be found that if the nearest station is within range, with the plug in one of the four sockets, signals will be heard with a certain adjustment of the spades. These should be moved until best signals are received. In order to receive 5XX the Clix plug should be left hanging loose and the spades rotated as previously. When signals are heard it is interesting to change over to the adjustable detector and adjust it to a sensitive position. In this way one is given a good idea as to how the detectors compare. The position of the spades will, of course, vary with different aerials.

Test Report

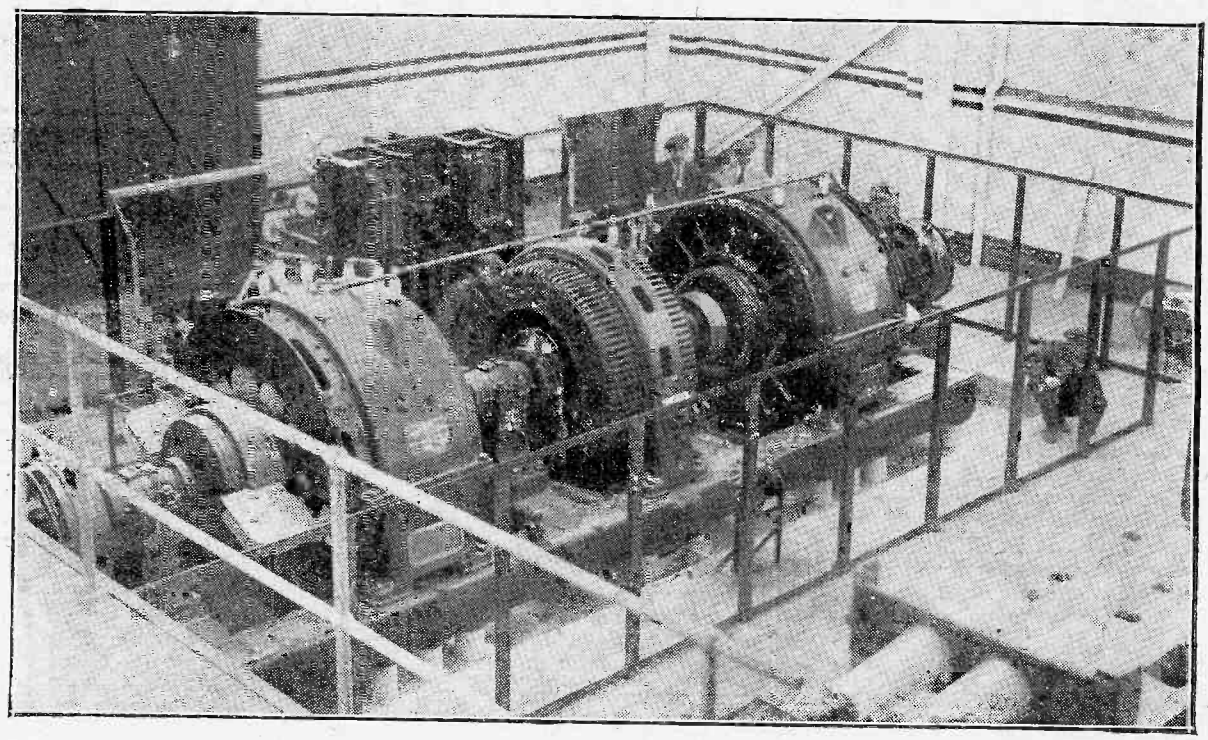
Tested on a full-sized but somewhat screened aerial about six miles or so from 2LO, very good signals were received from that station on the headphones. On connecting a small Amplion loud-speaker across the telephone terminals, signals were surprisingly good for a crystal receiver. Whilst, of course, not approaching anything that could be called loud-speaker strength, signals at the same time were distinctly audible several feet from the loud-speaker, whilst the Savoy bands were playing.

Chelmsford was received at pleasant headphone strength, but was not so loud as 2LO, and tuning on the former station was extremely flat.

After 2LO had closed down, GNF, GNI and two or three ships were heard at good strength.

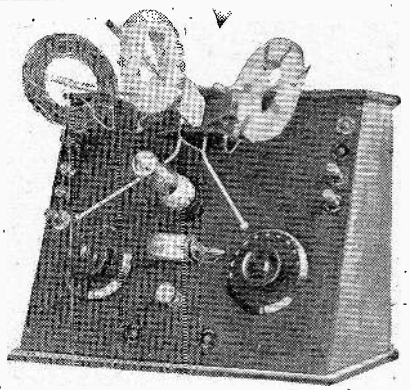
Conclusion

This little receiver was not built with the idea of obtaining distance, but for good reception of the local station, with the possibility of faults developing reduced to a minimum. At the same time the strength of signals obtained is extremely good and it would be worth the experimenter's while to try the effect of using different types of coils and other methods of bringing metal into proximity to them.



The power-house at the Rugby Station contains the 500-kilowatt generator seen in this photograph.

Some Interesting Letters from Readers at Home and Abroad



A Reader's Tri-cell Receiver.

From South Africa

SIR,—Having constructed Mr. Percy W. Harris' special Crystal Receiver, described in the September MODERN WIRELESS, also the one of the same type described in the *Wireless Constructor* for December, using Clix plugs, and having found them excellent, I took my courage in both hands and made his Tri-Cell Reflex (September "M.W."). I anticipated, being without any experience of valve sets, that it would be difficult to work; but though, as Mr. Harris said, some patience is required, I soon got the "touch" of it. I am within five miles of the Cape Town station, and can get C.T. at loud-speaker strength on an indoor aerial, 40 feet of 24 d.c.c. wire, without any earth. Imagine, however, my surprise when, on the second evening of using the set, I got Durban and J.B. (Johannesburg) after Cape Town closed down. Both these stations are as near to a thousand miles as makes no odds. Music was clearly heard and speech plainly followed. I wonder how many enthusiasts forget the first words of the distant station they have long hoped to tune and eventually get? The words, "Wasn't that beautifully timed, right on the minute?" that came over the air to me from J.B. just at the conclusion of the last orchestral item at 10.30 (closing down time), remain fixed in my memory.

I have made and wired the set just as Mr. Harris instructs, except that the expensive components are just a trifle beyond me; I had therefore to be content with P. and M. and Ormond condensers (ordinary type) and a Brunet transformer, which seems to stand up admirably to what is required of it. I found it gave a more satisfying look to the set to mount it sloping as shown in the attached photograph.

With the best of wishes for the success of your publications.—Yours truly,

REFLEX.

Cape Town, South Africa.

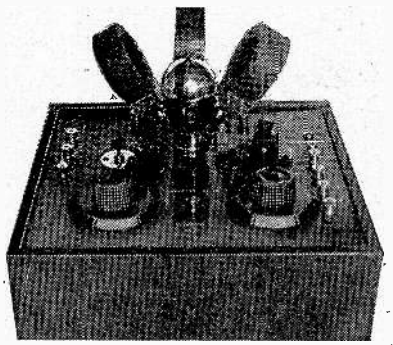
P.S.—My aerial is about 60 feet long and 35 feet high, slung loosely between trees. The coils are home-made.

"Modern Wireless" in Holland

SIR,—I beg to inform you that all my knowledge about wireless was gained from the *Wireless Constructor* and MODERN WIRELESS. With this knowledge I built the set of which I supply a photograph.

I call it "The Experimental I.", for it is possible to try several circuits.

I get regularly all the B.B.C. main and the Continental stations.



"The Experimental I." Set

On the tuning side of the set there are several arrangements described in your papers.

The coils I use for the wavelengths from 80 to 500 metres are of my own construction. For the longer waves I use Harris coils.

I also made an L.F. amplifier according to the description in the *Wireless Constructor*, No. 6, and with this addition it is possible to get several stations at good loud-speaker strength.

Wishing you every success.—Yours truly, K. K. VAN HOFFEN.

Amsterdam, Holland.

A Letter from France

SIR,—I thought it might interest you to know that I made up the set described by Mr. C. P. Allinson in the May issue of MODERN WIRELESS, but only using one "note magnifier," with the following results: Rome comes in rather too loudly to be comfortable in the telephones; London, Bournemouth and Cardiff all come in quite strongly, as also does Zurich, Madrid and one or two German stations. I think the above results speak highly of your circuit considering that I am situated on the side and practically at the foot of one of the mountains of the Alpes Maritimes, so that I have almost the whole range between my station and England. I only finished the set last night in time to hear the American Ambassador's speech S.B. from London through Bournemouth. Thanking you very much for such an interesting circuit.—Yours truly,

D. D. MCGREGOR.

Beaulieu-sur-mer, France.

The "Improved Two-valve Receiver"

SIR,—With reference to the "Improved two-valve receiver," described by Mr. Stanley G. Rattee in MODERN WIRELESS, dated January, 1925, I have built this set in a gramophone box, using the horn thereof as a loud-speaker in conjunction with a Brown attachment.

I can get all the B.B.C. stations at comfortable 'phone strength, Manchester, Liverpool, and occasionally Belfast coming in sufficiently strongly to work the attachment.

Good results are also obtained by my set on the Continental stations, Madrid being the loudest. Barcelona, Radio-Paris, Eiffel Tower, Petit-Parisien, Stuttgart, Hamburg, Munster, Brussels, and Voxhaus are also stations that I have picked up on this set.

Wishing you the best of luck with your excellent publications.

Yours truly,

F. SHARP.

Blackpool, England.

Further Results with Radio Press Sets

The Simplified Three-Valve Dual

SIR,—I have just completed the simplified 3-Valve Dual (designed by Mr. John Scott-Taggart) published in MODERN WIRELESS, March issue, and I feel I must write and express my appreciation of this set.

I have made up a good many sets as published from time to time, but for volume, clarity of tone, and selectivity I have not found one anything like as good as the 3-Valve Dual.

I copied your components exactly except that I used square law condensers, which I prefer, but I think it is essential in a set of this description that the specified components are used; and this applies particularly to the transformer used for reflexing. I used, temporarily, a transformer I had by me for this purpose, but, when the Woodhall arrived and was fitted it made a surprising difference.

I also like the separate vernier condensers for tuning, and I was able to go round the English and Continental stations simply by tuning with loud-speaker without having to use head-phones.

I consider this remarkably good, and the set is a particularly attractive one for the ordinary amateur.

Yours truly,

Twickenham. GEO. F. WINTER.

The "Simple Selective Set"

SIR,—I beg to say that I have built the "Simple Selective Set," described by Mr. A. D. Cowper in MODERN WIRELESS for April, together with two resistance coupled valves, DE5B and B4, using also DE5B as detector. Coils home-made "higgledy piggledy," 16 S.W.G., d.c.c. 3 in. diameter, self-supporting, tapped as Lissen "X" and attached to "Athol" plugs.

Although I have now made up over 50 circuits taken from your three journals (to all of which I subscribe) I have never previously met a set which seemed to call for an expression of approval as does this comparatively simple but efficient set.

Situated some 4 miles "as the crow flies" from 2ZY I get on L.S. all main stations except Bournemouth and Newcastle.

Relays received are Liverpool, Sheffield, Leeds-Bradford, Stoke and Nottingham. Liverpool nearly as loud as 2ZY.

Foreigners: All French, many German, Swedes, Norway (Oslo), Zurich and Hilversum, Madrid and Brussels.

I find the set is more efficient on the 250/500 metre range than on the higher waves such as 5XX and Radio Paris.

Best results are obtained by making set *exactly* as specified, careful use of right H.T. and *very careful adjustment of L.T. on detector.*

I am awaiting Mr. Cowper's next with impatience, but in the meantime trying out some of his previous circuits, assuming that "the circuits of one and the same author are equal to one another." — Yours truly,

HERBERT S. COPPOCK.

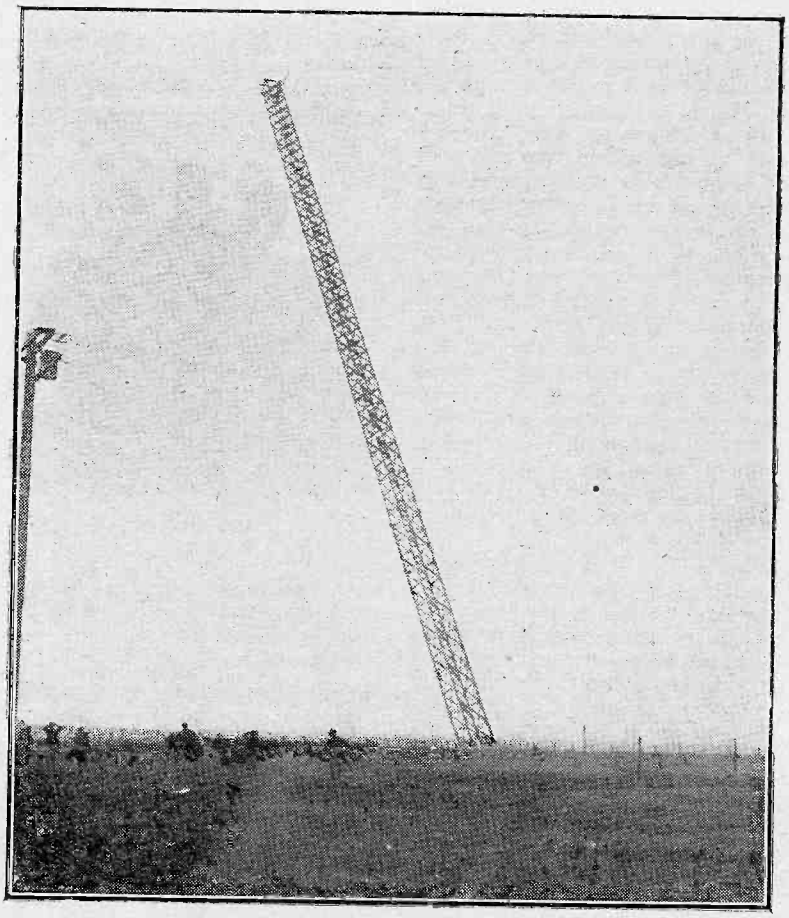
Didsbury.

The "Simplicity" Set

SIR,—I feel I must write and express my thanks for the very clear instructions contained in the *Radio Press Envelope No. 3,* by Mr. G. P. Kendall, B.Sc. I have completed a "Simplicity" set and must say I am highly delighted with it. It was my first experience at building a set and I had no difficulty in following your instructions. I have tuned in practically all the B.B.C. stations and several Continental ones with a distinct clearness. My friends, several of whom have bought expensive sets, have remarked that my set is equally as good, if not better than theirs.—Again thanking you, Yours truly,

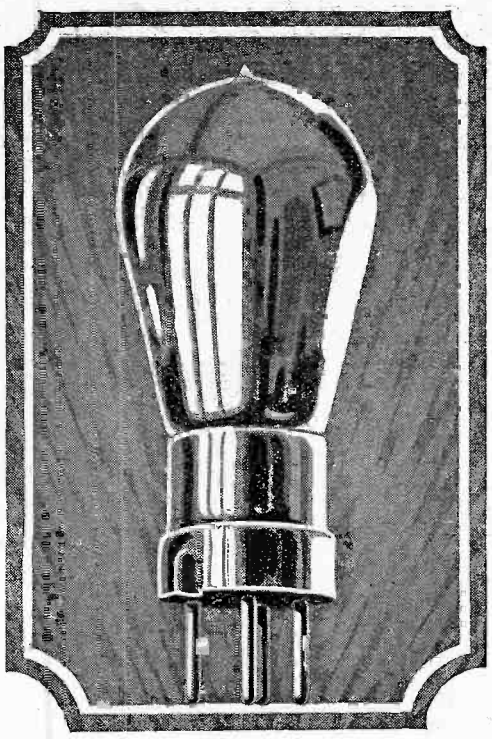
S. G. B. SHIESH.

Narberth, Pem.



One of the masts of the naval station at Inglewood, California, crashing to the ground. The station was dismantled recently, its sphere of usefulness having been fulfilled

Louden Valves



The 6-volt Dull Emitter.

THE economy of the Dull-Filament Valve is undoubted. Its low current consumption, especially if you possess a multi-valve set, will save you several pounds a year in the recharging of your accumulators alone.

The economy, of course, is all the greater if you can fit the Dull-Emitter Valve straight on to your set without having to alter the Filament Resistances. For this reason we have recently placed on the market a Louden Dull Emitter which works at 6 volts. This means that if you are now using ordinary bright-emitting valves, getting their current from a 6-volt accumulator, you can substitute Dull-Emitting Loudens for them and reduce your accumulator bill to one-seventh. This, if you consider it, means quite a large saving in a year's broadcasting expenditure.

To effect this saving, incidentally, does not involve any large initial outlay. The Louden 6-volt Dull-Emitter only costs 13s. 6d., and this is not much more than you have to pay for the ordinary Bright Emitter. In addition you get a valve which has become famous for its qualities of Silver Clear Reproduction, and which will improve your reception beyond recognition.

If you desire a personal test of these valves visit your local retailer and ask to hear them. They are a revelation in clear reception.

NOTE.—The Louden Bright-Emitter is now available at the wonderfully low price of **7/-**

Filament Volts	4.8—5
Filament Amps.	0.4

Types F1 and F2. Price 7/-

LOUDEN DULL EMITTERS

Type F.E.R.1 for Detection and L.F. Amplification.

Type F.E.R.2 for H.F. Amplification.

Filament Amps. 0.1

Please state whether you require them for a 4-volt or 6-volt Accumulator.

4-Volt Type **12/-**

6 Volt Type **13/6**

FELLOWS WIRELESS

Advt. of the Fellows Magneto Co., Ltd., Park Royal, London, N.W. 10.

B.P. 52

An Enclosed Single-valve Resistance Coupled Amplifier

By JOHN UNDERDOWN.

The amplifier is compact and of pleasing and distinctive appearance.

A VERY large number of requests are received from readers asking for details of a single stage of amplification to add to existing sets. The amplifier about to be described was designed for this specific purpose, and resistance capacity coupling was adopted, since even in some cases the addition was desired to be made to a set with two existing iron-core transformer coupled low-frequency stages. In practice, considerable difficulty is usually experienced if a further stage of transformer coupled low-frequency amplification is added to existing similar stages, as low-frequency oscillation often occurs.

Resistance Coupling

This may not necessarily announce itself by a loud whistle, but will often spoil reproduction. A resistance coupled amplifier can, usually, be added to such a set and also to some reflex sets, which otherwise will not allow of a further stage of low-frequency amplification being successfully added. Since a number of our designs for which an amplifier is desired are housed in American types of cabinets, this type of case has been used. Not only is the valve enclosed, thus putting it out of harm's way, but drilling and constructional work is reduced to a minimum and wiring simplified.

The Circuit

Referring to the theoretical circuit diagram below it will be seen that the circuit is quite a conventional one. Within the dotted lines to the left of the diagram the internal arrangements of the Polar resistance capacity coupling unit used are indicated. The resistance R2 is that which replaces the telephones in an existing set. The end marked plus and shown as H.T. in the unit, goes to the plus telephone or loud-speaker terminal of the set, whilst that marked "A" is connected to the other telephone terminal which goes to the plate of the preceding valve. The loud-speaker is connected between the two terminals shown as L.S. in the diagram, that marked plus being connected to the plus of the high-tension battery. No other connections are shown to this battery, although it may well be used for the remainder of the set. The switch S serves to make the filament connection of the valve, and when this is in the "off" position the loud-speaker can readily be taken from its terminals, and connected to the original set if the extra stage is not required. The use of a grid biassing battery has been indicated by that shown as B3 in the diagram.

Components

For the benefit of readers who wish exactly to reproduce the set as seen in the photographs, a list of the actual components used and makers' names is given below. This is as follows :—

1 mahogany cabinet to take a panel 8 in. by 6 in. The other dimensions are such that the cabinet may be uniform in size with the "All Concert" type. The measurement of the wood base in my case is 6¾ in. by 6 in. The cabinet shown was made by the Carrington Manufacturing Co., Ltd.

1 black Radion panel 8 in. by 6 in. by 3/16ths in. thick. (American Hard Rubber Co., Ltd.)

1 filament resistance. That used is of dual type, but whether such a type is used will be determined by the type of valve chosen. (Burndept Wireless, Ltd.

1 resistance-capacity coupling unit (Radio Communication Co., Ltd.)

1 anti-phonic valve-holder (Burndept Wireless, Ltd.)

1 Connecticut "on and off" switch. (R. A. Rothermel, Ltd.)

1 nickel-plated valve window (Bowyer-Lowe Co., Ltd.)

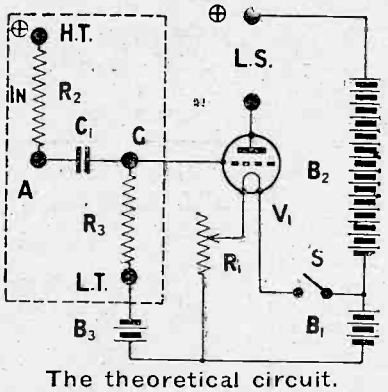
4 nickel-plated terminals. (Burne-Jones & Co., Ltd.)

1 6-volt tapped grid battery. (Ever Ready.)

A suitable length of heavy red and black twin flex.

A quantity of V.I.R. flex.

A quantity of 16 gauge tinned copper wire and soldering tags.



The theoretical circuit.

