NEXT WEEK'S ISSUE (6d.) IS A CHRISTMAS DOUBLE NUMBER

A "DOUBLE-DUAL" OR DUPLEX-REFLEX SET

Amateur Wireless And Electrics

Vol. V. No. 131. SATURDAY, DECEMBER 6, 1924 Price 3d

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will be a
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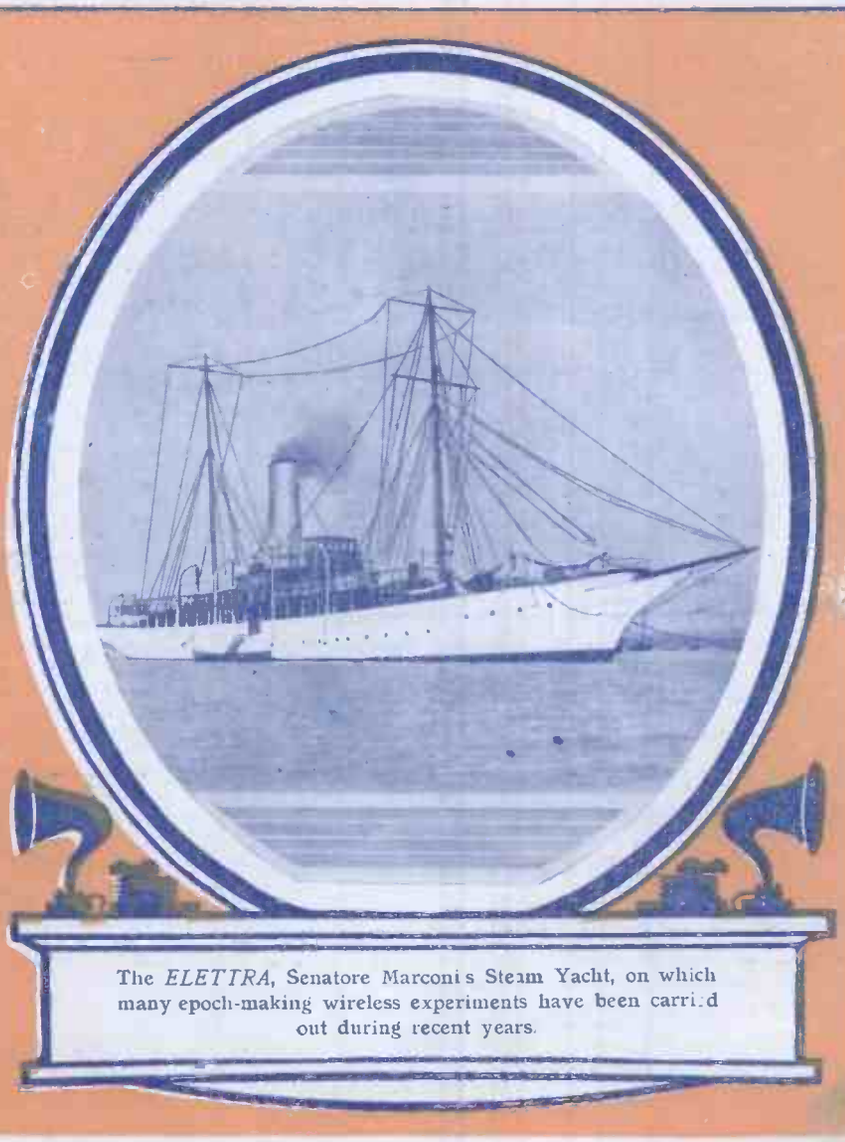

The *ELETTRA*, Senatore Marconi's Steam Yacht, on which many epoch-making wireless experiments have been carried out during recent years.

THE PRESS PAY TRIBUTE TO TUNGSTALITE

"DAILY EXPRESS"

NOVEMBER 22nd.

Finally, one must mention the number of crystals that are to be seen. Of all of them, however, I was most interested in TUNGSTALITE, a crystal I personally tested and used in ordinary and reflex sets. IF THERE IS A BETTER CRYSTAL OF ANY KIND I HAVE NOT SEEN IT.

A Contemporary says:

NOVEMBER 22nd.

We have just received a sample of that well-known crystal TUNGSTALITE for test. It was tried out both in ordinary crystal and in valve crystal circuits. In all cases results were commendably satisfactory, and in point of sensitivity and stability we consider it as good, if not BETTER THAN ANY CRYSTAL WE HAVE YET HAD BROUGHT TO OUR NOTICE.

"BROADCASTER"

The specimen tested was a good rectifier. It was heated and handled without ill-effect, and we recommend it for general use as a rectifier.

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This new crystal possesses the extraordinary properties of being unaffected by greasy fingers or the heat of ordinary solder. The RECTIFICATION LOST IS VERY MUCH LESS THAN 1 per cent. The crystal also performs very well when used on a reflex circuit.

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A house *with* an aerial and a Pressland Safety Lead-in, is safer than a house *without* an aerial.

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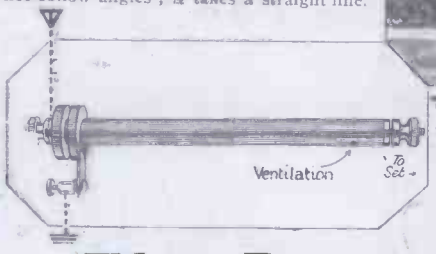

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E.W.B

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Amateur Wireless and Electrics

Vol. V. No. 131 December 6, 1924

WEATHER REPORTS AND HOW TO READ THEM

SOME OF THE WORLD'S METEOROLOGICAL WIRELESS STATIONS

THE collection and distribution of data relating to weather conditions is a most important work, which to a great extent is carried on by means of wireless.

Throughout the world there are numerous wireless stations which are continually engaged in sending out messages relating to meteorological conditions. If you are able to read morse and you should happen to tune in one of these stations, you would probably be unable to make any sense of the apparent jumble of figures, phrases and letters in which a modern weather message is sent unless you were in possession of the code.

Meteorological Codes

In many cases the information broadcast is so scientific and detailed that it would take many hours to transmit an average weather report. Therefore recourse is made to code, which enables a long message to be sent in a relatively short space of time. There are many codes used by the various meteorological wireless stations, but an attempt is being made to persuade all countries to adopt what is known as the New International Code. Besides the International Code, there is the Lindenburg Code, the American Code, and the French Meteorological Code, which is similar to the International Code with one or two exceptions.

It would take many pages of this journal to describe fully all these various codes, and the technicalities involved would be most difficult to understand unless the reader had had some training in meteorology. However, the writer proposes to give a few details concerning the International Code which may be of interest.

Understanding the Signals

A system of symbols has been devised, each with its separate meaning. These symbols range from A to Z, with various combinations, and denote various weather conditions. For instance, DD followed by a code figure means "the direction of the wind near the ground," L followed by a code figure means "amount of sky covered by cloud," and R with a code figure denotes "rainfall for the preceding twenty-four hours." These code figures range from 0 to 100, and are used to denote types of weather, for example, "fair," "cloudy," "rain or drizzle," etc. Thus R2 would mean that the rainfall for the preceding twenty-four hours, reckoned from the timing of the report, was 0.2 to 2 millimetres, while R6 would mean a rainfall of 16 to 20 millimetres.

Altogether there are fourteen codes used for the specifications of types of weather alone. To give one or two instances, there is a code which denotes the weather at the actual time of observation together with the general character of the weather, the symbol for which is "ww," and then there is a code for horizontal visibility, symbols V and Vs, a code for the state of the sea and swell, symbol S, and so on.

How to Decode

Suppose we wanted to put into code form the following simple message:

"The sea is very rough and visibility is poor. It has been raining five or six hours before the time of this observation."

Looking up our list of symbols, we should see that S denotes the state of the sea and swell, therefore S is put down as part of the message. We then turn up our list of codes and look for the code which denotes "state of sea"; "very rough" is number 8 in this particular code, so we add 8 to S, making S8. The same process is carried out for the remainder of the message, and in the end we arrive at the following code message:

"S8v5R6."

Although this may not be the order or the grouping in which a meteorological message is sent, the example will show how simple the above message appears when in code.

The above examples will show on what system the International Code is worked, but of course a complete message in the code is rather a complicated affair, containing as it does index and check figures, besides a quantity of other matter not mentioned here. A complete weather message looks more an algebraic sum than a statement of weather conditions. So thorough has been the make-up of the International Code that it is possible to send the most intricate observations concerning humidity and barometric tendencies with absolute accuracy.

The Eiffel Tower

Perhaps the meteorological station best known to amateurs is the Eiffel Tower (F L) at Paris. This station is one of the most powerful in the world, and provides a fine meteorological service. Messages are sent at the following times: G.M.T. 02.20, 04.00, 08.20, 10.05, 14.20, 16.00, 19.20. The message at 10.05 is sent on a wavelength of 2,600 metres (spark) and can be picked up on a crystal set capable of tuning to the wavelength in this country. The other messages are sent out on a wavelength of 7,3300 m. (C.W.), but in the case of a breakdown on the main transmitting plant a wavelength of 6,500 m. (C.W.) is used. The code chiefly used is the International Code.