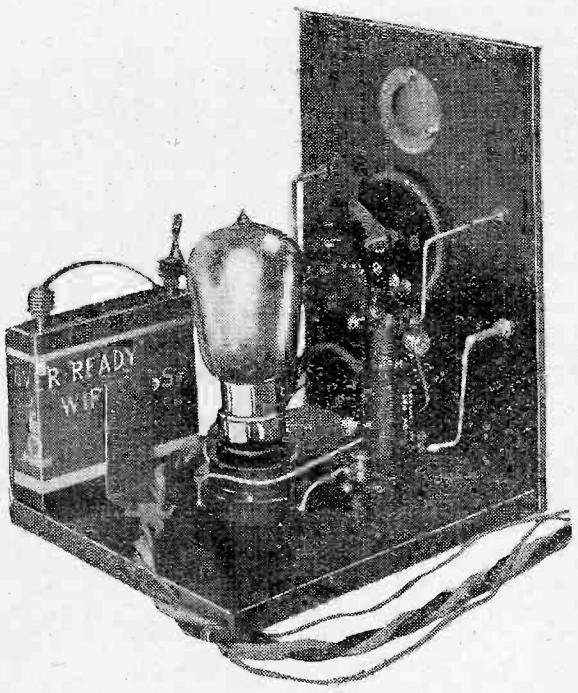
These latter items may be obtained from any good wireless store.

1 strip of phosphor bronze or similar springy metal approximately 3 in. by 1 in.

4 Clix plugs and insulating bushes. Two of these should preferably be red and two black.

1 packet Radio Press panel transfers.

This useful instrument, whilst considerably increasing the volume of your signals, will not introduce distortion even as a third stage amplifier.



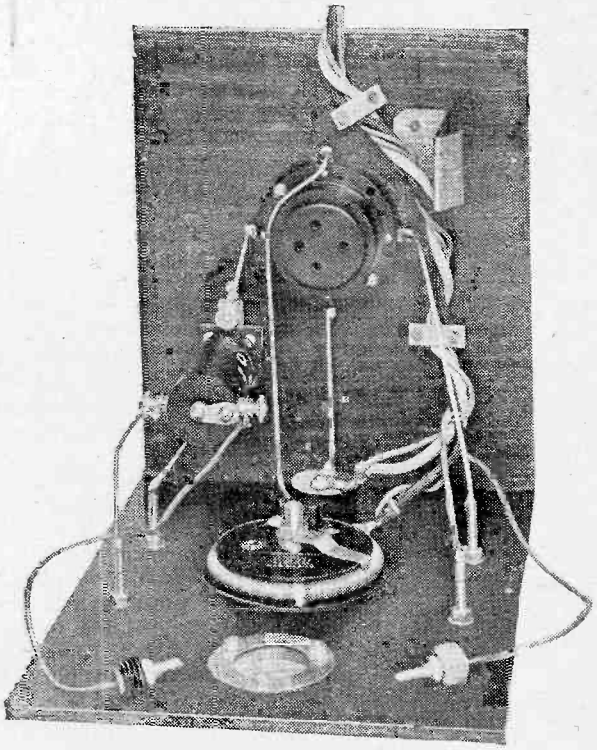
The valve holder, coupling unit and grid bias battery are mounted on the wooden base.

General Layout

The compact, though simple, layout of the amplifier will be seen from the photographs, in which it will be noticed that the valve window, the filament resistance and the "on and off" filament switch are located on the centre line of the panel. To the left hand of this will be seen two terminals marked "In." These two terminals are connected to the telephone or loud-speaker terminals of the preceding set. The one marked plus goes to the plus telephone terminal. On the right of the panel are seen two terminals marked loud speaker. One is marked plus and to this the plus terminal of the latter should be attached.

Drilling the Panel

With the particular arrangement adopted in the amplifier, drilling is reduced to a minimum, and reference to the front of panel drilling diagram will clearly show how to proceed. The only hole which may give any difficulty is that for the valve window, and this in my case was readily made by first drilling the centre hole with a 4 B.A. drill, and then using a 1 in. diameter carpenter's bit in an ordinary carpenter's brace. It is, however, perhaps advisable before drilling this hole to drill the other three which hold the window in position. The hole for the Connecticut "on and off" switch may be drilled in a similar manner, but a somewhat smaller bit is necessary.



The omission of the usual terminal strip considerably simplifies wiring.

Construction

Once the panel is drilled the constructional work is simplicity itself. The switch, rheostat, valve window, terminals, etc., being mounted on the panel; this is merely affixed to its baseboard by means of two ¾ in. No. 4 wood screws. With this in position the resistance capacity coupling unit and the valve holder may be readily screwed on the panel in convenient positions, whilst the clip shown in the photograph, which holds the grid battery in place against the side of the case, is readily affixed by means of two small screws or even two tacks.

Wiring

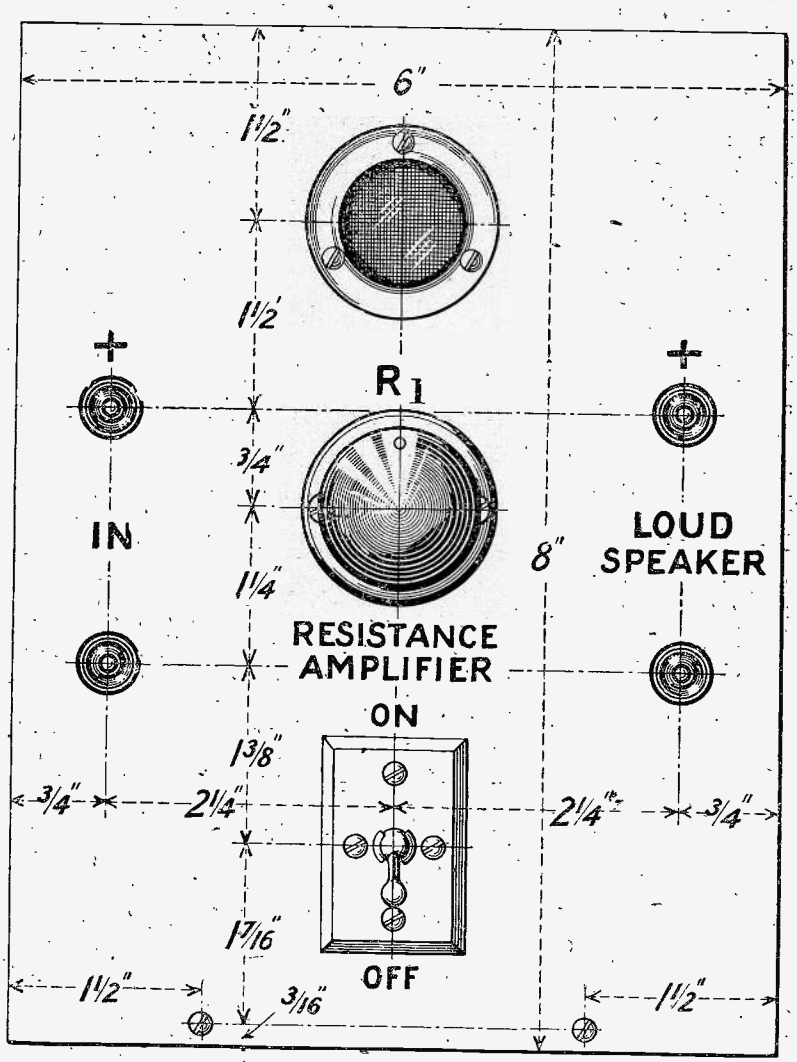
The wiring is carried out with 16 gauge tinned copper wire, and the flex leads mentioned in the list of components. Although extremely simple, a number of precautions should be taken to avoid confusion later. It will be observed that the usual terminal strip at the back of the cabinet has been omitted for the sake of simplicity, and the battery leads are taken directly through the back of the cabinet. These latter leads are all twisted together and brought out through a ½ in. hole.

H.T. and L.T. Leads

The first leads to fix in position are those for the H.T. and L.T. connections. For the L.T. leads the heavy red and black twin flex is used, whilst for the H.T. leads the V.I.R. flex serves. First clean the two ends of the red and black twin flex and twist to the cleaned ends two lengths of V.I.R. flex, which serve respectively for the H.T. minus and grid bias plus leads. The black L.T. lead and that for grid bias plus should then

be inserted into a small soldering tag, and a very hot iron used to make the connection. L.T. plus and H.T. minus leads should be treated similarly, and the black L.T. lead should then be inserted under the left-hand side contact of the filament resistance. The L.T. plus connection should be made to the upper switch connection. This done, the next connection is for H.T. plus, which is made from the top left-hand terminal looking at the panel from the rear. This lead is of V.I.R. flex, and with the lead from H.T. negative is twisted round the twin flex for a length of 6 or 7 ins. The combined H.T. and L.T. leads should then be secured to the wooden sub-base by means of two strips of fibre or similar insulating material fixed to the base by two tacks. This will be clearly seen by reference to the wiring diagram. The remainder of the wiring is simplicity itself, and no more need be said on this subject, excepting that the grid bias minus lead is another flexible lead taken from the L.T. terminal on the coupling unit, and ending in a black Clix plug.

To save trouble in tracing out the various battery leads it is advisable before these are twisted together that H.T. plus lead should have a red Clix plug attached to its end, whilst H.T. negative should have a black one.



The front of panel arrangement is attractive and symmetrical.

Connections

Having wired the amplifier, it now remains to test it, and this will readily be carried out as follows. The two terminals marked "in" will go to the telephone terminals of the set with which the amplifier is to be used, the plus one, as previously explained, going to the plus telephone terminal. The loud-speaker will be connected between the loud-speaker terminals, whilst the L.T. leads may either be taken directly to the accumulator or to the plus and minus L.T. terminals on the preceding set. If a separate high tension battery is to be used, the red and black Clix will be inserted into appropriate sockets of this battery, whilst if the same battery as used for the set is to be brought into service the negative H.T. lead will be inserted in the negative socket, and the red Clix will be plugged into an appropriate value for the valve to be used in the amplifier.

Grid Bias

It should be noticed here that the value of grid bias on the preceding set will now have to be changed, as the resistance in the amplifier is inserted in the plate circuit of the preceding valve, which was originally the last valve in the set, and hence the value of grid bias will have to be reduced. If a small power valve was previously used in the last stage of the set it should now be inserted into the amplifier valve socket, whilst in the last socket of the set a special valve designed for resistance capacity working such as the D.E.5B., D.F.A.4, D.E.3B., etc., may be used. Alternatively, with the amplifier a general purpose type of valve has been found to work well in this position. If only a fairly low value of high tension has previously been used on the last valve in the set, it is advisable that this be increased to compensate for the voltage drop across the anode resistance. As previously stated, a small power valve, if used, should be inserted in the amplifier and given an appropriate value of high tension. The value of grid bias should be that given by the makers for the value of high tension used, since there is no resistance in the plate circuit of this valve.

Final Tests

Having connected up all except the plus high tension lead, the amplifier switch should be placed into the "on" position and the filament resistance rotated to see that the valve lights correctly. If all appears correct, now plug in the high tension plus lead when, if the set to which the amplifier attached is tuned to the appropriate wavelength, signals should be received on the loud-speaker.

The effect of varying the grid bias on the last valve in the preceding set and also in the amplifier should be tried.

Test Report

The amplifier was tested in conjunction with the "2-valve Drawing-Room Receiver" described by the present writer in the April issue of MODERN WIRELESS, on an average aerial 12 miles south-east of 2LO. Two general purpose "R" valves were used in the set, which consists of a detector with reaction and one stage of transformer coupled low-frequency, and a B_4 was used in the amplifier. On the detector valve a high tension value of 60 volts was adopted, and for the two amplifying valves a value of 100 volts. About 1½ volts negative grid bias was used on the second valve, whilst on the last a value of about 6 volts was found suitable.

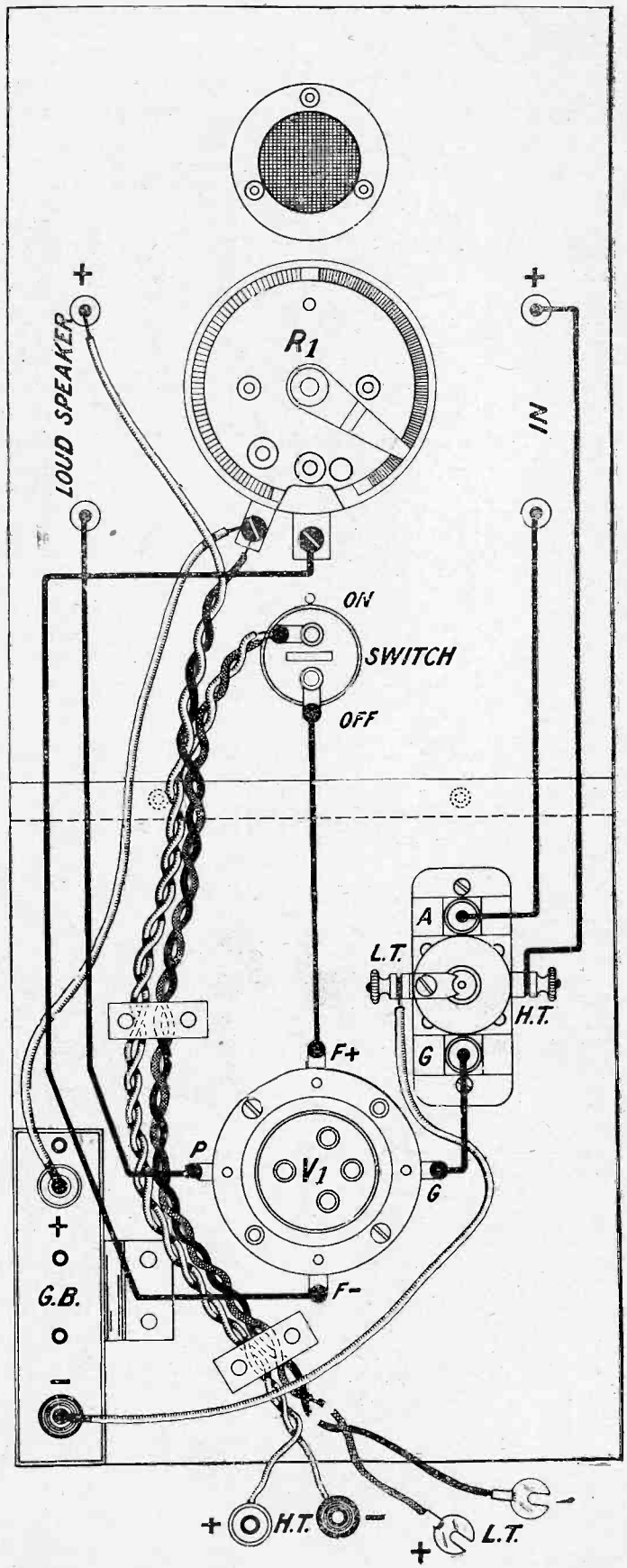
On 2LO excellent loud-speaking was obtained, the music from that station being clearly followed at a distance of 50 yards from the set. The step-up from 2 to 3 valves was very appreciable, whilst no loss in purity resulted. Where previously loud-speaker strength had been adequate it was now found to be too great for an average sized room, but it would serve excellently for dancing purposes. It was with this object in view that the amplifier was really designed, and for this reason the anti-phonic valve-holder was incorporated, since if used in the same room a good deal of vibration is likely to be experienced.

General Considerations

The amplifier will be found extremely useful for adding to existing valve sets where up to two stages of transformer coupled low-frequency are used, or two stages of resistance capacity coupled amplification adopted. It can equally well follow a detector valve, but in this case it will be necessary to place a small condenser across the input terminals, provided that none is already included across the detector telephone terminals. Usually, if incorporated, the value of this condenser is too high for maximum amplification, as the latter decreases with increase in the capacity of the by-pass condenser across the anode resistance. In practice therefore the smallest value consistent with smooth reaction control should be used, and generally this will be from ·0001 μF upwards as determined by experiment.

Two or three units of this type may be used together after a detector valve if desired, but where the detector is preceded by one or two stages of H.F. amplification, a somewhat higher value of by-pass condenser than indicated above is sometimes desirable. Its value must be determined by actual experiment.

With some reflex sets the addition of a transformer coupled stage is not found to work satisfactorily, and an amplifier of this type may be tried with fair hopes of success, more especially if separate H.T. and L.T. batteries are used.



The battery leads are twisted together in the set, but are shown separately here for the sake of clearness.

Great New Radio Press Laboratories

Important Announcement to all Readers

IT will not come as altogether a very great surprise to those who have followed the policy of the Radio Press (the proprietors of *The Wireless Constructor*, MODERN WIRELESS and *Wireless Weekly*) that they are establishing great new laboratories at Elstree, about 12 miles north of London.

The scheme under which these laboratories will be worked will be the most ambitious which has ever been undertaken by any technical publishing house, and it will be a convincing proof that the firm of Radio Press, Limited, are radio engineers first and publishers afterwards.

The Radio Press Policy

The history of the company, which is one of rapid but firmly established success, has been marked by a continual and increasing attempt to ensure that readers shall have offered to them the best designs, the best circuits, the best advice and the best information generally connected with the subject in which they are interested. Whether it is a simple article dealing with a crystal set, or one dealing with a nine-valve super-heterodyne receiver, the same care, the same accuracy, the same careful preliminary design work have been features which have placed the Radio Press in the forefront of technical publishers.

Unfortunately for the more responsible sections of the technical press, the beginner, who forms such a large proportion of the wireless public to-day, is not sufficiently competent to judge the difference between a good article and a bad article, a good design and a bad design, good advice and bad advice. It is, however, to be supposed that even a beginner will learn to appreciate that those publications which are issued from a house of the standing of Radio Press, Limited, can carry conviction. Purely wireless people, the Radio Press are building up a prestige which is making itself felt in every corner of the country and in many foreign countries, as is evident by the letters appearing in their periodicals.

The Service Department

The establishment of the Service Department has done a great deal towards developing still further that feeling of confidence which every reader should have in the paper he reads and in the sets he sees described. Even the newest convert to the Radio Press realises that where a concern guarantees the efficiency of their sets and is prepared to put readers' sets right, provided they are built to their designs, then that concern deserves their trust and support.

It is this great trust which has won the Radio Press hundreds of thousands of supporters. The joint net circulations of their three journals approximate 400,000 copies, and the sales of their non-periodical publications are of the order of 500,000 per annum.

The Latest Development

It is little wonder, then, that, having gone so far, they should take advantage of their unique position by still further development, and to effect this and to increase their prestige still further amongst the wireless public of this country and amongst the members of the industry, they are setting up laboratories at Elstree where research and development work will be carried out for the express purpose of supplying readers of Radio Press periodicals, books, etc., with the best possible information, the most recent developments and the most effective set designs.

In addition to research and development work, there will be departments for standardisation and measurement, for the testing and repairing of readers' sets (on a larger scale than hitherto), and for affording to the industry itself such assistance as it may, of its own accord, desire.

The amount of research carried out at present is limited almost entirely to Government departments and one or two leading firms of wireless manufacturers. In all these cases the information obtained is of a confidential character and not normally divulged. The Elstree laboratories, however, are being established expressly for the purpose of divulging such information, not obviously as a gratuitous presentation to the public, but as a very great inducement for that public to purchase the productions of the Radio Press, which, of course, will exclusively publish the results of work carried out at the new laboratories.

Staff

The laboratories will be in charge of a Chief Engineer, who will, as will be seen from an advertisement elsewhere, receive a salary of £2,500 per annum, to which will be added other remuneration, probably bringing the total amount to £4,000 per annum. This post will be the most highly paid technical position in radio in this country, and considering the nature of the work and the responsibility towards at least half a million supporters of the Radio Press, the salary will not be excessive. It is hoped that the name of the successful applicant will be announced in our next issue. Meanwhile, it may be stated there are lower-grade vacancies for physicists and research engineers of high standing and experience.

It is anticipated that the buildings will not be completed for three years, but the freehold of seven acres of land has been acquired in an ideal situation, and work will commence almost at once, so that

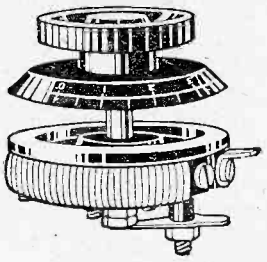
(*Continued on page 583.*)

Then — and Now

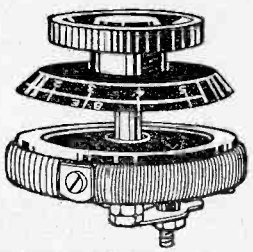
In olden days important news was "broadcast" through the medium of beacon fires on hilltops. This and other old-fashioned methods have been superseded by radio, but the significance of the beacon—a light visible, through its high position, to all—still remains. The high quality of (MH) COMPONENTS is making itself known to an ever-widening circle of radio enthusiasts.

HERE ARE SIX REASONS

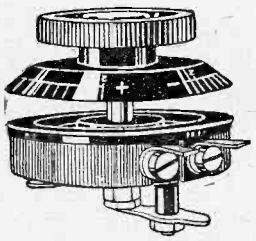
why you should use (MH) Filament Rheostats. Once you *have* used them, you will find many others.



(MH) Bright Rheostat



(MH) Dual Rheostat



(MH) Potentiometer

(i.) They are wire wound, therefore their value does not alter from day to day or hour to hour. A certain setting on the dial always gives the same control.

(ii.) The wire is wound on a former in such a manner that it will not loosen with use.

(iii.) The winding will safely carry the required current without overheating.

(iv.) The moving contact is smooth and silent in operation. In the dual type it is transferred from the fine to the heavy winding by a metal bridge piece. This gives indication to the touch of the position of the slider, a safety device of considerable utility.

(v.) It is only necessary to drill a single hole to mount any one of these rheostats, and each is supplied with an engraved dial.