The Eiffel Tower, besides the code messages, sends out some weather reports in French by telephony. These reports and forecasts are mainly intended for farmers, and are sent out on a wavelength of 2,600 metres at the following times: G.M.T. 06.40, 11.15, 19.00, 22.10. On Sundays the 19.00 message only is transmitted.

The Air Ministry

Another well-known meteorological station is the Air Ministry station in London, which sends most of its messages on a wavelength of 4,100 m. (C.W.). The station sends an International Collective Report at 08.50 and 14.50 G.M.T. in the International Code. The British and Icelandic Synoptic Report is also sent in code on 4,100 m. (C.W.) at the following times: 02.00, 06.00, 08.00, 14.00, 19.00, 19.40 G.M.T.

Other Foreign Stations

In the United States there are several stations, some of which can be picked up by amateurs in England. Annapolis (N S S) transmits each day to France a weather bulletin containing observations taken at a number of stations in the United States, Alaska, Canada, Nova Scotia, Newfoundland and Bermuda. This bulletin is sent out as the first message in the Annapolis Schedule with France, and commences at 05.30 G.M.T. on a wave-

(Concluded in third column of next page)

WHY SOME CRYSTALS GIVE BETTER RESULTS THAN OTHERS : *IMPROVING RESULTS FROM 5XX*

THERE are two classes into which detectors may be divided. In the first, to which belongs the crystal detector, the *current* set up in the aerial by the incoming waves is used directly to operate the phones. In the second, of which the valve is the typical example, the detecting device serves to release the energy of a local source of power (the H.T. battery) which provides the phone current, the actual detector merely controlling this current according to the voltage applied to it. The first class are known as "current-operated," the second as "potential-operated" detectors.

Detector and Aerial

It will be evident that the considerations governing the method of application of these two classes of detectors to the aerial will be different. Generally speaking, a current-operated detector should be placed *in series* with the aerial in order that the whole of the aerial currents may flow through it. A potential detector, on the other hand, should be *in parallel* and connected to the two points on the aerial between which the maximum differences of potential are set up.

But in practice we find that a crystal detector in series with the aerial is very inefficient and that, in the vast majority of cases, the connections for a valve or crystal are both made in parallel across a portion of the aerial circuit, usually the A.T.I. Sometimes only a part of the A.T.I. is used; sometimes, as in auto-transformer arrangements, an attempt is made to get a step up in voltage, but the effort is always to obtain *voltage*, even when the crystal is used.

Detector Resistance

Now the reason for the inefficiency of the series arrangement of the crystal is that the very high resistance of the detector, being added to that of the aerial, reduces the current to a very serious degree. But if the crystal is in parallel, the total impedance of the whole circuit is reduced, because the resultant of two parallel impedances is less than either of them separately. So the *total current* is increased, and by arranging our shunt efficiently we get better results from the portion we tap off than we could from the whole of the much feebler currents which can pass with the series arrangement.

Valve and Crystal Contrasted

But whereas in a valve detector we can say at once that a high grid-filament impedance is desirable, since practically no current is required to pass, and the higher the total joint impedance of the A.T.I. and grid-filament circuits the greater will be the potential difference across them, the crystal circuit requires more careful consideration. The crystal circuit is a *power* circuit and is therefore subject to the same conditions as those governing other power circuits.

Useful and Wasted Power

It is an elementary rule in electrical engineering that, when there is inevitable waste in the source of power, the maximum power is obtained in the outside

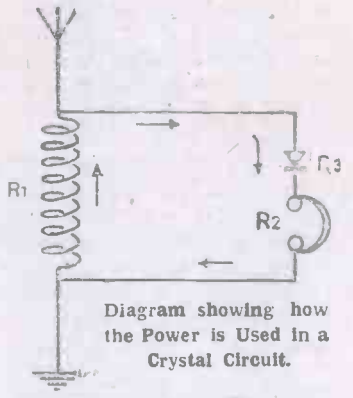


Diagram showing how the Power is Used in a Crystal Circuit.

circuit when the impedance of that circuit is made equal to that causing the loss in the source.

In the diagram the power circuit consists of the A.T.I. (R1), the phones (R2) and the detector (R3). The source of power is, of course, the A.T.I., across which the potential for driving the current is set up. The useful work is done in the detector and phones. R1 should therefore be equal to R2 plus R3.

R1 is determined in practice by the size and efficiency of the tuning coil and the frequency of the incoming wave. For a given set, used on a given aerial, it is thus dependent on the wavelength and not readily controlled by the operator. R2 similarly depends on the phones, phone leads, condenser, etc., and again is not usually under control. But R3, the resistance of the crystal detector, can be varied within fairly wide limits by the choice of crystal and crystal setting; it provides a means of adjusting our receiver not often understood by the average crystal user, though many do something in this direction (without knowing why) by resetting their crystals when they find signal strength unsatisfactory after a change of wavelength.

Have Several Crystals

The practical upshot of it all is that *as the wavelength increases you should use a crystal of higher resistance*. You should provide yourself with an assortment of crystals and not expect the one which has served you admirably for 2 L O to perform equally well on 5 X X. Neither is the one which gives Brown satisfaction in his set, and on his aerial, necessarily suited to Robinson's receiver. The actual resistance of any given crystal depends not only on the point of contact but also on the cat-whisker pressure and the signal strength. Speaking generally, the galenas (the various "ites") are medium resistance crystals, most specimens of carborundum can be considered high, and most of the perikons rather low. Experiment is the only sure guide.

H. W. S.

"Weather Reports and How to Read Them" (*continued from preceding page*)

length of 17,145 metres (C.W.). This message is in the International Code and not in the American Code.

Germany has many stations regularly transmitting weather reports, chief among which may be mentioned Königswusterhausen (L P). This station transmits on 5,700 metres (C.W.) at the following times: 06.50, 08.40, 08.50, 14.50, 19.40, 19.50 G.M.T.

The reports are in the International code, and are of a synoptic and international collective nature. In this connection it may be mentioned that use is sometimes made by L P of the Lindenburg Code, but this is mostly for messages known as "aerological" reports.

Karlsborg (S A J) is a Swedish meteorological station, which can be picked up by English amateurs with valve sets. The wavelength is 4,200 m. (C.W.), and the chief transmissions are at G.M.T. 07.40, 13.40, and 18.40 in code.

If there are any amateurs with a knowledge of the Morse code who would like an evening's practice at receiving meteorological messages, tuning-in the following stations is suggested:

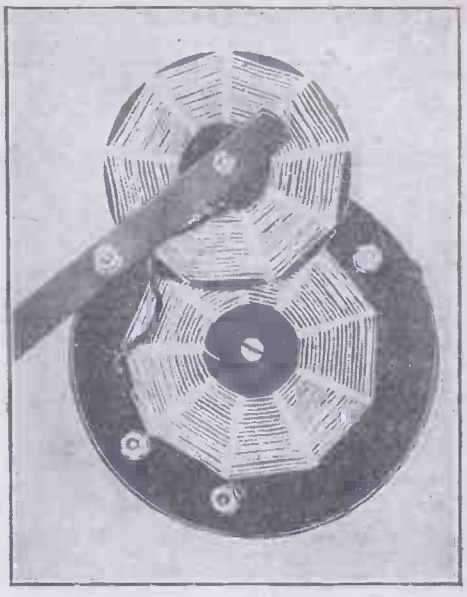
G.M.T.	*Station*	*Wave*	*Report*
1900	Air Ministry G F A.	4100 C.W.	British and Iceland Synoptic.
1920	Paris F L.	7300 C.W.	French National Synoptic.
1950	Königswusterhausen L P.	5700 C.W.	International Collective.
2030	Madrid E G C.	2000 Sp.	Synoptic.
2210	Moscow R A I.	5000 Sp.	do.

The picking up and decoding of meteorological messages is a fascinating study.

S. W.

A UNIQUE CRYSTAL SET

The Complete Receiver.



Under Side of Panel.

UNDOUBTEDLY there is nothing like the crystal set for simplicity and cheapness; for those living within a few miles of a broadcasting station it is quite loud enough for use with phones.

The set about to be described is small and neat in appearance, but is as efficient as many large sets. The general arrangement can be gathered from the photographs.

Commence making this set by marking out the base on a piece of ebonite $\frac{3}{16}$ in. thick. The centre point should first be punched and a 4-in. diameter circle marked; all the holes can be marked out and drilled according to Fig. 1. The disc may be turned in a lathe or cut out with a fretsaw.

The base stands on three legs, which leave space for the tuning coils beneath. Two of these legs are pieces of $\frac{5}{16}$-in. ebonite rod (Fig. 2) tapped 4 B.A. at one end; the third, which acts as a pivot for the handle of the moving coil, is turned from $\frac{3}{8}$-in. diameter brass rod to the dimensions shown in Fig. 3. The crystal detector can be purchased for a trifle, though that shown in the photograph was specially made. Details of the ebonite cap for this and the crystal cup are shown by Figs. 4 and 5.

The formers for the basket coils (Figs. 6 and 7) should be cut out from black fibre $\frac{1}{32}$ in. thick. Cardboard can, of course, be used, but the fibre is preferable. These coils should be wound in the usual manner with No. 24 d.c.c. wire, the small coil having 34 turns and the larger one 38 turns. It is necessary when connecting up that the current should flow in the same direction in both coils, so that if the coils are both wound in the same direction and are mounted face to face the two finishing ends should be connected together.