(vi.) The fact that they are (MH) Components is sufficient guarantee that they will give you long and dependable service.

Bright Emitter Filament Rheostat ... ... **5/-** each.
Dull Emitter Filament Rheostat ... ... **6/6** each.
Dual Type (for either Bright or Dull Emitters) ... **7/6** each.

Control with precision by using a MH Potentiometer.

If it is desired accurately to adjust the grid potential of a valve, a potentiometer is indispensable. Its moving contact must, however, be constant and quiet in operation or all advantages accruing from its use are lost. Also its resistance must be high or a heavy drain is put on the L.T. filament supply.

The (MH) Potentiometer which has a resistance of 300 ohms is an instrument every wireless enthusiast should possess. Every detail in design and manufacture has been carefully considered, and it can be relied upon to give satisfactory service.

Potentiometer mounted with terminals ... **Price 21/-** each.
Potentiometer for panel mounting (as illustrated) **Price 7/6** each.

SPECIFY (MH) COMPONENTS

Head Office:
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STRAND · LONDON · W.C.2.

L. McMICHAEL LTD

Manufacturers of Wireless and Scientific Apparatus.

Showrooms:
179, STRAND, LONDON, W.C.2.
Works: SLOUGH, BUCKS.

Barclays Ad.

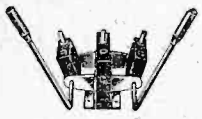
MAGNUM H.F. TRANSFORMERS
With Protected Windings.

The most efficient H.F. Transformer obtainable. (See report in "Wireless Weekly.") **7/-** each. Postage 3d. Guaranteed correctly matched **14/-** per pair. (Postage 3d.)

No. 0	150–300
†No. 0A	250–525
No. 1	300–600
No. 2	550–1200
No. 3	1100–3000
*No. 4	2500–7000

*Specially recommended for super heterodyne circuits.

†Special winding for Anglo-American Six referred to as Neutrodyne Units. Per set of 3, **21/-** (post free).



MAGNUM 3-COIL HOLDER.

As used on Radio Press sets, **12/6.**

MAGNUM 2-COIL HOLDER.

As used on Radio Press sets, **9/6.**

MAGNUM NEUTRODYNE CONDENSER.

As used in Anglo-American and many Neutrodyne Circuits, **4/6.**

CONSTRUCT THE PORTABLE RECEIVER
as described in this issue by Mr. A. S. Clark.

1	Carrying case as described ..	£1	2 6
1	Ebonite panel 9 x 9 x ¼in., drilled sq. and matt		7 6
1	Gambrell L.F. transformer, 1st stage	1	7 6
1	Dialodenser .0005		10 0
2	Magnum Vibro valve holders (anti-cap.)		10 0
1	Dubilier grid leak and condenser ..		5 0
1	Paragon condenser, .0001 ..		2 6
1	Paragon condenser, .0005 ..		2 6
12	Terminals complete		2 0
2	Microstats		5 6
Supply of No. 26 d.c.c. wire ..			1 3
1	Loading coil for Chelmsford ..		5 6
1	Coil socket and shorting strap ..		9
12	Flash-lamp batteries		6 0
1	Ever Ready battery, L.T.3 ..		7 6
1	T.C.C. condenser, 1 mfd. ..		3 10
50	Yards rubber flex		8 6
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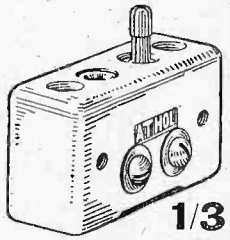

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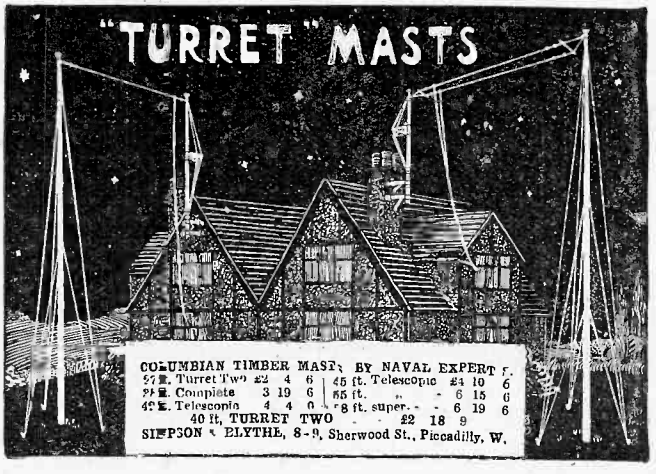
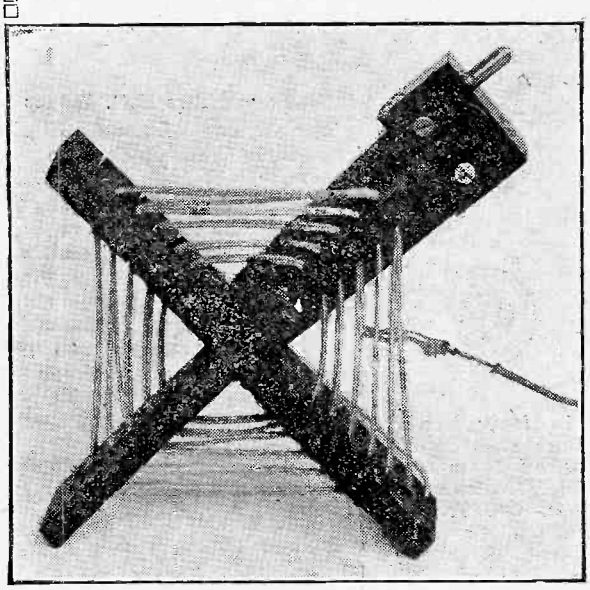


Adapting Your Set for KDKA

By G. P. KENDALL, B.Sc., Staff Editor.



A simple plug-in coil is described in these notes which enables practically any set to be used for short-wave reception. No internal alterations in the receiver are needed.

THERE must still be many readers of MODERN WIRELESS who have yet to experience the joy of hearing that nasal voice repeating the formula about "KDKA, the East Pittsburg station," etc., and I hope to show in the notes which follow how the omission can be remedied very easily. I believe the reason why many people do not make any attempt to receive KDKA is that they believe that it is necessary to build a very special set for the purpose, that, even so, reception is by no means certain, and that the whole matter is one of considerable difficulty. As a matter of fact however, KDKA is a very easy station to receive, and is often heard at greater strength than several of the more distant B.B.C. stations, even now when full summer conditions are rapidly approaching. Most emphatically, given a suitable tuning arrangement, KDKA is not a difficult station to receive at all, and it can often be heard upon even an indoor aerial. Moreover, KDKA starts its programme at such an hour in the evening that one does not have to get up in the cold and chilly hours of the early morning to attempt its reception. Since it is so strong a signal, it is not essential to build a special low-loss short-wave receiver, and fair results can almost always be obtained by a very simple conversion involving no alterations to wiring upon a quite standard set. As an example of such possibilities, I would point out that I usually receive it myself upon a standard and rather complicated tuner which I designed for use upon other wave-lengths, viz., the "Experimenter's Tuner," which I described in the September issue, merely by the use of a suitable plug-in coil and an auto-coupled circuit.

Cut Out the H.F. Valve

It must first be realised that in the ordinary way it is not worth while to attempt to use high frequency amplification upon KDKA, but to rely upon a detector valve with reaction, possibly followed by one or more low-frequency stages. The first thing to be done is therefore to devise a simple method of cutting out the high-frequency stages which may be present in one's receiver, and a few words upon this point may be of assistance. Naturally, the exact method must depend upon the particular set, but it is possible to give some general rules. In the case of a tuned anode set, the method is quite simple, and we will take as an example the circuit shown in Fig. 1. Here we have a quite conventional tuned anode receiver employing one high-frequency valve, detector and one low-frequency amplifier. It will be observed that what is required is to bring the connection from the grid condenser of the detector valve round to the aerial circuit so that the high-frequency valve is cut out. A very simple method of doing this is merely to remove the anode tuning coil from its socket, at the same time turning the anode tuning condenser carefully to the minimum position, and then to connect together the plate and grid of the high-frequency valve socket, after pulling out the valve.

I do not recommend the insertion of a switch for any of these operations, since better results can be obtained merely by pulling out the high-frequency valve from its

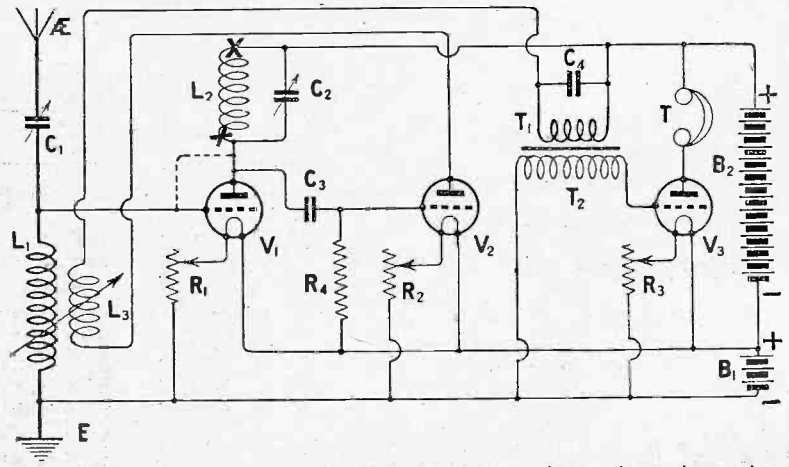


Fig. 1.—How to cut out the H.F. valve where tuned anode coupling is used. The anode coil is to be pulled from its socket before the dotted connection is made.

socket, and inserting in the plate and grid sockets two separate valve pins connected together by a short piece of wire.

This must not be done, of course, until the anode coil has been pulled from its socket, or you will short the high-tension battery. After the

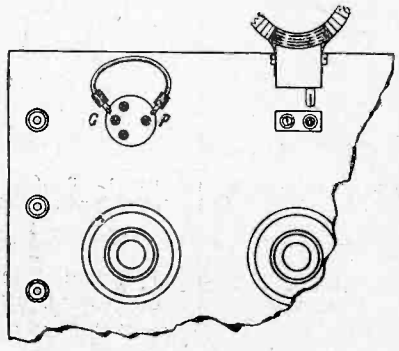


Fig. 2.—This is how the operations illustrated in Fig. 1 are actually carried out on the panel. The valve socket is that of the H.F. valve.

connections to the reaction coil have been reversed, the cutting out of the high-frequency stage will be complete and the circuit will now be a simple detector with reaction and one stage of note magnification.

The conversion is even simpler in the case of a set employing one stage of tuned transformer amplification, so long as a plug-in transformer is employed, since all that is required is to pull out the high-frequency valve, take the transformer from its socket and then insert one of our separate valve pins in the grid socket of the high-frequency valve, and the other in whichever socket of the high-frequency transformer is discovered to be wired internally to the grid condenser of the rectifying valve. This will generally be found to be the equivalent of the grid. If these two pins are connected together by means of a piece of wire, the cutting out of the high-frequency valve will have been accomplished.

Sets with Two H.F. Valves

The various diagrams will show how these alterations are made upon any set employing one stage of high-frequency amplification, provided that some form of plug-in coupling in it is used, such as a tuned anode coil or a plug-in transformer. A very similar method is employed in the case of a receiver employing two high-frequency stages, such as the "Transatlantic" series. The only point to be noticed here is that the connection shown dotted in the diagram, to which reference has been made, must be taken direct from the socket connected to the grid condenser of the rectifying valve to the anode socket of the *first* high-frequency valve.

This may be done with a piece of flexible wire carrying a valve pin at each end, these pins being inserted in the anode socket of the second high-frequency valve and the grid socket of the first high-frequency valve, where tuned anode coupling is employed, while in the case of two stages of tuned transformer coupling, one pin should be inserted in the grid socket of the first high-frequency valve, and the other in the socket of the second high-frequency transformer, which is internally wired to the grid condenser of the rectifying valve. These points will become clearer upon an inspection of the diagrams.

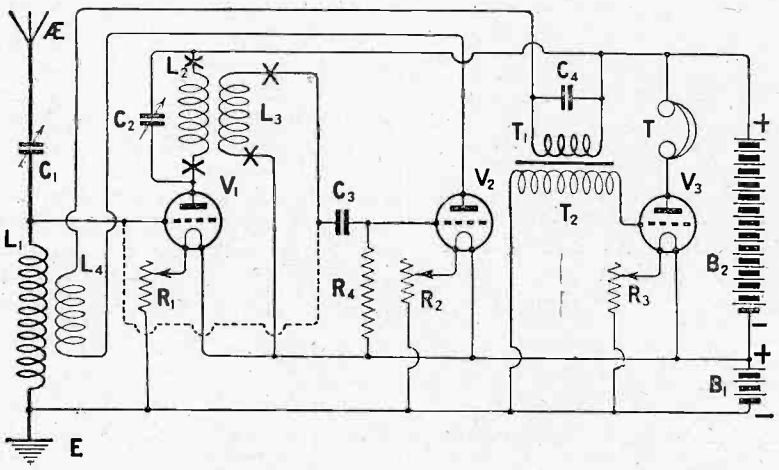


Fig. 3.—The conversion in the case of a transformer-coupled H.F. valve is quite simply done.

An Exception

It is not possible to use exactly this method in the case of the original 3-valve Transatlantic set, since this receiver was designed for the clip-in type of valves, and the connection here should be made by means of a piece of flex bearing upon one end a valve pin inserted in the usual transformer socket, the other end being placed under the aerial terminal. The high-frequency valves must both be removed from their sockets.

There are one or two precautions which should be taken in every case when carrying out the conversion, and the most important of these is

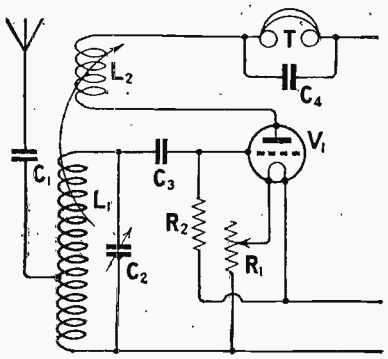


Fig. 4.—The tuning arrangements required for KDKA. One or more stages of low-frequency amplification are desirable in addition to the detector valve shown here.

to see that every high-frequency valve is removed from its socket, and that both high-frequency transformers are removed, also the tuned anode coil or coils where this method of coupling is employed. Further, the anode or transformer tuning condensers must be set to their minimum positions, and care should be taken to see that the grid leak remains connected to the proper end of the filament. If, for example, the grid leak is connected in parallel with the grid condenser, it will be necessary to alter this arrangement to the more customary one in multi-valve sets, direct between grid and filament positive. This will, of course, make no difference to the functioning of the set when using the full number of valves, and the desired effect will be produced when the H.F. stages are cut out.

Sets without H.F. Stages

All the alterations which we have so far considered apply only to sets in which one or more high-frequency stages are employed, but do not concern those receivers which consist of a rectifying valve, possibly followed by one or more stages of low-frequency amplification. In such sets all that is necessary is to modify the tuning

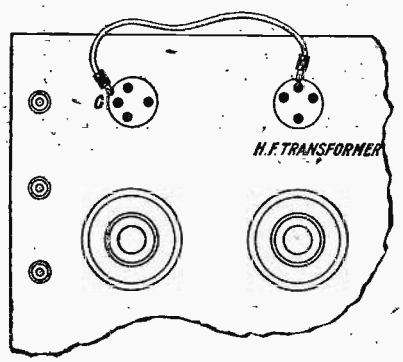


Fig. 5.—How a transformer-coupled H.F. valve may be cut out in order to permit reception on the short waves.

arrangements in a manner which we will now consider.

The basic circuit is illustrated in Fig. 4, and it will be observed that a simple type of auto-coupled arrangement is recommended, the aerial lead being taken to a tapping near the lower or earth end of the tuning coil, through a small fixed condenser, which is intended to permit easy reaction control.

Altering the Tuning Arrangements

To convert the tuning arrangement of practically any set employing plug-in coils to the circuit shown in Fig. 4 is quite a simple matter, readily to be achieved by the use of a specially wound coil which is inserted in the aerial socket, and we will now proceed to consider the construction of this little coil. The one which I use myself

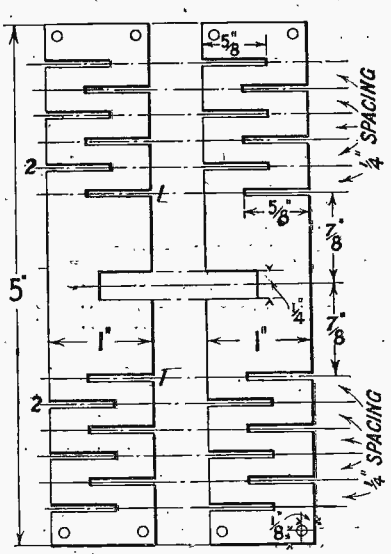


Fig. 6.—How the former for the coil is made.

is illustrated in the photograph accompanying this article, and it will be seen that it is wound upon one of the cross formers which were designed with a view to reducing the amount of dielectric material necessary to support the windings.

The Coil Former

This special former is a fairly easy thing to make, and one of the accompanying diagrams will show how it can be done. (Those who prefer to purchase it will find that it can be obtained from several of the advertisers in this journal.) In winding coils upon these formers for the longer wavelengths, it may be remembered that it is usual to wind a full layer of wire in each set of saw cuts until the whole former is full, the desired number of turns for the complete coil being achieved by placing a suitable number in each layer. For an example of a coil of this type the reader is referred to the crystal set described by Mr. A. Johnson-Randall in the last issue.

In winding a coil for KDKA upon this former, of course, only a small number of turns is required, and the procedure is as follows. In the first set of saw cuts, marked 1 in the diagram, wind in two turns of No. 22 d.c.c. wire, then cross over to the second set of saw cuts upon the other side of the former, wind two turns here, proceed to the third set of saw cuts, wind two turns, and so on until ten turns have been wound round. This will only occupy the first five sets of saw cuts, the sixth being left unused. Of course, if you make the coil for yourself there is no need to make the outer set of saw cuts at all, but if you buy a standard one, then you will, of course, find them provided.

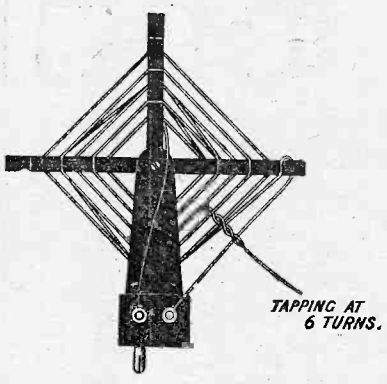


Fig. 7.—The finished coil is attached to a basket-coil mounting.

Making the Aerial Tap

The necessary tapping point for the aerial connection should be made as the winding is done, and it should be made in the sixth turn from the starting point, that is to say, upon the conclusion of the third layer of two turns. Simply twist a small loop in the wire when you reach this point, and then proceed with the winding. When the coil is finished, the outer end can be fastened off by passing it through one of the small holes in the former, which are provided in the standard ones for this purpose, and we then come to the question of the mounting of the coil.

I have found that ordinary basket-coil mounts are exceedingly convenient, since most of these have a hole provided near the top of the upright piece, through which a screw can be passed into the intersection of the arms of the cross former, the formers bought ready-made being provided with a tapped hole at this point for the purpose.

The connections from the coil to the mount must be made correctly, otherwise the proper arrangement

of the circuit will not result when the coil is plugged into the aerial socket of the set. Investigate the wiring of your receiver and discover which element of the aerial coil holder is connected internally to earth and make a note of this. Then discover which element of the mounting of the basket coil will be connected to that particular element of the aerial coil holder when the coil is inserted, and to this connect the inner end of the coil winding. The outer end of the coil winding is then, of course, connected to the other element of the mount.

Inserting the Coil

If this coil is now plugged into the aerial socket of the receiver, and the aerial lead taken off the set and connected to one side of a small fixed condenser of about ·0001 μF capacity, a wire being taken from the other side of this small fixed condenser and soldered to the tapping point upon the coil, the desired conversion will have been achieved, the earth lead remaining on the usual earth terminal.

The question of a suitable reaction coil to use with this adapter coil must depend to some extent upon the valve used as a detector, but either the Gambrell a, "a/2," or the Burndept S1 should prove suitable. Those who possess the Burndept set of special short-wave coils will be able to choose one from this set. The ideal is to find a reaction coil which is capable of making the circuit oscillate when placed some two or three inches away from the tuning coil, in order that movement of the reaction coil may not have such serious effects upon tuning as it would have if the two coils were placed close together.

Valve to Use

A little pains should be taken to discover a suitable valve for the rectifier, since the requirements upon these very short waves are somewhat severe, and with certain types of valves it is very difficult so to adjust the filament and high-tension voltage that a smooth control of reaction is obtained, and it cannot be stated too emphatically that if the reaction control is "floppy," there is very little hope of achieving successful reception. In general, a valve which will make the set oscillate easily is desirable, in view of the small size of the inductances available for coupling purposes. I find a valve of the D.E.5B. type to meet these requirements with a fairly high value of anode voltage. Adjustment of the anode voltage will often be found to be much more critical than in reception upon the longer wavelengths, a higher value probably being necessary before the set will oscillate freely. Of course, should you be unable to make the set oscillate, do not forget to try reversing the connections to the reaction coil; and if it is still a matter of extreme difficulty to obtain oscillation upon certain points on the condenser dial, try replacing the ·0001μF fixed condenser with a No. 50 plug-in coil or its equivalent.