The tuning handle (Fig. 8) should be made from a piece of $\frac{1}{8}$-in. sheet ebonite.

Before assembling all the brass fittings should preferably be lacquered.

There now only remains the assembling and wiring to complete the set. The wiring is very simple, and is shown in Fig. 9. The two phone terminals should have their stems cut as short as possible so as not to foul the moving coil, but the stem of the aerial terminal if left long will act as a stop and prevent the coil from being moved the wrong way. The fixed coil should have a 4 B.A. screw passed through the centre hole of its former and a thin 4 B.A. nut screwed on. If this screw is now passed through the centre hole of the base (a wire having been first put round it) the crystal cup when screwed on at the top of the base will secure its connecting wire and the coil. The moving coil should have two pieces of thin flexible wire soldered to its ends. These should be passed through the two small holes in the

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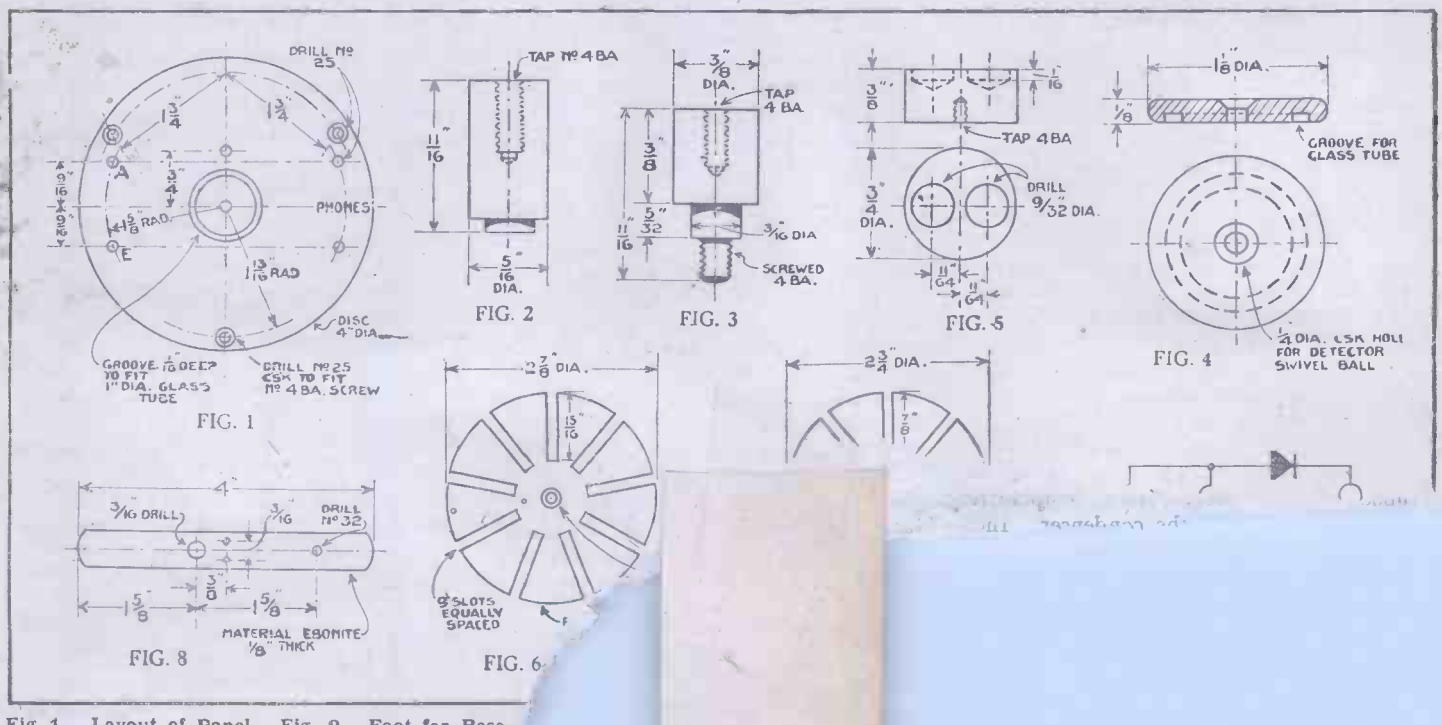


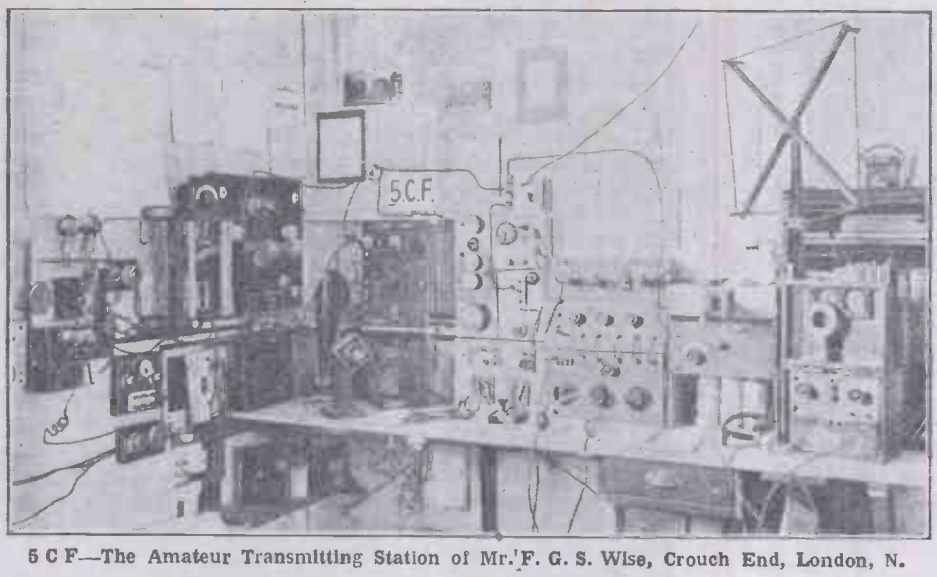
FIG. 1 FIG. 2 FIG. 3 FIG. 5 FIG. 4 FIG. 8 FIG. 6

Fig. 1.—Layout of Panel. Fig. 2.—Foot for Base.
7.—Formers for Tu

WELL-KNOWN AMATEUR STATIONS—5CF

5CF, the station shown by the photograph on this page, is owned by Mr. F. G. S. Wise, 12, Crouch End Hill, London, N. The completeness of the installation needs no comment, and the following brief particulars will suffice.

On the extreme left of the photograph is the short-wave (100 metres) power transmitter, wired to allow experimental changes of circuit. Modulation for telephony is obtained by the relay-control valve method. The power board carries the 240-volt mains, and this is supplemented by a bank of accumulators switched in series and giving a maximum pressure of 350 volts.



5 C F—The Amateur Transmitting Station of Mr. F. G. S. Wise, Crouch End, London, N.

Next is the permanent low-power transmitter (130-200 metres) which uses the reversed feed-back system with the grid-control method of modulation. The instrument board carries the filament voltmeter, aerial ammeters, milliammeters, and switch for aerial change-over.

Switches are provided for the use of various microphones, a speech amplifier and remote control being provided for each transmitter. A master rheostat for filament-current variation and a power cut-out switch is also fitted for convenience. The three-valve (1-v-1) receiver for short waves (80-250 metres) is of the straight-circuit design and uses variometer tuning in the anode circuit of the H.F. valve. The two-valve (0-v-1) receiver on the left of the photograph is for broadcast work; plug-in coils are used. This receiver is operated by relay from various points for loud-speaker reception, a great convenience to the listener.

The portable receiver on the extreme right is self-contained, employing a reflex circuit (modified Voigt) and giving on a frame aerial a range of 150-400 metres.

The resistance lamps are used for accumulator charming, switching being provided to allow the use of a floating-charge battery system.

TWO GOOD PHONE TESTS

THE following are two simple yet reliable methods of testing either high- or low-resistance phones, the latter being used with a telephone transformer.

Obtain a good quality fixed condenser of about .002 microfarad capacity, tighten up the terminals, and holding the instrument in the hand proceed to give one of the terminals two or three smart rubs on the coat sleeve. On bringing the leads from the phone into contact with the condenser terminals a click will be heard in the earpieces if everything is in order.

A slightly more powerful effect can be obtained by allowing one of the condenser terminals to be in contact with the hand at the time the other terminal is being rubbed on the sleeve, thus temporarily [illegible] condenser. Incidentally finger of the same hand. With the other hand—holding by the insulation—bring the tag of the remaining cord into contact with any portion of the same metallic object; if the phones are in good order a click will be audible on making contact.

A modification of the foregoing test, which is extremely useful for comparative tests with various phones, is to substitute the metal object with a pencil line drawn on paper. The line should be from $\frac{1}{16}$ in. to $\frac{1}{8}$ in. in width, and should be made with a soft pencil. A finger of the hand holding the phone tag should be pressed on one end and the tag of the other cord brought into contact with various parts of the pencil line.

A click will be heard on touching the blacklead line with the second tag, pro- [illegible] a distance does not [illegible] contact. Com- [illegible] by noting [illegible] through [illegible] ruments [illegible] st, it [illegible] in width, and drawn rather heavily with a BB pencil on ordinary writing paper, a click was audible in the phones throughout the length of line of just over 1¾ in., the headphones used being of 8,000 ohms resistance.