Operation

Assuming that you have now inserted the coil in the set and achieved a fairly smooth control of reaction so that the set can be made to oscillate freely when required, and adjusted to the verge of self-oscillation without actually becoming "floppy," we will now proceed to the question of the operation of the receiver upon these short wavelengths. Assuming you have a ·0005μF condenser in parallel with the coil, it will be found that KDKA comes in somewhere quite close to the bottom end of the scale, probably somewhere between 10 and 20 degrees; but, of course, this cannot be stated very definitely in view of the varying minimum values of different makes of condensers (a square law type is assumed).

The tuning condenser of the set must, of course, be placed in the "parallel" position, and if no vernier control is already fitted it will be found most desirable to attach some sort of long handle to the knob. Adjustments on 68 metres are extraordinarily critical, and without either vernier plate, separate vernier condenser, or long handle, it is exceedingly difficult to tune in any station which is not really strong.

To pick up KDKA for the first time it will probably be necessary to search for the carrier wave with the set in the oscillating condition, but *do* stop it from oscillating the *moment* you find it.

Great New Radio Press Laboratories.

(*Continued from page* 574.)

the effect of the laboratories will be felt in a few weeks' time. As is to be expected, almost the whole work of the laboratories will be concentrated on methods of reception, and all problems allied to what is of principal interest to readers of Radio Press publications.

Public Inspection

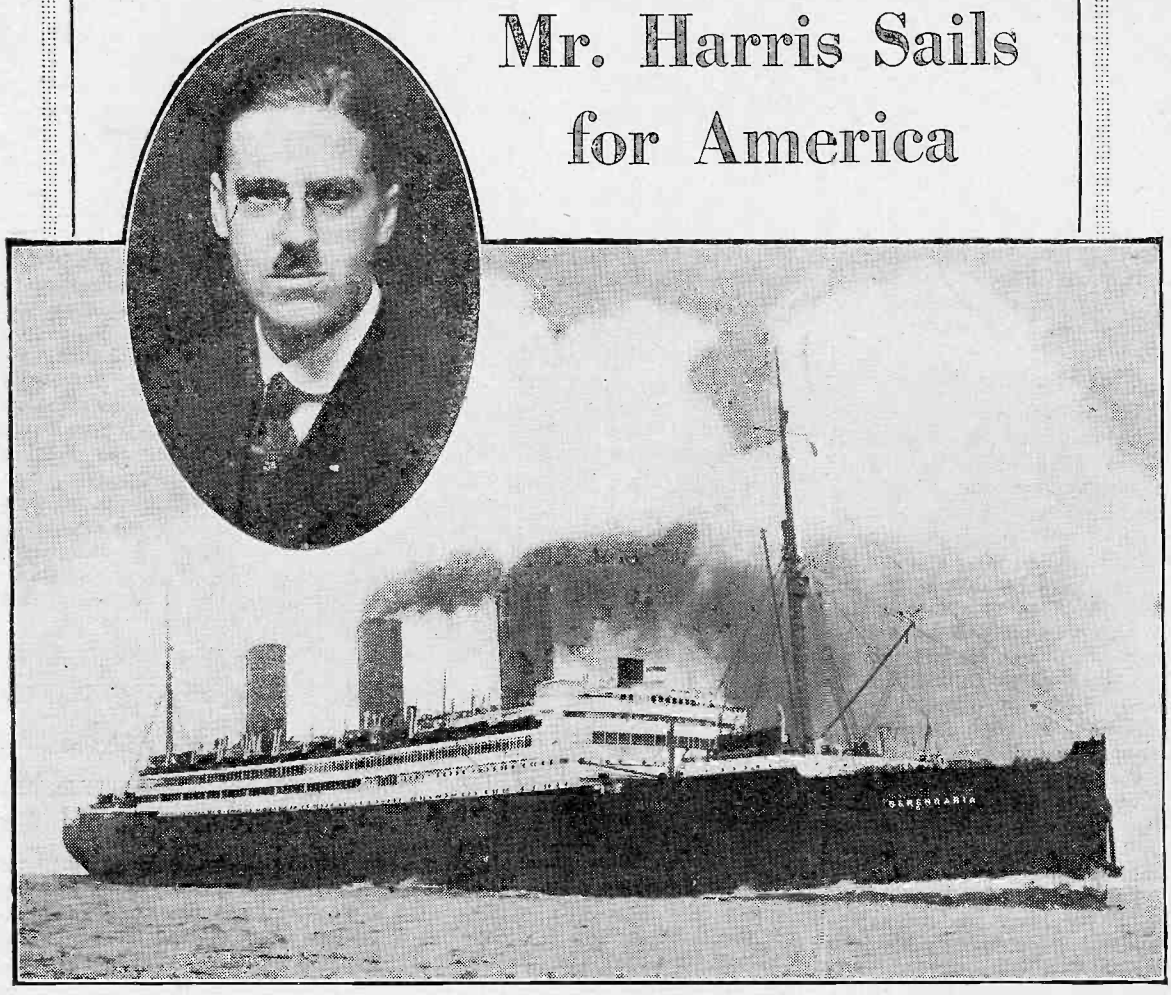
When the laboratories are fully operating it is intended that both the public and trade shall have the opportunity of inspecting the work being carried out and seeing the actual carrying on of research work, the testing of sets, measurement and standardisation work, etc.

A great enterprise has been launched and will have a considerable effect on the whole design of experimental work in this country, and the Managing and Technical Director of the Radio Press (Mr. John Scott-Taggart, F.Inst.P., A.M.I.E.E.) believes that the great expense (a sum of £20,000 is allocated for preliminary expenses) will more than justify itself as a result of the support which the wireless public will give to Radio Press publications by buying them and by supporting those firms which advertise in these publications. It is confidently expected that not only will the already large number of readers be increased (the circulation of one of the Radio Press journals alone is equal to the joint circulation of all the technical and semi-technical publications of other firms put together), but present readers will become still stauncher adherents and will assist the company in its policy by telling their friends entering the realms of wireless of the work being carried out by a concern which is the largest wireless publishing firm in the world, but which, nevertheless, realises its responsibilities and intends to proceed still further along the path it has already so successfully followed.

Queries.

The Query Department is now re-opened to accept readers' queries. Readers are advised that a charge of 2s. 6d. is made per query, and a stamped addressed envelope should be enclosed.

Mr. Harris Sails for America



IT has long been felt that an effort should be made to give our readers some real account of wireless conditions in America, and that something more was needed than descriptions written by those who know only the American conditions. Many articles from the pens of eminent Americans have appeared in the periodicals controlled by Radio Press, and a good deal of valuable and interesting information has been obtained therefrom, but, to show in true perspective a clear picture of the technical conditions in America, the broadcasting methods used in that country, and so on, the writer must be one who has an intimate knowledge of British conditions.

It is chiefly by comparisons between conditions with which we are familiar and those of the country in which we are interested that a clear idea of the subject may be obtained, and to make such comparisons, a writer is needed who is thoroughly familiar with our own affairs and who is capable of understanding the deeper significance of all the unfamiliar things which he sees.

The Decision

This problem has been given much consideration by the Management of Radio Press, Limited, and it was finally decided to send Mr. Percy W. Harris, Editor of *The Wireless Constructor*, and Assistant Editor of *Wireless Weekly* and of MODERN WIRELESS, on a visit of investigation to the principal centres of the United States and Canada. Mr. Harris actually set sail for America on the 16th of May on the Cunard liner "Berengaria," with New York as his immediate destination. Armed with letters of introduction to many of the principal authorities upon wireless in the United States, including many of those responsible for the actual conduct of broadcasting, he will have opportunities of making a thorough investigation into the present position of Trans-Atlantic radio, and he intends to present his conclusions in a series of articles which should prove of much interest to our readers.

Technical Investigations

Besides the general aspects of the interesting differences in American conditions, much of Mr. Harris's time will be devoted to the more technical matters of, for example, the design and details of the latest American super-heterodyne receivers—a most interesting subject in view of our present development of interest in these circuits. Although Mr. Harris himself has not written any articles on supersonic reception, he has yet done much work on the subject, and he will have an opportunity of hearing and giving thorough tests to all the leading makes, including some of the latest modifications of the original supersonic circuit, such as

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O.A.V. Tom-Tit... 30/-
O.A.V. Junior..... 55/-
Sterling Baby..... 55/-
Sterling Dinkie... 30/-
Amplion Junior... 27/6
Amplion Dragonfly 25/-
Amplion Do. III 50/-
Amplion De Luxe 65/-
Amplion AR19...105/5
Dulcevox..... 42/-
True Music Minor 21/-

TRANSFORMERS L.F.

Eureka Concert Grand..... 30/-
Eureka Second Stage..... 22/6
Igranic Shrouded New Model..... 21/-
Formo Shrouded 18/-
Formo Open Type 12/6
Portland..... 12/6
General Radio 83 15/-
Super Success (black)..... 21/-
Royal..... 20/-

Terminals complete.
Pillar.....doz. 1/3
Do. ..... ,, 1/-
W.O. ..... ,, 1/3
'Phone ..... ,, 1/1
Nickel, 9d. doz. extra.
Voltmeter.....each 5/6
Grid Leak & Clips 1/4
Rheostat & Dial....2/3

HEADPHONES

British R.T.H.... 20/-
Brandes' Matched 20/-
General Radio..... 20/-
Brown's F Type 20/-
Sterling's 22/6
All 4,000 ohms.

QUALITY (GOSWELL) RADIO COILS MOUNTED.

25 ... 1/6
35 ... 1/9
50 ... 2/-
75 ... 2/3
100 ... 2/9
150 ... 3/-
175 ... 3/6
200 ... 3/9

Valve Holder 1/9
2-way Cam Vernier 9/-
3-way Ordinary...12/6
3-way Ordinary..... 7/6
2-way Pancl..... 3/-
3-way Panel..... 5/-

N & K HEADPHONES.

Guard against inferior imitations which are "cleverly" got up to deceive. Make sure of the genuine article, and see letters N & K stamped on back. 4,000 ohms .....12/11 Post 6d. pair.

DR. NESPER HEADPHONES

Adjustable diaphragm, detachable receivers, double leather-covered head springs, long flexible cords, nickel plated parts. Very comfortable fitting to the head. Per pair, 12/11. Post 3d. pair.

Retail Orders of £5 (*own goods*) Customers given a pair of Brown's 'Phones, "F" Type. Free.

IGRANIC COILS

Coils: 25, 5/-; 35, 5/-; 50, 5/2; 75, 5/6; 100, 7/-; 150, 7/10; 200, 8/8; 250, 9/-; 300, 9/5; 400, 10/3; 500, 10/6.
Rheostat, 4/6; 50 ohms, 7/-.

VARIABLE GRID LEAKS

Lissen 2/6
Watmel.....2/6
Allen.....1/6
Bretwood.....3/-

ANODE RESISTANCE

Lissen 2/6
Watmel.....3/6
Allen.....1/6
Bretwood 3/-
Super-Selective Resistance Bretwood....3/-
B.M.C. 4/-
Watmel.....3/6

TELEFUNKEN

Adjustable 'Phones, 4,000 ohms, genuine when bearing No. EH 533 on earpiece. These 'phones are lighter than a feather. **17/11** pair.

ERICSSON E.V. CONTINENTAL 12/11

Your favourite 'phones. Entirely NEW MODEL. Most beautifully finished, exquisite tone. (4,000 ohms).

VALVES 8/-

All makes stocked B.T.H., Ediswan, Mullard, Cossor, Marconi, Bright Emitter. Dull Emitter, and Power Valves.
We highly recommend MULLARD VALVES.

COSMOS
Met-Vickers, Ltd., Bright Emitter Valve, 7/6.

SHIPTON STRIP.

7 ohm Rheostat... 3/-
30 or 60 ohm 3/-
Potentiometer, 600 ohms 4/6

WONDER AERIAL.

Phosphor Bronze, 49 strands. Not cheap imitation. 110 ft.....3/3.

Polar capacity coupling unit.....15/-

SUNDRIES

Grid Leak & ·0003 2/2
Edison Bell do.....2/3
Dubilier do.....5/-

IMPORTANT.

By agreement with Messrs. Bower Electric I offer GENUINE 5-PIN Thorpe K4, **17/6** (Unidyne valves). 5-pin Holder 1/3
Set of parts for One-valve Unidyne 50/- For Two-valve Set, 75/- (excluding box and Ebonite).
Complete set, made up, tested and guaranteed (2 valves £9 9 0

ALL POST FREE.

RAYMOND VARIABLE CONDENSERS

SQUARE LAW LOW-LOSS

One-hole fixing. Aluminium ends. WITH VERNIER			EBONITE Bushes Highly recommended WITHOUT VERNIER		
·001	..	8/6	·001	..	7/7
·0005	..	7/6	·0005	..	5/9
·0003	..	7/-	·0003	..	5/3

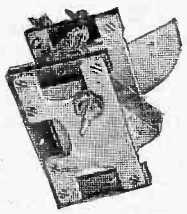
Complete with Knob and Dial.
EBONITE ENDS 1/- EXTRA
Post Free.

ORMOND CONDENSERS SQUARE LAW LOW-LOSS.

·00025 - **6/6**
·0003 - **7/6**
·0005 - **8/-**
·001 - - **9/-**

With Vernier **1/6** extra.

Knob and Dial Free.



NEW DESIGN

ORMOND No. 3.

Square Law with Vernier, Ebonite Ends, Knob and Dial.

·001 - - 10/6
·0005 - - 9/6
·0003 - - 9/-

London's LARGEST Stockist of JACKSON BROS.'

"J.B." Variable Condensers, Complete with Knob.

SQUARE LAW			STANDARD		
·001	.. ..	9/6	·001	.. ..	8/6
·0005	.. ..	8/-	·0005	.. ..	7/-
·0003	.. ..	6.9	·0003	.. ..	5/9
·00025	.. ..	6/6	·0002	.. ..	5/-

SQUARE LAW WITH VERNIER
·0005 .. .. 12/6 ·0003 .. .. 11/6
ALL EBONITE ENDS.

SUPER HETERODYNE PARTS STOCKED

MAGNUM

(Burne Jones, Ltd.)

All parts stocked.
Magnum tapped coil No. 1 .. .. .. 12/6
159-1050 metres.
Do. No. 2, 450-3850 metres.. .. 15/-
H.F. TRANSFORMERS.
Protected windings, 150-300, 250-525, 300-600, 550-1200, 1200-3000, all each.
COIL HOLDERS.
2-way .. 9/6 3-way 12/6
NEUTRODYNE CONDENSER 4/6
SEND FOR LISTS.

REFLEX COILS

Made under Licence "Burndept" Patent No. 168249
Larger sizes stocked.
Set of 4 (35, 50, 75, 100) with plugs, 6/11 post free
No 150 .. .. 2/6 post free.
No. 200 .. .. 3/11 post free.

H.T. BATTERIES
(Various makers).
60-v., 5/6, 6/6, 6/11
100-v., 12/6, 14/11

EVER-READY

60v. 13/6
108v. 22/6
60v., B.B.C.....8/6
36v. 5/6
16.5 .....2/9
9v. (grid bias).....2/3

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Stock sizes 3/16th.
6 x 6—7 x 5 each.... 1/2
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16 x 8—12 x 6 .....3/-
12 x 9 .....4/3
12 x 12 .....5/6
14 x 10 .....5/8
1/4th in. also stocked

D.C.C. WIRE
1/4 lb. reels.

16 or 20 g.....9d
22 g. .....10d.
24 g. .....11d.
26 g. 1/-
28 g. 1/2
16 g., per lb. 2/4

SWITCH ARM

12 studs., 12 nuts, 12 washers. The lot: Brass 10½d.; Nickel 1/3.
2-way Coil Stands..1/7
Ditto 1/11
2-way cam vernier..3/3
2-way geared 5/3
Ebonite basket holders, 6d., 7d., 8d., 9d., 10d., 1/-.
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Screws & nuts..2 a 1d.
'Phone connectors..1d.
Pliers, good make, 10d. 1/-
Climax earth tubes, 5/-
Twin silk flex, 6 yards .....6d.
Ormond Rheostat....1/8
Raymond.....1/3, 1/6
With dial ...1/6, 1/11

SQUARE LAW

Variable condensers.
.0005 .....5/-
.0003 .....4/6
Including knob and dial.
D.P.D.T. Panel.....1/-
S.P.D.T. .....10½d.
China base:
D.P.D.T. 1/3
S.P.D.T. .....8½d.

5/- 'PHONES.

Customers buying 20/- worth full-priced goods can have a first-class pair of 'phones for 5/-. Must be taken at time of purchase.

Fixed Condensers.

Raymond (ebonite base) .001, .0001, 2, 3, 4, 5, 10d.
.002, 3, 4, 5, 6.....1/-

Terminal fittings.

REFLEX COILS.

Made under licence "Burndept" Patent No. 168249.

No. 35	150-300	8d.
No. 50	200-500	9d.
No. 75	300-750	1/-
No. 100	400-1,000	1/2
No. 150	600-1,500	1/8
No. 200	800-2,000	2/9
No. 250	900-2,500	3/3

MANSBRIDGE

2mfd., 3/9; 1mfd, 3/3; 25, 2/9

COIL FORMERS

Double 1/-

BREAST DRILLS

Double pinions, Cut bevel 4/3
West End Stockist o Edison Bell, Igranic, Goswell (quality), Polar Jackson Bros. (J.B.), Marconi, Cossor, Mullard, Ediswan Valves, Sterling, B.T.H., McMichael's, Lissen, Dubilier, T.C.B., Shipton parts.

ACCUMULATORS
(well-known makes)

2v. 40a 7/6, 8/6
4v. 40a, 13/11, 15/11
4v. 60a 17/6, 18/3
4v. 80a 22/6, 23/6
6v. 60a ...25/11, 27/6
6v. 80a 33/-
6v. 100a 38/6

Terminals, 1d.; doz. 10d.
Nickel .....1½d.
Valve sockets, 4 for 8d.
Stop or valve pins. 1d.
Washers.....12a1d.
Nuts .....6 a 1d.
Spade tags.....6 a 1d.
Spade terminals. 2 for 1½d.
Pin terminals, 2 for 1½d.
Above red and black. 2 for 3d.
Copper foil....foot 2½d.
Bell wire, 10 yds., 5d.
Red and black flex 12 yards, 1/6
Aerial, 7/22, 100ft., 1/11
Battery Clips, 3 a 1d.
Sleeving, 12 yards 6d.
Wander plugs, pr. 2d.
Contact studs complete. 2 a 1d.
'Phone cords, 6 ft., 1/3
Knobs .....1d.
Knobs and Dials, 10d.
Empire Tape, 12 yds, 6d.
Valve Holders.....8d.
'Phone Plug and Jack, 4d.
7/22 Aerial, 50 ft., 1/1
Ins. Hooks, 2 for 1½d.
Loud speaker cords. 1/4, 1/6
Ins. Staples.....5 a 1d.
Flush panel sockets (nickel and nuts), 1d.
Rheostats, special, 9d.
Vernier condensers, 1/9

VARIOMETER

250/700 metres inside winding, worth 10/-, 50 at 4/11.

ERICSSON E.V.

Continental 4,000 ohm 'phones, worth much more. Callers 11/9 pr.

Tumbler switches, 10½d.
Shorting plug ....3½d.
Egg insulators. 4 for 3d.
Var-ometer, 250/650, 1/6
Murray valve holder, 1/3
Anticap ditto....10½d.
Solid rod standard. 1/-
Good quality do...8½d.
H.T.C. Bretwood, etc., Hank 1/16th sq., Bus Bar .....6d.
Lead-in (10 yds.)....1/-
Ebonite dials .....3d.
Unbreakable knobs 3d.
Adhesive tape, roll. 2½d.
Valve templates.....1½d.
Tape aerial, 100 ft., 1/10
Set of 5 spanners, 3½d.
Screwdrivers .....2d.
Soldering irons 6½d
Drills (7) 1/2
Solder (2 sticks)....2½d.

Ebonite Coil Formers

Fitted Fibre .....7d.
Plain .....4½d.
Shaped ....6a. & 7d.
Edison Bell .....11d.
Loud speakers.....15/9
4,000 ohm 'phones, 6/8
3-way coil stands..3/6
Special rheostats.....1/-
Crystals, best.....6a.
Enclosed detectors..8d.
Extra large do.....1/-
2-v. 40 accumulator..7/6

MICROMETER

Crystal detector, enclosed 1/8

DR. NESPER

(Genuine) 4,000 ohm phones. Callers, 11/9

Reactone Coils

Set of 5.....3/-
1 for 5XX.....1/9

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Shaftesbury Avenue, W.C.2.
New Oxford Street End

NOTE! GRAPE ST. is between Princes Theatre and Mudies' Library. *(POST ORDERS TO ABOVE.)*
Open 9 to 7.30. Closed on Sundays.

27, LISLE ST.,

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Open 9 to 8. Sundays 11 to 1

Be sure IT'S RAYMONDS.

the various instruments which incorporate the reflex principle.

Ranges

The receiving ranges which can be covered with a given number of valves and type of circuit is one upon which most of us are prepared to argue, and there is a strong tendency in this country to discount heavily all American accounts of the performance of their receivers; but we must not lose sight of the fact that reception conditions vary very much in different parts of the world, and there are indications that in the United States it is actually possible to cover extreme ranges with simple apparatus which would be practically useless for the same purpose in the British Isles. For example, it is frequently argued by the Americans that their slowness in taking up high-frequency amplification was due to the fact that it was possible under their conditions to cover remarkable ranges with ordinary detector circuits using reaction, and the impressions gained by Mr. Harris will be distinctly useful.