A. P.

"A Unique Crystal Set" (*continued from preceding page*)

tuning handle and the coil fixed thereto by means of a 6 B.A. countersunk screw and nut. The tuning handle should now be placed on its pivot with a 2 B.A. washer which has been cut through and opened to act as a thin spring washer. If a 4 B.A. nut is now screwed down to the shoulder the handle should work smoothly.

For a catwhisker a piece of No. 36 resistance wire which has been wound round a ⅛-in. drill shank is very suitable.

The tuning coils described here are designed to tune to 2 L O with sufficient variation to make up for any difference in aerials. For other stations more or less turns, determined by experiment according to wavelength, will be required on the fixed coil.

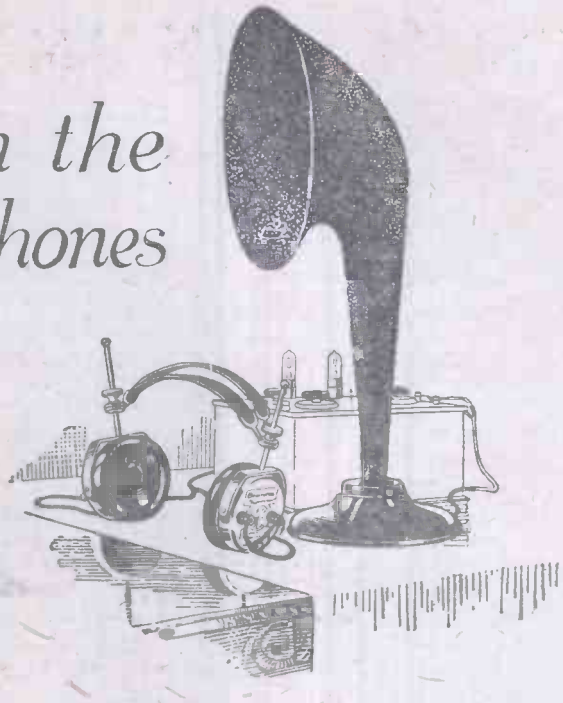
T. W. R.

Tune the Table-Talker with the "Matched Tone" Headphones

The Brandes Family Series

GRANDPA is well content with the comfortable companionship of the Brandes "*Matched Tone*" Headphones and their clear, full-blooded tone. He watches the joyful exuberance of the younger members of the Brandes family under the influence of the Savoy Orpheans in amusedly tolerant mood. The *Table-Talker* brings the rhythmical vigour of this famous dance band with intoxicating naturalness, and nothing loath, he will join in the frolic. They'll have a jolly time at Christmas. Amaryllis artfully defies him. Grandpa will then execute a gay *pas seul* with paper cap at rakish angle, to the intense amusement of all. He says he is as young as any of 'em.

Ask your Dealer for Brandes.

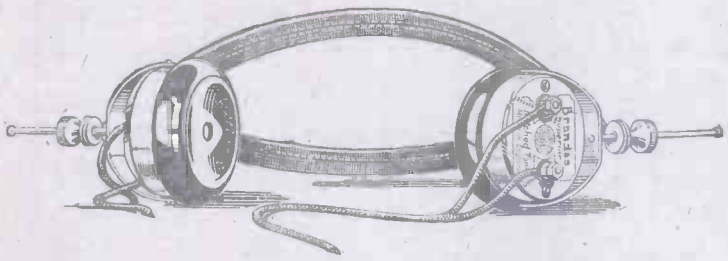


All Brandes products carry our official money-back guarantee, enabling you to return them within 10 days if dissatisfied. This practically constitutes a free trial.

The "*Matched Tone*" feature was embodied as the distinctive characteristic of Brandes Headphones in 1908, and means that both your ears hear exactly the same sound at the same instant—and you learn a new beauty of tone. They are tested and re-tested for just this one vital point, and in addition their strength, long-wearing comfort, and reliable efficiency make them undoubtedly superior. **25/-**

The *Table-Talker* is a Brandes quality product at a moderate price. The non-resonant, specially constructed horn is matched to the unit so that the air resistance produced will exactly balance the mechanical power of the diaphragm. This means beautiful sound-balance and remarkable tone qualities. It is twenty-one inches high, and is finished a shade of neutral brown. **42/-**

British Manufacture (B.B.C. stamped).



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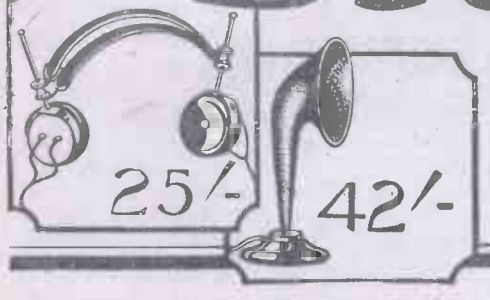


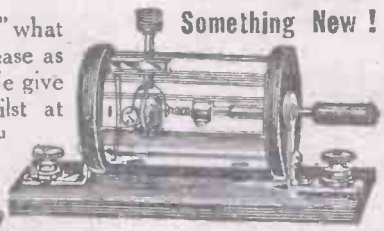
WIRELESS ON EASY TERMS

GAMAGES have now extended their easy payment system to Wireless, and you may now secure on payment of first deposit Wireless Sets and Apparatus from £5 upwards, balance being payable in monthly instalments. Write for details to Wireless Dept.

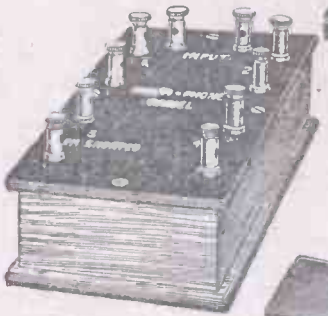
GAMAGES

WIRELESS PARTS FOR XMAS GIFTS

For your fellow "Listener-in," what Gift as practical—as sure to please as a Gamage Wireless Part? We give a few suggestions here, whilst at Holborn is a Great Array which you would do well to come and see



Something New!



SUPER CRYSTAL DETECTOR

The striking points about this new detector are the revolving crystal, the silver cat's whisker, all brass parts lacquered. New crystal easily fitted. Complete with Gamages famous "Permanite" Crystal. Post 4d. on each type.

Price for Panel Mounting **4/6** Price for Table Panel Mounting **5/6**

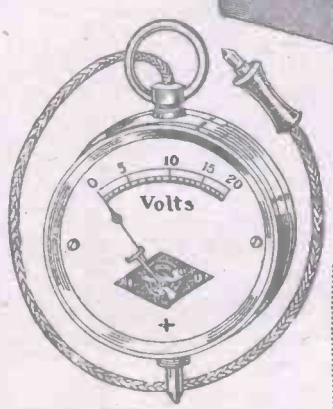
THE MULTI 'PHONE PANEL

This is the perfect addition to any Wireless Set when it is required to use several pairs of 'phones. As an Xmas Present, it is ideal.

Post 6d.

Price **7/6**

Order yours now — personally or by post.



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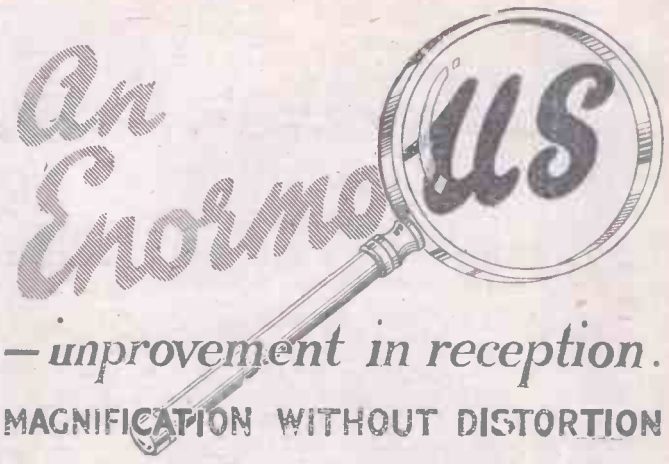

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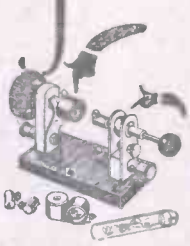

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All Models enclosed by handsome Ceias oid dust cover, instantly detachable. This is omitted from illustration so that details of Detector may be closely seen.

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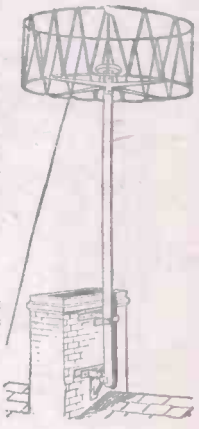

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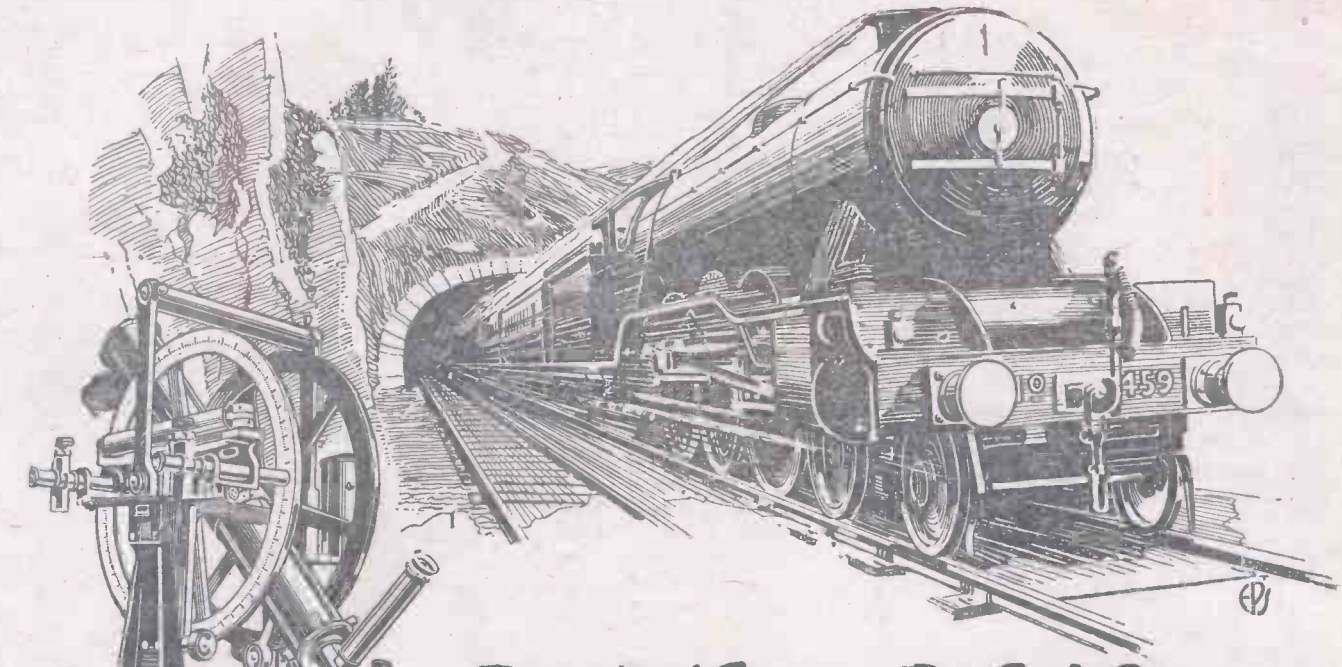

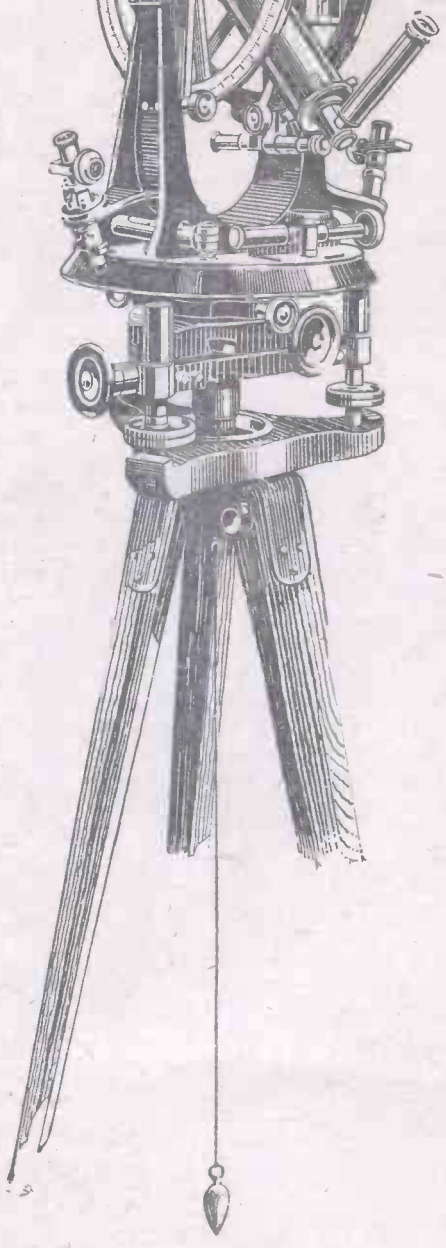

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THE Railway Engineer requires his instruments to be of the greatest precision.

When he chooses a theodolite, he goes not to an upholsterer, nor to a maker of gramophones, but to a firm whose speciality is the manufacture of surveying instruments.

He knows that instruments if defective may cost him thousands of pounds, so he is careful to buy them only from a firm whose long specialised knowledge is a guarantee of good results.

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On Your Wavelength!

America

I OUGHT really to be able to tell you that during the International Radio week I have been obtaining perfectly wonderful reception of America. To do so would be easy. I could speak glibly of the main items rendered and received—for has not the daily press been packed with detailed reports? But, reader, I will be frank, free and honest with you. My direct reception of U.S.A. stations this week has been so poor that it is hardly worth talking about.

WGY and KDKA I have had, certainly, but neither would come in with its usual strength or clearness. Probably there is some small thing amiss with the set, or it may be that my skill in fine tuning is temporarily—I hope that it is only temporarily—in abeyance. This kind of thing *would* happen, would it not, in just the one week when one most wanted to hear the American stations. Last week everything was working beautifully. I had no difficulty at all in picking up these far-away voices; next week it will probably be the same. But at present, if I get hold of a Transatlantic carrier wave, I cannot resolve it in most cases, and if I do resolve it I get nothing but woolly, mushy sounds that are far from pleasing. It is all very sad.

A Tragedy

Last night I received what Shakespeare called the most unkindest cut of all. I had decided to make a night of it, and this I duly did, not seeking my couch until 5.30 a.m. Until 11.30 p.m. I amused myself by listening to 2LO's "Lucky Dip" programme, and later to his "Consolation" items. I went round a good many of the Continental stations, all of which came in well.

Signal strength was not phenomenal, but there were no atmospherics worth talking about, and when they are absent, or nearly so, it is usually worth while to sit up. Then I did a little work until about one in the morning, which finished, I sat down with a book and a pipe to while away the next couple of hours. At 3 o'clock, with notebook and pencil beside me, I started to tune-in. Before long I had distinct sounds of speech from a station which the wavemeter showed to be WGY. When I say "distinct" I mean that they were undoubtedly speech. That was as far as I could get.

A little later there was music. It was an orchestral piece, I know, but more I cannot tell you.

I went higher up the wavelength scale. "Hallo! There's something quite hefty." Yes, this was the real stuff at last. A military band playing the "Star Spangled Banner." And then came a voice speaking in *German*. It was Hamburg, who was apparently conducting a little Transatlantic trial all on his own between 3 o'clock and 4 o'clock, instead of in the following hour.

And so it went on until just before 4 o'clock my finger rested accidentally on the voltmeter press-button, and the needle shot round, not to four good volts but to a miserable three!

How It Happened

In a flash I realised how it had come about. Normally I use nothing but dull-emitters, and the current consumed by the united valve filaments of the multi-valves is just under one ampere. At the end of the previous week I thought I would test out bright-emitters against dull to see whether any difference could be detected between their respective performances. I mounted a quintet of these current-devouring eye-dazzling things, and let them batten upon my accumulator for two days. Four amperes they took between them, according to the ammeter, and it was their horrid gluttony that did in my accumulator. I had forgotten the drain to which it had been subjected, forgotten that it would have to go to be charged long before it would have been due to do so in the ordinary way.

By cutting down the valves first to three and later to two, and using "06's," I nursed the set for a further hour and listened to several of the Continental stations hailing America. If any of their transmissions were picked up on the other side of the water I am willing to wager that Radio-Iberica was amongst them. He was coming in very much more strongly than any of the others, on the medium wave, at any rate, for I did not try Radio-Paris, having by that time reached a stage produced by a mingling of disappointment and sleepiness at which even the simple task of changing coils seemed a labour too great to be contemplated. And so ended a tragic night of listening, when everything that could go wrong did go wrong. I am not in the least consoled by the knowledge that it was all my own fault for not remembering about the accumulator!

The Foreign Ramp

The "dumping" of foreign goods on our wireless market continues, in spite of the fact that such components are taboo in broadcast receivers. I have before me an extremely funny pamphlet which came over with a foreign crystal detector.

Apart from glowing claims for the detector, the wording of the pamphlet is full of quaint blunders. For instance, I am informed that "an unobjectionable earth is absolutely necessary" to get the results claimed—and I quite believe it! Further on it is stated that "At the beginning the tuning demands some patience but a surprising and fine result does not fail to be the reward!" Oh, ye shades of Hertz, what on earth has the crystal detector to do with the tuning?

Under a paragraph headed "Its Advantages" the following tips are given.

"Most simple attendance, even easy for a child *or a blind*." The last three words may mean more than appears at first glance.

"Using an outdoor aerial it will be possible to receive without amplifier not only local stations but also Continental stations, besides distant English stations. Naturally it is supposed that a good receiving set is used as well as an unobjectionable aerial!"

"The intercepted energy is naturally weak, so that it must thoroughly be used. Evidently the reception of distant stations is soft *but sometimes clear*."

I quote the leaflet word for word, and leave it to my readers to guess whence came this gem.

"Dud" Components

But, speaking seriously, many of these foreign goods are not worth the money expended on their transport to this country. There are exceptions, of course, but some few months back I saw a German H.T. battery, and in a rash moment I purchased it. Thirty-six volts for 4s. 6d. was a temptation not to be lightly put aside, and I fell! Within two months that battery refused to yield more than a dozen volts, although its use had been limited to the heterodyne wavemeter—about ten hours' run in all!