Static

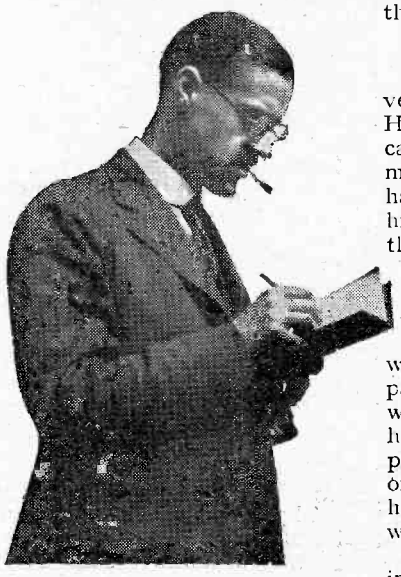
Although what the Americans describe as "static" is no doubt very severe during the summer months in the United States, it appears that in the winter, reception conditions are often what we should describe as extraordinarily good, so that it becomes quite easy to receive, say, a station in San Francisco upon the Pacific coast with an ordinary single-valve reaction set. In favour of the view put forward by those who believe that such remarkable long-distance work is more to be attributed to the excellence of American reception conditions than to the quality of the receivers used in that country, it must be admitted that some of the American sets which have been tried in this country have not lived up to the expectations entertained of them.

The A.R.R.L.

From Mr. Harris' own point of view, probably some of the most enjoyable moments during a tour which must prove a very strenuous one will come when he meets some of the stalwarts of the American Radio Relay League and makes the acquaintance of many of those men who are known to most of us only as a call sign and a style of sending. From them he will no doubt receive the cordial welcome for which the A.R.R.L. is famous, and his opportunity of hearing at first hand of all the latest developments in ultra short-wave work which are being made by John Reinartz and his confrères is one which will be envied by British transmitters.

The American Home Constructor

An interesting sidelight should be thrown by the articles which Mr. Harris writes upon the ways and methods of the American



Mr. Harris in a characteristic attitude.

home constructor, who is to most of us a somewhat mysterious person, for although the American magazines give him a good deal of attention in the way of designs for sets and apparatus, they convey very little idea of the actual methods and capabilities of the average constructor for whom they are catering. It is no uncommon thing, for example, to find a lengthy description given of a quite complicated receiving set, with numerous photographs and a diagram showing the layout of the parts, without any other assistance in wiring-up the set than a simple circuit diagram, and one is left to wonder whether their readers are really capable of wiring up such a set successfully without the aid of a full wiring diagram.

The Route

Following upon his initial investigations in New York, Mr. Harris will commence upon a carefully planned tour of the more important centres, his route having been worked out to enable him to make the utmost use of the necessarily limited time at his disposal. The important cities of the Middle West will detain Mr. Harris for some time, and he will then go down to the Pacific coast, where he is likely to receive a particularly vivid impression of what "static" can be. When he has devoted so much time as his programme will allow to the study of the United States conditions, he will pass northwards to Canada, where his investigations will end.

His tour, needless to say, will include visits to the Bureau of Standards, the laboratories of the Radio Corporation of America, the Western Electric Company, and all the principal manufacturers. In short, readers of Radio Press publications will receive all the great benefits resulting from a close and critical investigation of American progress and design work, conducted by one who is so well known as the recently appointed Editorial Manager of the Radio Press, Limited.

Mr. Scott-Taggart and Mr. Harris planning out final details of the route.

Wireless and Everyday Life

IT is practically safe to say that the reception of broadcasting has now become a necessary part of everyday life for the great majority of people who try to keep pace with modern progress. Apart from the huge number, however, who utilise a wireless receiver purely as a means of bringing the latest news and music into their own homes, there are those who make wireless reception their main hobby, realising the tremendous fields yet to be explored.

A Neutrodyne Set

Both of these classes will find very absorbing and instructive articles regularly appearing in Radio Press publications. For the more advanced of the latter class a constructional article by John W. Barber, fully describing a set with two high-frequency stages utilising the neutrodyne principle, appeared in *Wireless Weekly* for April 22. Properly handled, this set is capable of covering really long distances.

In the next issue of the same periodical D. J. S. Hartt, B.Sc., gave constructional details of a set which, whilst being easily adapted to work on very low wavelengths, such as that used by the American short-wave station KDKA, may also be used very efficiently on the more ordinary B.B.C. station wavelengths. This set, although using only two valves, has several Continental, most B.B.C. stations and the American station previously mentioned to its credit, Eiffel Tower being received on the loud-speaker.

"A General-Purpose Two-Valve Receiver," by John Underdown, a full description of which appeared in the May 6 *Wireless Weekly*, will present a great appeal to those who require a receiver which, whilst being able to operate a loud-speaker on the local station, requires no complicated adjusting. A switch is incorporated in this set, allowing one or two valves to be used at will, without necessitating any disconnecting or changing of leads whatsoever.

Transmitting

The more advanced amateur interested in transmission will find in the same issue an instructive article dealing with practical transmitting circuits for 200 metres by Dallas G. Bower.

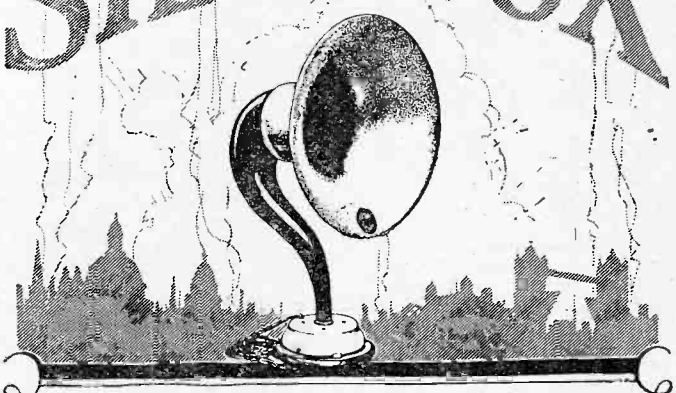
There are those who prefer the crystal as a detector and yet desire loud-speaker reproduction. A set which supplies their need was constructed and described by Stanley G. Rattee, M.I.R.E., Staff Editor. The results obtained with this receiver are well up to the standard of previous sets which have been constructed and described by the same designer.

Moisture in Coils

In the same issue a discussion on various types of coils and the effect of moisture on their efficiency, by G. P. Kendall, B.Sc. (Staff Editor), will be welcomed by the home-made coil enthusiast. Mr. Kendall has made a very special study of the efficiency of various types of coils, and some first-hand information regarding them is contained in this article.

In the *Wireless Constructor* for June a crystal set is described by Percy W. Harris, M.I.R.E., which may be tuned to 5XX or one of the ordinary B.B.C. stations at will by merely moving one switch and slightly re-tuning on a condenser. The advantages of this arrangement are obvious and will be fully appreciated by non-technical broadcast listeners when they wish to change over from low to high wavelength and vice versa.

SILVERVOX



The Silvertown "Silvervox" Loud Speaker will reproduce both speech and music without the loss of its original tone and quality. Coils wound to either 120 or 2,000 ohms. The tone arm is a heavy aluminium casting. Total height 20 inches. Size of trumpet 12½ inches diameter.

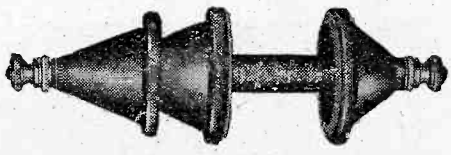
PRICE £3 10 0 each.

Silvertown Window-Pane Insulators.

Regd. No. 705625.
(Patent Applied for.)

Made of best quality enamel-coated ebonite, these insulators take advantage of the excellent insulating properties of glass, and at the same time avoid losses by keeping the lead-in well away from walls. Rubber rings form a water-tight joint against the pane. The cone keeps a portion of the insulator dry in wet weather.

PRICE 4/- each. A special drill with instructions for making hole in glass supplied with each insulator.



Silvertown Cone Lead-In Insulators.

Regd. No. 705625. *(Patent Applied for.)*

Another effective form of insulation, using the cone insulators in conjunction with an ebonite tube passing through a window frame or wall. Electrical efficiency assured.

PRICES from 4/6 each.

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LIVERPOOL: 54, Castle St.
LONDON: 100 and 102, Cannon Street.
MANCHESTER: 16, John Dalton Street.
NEWCASTLE ON TYNE: 59, Westgate Road.
PORTSMOUTH: 49, High Street.
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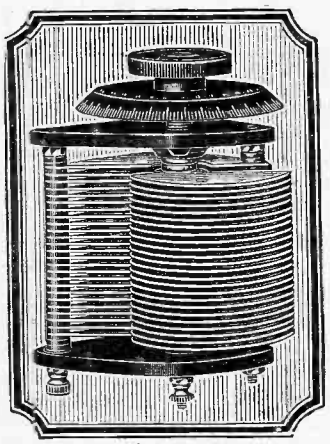
SILVERTOWN ADI COMPONENTS



A BETTER CONDENSER

—improves any receiver

Condensers are in your radio set to help you towards perfect reception.

If these instruments are not made with the utmost care to ensure accuracy, even though every other component in your receiver is perfect, the quality of your reception will be far from satisfactory.

It is wise, therefore, to incorporate only those condensers that by popular use and expert approval are proved to be definitely efficient and accurate.

Whether it be capacity, dielectric losses, or mechanical construction, every detail that makes for the utmost tuning efficiency is embodied in J.B. Condensers.

If you are a serious experimenter you will eventually fit them. On the other hand, if you are an amateur seeking the best, you have found it when you purchase J.B. condensers.

Once you have built J.B. Condensers into your sets you will continue to build well, for your experience will teach you that only condensers bearing the mark "J.B." can give you real tuning efficiency.

SQUARE LAW.			
.001	9/6	.00025	6/9
.00075	9/–	.0002	5/6
.0005	8/–	.0001	5/3
.0003	6/9	Vernier	4/6
STANDARD.			
.001	8/6	.00025	5/9
.00075	8/–	.0002	5/–
.0005	7/–	.0001	4/9
.0003	5/9	Vernier	4/6
J.B. SQUARE LAW WITH VERNIER.			
.0005	12/6	.0003	11/3
.003	14/–	.00025	11/6

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HAYNES GRIFFIN Intermediate Wave Transformers are individually tested and the exact peak of resonant frequency is carefully ascertained. They are then matched in sets of four which display the same characteristics. It is apparent that such careful matching must give consistently better amplification than ordinary unmatched instruments. A minimum of L.F. amplification is assured by the low impedance windings used. Ease in tuning is assured from the fact that H.F. transformers are tuned to a comparatively low wave-length, thus eliminating the repetition of stations at different points on the oscillator dial. Amplification at this low wave-length also eliminates a great deal of noise and static.

Used in an intermediate amplifier the amplification peak of Haynes Griffin Transformers using bright valves will be at about 150 kilocycles, or 2,000 metres.

FOR THE HAYNES' SIMPLIFIED, HAYNES' DE LUXE, NEW COCKADAY AND ALL SUPER HETERODYNE RECEIVERS.

SET OF FOUR MATCHED TRANSFORMERS.
List Price, £5 5s.

OSCILLATOR COUPLER.
List Price, 18/– each.

VARIABLE INPUT CONDENSER.
List Price, 8/6 each.

Stocked by all high-class Radio Dealers.

Write for Complete List of latest American Apparatus.

SUPER SUCCESS

By A. J. HAYNES, is a 28-page Booklet describing the theory and construction of Super Heterodyne Receivers.

Sent Post Free for

1/6

R. A. ROTHERMEL LTD., 24-26, Maddox St., London, W.1

Radio Press News

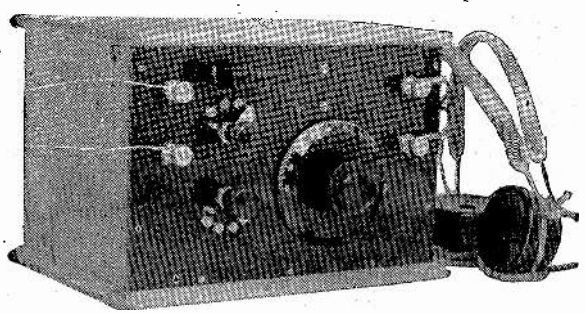
Announcing the publication on June 20th of two additions to the Radio Press Envelope Series:

No. 10.—"How to Make the Twin-Valve Loud-Speaker Receiver." By John Scott-Taggart, F.Inst.P. A.M.I.E.E. Price 2s. 6d., or 2s. 9d. post free.

No. 11.—"An Adaptable Crystal Set and How to Build It." By Percy W. Harris, M.I.R.E. Price 1s. 6d., or 1s. 9d. post free.

A Popular Crystal Set

IT is scarcely possible to say, among the very large number of extremely popular sets designed by Mr. Harris, which has achieved the greatest measure of appreciation, but it may well be concluded that one of those which has achieved popularity in the



Mr. Harris' 16-gauge wire crystal receiver is now described in Radio Press Envelope No. 11.

face of the greatest difficulty is the special crystal set which he described in the September issue of MODERN WIRELESS. To design a crystal set which possesses remarkable merits from the point of view of simplicity of construction, originality of arrangement, and efficiency of working, is no easy matter in these days, but the receiver in question achieved all three distinctions to so marked a degree that the set has become one of Mr. Harris' most notable contributions to the art of simple set designing.

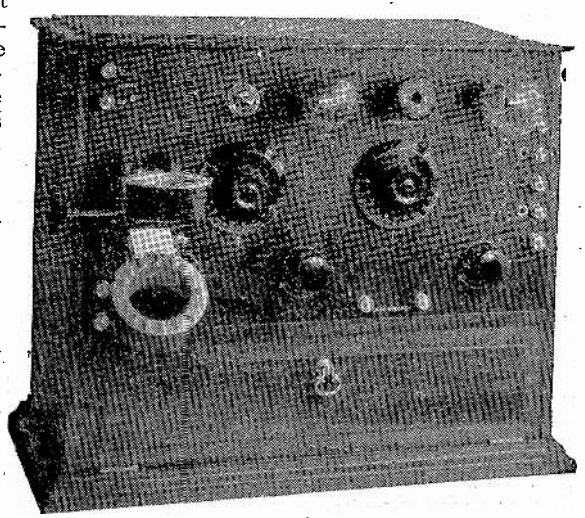
In a New Form

So great has been the vogue of this set that it is now being republished in Radio Press Envelope form (Radio Press Envelope No. 11), so that all those who missed it on its first appearance will now be able to build the instrument with the greatest possible ease and with the aid of all the advantages conferred by a Radio Press Envelope. For example, upon obtaining the envelope, with its attractive coloured cover, they will find that two full-sized blue prints are included, one showing the dimensions for the drilling of the panel and the other the wiring itself. Incidentally, the first of these blue prints can be used as a template for carrying out the drilling; that is to say, it may be lightly stuck to the panel, the positions for all the holes transferred to the panel by centre-punching, and then the panel can be drilled through these marks with a fair degree of accuracy, limited only by any tendency to shrinking or stretching in the processes of the making of blue prints.

In addition to the customary full description of the building of the instrument, and instructions for its working, there will also be found the usual set of drawings, showing in this case the circuit of the instrument and the working positions for the switches incorporated in the set, and the circuit modifications which result from each of these settings. As a final aid to the constructor, there are three sheets of reproductions of photographs showing the set from every useful angle, so that its assembly and wiring becomes so simple that no mistake is possible.

This set is illustrated in one of the photographs accompanying these notes, and it may be seen that it is of a particularly pleasing and compact appearance, since no external coils are required for the ordinary broadcast wavelengths. A special design of inductance devised by Mr. Harris is incorporated inside the box, and an additional plug-in coil is only required when receiving 5XX. A special circuit is incorporated of the auto-coupled type, which is now receiving so much attention; and two switches are provided which enable such variations of coupling turns, etc., that it is possible to suit this set to practically any conditions of aerial and earth. As an additional attraction it will be noted the crystal detector is mounted inside the box in such position that it is accessible on lifting the lid, but entirely protected from dust and damp.

This set has proved extraordinarily successful in readers' hands, and it may be commended confidently to the notice of anyone who contemplates the building of a crystal set for any situation up to the extreme ranges at which crystal reception is possible.



The Twin-Valve Receiver, which is now described in Radio Press Envelope No. 10.

Stability and Reflexing

The popularity of a reflex receiver doubtless depends to a con-

siderable extent upon the ease with which it may be operated, in addition to the actual quality of the results which it gives and its stability in working, and, therefore, it is easy to see why the Twin-Valve Set has enjoyed so great and wide a range of appreciation.

Every wireless receiver which forms the subject of a Radio Press design may be depended upon to be properly stabilised, but in those in which a crystal detector is used there is always the objectionable feature of the adjustment of the crystal itself, at least unless one of the permanent type is employed.

The "Twin-Valve"

Although there is a considerable attraction about a reflex receiver in which a valve is saved by the use of a crystal, a good and stable design employing valve detection has always a strong appeal to those who wish the set to be simple to operate and maintain as sensitive a condition as possible. These, no doubt, are some of the reasons for the great popularity which the Twin-Valve Receiver has won for itself. This set employs the reflex principle in the first valve only, which serves the purpose of high-frequency amplifier and note magnifier, the second valve being the detector, reaction being provided from the plate circuit of this last valve to the aerial.

The Design

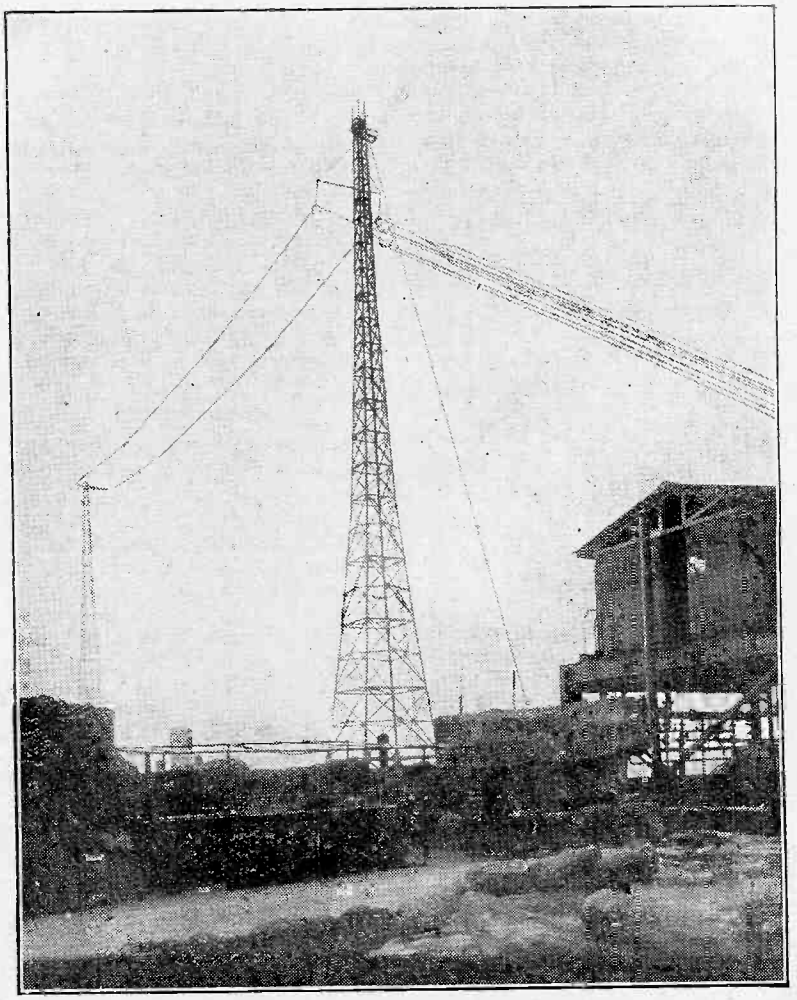
Great pains were taken in designing this set to obtain the maximum possible stability, together with really good results, and the outcome is a set which is notable from any point of view, whether regarded as an instrument for obtaining the maximum possible volume from two valves, or as a steady and dependable set for family reception which can be left permanently adjusted to a given station, and switched on and off as required by quite unskilled operators. Although, no doubt, the discriminating constructor attaches more importance to the performance of which a set is capable rather than to the matter of the symmetry of the layout of the panel and so on, believing that the works are more important than the looks. Yet no one can deny the attractiveness of a design of really pleasing appearance and good arrangement, and here the Twin-Valve Receiver again claims attention, as may be judged after an inspection of the illustration on the preceding page. Not merely is its appearance extremely handsome, but it possesses the great merit of being completely self-contained, compartments being provided in the cabinet for the batteries, so that it can be used in a drawing-room without the usual visible, untidy accessories.

Results

Of the actual results to be expected from the Twin-Valve Receiver it is as difficult to speak as it is in the case of any receiver which will be used under a variety of conditions, but in the hands of readers it has proved quite reasonable to expect good loud-speaker results up to distances of at least 25 miles from a main station, provided that a fair outdoor aerial is used. Of course, good headphone signals have been obtained up to very much greater distances. (Many readers have reported hearing quite a large number of both British and foreign stations.) The distance of 25 miles may, perhaps, therefore be regarded as a safe minimum for loud-speaker work upon an outside aerial, and although such good long-distance work has been accomplished by many readers, the set is really intended to be regarded as one for good and dependable loud-speaker work upon the local station with a minimum number of valves.