Similarly an L.F. transformer, when disembowelled, disclosed that its interior was wound with resistance wire! Readers therefore should beware of cheap foreign component parts.

In a Foundry?

2LO unknowingly provided me with a real thrill on the first night they attempted to relay KDKA this season. Have you ever been in an iron foundry or shipyard? Have you ever tried to keep calm and collected when huge sheets of steel plate are being thrown about by giant cranes? When the announcer said that they were going to attempt to relay KDKA, I thought that a mistake had been made and that we had got switched through to some shipbuilding yard. Eventually things calmed down a little, but that continual

On Your Wavelength! (continued)

crashing and jangling, interrupted by a nasal voice and short periods of silence, was more of a thriller than Congo night! It was a huge success. Anyway, I had to switch off the loud-speaker for the sake of the sleeping humanity round about me!

Loud-speakers: High or Low Resistance?

Several correspondents have asked me whether the high- or low-resistance loud-speaker is to be preferred. This is an interesting question, but it is not possible to give an answer one way or the other which will cover every case. The advantages of the low-resistance instrument are that its windings do not have to carry the steady current flowing in the plate circuit of the last valve and that it is not nearly so likely to be damaged by the effects of powerful atmospherics. Against this we must set the drawback that its use makes it necessary to introduce another iron-cored audio-frequency transformer. The more iron cores you have in a set, the greater are the chances that distortion will be present for a variety of reasons. Telephone transformers, too, are just as liable to the effects of interaction as intervalve transformers.

Had It a Good Flavour?

Although you may not believe it, I can vouch for the truth of the following story.

* * * * *

Scene: Busy period at a recent exhibition. Young Hopeful goes to the stall of a certain phone manufacturer and engages a salesman in conversation.

Young Hopeful: ". . . I've a two-valve and crystal reflex set. But, do you know, I can't hear a sound with your phones unless I take the insulating washer off one terminal."

Salesman (a little uncertain whether to laugh or cry): "Really? Would you mind telling me a little more about your set?"

Young Hopeful does so at length, and they discuss reflex circuits in detail.

Young Hopeful: "Oh! yes, my set is very powerful. Why, all the time I am wearing the phones I can taste the sounds in my mouth."

Total collapse of salesman, who decides to cry after all.

* * * * *

Do you know why he could taste the H.T.? No? Well, he had a frame fault in the phones and was getting a current through his body.

Fading

Fading during the last ten days or so has been very marked where I live and move and turn my knobs. It has affected not only British stations, but also many of the Continental ones on whose transmissions I have never before known it occur. I can't help thinking that a good deal of it may be due to the action of receivers that, though oscillating, are not actually howling. If no howls and shrieks occur when the knobs are twiddled many users of wireless sets believe fondly that all must be well and that the set cannot be oscillating. It can, though, and if it is allowed to do so it will affect other people's reception over a big area.

Trouble Nights

I have a confession to make. It concerns my receiver. It's a very nice receiver and has given me excellent service, at least the panel and terminals which were part of the main construction three years ago have; other parts have come and gone with time, amongst them being many L.F. transformers. And that is a part of the confession. I cannot keep a moderately-priced L.F. transformer in the set for longer than a year but bang goes the primary winding.

Disembowelling the Set

The first time it happened I was led a sorry dance. In my ignorance I took that receiver to pieces and reassembled it half a dozen times at least. The symptoms were crackling, periodic cessation of oscillations, a weakness in signal strength, and a rise in my personal temperature. The H.T. battery was first of all blamed (as is usually the case), and although it showed a good percentage of its normal voltage, it was consigned to the dustbin and a fresh one substituted. Still the symptoms persisted, and the condensers (fixed and variable), grid leak, earth lead and everything else came under suspicion in turn, with disastrous results for them. Strange faults were suspected and remedied by the substitution of fresh components, but it was of no use.

Transformer Trouble

The L.F. transformer also was not above suspicion. It was tested for continuity of both windings, and although the ratio of resistance seemed inclined to be high, the continuity was there. The tests were made with a high-resistance voltmeter. The transformer went back. Still those cracklings. On some nights I imagined that statics were the cause, because on other nights the set was silent. At last I could bear it no longer. Once again the transformer came out and a new one went in—and all was well. I made a note in the log book: "Next time statics are bad, suspect the transformer."

And what was the trouble? The primary was actually broken, but the wire was making intermittent contact so soon as it got warmed up by the one and a half milliamps dissipated on the plate of the valve. The voltmeter always refused to show up this intermittent current, probably because it was not sensitive enough.

After this you would have thought that my experience would have led me to the seat of the trouble if it occurred again, but not a bit of it. The same symptoms appeared in due course, but the new transformer was a costly affair and beyond suspicion. The same old heart-breaking search took place and the same result was obtained—nothing doing. In desperation that transformer came out and another one went in—and all was well. I am now wondering what to do next time.

The Organ in Wireless

I am a great admirer of the organ, but it does not broadcast well except in the hands of players who understand the needs of the microphone. Frankly, I have not heard this instrument properly played since Mr. Stanton Jefferies was heard relayed to 2 L O from the National Institute for the Blind. Last Sunday, however, another clever organist in Leonard A. Marsh evidently grasped the same point that the reed and gamba stops are the ones to use when broadcasting. Consequently I enjoyed one part of the Sunday programme. This is not of frequent occurrence, for every week the sermons grow longer and the propaganda stronger.

Local Talent

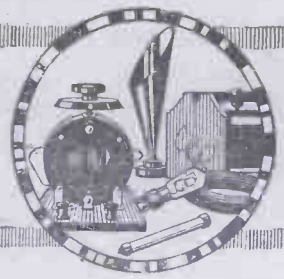
I believe in utilising local talent where possible, don't you? Think of the joy of being able to meet your next-door neighbour the next day and tell her that your valve was half a tone flat, and what a shame the pianist could not get her top notes. It adds local colour sometimes. However, Nottingham did well with the prize choir known as William Turner's Ladies' Prize Choir, consisting of 140 of Nottingham's feminine singers. As it has won over forty prizes, including the first prize from the National Eisteddfod of Wales, it is worth the hearing.

Dancing Decadence

There's no pleasing everybody, I know, but taking into consideration that the majority of the listeners are, to quote Barrie, "young enough to know everything," as well as to enjoy, I can't agree with that pessimist who grumbled at the broadcasting of dance music. I'm no lover of jazz, though neither do I see the practical use of Sarabandes, gigues and other "back numbers," but I'll back that Wireless Trio at 2 L O to play "What'll I do" better than any jazz band in the country.

Now, if that grumbler had struck at some of those talks, especially the Japanese schoolgirl variety—well, I'd join issue with him. Come to that, why can't I develop a thirst for information on Hottentots and Afridis?

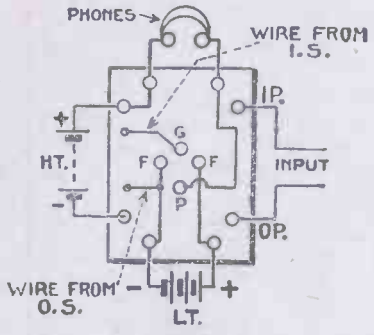
THERMION.



PRACTICAL ODDS AND ENDS

Compact Amplifier

A COMPACT L.F. amplifier can be made by fixing over the four terminals of an intervalve L.F. transformer a piece of ebonite on which is mounted a valve holder. The ebonite is drilled to slip over the transformer terminals, a valve holder is mounted in the centre and two extra terminals are provided at each end.



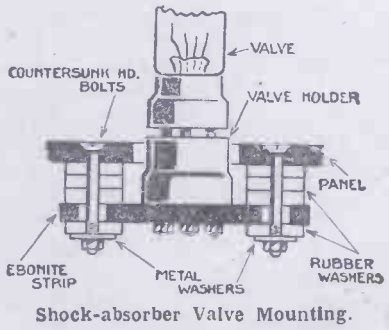
Wiring of Compact Amplifier.

Connections are made as shown in the diagram. It should be noticed that no filament resistance is included, but that for the detector valve can be used. E. O. W.

Valve Mounting

A NOVEL method of valve mounting, very suitable for use in portable sets or in places where vibration is likely to effect the proper working of the valves, is shown by the illustration.

A clearance hole is provided in the panel for the valve socket, which is mounted on an ebonite strip, this in turn being secured to the panel proper by means of two or four countersunk head bolts. Rubber washers should be interposed between the panel and holder strip for the purpose of taking up shocks or vibration. R. N. W.

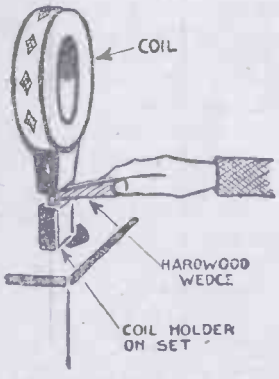


Shock-absorber Valve Mounting.

Removing Coils

WHEN removing or changing plug-in coils in a set that has dull-emitter or other valves with delicate filaments, the use of a small hard-wood wedge for prising the coil out of the holder (as shown in the illustration) will prevent undue vibration and obviate risk of filament fracture. Microphonic noises are also obviated.