Its Popularity

The popularity of the set is now in a fair way to being very much enhanced, since it is being brought out in Radio Press Envelope form, with all the advantages conferred by that method of publication. For example, two full-sized blue prints are provided in the envelope showing the wiring and the exact drilling of the panel, elaborate instructions for building and working are given, and there is the usual set of reproductions of photographs showing the instrument from a great variety of angles, so that not the slightest doubt can remain in the mind of the constructor as to its exact assembly and wiring.

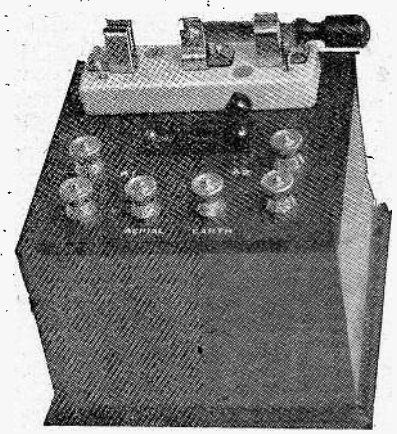


An unusual view of one of the masts of the new London Broadcasting Station.

Aerial Switching

By A. S. CLARK

A description of an interesting and useful little unit which, whilst providing for earthing the aerial, makes it possible to compare conveniently outdoor with indoor aerials.



The completed unit has a compact appearance.

Components Required

NOW that the season of thunder-storms is here, many will be turning their attention to the question of aerial switching. The unit to be described not only provides for a means of earthing the aerial when not in use, but includes a change-over switch by means of which two aerials or earths may be compared.

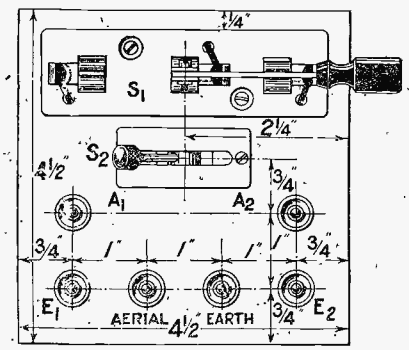


Fig. 1.—Showing the positions of the components.

The components are few, as is shown in the following list:—

One ebonite panel 4½ in. by 4½ in. (Paragon).

One single-pole double-throw switch mounted on porcelain.

One "Utility" two-pole two-way switch.

Six terminals.

Packet Radio Press panel transfers.

One suitable containing box.

Mount all the components on the panel in accordance with the drilling diagram of Fig. 1, using this diagram when drilling the holes. Having mounted the components,

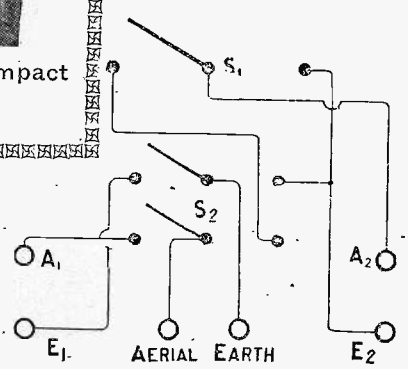
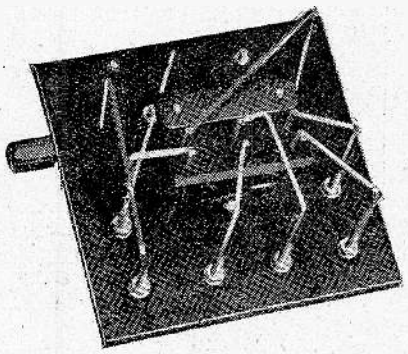


Fig. 2.—A diagram which shows the switch connections.

now wire up the unit. Directions for doing this will be obtained from the wiring diagram of Fig. 3. When this has been done and the transfers have been added to the unit as shown in the photograph, it is completed and may be put into use.

Connecting Up

The terminals marked aerial and earth go to the aerial and earth of the set. The terminal A_2 goes to the outside aerial and the terminal under it to the outside earth. These two terminals may be shorted by means of the larger switch S_1, when it is put over to the right. When it is over to the left the outside aerial is ready to connect to the set by means of S_2 if desired. The inside aerial and earth, or a frame aerial are connected to the terminals A_1 and E_1 the aerial going to A_1. Now when the switch S_2 is over to the right the outside aerial is connected to the set, and when it is over to the left the inside aerial and earth or frame aerial are connected to the set.



A photograph of the wiring of the unit.

Further Uses

If it is desired to compare two earths or two aerials only, the two earth terminals or the two aerial terminals are joined with a piece of wire, the two aerial terminals being shorted when comparing two earths and vice versa.

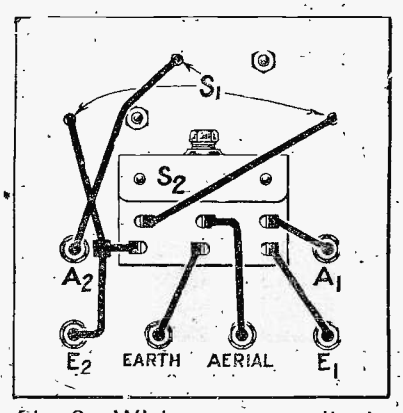
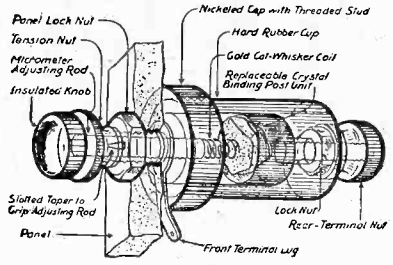


Fig. 3.—Wiring can easily be carried out from this diagram.

This switching unit will be found very handy when conducting experiments on the elimination of static by means of an indoor aerial or a frame.

Although not designed for the purpose, it will be obvious to the experimenter that this unit may be used as a change-over switch for comparing components such as telephones and inductances. In this case the two components are connected to A_1 E_1, and A_2 E_2, leads being taken from the terminals marked Aerial and Earth.

The Foote Variotector.

6/6  6/6

This is the only crystal detector with **One-hole Mounting.** Supplied complete with tested "extra loud all over" **Pyrite** crystal. No searching necessary; just screw down the insulated knob until the gold cat's whisker touches the crystal; a few turns to the nickel-plated lock-nut and all is set for the rest of the evening—and for the next evening, too.

PYRITE CRYSTAL.

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Mounted, but without screw **1/6**
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0.1—5 megohms ... ... } **3/-** each.
1,000—100,000 ohms. ... ...

The Durham Fixed Grid-Leak is hermetically sealed into hard glass tubing and consequently unaffected by humidity and atmospheric changes.

3 megohms
2 ,, } **2/6** each.

0.1 megohms
0.05 ,, } **3/-** each.

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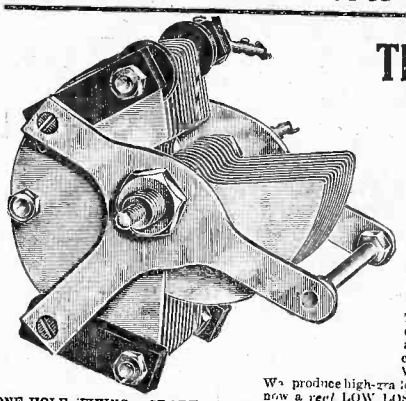

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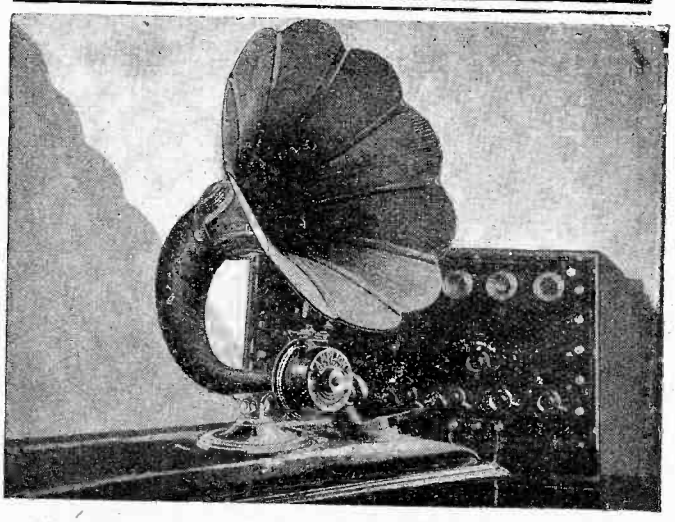

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Actual users of the AMPLION, often after many disappointments with other makes, assert most emphatically that no Loud Speaker compares with an AMPLION for tonal quality, clarity and freedom from objectionable resonance or distortion. The AMPLION is the outcome of many years' striving for perfection by the originators of the loud speaker.

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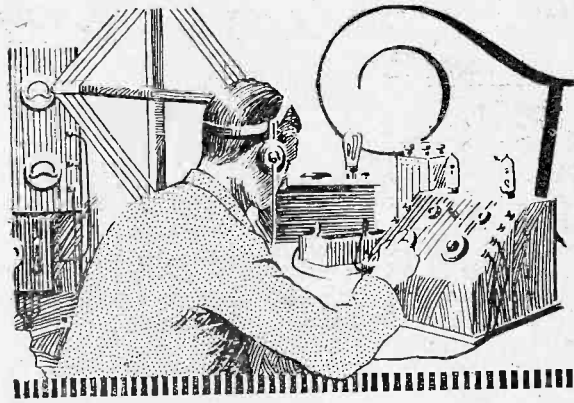


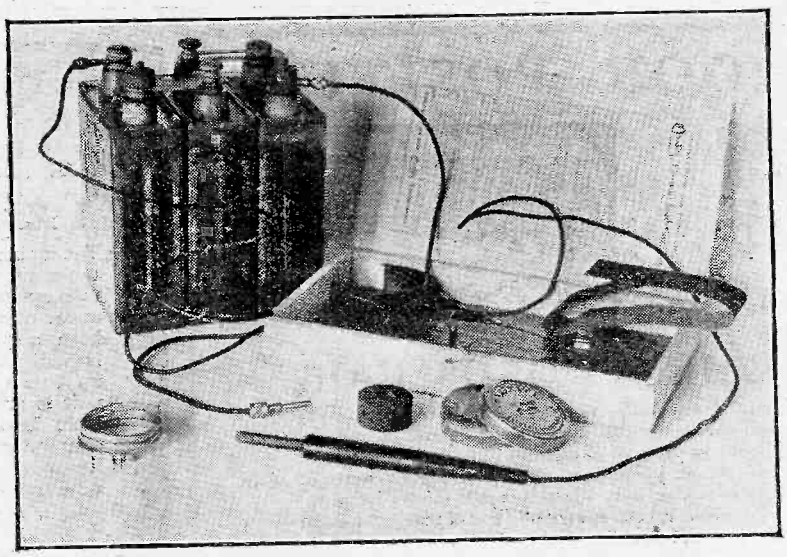
Tested by Ourselves

L.T. Accumulator with Charge Indicators

WE have had submitted to an extended practical trial a large specimen of the L.T. accumulators supplied by Messrs. Peto and Radford, equipped with tell-tale gravity floats (hydrometers) which indicate when the cells are nearly discharged, and approximately to what extent. A small white float sinks when the cell is 50 per cent. discharged, a blue float at 75 per cent., and a red one indicates approaching danger at 95 per cent. discharge. On charge, the floats give corresponding information as to the degree of charge accomplished. One can feel sure that if these floats are watched (they can easily be observed through the transparent sides of the cells), and if the makers' very careful instructions as to rate of charge, etc., are followed, the usual troubles experienced with small radio accumulators will be largely obviated. The battery tested was of 4 volts, 80 ampere-hours (ignition rating) capacity, the cells being arranged in a strong, handy, wooden carrying-case, with wide strap for carrying, and open ends for observing the telltales. Effective, large, non-splash vents were provided, and large insulated terminals clearly marked for polarity. In an extended test in actual reception, and on the bench, the cells showed full continuous-rate capacity, and maintained their voltage on heavy discharge. Even with four bright emitter valves in continued operation, there were no battery noises. We can well recommend these well designed and substantially built accumulators, and would particularly commend the indicator device.

An Electric Soldering Set

A somewhat courageous—but actually most successful—innovation in the technique of that most troublesome task in home radio construction, the soldering of the connections behind the panel, has been introduced by Messrs. Goswell Engineering Co., Ltd., in the form of a small soldering set for operation from the ordinary 4- or 6-volt L.T. battery. This is analogous to the "arc" welding equipment used on a very much larger scale in industry; whilst a genuine permanent arc cannot be maintained with carbon electrodes with but 4 to 6 volts, the combined sparking and intense local heating through bad-contact resistance between a carbon electrode and a carbon block or metal terminal, etc., suffices to fuse the low-melting-point solder in a few seconds. As the heat is applied just where it is needed, and the whole can be maintained scrupulously clean, it becomes a matter of extreme ease to obtain sound and neat joints. Practical trial showed that the task of soldering, e.g., tapping wires on to a finished wound inductance, or of making alterations in an already finished and wired-up set of some complexity, was enormously facilitated by this clean and rapid method, whilst the portability of the outfit, which is supplied packed in a small wooden box 8 in. by 4½ in. by 1 in., complete with flux, solder, electrodes and cleaning material, etc., and the fact that no gas or other fire is needed for heating an iron (only the usual L.T. battery being required) were appreciated. Whilst the method should not be used with very small accumulators, on account of the momentary rush of current when a good contact is made—up to 8 amperes with a 4-volt battery, though the average consumption is about 4 amperes with proper light-handed manipulation — we can strongly recommend the method and the convenient equipment for it offered by Messrs. Goswell Engineering Co., Ltd. This is marketed, we were glad to note, at an extremely moderate inclusive price. Detailed instructions for operation are given with the set, and should be followed closely.



The Quality Radio electric soldering set, which works on a low-tension accumulator.

"Trolite" Insulating Material

An interesting insulating material of, apparently, multitudinous possibilities is "Trolite," a synthetic cellulose product which is produced in a large variety of colours. Samples submitted by Messrs. F. A. Hughes and Co., Ltd., showed a diversity of moulded and highly finished forms, in rod, sheet, moulded knobs and finished engraved condenser scales, etc., in most varied and attractive colours. Some very pretty mottled effects were obtained, as well as an agate-like finish, and a normal black, similar to good ebonite. We understand that both panels and moulded fittings are available in six standard colour designs. The material is soluble in acetone, and the latter can be used as an adhesive. The makers claim that such a joint is as strong as the rest of the material. Those who have experienced trouble in fixing scales and labels, etc., on ordinary ebonite panels will welcome this feature.

We tested some of this material in simple workshop operations, such as sawing, filing, drilling, etc., and as a material for a small valve-panel. It stood up well to the ordinary treatment, a little care being needed, as usual, in finishing a drilled hole. It was easy to get a nice finish on the edge of a panel, and it appeared to be in every way a suitable material for wireless purposes.

A Microphone Relay

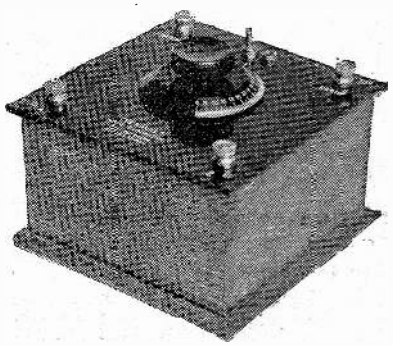
Messrs. Economic Electric, Ltd., have sent for test samples of their "Detectorvox" microphone attachment, for use particularly with crystal receiving sets. This is in the form of a narrow circular case, 2¼ in. diameter, with a circular aperture on one side covered with perforated metal, behind which is the diaphragm of the microphone proper, apparently of the ordinary carbon granule type. This case is to be clamped on the ear-piece of the ordinary 'phone, a rubber ring making an effective joint between the two. The makers specify a three-volt dry battery with a telephone receiver, loud-speaker, or 'phone-transformer primary of around 10 ohms resistance, to complete the equipment of the relay.

On practical trial of the microphone unit, it was found to be surprisingly sensitive when coupled up as indicated with a single 10 ohm receiver and a battery, the very faintest scratch or vibration, or speech at several feet from the microphone, being reproduced as a loud noise in the receiver, with the case either on edge or lying face downwards. It was hard, in fact, to get a support sufficiently free from vibration to give a moderately silent background. With 3 volts (two large dry cells) applied, and with the single microphone and a 10 ohm receiver, the resulting current appeared to somewhat overload the microphone, so that there were continuous noises of an irregular nature; with two microphones in series, or with one microphone and but 1·5 volts (one large dry cell), this effect largely vanished.

Tried as a microphone relay, with the one microphone fastened on the face of a single 2,000 or 4,000 ohm receiver connected to an efficient set tuned to the local station, and therefore already giving good signals, with 3 volts applied in the single microphone circuit the intensity of the relayed signals in the 10 ohm receiver was considerable, so that they were audible at some distance away from the receiver, and evidently could operate to some effect a loudspeaker of suitable impedance. The familiar expedient of an improvised loud-speaker made of a deep bowl and the single receiver gave intelligible speech across a room, though, of course, a long way away from full loud-speaker strength. Using two

microphones in series with the 10 ohm receiver and 3 volt battery, and placing each microphone on one ear-piece of an ordinary 4,000 ohm telephone head-set, there was a considerable improvement in quality of reproduction, though the signals appeared to be no louder, and the background was much quieter. However, it will be obvious that the ordinary limitations of the carbon microphone are necessarily present in any such arrangement; so that the best effect obtainable was comparable to the reproduction obtained on an ordinary telephone trunk line distant call. Actually, in spite of the amplification attained, speech was sometimes more intelligible when fainter, but undistorted, without the use of the relay. There are obvious possibilities in this simple device, where intensity rather than flawless reproduction is required, as in "calling-up" devices, and for operating a loud-speaker to give audible warning, without requiring close attention, of the commencement or termination of some particular item in the programme, etc. The makers suggest also the possibility of connecting two microphones in cascade. Experimenters will find many interesting lines of work opened up by this device.

Some authorities consider that future progress in domestic broadcast reception lies in the development of the efficient loud-speaking valveless relay, and this little instrument is an interesting attempt in that direction.



The Wave-Eliminator, made by Messrs. Seagull, Ltd.

"Seagull" Wave-Eliminator

We have received from Messrs. Seagull, Ltd., a specimen of a wave-trap or "Wave-Eliminator" designed on scientific lines, which on practical trial has proved most remarkably effective in elimination of a particular unwanted signal, even at fairly short range. This takes the form of a 6 in. square panel on a neat box-mounting about 3 in. deep, with four terminals, a socket for a plug-in coil, and a tuning condenser knob and scale. The terminals are marked "Aerial," "Earth," "A" and "E" respectively. The first two are to be connected as usual to the aerial and earth leads, and the second to the aerial and earth terminals on the set, after the latter has been carefully tuned to the station to be eliminated in the ordinary manner. The earth connections are actually common to both, whilst across the first pair of terminals is connected, when a suitable coil is inserted in the socket, a series "acceptor" circuit in conjunction with the variable condenser in the trap. When this is tuned sharply to the unwanted station, from elementary physical principles no oscillating P.D. can be built up across it at all, if its ohmic resistance is vanishingly small: hence by connecting the usual aerial terminal of the set to "A," so that a small fixed condenser (mounted in the box) joins it to the top of this acceptor circuit, no signals at all will be heard on this wavelength in the receiver, as there is no signal voltage available. In practice the H.F. resistance of the trap-coil must be as low as possible, and

the instrument was accordingly tested with a No. 75 coil of stout wire possessing, by actual comparative measurement, a low H.F. resistance.

It was noticed that the tuning of this trap circuit was razor-sharp, so that hand-capacity effects were appreciable. The setting also was not independent of the receiver tuning, for complete silence. Tested practically under very severe conditions on an unusually high and efficient aerial in a suburb of London, and with a single-circuit tuner with series condenser tuning, which without a trap gives 2LO all over the scale, the latter could be entirely silenced in the 'phones, so that Hanover (about 300 m.) could be heard in comfort and at excellent strength. The lower relays were distinguishable. Manchester was readable through London with extremely careful tuning and with but a whisper of the latter. Cardiff could not be isolated, as reaction became unmanageable in this region, and the tuning was very tricky indeed so close to London's strong wave. Other more remote stations (in the frequency sense) were, of course, quite free from London, and readily tuned in on a single valve. Morse was sharply eliminated when not too powerful.

Whilst not by any means a foolproof instrument (no selective arrangement can be at the present state of the art), for cases of severe local jamming by fairly sharply tuned interference, or for occasionally exploring the ether in the neighbourhood of the local station's frequency, this instrument has obvious merits. Its selectivity (in this sense) was found greater than that readily obtained by the conventional three-coil tuner.

Low-Loss Coil-Formers

Samples of coil-formers of the open form suitable for the winding of low-loss coils, with stout wire properly air-spaced and with the minimum of energy-absorbing dielectric, have been submitted by Messrs. Precision Screw Co., Ltd. They have six ½ in. diameter ebonite tubes supported in end rings by a neat device of screw and set-in lining bush at the ends, and having each a coarse screw-thread turned on them, so as to provide shallow notches in which to wind the turns of wire, spaced as desired by one, two or more threads. Thus even bare wire can be wound with care. The 6 in. diameter former submitted proved convenient to wind, the optimum winding for low H.F. resistance for a given inductance of No. 18 enamel-covered (or bare) wire well air-spaced being readily obtained. We can recommend the formers for experimenters desirous of exploring these new fields of low-loss efficient receiving circuits. By the method of mounting, the former can be made of any convenient length, and when of considerable length a supporting ring or rings are conveniently introduced between the end rings to avoid sagging.

Earthing Clip

A neat and effective earthing clip has been sent for our inspection and trial by Messrs. Edison Swan Electric Co., Ltd. This has a metal strip perforated with a series of holes, for application to varying sizes of water-pipes, and a knurled-head screw working in a wide nut, whose purpose is to pull the clip tightly round the pipe, and at the same time provide a point of attachment for the earth lead. The clip is suitable for pipes from about 1 in. diameter downwards and is neatly finished and strongly made. It is evident that with this device there should be no difficulty in

making a secure and electrically sound attachment to an available water-pipe, provided that the latter is first thoroughly scraped and cleaned at the point of application.

Non-Resonant Loud-Speaker Trumpet

Although the long years of experience of the gramophone manufacturers and recent investigations carried out by American research workers and others on this side of the Atlantic have shown forcibly that the design, size, and material of a loud-speaker trumpet have a very great deal to do with the matter of distortion (apart altogether from the question of power), a great many of the loud-speakers available for radio purposes are equipped with trumpets far from ideal in these respects. The typical tinny "bad gramophone" or harsh metallic sound, and the "band in a tunnel" effect so often complained of by those with musically trained ears, may frequently be traced directly to the use of too small, and metallic, resonant horns provided by the makers. Some large, expensive models introduce another type of trumpet-effect, in the form of a hollow, "shut up in a wooden box" sound. Messrs. Scientific Supply Stores have brought out a fibrous composition trumpet, available in the larger sizes indicated by physical principles for successful handling of the very low notes in the musical scale, and with adapters for use with most of the usual types of loud-speakers on the market. These are of various designs, both straight and curved, and of a variety of sizes. As indicated, the largest practicable size should generally be chosen; a sample which we have had the opportunity of putting to a very complete and lengthy trial was the largest made, being nearly 40 inches long by 24 inches aperture. This is built up of a composition which is strong enough mechanically for the purpose, but is yielding and quite non-resonant; the surface is roughened deliberately still further to diminish any resonance effects. The finish is in a quiet, elegant dull bronze, inconspicuous in a living-room.

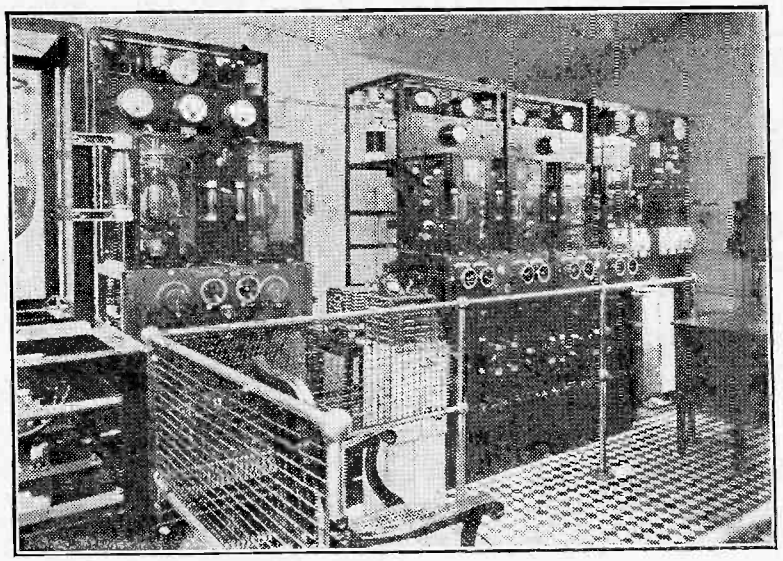
The effect of this large, non-resonant trumpet, when fitted, in some cases is most noticeably good. It cannot, of course, compensate for the distortion which results from overloading high-frequeucy stages at a few miles from a powerful station, excessive use of reaction, insufficient H.T. and grid-bias, the overloading of an ordinary small valve in a second stage of L.F. amplification, or the use of small transformers of the cheap and nasty variety with inadequate iron and windings, etc.; but it did certainly, on trial, bring out the best available result with a given equipment, and dispel that cheap gramophone effect so much deprecated. The full dignity and sonorousness of Big Ben or of Paderewski's piano bass came out unimpaired with proper equipment elsewhere; whilst speech was quite startlingly lifelike. The high notes are given proper justice as well: the general effect of such a large, non-resonant trumpet is that of an effortless, giant voice almost in the room, but not blaring forth from a narrow pipe in the manner suggested by the common type of small metallic trumpet. We can most strongly recommend these non-resonant trumpets.

A Back-of-Panel Valve-Holder

A single-hole-mounting valve-holder, for valve panels in which the valve is arranged horizontally or vertically behind the panel and parallel to it, has been submitted by Messrs. A. F. Bulgin and Co. This "Decko" holder has a large plated bolt in the square end of the insulating block, for affixing to the panel; connections are made to large soldering tags, two each of which are provided on the plate and grid connections—a thoughtful provision for tuning condensers and grid-leaks—these being arranged in an accessible manner. The leg sockets are recessed down to minimise danger of short circuits to the filament when inserting a valve. The insulation resistance, on test, proved excellent. The fitting is well and substantially made, and nicely finished.

Battery Tester

Messrs. A. F. Bulgin and Co. have submitted for our inspection a battery tester for checking up the condition of units in a tapped H.T. battery, or of a 4-volt accumulator, etc. This consists of a small flash-lamp holder, mounted in the insulated hinge of a pair of short conducting compass-legs, opening up to a span of about 4 in.: it is to be applied across the poles of the battery unit (of 4 volts or less, and according to the rating of the small lamp used); the degree of brightness of the lamp indicates to some extent the state of the particular unit. For convenience and portability this simple little instrument has an appeal, though it should not be applied for more than a moment to an H.T. battery unit, as the current taken is not inconsiderable.



This photograph was taken at the new 2 LO, and shows the main transmitting apparatus with its protective guards.

From Our Readers

KDKA Received with Ease

SIR,—*Re* the receiver for KDKA, described by Mr. Stanley G. Rattee in MODERN WIRELESS, March, Vol. IV., No. 2.

I have made it as specified, and the results are well worth the time taken in making it. I started, finished and tested the receiver in one day, and I have been able to get KDKA as easily as Cardiff. I am using an outdoor aerial 39 ft. high each end, 60 ft. long, with 30 ft. lead in.

I shall be coupling a two-valve amplifier to "The Little Wonder" and I am looking forward to plenty of music.

Wishing you every success,—Yours truly,

A. GRAYSTONE.

Kingston, Surrey.

Coils for the KDKA Receiver

SIR,—I am taking the liberty of suggesting a simpler way of winding coils for Mr. Stanley G. Rattee's single-valve short-wave receiver, described in MODERN WIRELESS for March.

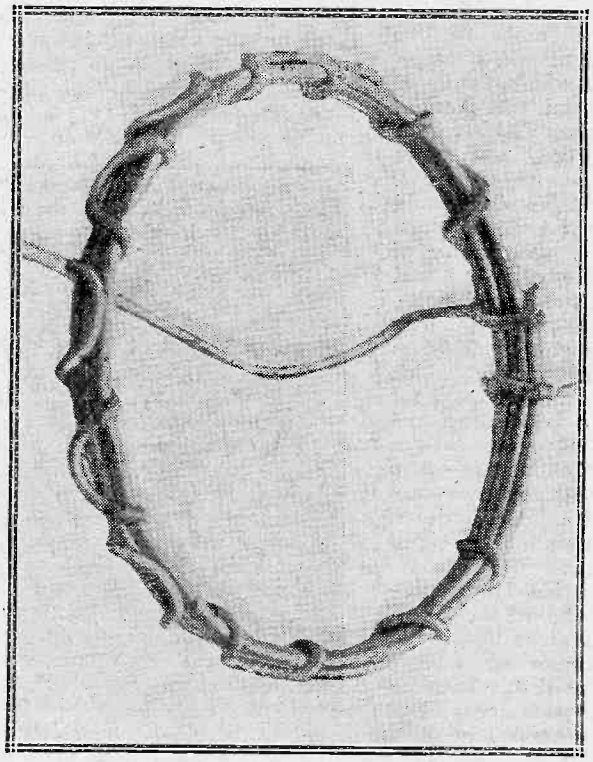
The enclosed coil was wound in five minutes, and the method of winding can be easily followed. I hope this will be of interest to other readers. I wish to thank you for the number of excellent circuits that have appeared in your journals.

Yours truly,

R. E. NEWMAN.

Leytonstone, E.11.

[While we are pleased to publish our correspondent's letter as a matter of general interest, we do not think that the method of winding the coil as suggested is quite so effective from the point of view of efficiency as that described by Mr. Stanley G. Rattee.—*Ed.*]



The coil referred to by Mr. Newman.

A Quick Method of Applying Radio Press Panel Transfers

SIR,—I thought you might be interested in the following improved method of applying Radio Press Panel Transfers on wireless panels, which does away with the hotpad business. Place the transfer on panel and moisten back with methylated spirit, press down with thumb and then apply cold water to remove paper; slowly drawing this away leaves the transfer on panel intact.

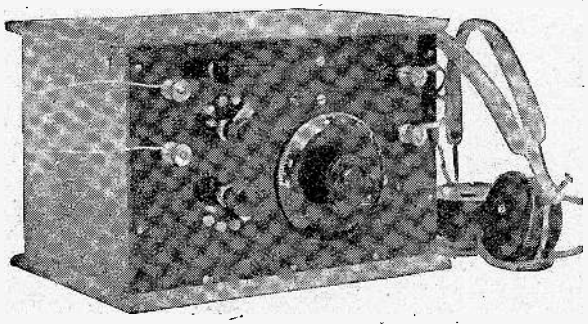
I found that the above method takes about a third of the time occupied by adhering to the printed instructions.

Yours truly,

G. G. PULLIN.

Chester.

A New Radio Press Envelope



You must build this wonderful Crystal Set !

Radio Press Envelope No. 11

"An Adaptable Crystal Set"

Price 1/6

Post Free 1/9

To be published JUNE 20th.

A special feature of the "Adaptable Crystal Set" by Percy W. Harris, M.I.R.E., Editor of "The Wireless Constructor," is the adaptability to varying earth and aerial conditions.

By means of a specially tapped efficient inductance placed inside the cabinet it is possible to make the set match with any aerial in a few moments.

In the case of the auto-coupled circuit used in this set, this results in appreciably louder signals and the set is capable of receiving 5XX, with the aid of a loading coil, within reasonable range, in addition to your local station, provided your aerial and earth systems are of average efficiency.

Full instructions for the building of this unique receiver are contained in Radio Press Envelope No. 11.

Radio Press Envelope No. 11 contains the fullest instructions for building the set, with blue prints of the wiring and panel layout, reproductions of photographs and working drawings.

You can order Radio Press Envelope No. 11 from all Newsagents, Booksellers, your local Wireless Dealer, or direct from Dept. M.

Radio Press, Ltd.

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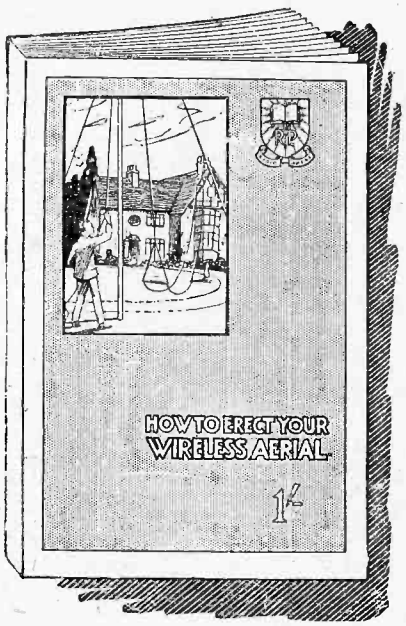


Don't blame 2LO

Look to your aerial. The seat of many set troubles can often be traced to the aerial. Bad insulation, defective "lead in," swaying, all these may make an otherwise perfect set inefficient.

If you want a good aerial, read this book—

"How to Erect Your Wireless Aerial"

By

B. MITTELL, A.M.I.E.E.

Abounds in practical hints on the erection of aerials. The Author has taken part in the construction of huge aerials at some of the world's largest stations, and so has more than a practical knowledge on the subject.

Now is the time to spring clean your aerial and locate possible faults. Unless you already have a very good knowledge of the subject you cannot hope to do this successfully without the assistance of "How to Erect Your Wireless Aerial."

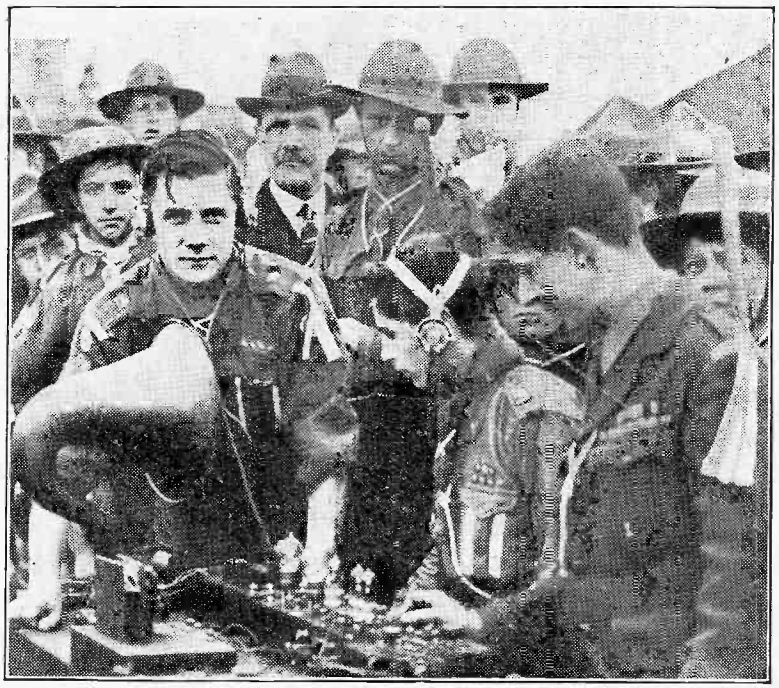
Obtainable from all Bookstalls, Newsagents, Wireless Dealers, Price 1/-, or direct from Dept. M, Radio Press, Ltd., 1/2, post free.

RADIO PRESS, LTD.,
Bush House, Strand, W.C.

Barclays Ad.

Brown

LOUD SPEAKERS AND HEADPHONES



Brown Users No. 2.

The "young idea" looks to its equipment too!

HALF the boy's pleasure in Radio comes from the knowledge that here, at least, he and his father can compete on level terms. Wireless is so fascinating and calls into play so much of the ingenuity inherent in every boy that our schools are turning out tens of thousands of budding wireless experts every year.

But although he may be young in years it is evident that already he is worldly wise to the fallacy of buying cheap and inefficient Wireless Apparatus. Brown Headphones and Loud Speakers are invariably selected by those who consider quality before mere cost.

Reduction in price of famous A-Phones.

Greatly increased demand for those super-sensitive Headphones by Crystal users striving for long distance reception permits us to make an important reduction in price. At their new prices the Brown A type Headphone offers wonderful value for money.

120 ohms, 2,000 ohms, 4,000 ohms } 50/-
8,000 ohms . . 60/-

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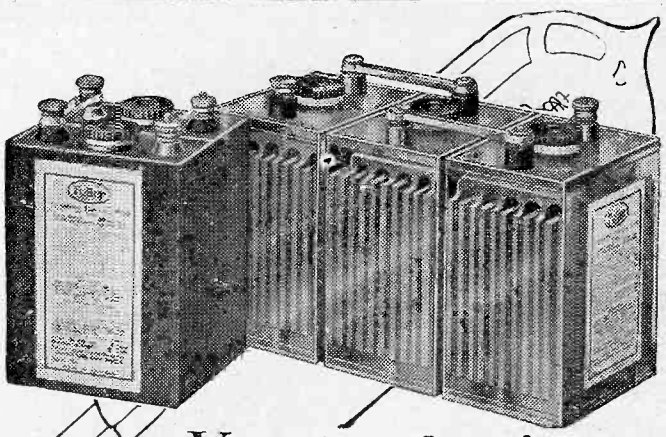
67, High Street, Southampton.

Brown Q-type Loud Speaker

Brown A type Phones

Brown H.1. Loud Speaker

Gilbert Ad, 2814.



Your valves' best friend.

Note the special ebonite case shown in the illustration of the smaller accumulator.

Fuller's Standard Plate Type Accumulators, specially designed for Wireless work, solve all your battery problems. Their trouble-proof, hard-wearing propensities ensure a dependable battery service that unfailingly allows the perfect functioning of your valves. If you would have better results with less trouble and expense, insist upon having a "Fuller."

All cells are fitted with non-corroding grease-cup terminals, and are assembled in either strong transparent celluloid cases, or specially constructed ebonite cases (as shown in the illustration of the smaller battery). The ebonite cases are practically fireproof and are recommended.

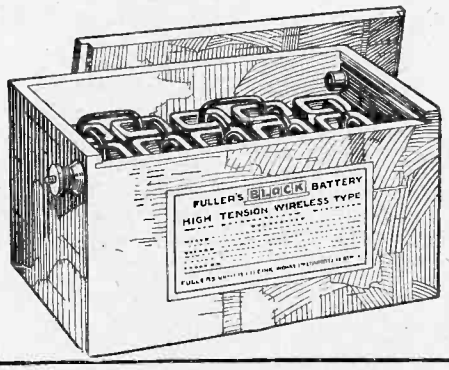
Made in 2, 4 and 6 volts and many different capacities, they are stocked by all reputable dealers.

ACCUMULATORS Fuller (Electrical Works, Chadwell Heath, Limited) **FOR RADIO WORK**

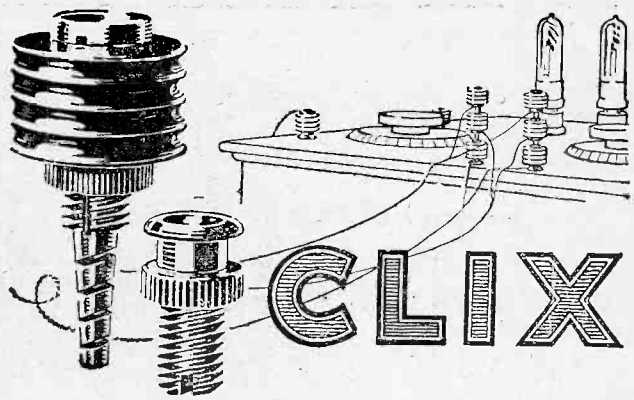
The Cheapest H.T. Battery in the World

The H.T. Accumulator has been introduced to replace Dry Batteries for the anode circuit. Though it is more expensive in its initial cost, it is *rechargeable* and will be found to effect a considerable saving in the long run. One charge gives six months' service, re-charging cost is very trifling, and with ordinary care the battery will last for ten years.

H.T.1, 30 volts, 30/-



Advts. of Fullers' United Electric Works, Ltd., Woodland Works, Chadwell Heath, Essex.



CLIX metal parts continue to be machine-turned from the best hard brass rod, but a special nickel-bathing process is now employed to increase CLIX high standard of efficiency, workmanship and finish.

In high-frequency circuits the milliampere currents function on the skin of all conductors. The connections in radio circuits are commonly responsible for 90% of the high-frequency resistance in wiring between components.

Vital importance attaches, therefore, to the high-frequency resistance of every connection. The new skin of special nickel-silver alloy of high electrical conductivity ensures in CLIX a perfect fitting connection with a high-frequency resistance of practically zero. This fact, in conjunction with the large area of contact surface provided with the minimum of capacitive metal in both plug and socket portions, gives CLIX its supremacy over every other form of plug, switch or terminal.

Retail Prices of the New CLIX.
CLIX with Locknut 3d.
CLIX Adapter with Locknut 2d.
CLIX Insulators (6 colours) 1d. each
CLIX Bushes (6 colours) 1d. pair

Obtainable from all Wireless Dealers or direct from the Patentees & Manufacturers

Solder all connections! Where you can't, use CLIX!

AUTOVEYORS, LTD.

Radio Engineers and Contractors,

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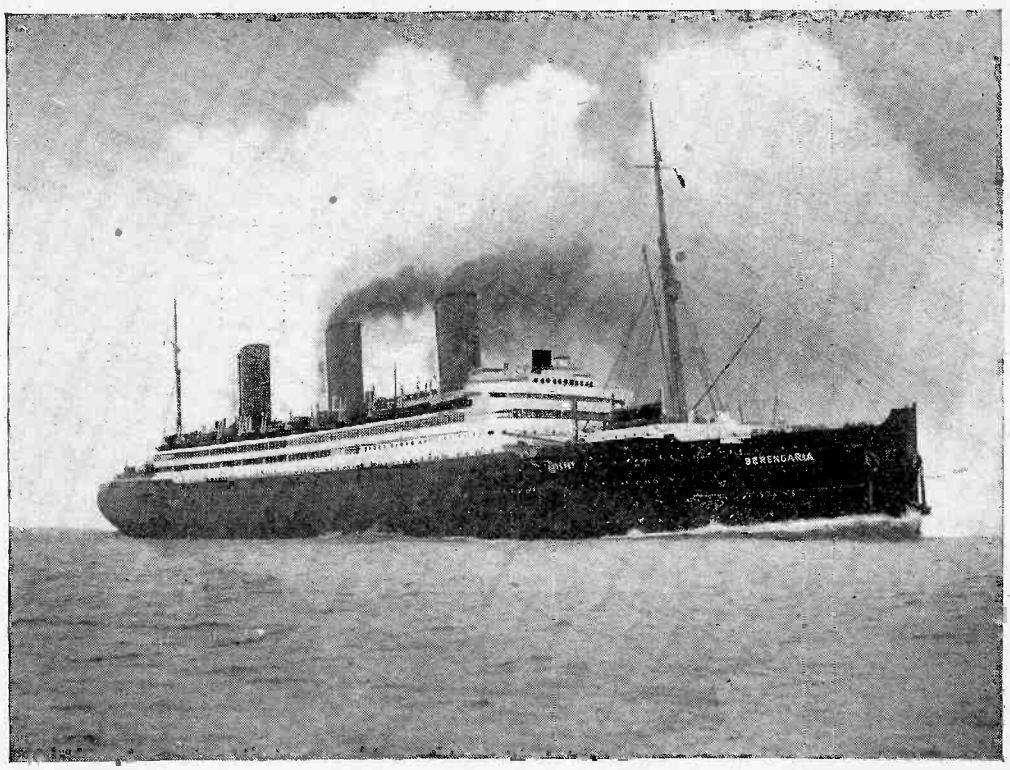

First-Hand Information

To give Radio Press readers first-hand information has always been a first principle of Radio Press, Ltd., and they spare no pains or expense in getting it.