R. W.

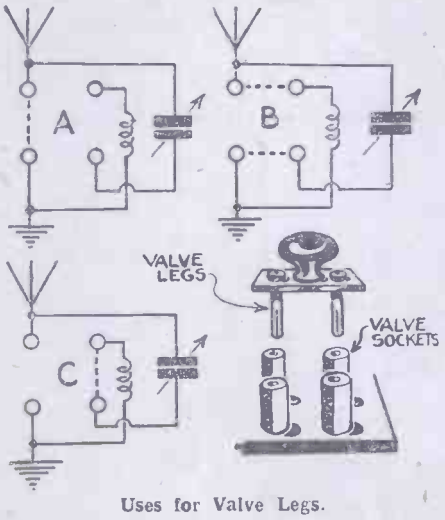


Method of Removing Coil.

Using "Dud" Valves

BURNT-OUT valves should never be thrown away, for the legs, when fixed to small strips of ebonite (as shown in the diagram), can be put to many uses. The arrangement shown comprises a simple aerial-earthing and series-parallel switch.

At A the aerial is put straight to earth; B shows the condenser and coil in parallel; while C shows them in series. W. H. A.

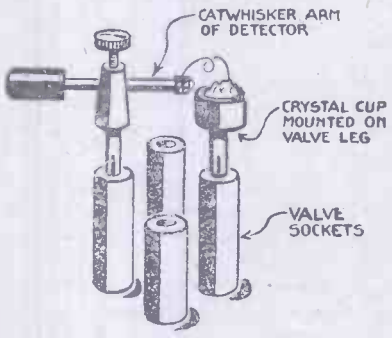


Uses for Valve Legs.

Improvised Detector

WHEN you have the misfortune to burn out a valve in a multi-valve set and have no spare at hand, there is no need to stop listening-in. Simply substitute the detector valve by a crystal, as shown in the diagram.

The detector parts are plugged into the grid and anode sockets, the grid condenser and leak being temporarily taken out of circuit. R. E. D.

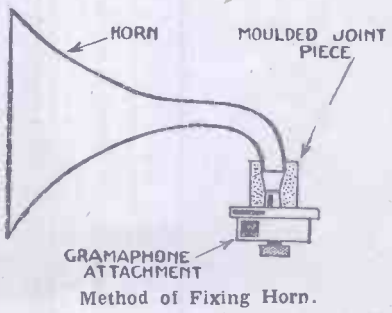


Arrangement of Improvised Detector.

Fixing Loud-speaker Horns

DIFFICULTY is sometimes experienced in adapting a gramophone loud-speaker attachment to a horn purchased separately. A good method of temporarily overcoming the trouble is to obtain a quantity of modelling Plasticine and mould a small tube to the dimensions required.

Providing care is taken when adjusting the magnets of the loud-speaker attachment, the temporary fitting will be found to keep its shape quite satisfactorily. To make a more permanent job the horn and the attachment should be securely fixed down to a wood base so as to prevent movement between the two parts. The wood may then be varnished. L.



Method of Fixing Horn.

AN EXPERIMENTAL FIVE-VALVER

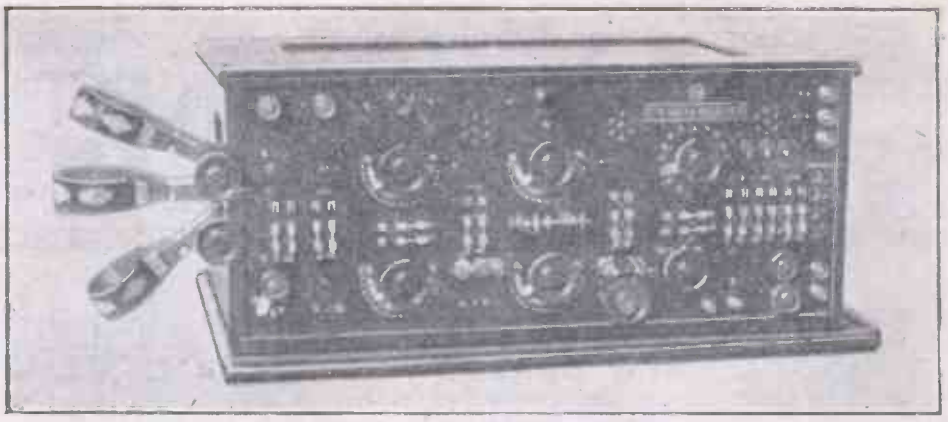


Fig. 1.—The Five-valve Multi-circuit Receiver.

THE photograph, Fig. 1, shows a wireless receiver, measuring 20 in. by 8 in., equipped with double-pole switches arranged to cut out any or all of the five valves. Fig. 2 is the circuit diagram. The switches, starting from the left, are: Tune-stand-by, first high-frequency valve, series parallel, second high-frequency valve, reaction reverse, valve or crystal detector.

Either or both of the low-frequency valves can be added at will by means of the two switches nearest the right-hand end of the panel. Variable grid bias can be applied to these valves (LS2 type) to give power amplification. The three-stud switch for this purpose is situated at the left-hand bottom corner, this being convenient as the flashlamp batteries are inside this part of the cabinet.

The aerial and earth terminals are seen at the top left-hand corner, while the two small ebonite buttons to the right of them are the dead-end switches for the two anode-tuning coils. Both of the latter are inside the set and, being identical, are simultaneously tapped by the double-armed switch just under the engraved name. These dead-end switches break the coils (which tune up to 4,000 metres) after the 500-metre point to give greater efficiency on broadcast wavelengths.

The three small knobs to the right of the anode-tap switch control the supply of low- and high-tension current, which is applied at the five terminals at the right of the panel; the topmost terminal is used for extra high plate voltages for power amplifying with the last two valves. The low-frequency portion of the set can be used as a separate two-valve amplifier, and any set can be attached to the two "input" terminals at the bottom of the panel near the right-hand end. The output is arranged for telephone jacks.

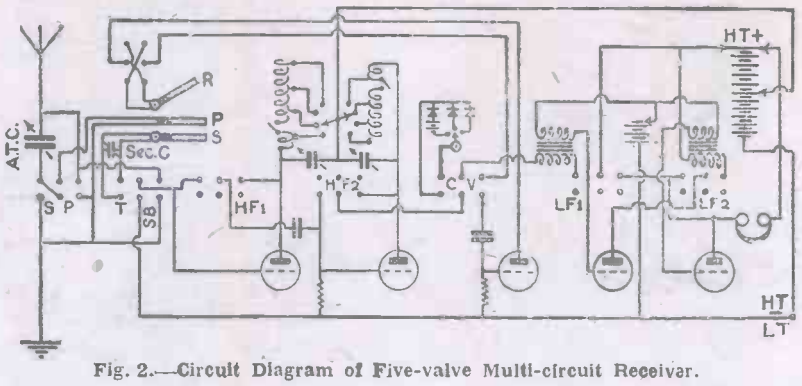


Fig. 2.—Circuit Diagram of Five-valve Multi-circuit Receiver.

Crystal rectification can be used with any combination of amplifying and magnifying valves, a choice of three types of detector being possible by means of the three-stud switch, including, in addition to the usual catwhisker type, carborundum and perikon.

The two upper knobs and scales belong to the primary and secondary tuning circuits, while the pair below control the two anode-coil condensers.

All the valves are arranged inside the polished mahogany cabinet on a separate panel, the H.F. and detector being of the V24 pattern.

The wiring diagram should make the switching arrangements quite clear. The filament circuits have been omitted in order to avoid confusion.

The filament circuits of the H.F. and L.F. valves are completed only when these valves are switched into circuit in order to effect a saving in current. Obvious fixed condensers have likewise been left out, as they only occur in the usual place, across transformers and phones, etc. H. R.

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John Blair, Esq., Rexall Pharmacy, Millom, says: "Your Condensers are a REVELATION to me as a Dealer." Sept., 1924.

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·00025	12/6
·0003	12/6
·0006	18/11

TWIN (Ordinary)

Equal units of ·00025 or ·0003. Complete with Knob and Dial 9/-

NEW MODEL SQUARE LAW

Knob & Dial Post Free.	Aluminium Ends	Ebonite Ends
·0003	10/-	11/6
·0005	10/11	12/6

JACKSON BROS.

"J.B." VARIABLE CONDENSERS

SQUARE LAW

·001	9/6	·00025	6/6
·00075	9/-	·0002	5/6
·0005	8/-	·0001	5/3
0003	6/9	Vernier	4/6

Complete with Knob and Dial.

"J.B." ordinary type Standard Super Micro-denser

·001	8/6	9/6	11/6
·00075	8/-	9/-	11/-
·0005	7/-	8/-	10/-
·003	6/9	6/9	8/9
·00025	5/9	6/9	8/9
·0002	5/-	5/6	8/-
·0001	4/9	5/3	7/9
Vernier	4/-	4/6	

STERLING SQUARE LAW

with Vernier.