On May 16th Mr. Percy W. Harris, M.I.R.E., Editor of "The Wireless Constructor" and Assistant Editor of "Wireless Weekly" and "Modern Wireless," sailed from Southampton for America on board the great Cunard liner the "Berengaria."

Mr. Harris will make an extended tour of U.S.A. and Canada. He will study radio conditions in all the great centres, including New York, the Middle West, and the Pacific Coast.

His own prestige in America and the letters of introduction he will carry will enable him to gain an insight into matters of supreme importance to British enthusiasts.

Such things as transatlantic conditions, the alleged superiority of American sets in selectivity and long distance reception; whether interference in the States is as bad as it is painted, and hundreds of other matters will receive his attention.

No really satisfactory answers have yet been given to these questions and the resulting articles by Mr. Harris should prove intensely interesting to every radio enthusiast.

These articles will, of course, appear exclusively in "Wireless Weekly," "Modern Wireless," and "The Wireless Constructor," as soon as Mr. Harris has obtained the necessary information.

Radio Press, Ltd., by sending Mr. Harris on this special trip will further increase that confidence which the radio public has in all Radio Press publications.

Radio Press, Ltd.

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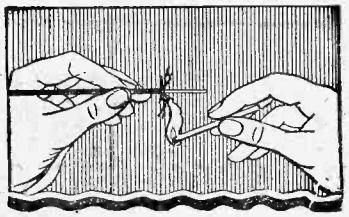

To make a neat end with Glazite

You can quickly make a neat end to "Glazite"—the new coloured connecting wire—by burning off the frayed cotton with a match. The charred ends can be rubbed away with the fingers, leaving a perfectly clean finish.
"Glazite" consists of a tinned copper wire covered first with cotton and then with a film of heavy insulating material which makes it flameproof and impervious to moisture. "Glazite" is made in four colours: Red, Yellow, Blue, and Black. Price 1/6 per coil of 10 feet at all dealers.

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The new **coloured** *connecting wire*

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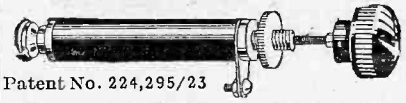
A Silent Background is obtained by using the

BRETWOOD GRID LEAK



Patent No. 224,295/23

The usual grid leak containing carbon in some form or other is totally unsuitable for long distance reception. The physical properties of carbon do not allow of passing a small current without variation and interruption. The use of a grid leak containing carbon is bound to produce a noisy background. In a variable grid leak especially the resistance material used must be constant in use.
Such a leak is the "Bretwood." The mastic is perfectly uniform and its action does not depend upon compression of its particles.

Fit a "Bretwood" and improve your receiver.

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All Bretwood specialities are obtainable from most Wireless Dealers.

BRETWOOD GUARANTEED

Bretwood Anode Resistance.

(Patent No. 224,295/23).

Constructed on the same principles that have made the BRETWOOD Components famous. Carries the BRETWOOD guarantee.

Price 3/-. *Postage 3d.*

Bretwood Patent Valve Holder.

Fix this efficient component and get maximum results. Positively no leakage or capacity effects. Perfect contact. Can be mounted on front or back of panel.

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BRETWOOD ANTI-CAPACITY SWITCH

Constructors will welcome news of a further Bretwood Product, an Anti-Capacity Switch, the principal features of which include:—Absolute freedom from capacity effects—Perfect Contact—Workmanlike finish and neatness of appearance—Simple single hole fixing and Easy-to-make wiring connections. Special spring loaded balls in the base make the Bretwood Switch wonderfully smooth in action and ensure clean and perfect electrical contact at all times. It is confidently offered to wireless constructors as the Anti-Capacity Switch par excellence, and of course it carries the famous Bretwood guarantee.

PRICE **5/-** *Postage 3d.*

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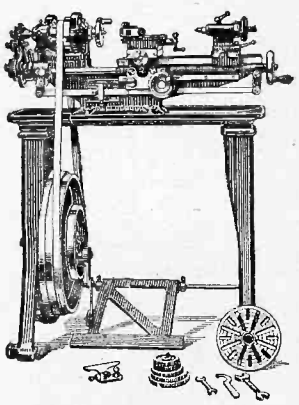

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Why not get the best out of yourself and your tools?

Your time and patience will be largely wasted if you have only makeshift tools. With a first-class lathe you can always do fine work. Why not invest in a tool that will be really worth while? You'll never regret it.

The best tools are the cheapest!

For all-round utility and adaptability

DRUMMOND LATHES

are the finest tools for both amateur and professional. They are complete, supplied in all forms of drive and equipped with every useful device. They are guaranteed. Every Drummond tool has over 22 years of machine design behind it. For wireless, model making, car and motor-cycle repairs, etc., they are ideal. Write, or send the coupon.

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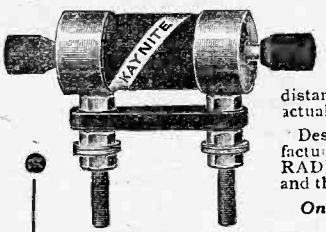
THE KAYNITE PERMANENT DETECTOR

Price 2/6 Only *(Post 3d. extra)*



UNCONDITIONALLY GUARANTEED to control that powerful reflex receiver, and bring in those faint and illusive distant stations. Every one tested on actual reception.

Designed and produced by the manufacturers of the World Famed KAYNITE RADIO COIL WINDING MACHINES, and the "Eiffel Tower Radio Crystals."

On Sale at all Live Retailers.

A. W. KNIGHT LTD.

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Telephone: NewCross 2427

A Word to Advertisers

Every reader of "Modern Wireless," "Wireless Weekly" and "The Wireless Constructor" is a present or potential buyer of wireless products.

A convincing advertisement in all or even one of these journals (which fully cover the radio public, beginner and expert alike) will result in an increased sale of your products.

For rates and other particulars write,
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Barclays Advertising, Ltd.
Bush House, Strand, London, W.C.2.

"Don't spoil the ship for a Ha'p'orth o'tar"

WHY leave your set in an unfinished state when for the small expenditure of sixpence on a Packet of Radio Press Panel Transfers you can give your set "that professional look"?

They will not only vastly improve the appearance of your set, but will also ensure accurate connections.

A mistake in the identity of the H.T. and L.T. Terminals may result in the loss of one or more expensive valves. With the aid of the Radio Press Panel Transfers you can clearly mark them, thus affording protection against a disastrous mistake.

As easy to apply as a child's transfer!

* * *

A simple method of applying Radio Press Panel Transfers.

* * *

Cut out the required transfer and place it in the desired position, placing over it a piece of cloth material. Heat an ordinary table knife to a moderate temperature and apply to the cloth for a few seconds. The cloth and film can then be pulled away, leaving the panel clearly and neatly marked.

* * *

Radio Press Panel Transfers are obtainable from all Booksellers and Wireless dealers or direct from Dept. M.

6D. Per large Packet of 80 Labels

8d. Post Free.

Radio Press, Ltd.,

The largest wireless publishers in the world.

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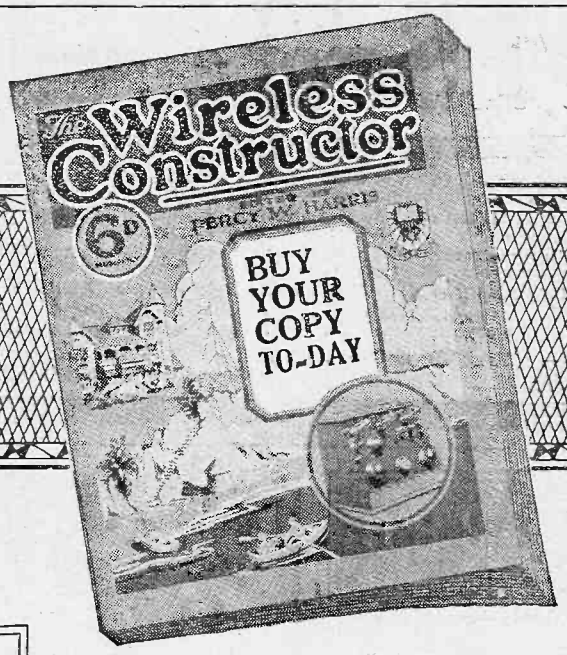

SELECTION FROM CONTENTS

The "Change-Over" Crystal Receiver.
By Percy W. Harris, Editor.

A Three-Valve Tuned Anode Receiver (free blueprint given).
By John W. Barber.

A Selective Three-Valve Set with "Split-Secondary" Tuning.
By C. P. Allinson.

A Useful Filter for Your Loud Speaker.
By John Underdown.

Wireless on the Map.
By Stanley G. Rattee.

Some Interesting Experiments with a Single-Valve Panel.

More About Crystals. Opera and Broadcasting. Etc., etc.

6D MONTHLY
RADIO PRESS

Facts

¶ "The Wireless Constructor" is bought by over a quarter of a million Experimenters, Amateurs, Constructors, Experts, Theorists and Beginners. It has therefore the largest circulation of any wireless magazine published in the British Isles. Why is this?

¶ Because—"The Wireless Constructor," as its title implies, satisfies all the requirements of the man who builds his own receivers.

¶ Because—the complete details given in the constructional articles enable even the veriest novice to make successfully the sets described.

¶ Because—these sets are so designed that only the smallest possible number of tools is needed, thus making construction a cheap and easy matter.

¶ Because—not only are there articles which appeal to the beginner, but the expert, too, will find much that is of interest to him.

¶ Because—every care is taken to ensure the technical accuracy of the articles that appear in its pages, so that the reader knows that he is on the right path.

¶ Because—it has done more to assist those interested in receiving broadcast reception than any other radio publication.

¶ Because—it is produced and published by Radio Press, Ltd., whose whole energies are devoted entirely to supplying reliable radio information and instruction.

¶ *And because*—at the price of 6d. a copy, it presents value for money that cannot be equalled.

If you have not yet seen this splendid issue, be sure and buy a copy now.

ONLY SIXPENCE MONTHLY
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The Wireless Constructor

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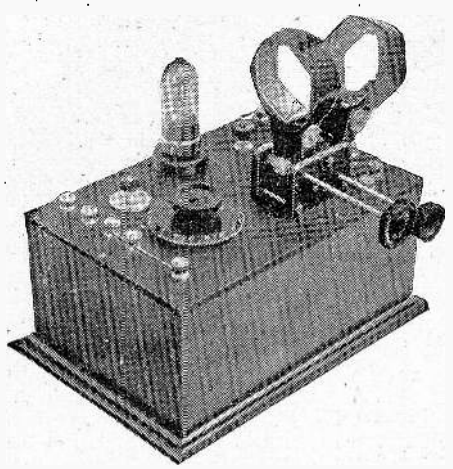

A SINGLE-VALVE RECEIVER.

"It's a beauty!"

"I've had all the B.B.C. Stations and many Continental ones. The best of it is, I have never built a set before. My first venture in Radio and all thanks are due to Radio Press Ltd., for my success."

RADIO PRESS ENVELOPE No. 9,

By HERBERT K. SIMPSON,

contains all the instructions necessary for the building of this really efficient Single-Valve Set.

It includes full and elaborate sheets of instructions for making the Set, two full-size blue prints, three sheets of reproductions of photographs on art paper, and one sheet of working drawings.

The Set will receive 5XX anywhere in Great Britain, and forms a perfect starting point for the novice who desires to construct a set.

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(Dept. M.)

Radio Press Ltd.,

Bush House, Strand, London, W.C.2.

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Save visits to the Charging Station by using an

OLDHAM ACCUMULATOR

Made under the Special Activation Process

All good dealers stock them

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BUILD THAT SUPER HET—NOW

RADIAX WE SATISFY YOU

The foundations of this system are the **Filter Circuit Oscillator** and **Coupling**, and the **Intermediate Frequency Transformers.**

We have now produced sets of these components which simplify the building of a Super Het. Set, and with the splendid diagram, list of valves and general information which we supply cuts out all doubts and difficulties in construction.

These components are of the highest possible quality as regards finish, accuracy of calibration, insulation, etc.

5 Valve outfit comprising :—
1 Oscillator, 1 Oscillator variable coupler, 1 Intermediate frequency filter, 2 Intermediate frequency transformers (30 kilocycles), circuit diagram, etc.
No. 813 .. **52/6**
6 valve outfit, No. 814 .. **64/6**
7 valve outfit, No. 815 .. **77/6**

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WRITE AT ONCE for our illustrated list of 100 varieties of cabinets for radio sets, including many described in "MODERN WIRELESS," "WIRELESS WEEKLY," and "WIRELESS CONSTRUCTOR," etc., or 'phone Clerkenwell 6903.

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Write in Block Letters Please.

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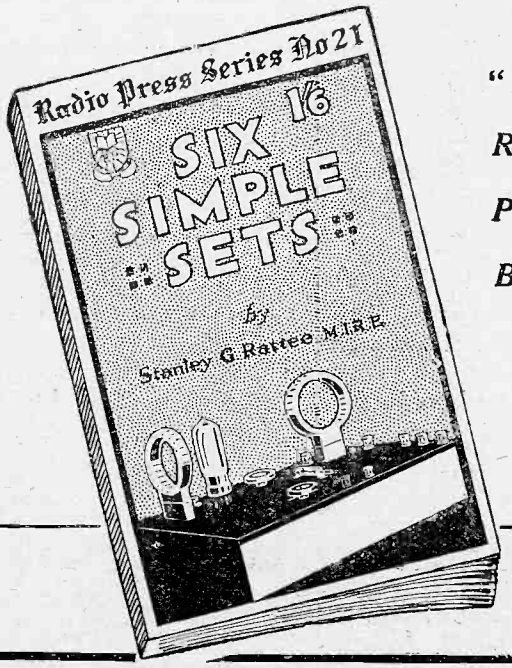

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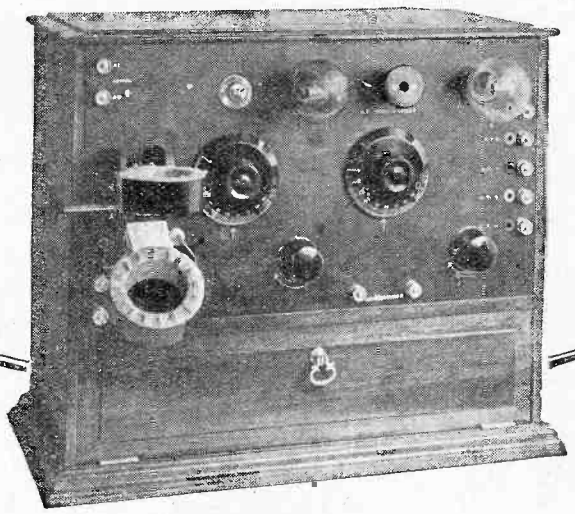

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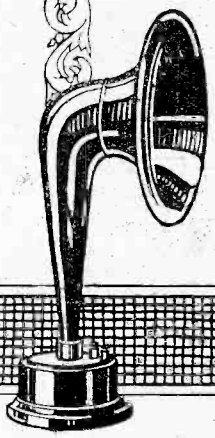

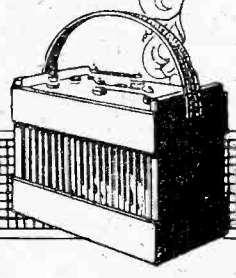

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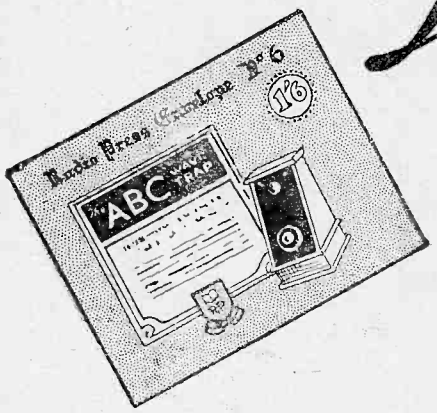

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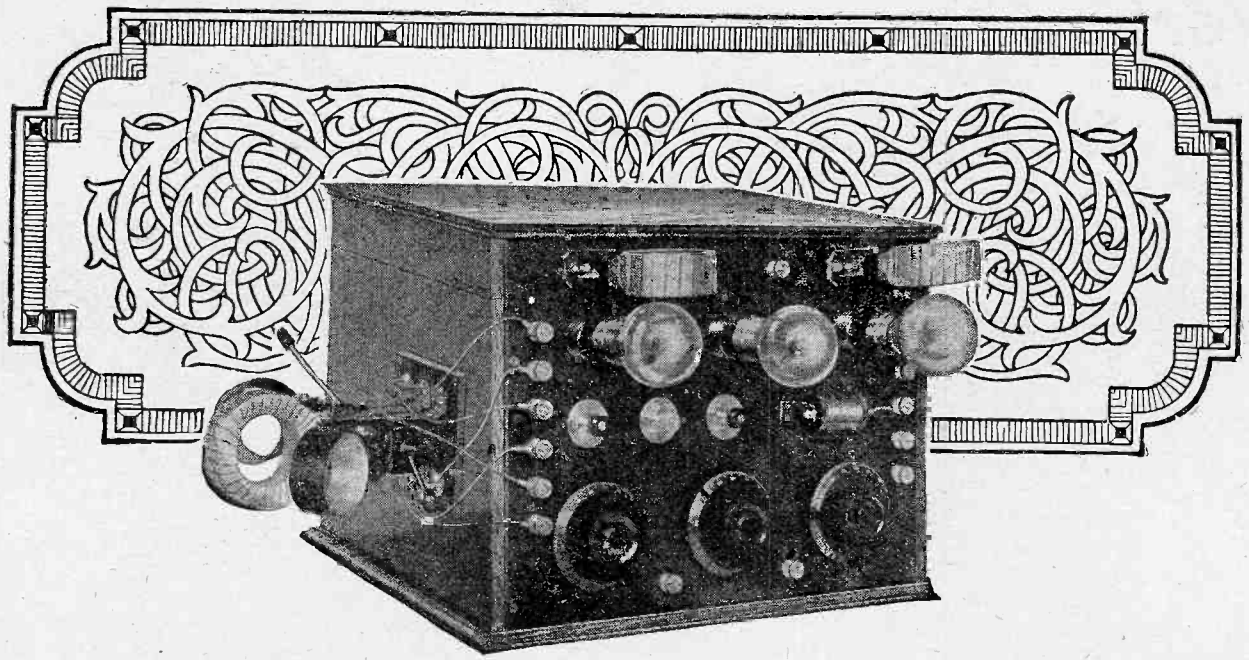

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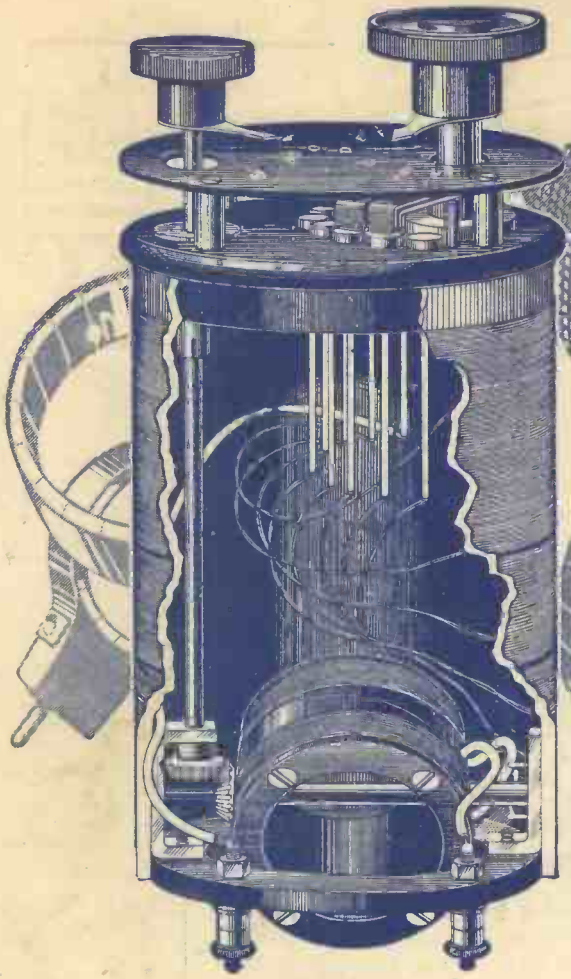

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