·001	30/-
·005	25-6
·00025	23/6

POLAR

·001 var. Condenser	10/6
·0005 " "	10/6
·0003 " "	10/6
Micrometer Condenser	5/6
Cam Vernier 2-way Coil Holder	11/-
Polar 2-way, with Vernier	11/-
Polar 3-way, with Vernier	17/-
Polar-Junior, 2-way Cam Vernier	6/-
Polar Junior, 3-way Cam Vernier	9/6

GOSWELL ENGINEERING

Patent Valve Holder	1/6
Goswell 2-way coil holder	5/6
Goswell 2-way Vernier Coil Holder	9/-
Goswell 3-way Coil Holder	7/6
Goswell 2-way Panel Mounting	3/-
Goswell 3-way Panel Mounting	5/-
Goswell 3-way Cam Vernier	12/6

LISSEN

Variable Grid Leak	2/6
Anode Resistance	2/6
Lissen Minor	3/6
Lissenstat	7/6
Do. Universal	10/6
2-way Switch	2/9
Series Parallel	3/9
T1 Transformers	30/-
T2, 26/-; T3, 16/6; Coils: 25, 4/10; 30, 35, 40, 4/10, 50, 5/-; 60, 5/4; 75, 5/4; 100, 6/9.	
5 point switch	4/-
Lissen choke	10/-
Aux. Res.	1/3

HEADPHONES

We can recommend these as being excellent Headphones, with a great reputation. G.R.C., 4,000 ohms resistance, each £1 0 0

B.T.H., 4,000 ohms resistance, each £1 5 0

Brandes Matched Tone, 4,000 ohms resistance, each £1 5 0

Brown Type A, 4,000 ohms resistance, each ... £3 2 0

Sterling, 4,000 ohms resistance, each £1 5 0

Gecophone, 4,000 ohms resistance, each £1 5 0

ACCUMULATORS

MADE BY WELL-KNOWN FIRM FOR ME.

POST PRICES

2 v. 40 amps.	10/6
4 v. 40 amps.	17/6
4 v. 60 amps.	20/6
4 v. 80 amps.	24/6
6 v. 60 amps.	29/-
6 v. 80 amps.	34/6
6 v. 105 amps.	40/6

ENERGO

33

H.F. Plug-in Transformers

No. 1. 150-450	3/6
No. 2. 250-700	3/11
No. 3. 450-1200	4/3
No. 4. 900-2000	4/6
No. 5. 1600-3000	4/9
No. 6. 2200-5000	4/11

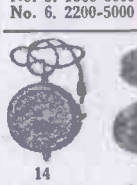
EBONITE POST PRICES

3/16th in.	¼ in.
6 x 6	1/6 2/-
7 x 5	1/6 2/-
8 x 6	2/- 3/-
9 x 6	2/2 3/3
10 x 8	3/- 4/2
12 x 6	3/3 4/2
12 x 9	4/3 5/6
12 x 12	5/6 7/6
14 x 10	5/6 7/6

Cut to Size, 3/16 in. at ½d. square inch.

Formo, open 12/6

47 Bucks "Powquip" 12/6



14 Voltmeter, 4/6

C and S, one-hole fixing, 1/3

DUBILIER

·001, ·002, ·003, ·004, ·005, ·006, Fixed ... 3/-

·0001, ·0002, ·0003, ·0004, .0005 ..... 2/6

Type 577, ·01 ..... 7/6

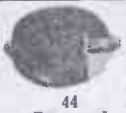
Grid Leaks, each ... 2 6

Anode Resistance 50,000, 70,000, 80,000, 100,000, on stand complete 5/6

Manchester, "Powquip," 15/6

Ormond, 14/6

16 Rheostat, with Dial, extra value, 2/6



44 Bretwood Valve-holder, 1/9

IGRANIC

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

Fil. Rheostat 4/6

Potentiometer 7/-

30-ohm Rheostat ... 7/-

Shrouded "Powquip," 18/-

Standard "Powquip," 14/6

D.P.D.T., 1/5

S.P.D.T., 1/2

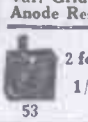
15 Grid Leak, 1/-, 1/3, 2/6

BRETWOOD

(New Model)

Var. Grid Leak 3/-

Anode Resistance ... 3/-



2 for 1/6

53

29 2 for 2/-

WATMEL

Var. Grid Leak 2/6

Anode Resistance ... 3/6

51. Enclosed Detectom Micrometer Adjustment, 1/9. By post 2/3

WATES MICROSTAT

For D.E. or R. Valves 2/9

Post Free.

McMICHAEL'S H.F. TRANSFORMERS

15/- 300 30/- 600 10/-

1,100-3,000 each (Manufacturer's advance.)

100,000 ohms

32 Fixed 2/6

2 meg. Leak 2/6

Both with clips.

Genuine DR. NESPER HEADPHONES

Adjustable diaphragm, detachable receivers, double leather-covered, head-springs, long flexible cords, nickel-plated parts. Very comfortable fitting to the head. LOOK FOR THE TRADE MARK.

4,000 ohms 12/11

Post 6d. pair.

FRENCH THOMSON-HOUSTON

JUST TRY THEM.

4,000 ohms per Pair 15/11

EDISON BELL

·001 to ·0005 Fixed	1/3
·002 to ·006	2/-
·001	1/3
·0003 with Grid Leak	2/6
Variometer	10/6
Twin Detector	5/6

41 AMPLION Dragon Fly, 25/-

43 BASKET 2-way, 4/11

"R.I." NEW MODEL IN SEALED BOX

Don't Buy Otherwise

Post 25/- Free

49 FORMO SHROUDED 18/-

POST ORDERS

Owing to tremendous pressure on Post Dept. ALL POST ORDERS accepted for delivery in strict rotation and on no other terms. Delivery for orders received AFTER Dec. 15 NOT guaranteed before the holidays. But we will do our best.

46 Cut from Solid Rod ... 1/3 Legless 1/3

48 5—1 11/9

ALL VALVES ON POST SENT AT PURCHASER'S RISK

VALVES

THORPE K4 5 PIN	17/6
PHILLIPS 4 ELECTRODE	12/6

(Both for UNIDYNE)

BRIGHT EMITTER

12/6 each

B.T.H.	R. Type
Ediswan	A.R. "
Marconi-Osram	R. or R5 V "
Mullard-Ora	"
Cossor	P.1. "
Cossor	P.2. "
Myers-Universal	
Mullard H.F. (Red Ring)	
Mullard L.F. (Green Ring)	

DULL EMITTER

21/- each	Type
B.T.H.	B.3
Ediswan	A.R.D.E.
Marconi-Osram	D.E.R

25/- each	Type
B.T.H.	B.5
Ediswan	A.R.O.6
Marconi-Osram	D.E.3
Mullard	D.F.Ora

DULL EMITTER POWER VALVES

For use with A.R.D.E. and D.E.R. Valves.

Marconi-Osram, Type D.E.6, 2-2.5 volt. .25 amps. 25/-

DULL EMITTER POWER VALVES

For use with .06 Valves

B.T.H. Type B.6	25/-
Marconi-Osram Type D.E.4	30/-
Mullard, Type D.F.A.2	30/-

POWER VALVES

For use with Bright Emitters

B.T.H. B.4.	35/-
Marconi-Osram D.E.5	35/-
Mullard D.F.A.1	35/-

·06 French Metal	16/11
·06 Dutch	13/6
Phillips .04 Type	16/11

FILAMENT RHEOSTATS

Wire-Wound Type. Rotary Action.

IGRANIC ohms each.

Plain Type 4 & 7	4/6
With Vernier Adjustment	4 7/-
Plain Type	30 7/-
The Raymond	6 1/6
The Ormond	9/-

BASKET COIL HOLDERS

No. 1	2 for 2/-
No. 2	2 for 2/6

(both with plug)

Coil Stand 2-way for Basket Coils 4/11

Universal 2-way for Basket Coils 5/11

"BABY" COIL STANDS.

2-way on base	3/-
3-way on base (brass fittings)	4/9
2-way ex. handles	4/6
3-way do. (nickel fittings)	5/6
2-way Cam Vernier, high-class	5/9

Several high-grade patterns, 2-way ..... at 5/-, 5/6 3-way ..... at 6/11, 7/6

RIGHT OPPOSITE DALY'S GALLERY DOOR

K. RAYMOND

WIRELESS DEPOT

27, LISLE STREET, W.C.2

'PHONE: GERRARD 4637

No responsibility accepted on post orders unless cheques and postal orders are crossed and made payable to the firm. Moneys sent must be registered

HOURS OF BUSINESS:

DAILY - - 9 to 7.45

SUNDAYS - 10 to 1

HULLO EVERYBODY!!

THESE GOODS ARE SENT BY POST

FOREIGN PACKING & POST EXTRA

PARTS FOR 2-VALVE "UNIDYNE" RECEIVING SET

The 4-electrode valve Thorpe K4, each	17/6
6 Terminals for	10d.
2 Microstat Filament Resistances, each	2/9
1 Variable Grid Leak	2/6
1 Single-Pole Double-Throw Switch	1/3
1 .0005 Variable Condenser, with Vernier	7/3
1 Cam Vernier 2-way Coil Holder	9/-
Panel 5½ in. by 1½ in., drilled to hold two 5-pin Valve Holders for	2/-
2 5-Pin Valve Holders, each	1/6
1 Fixed Condenser, 0.01	1/2, 2/2, 3/-
1 Fixed Condenser, .0002	1/2, 2/2, 3/-
1 Shrouded L.F. Trans. 10-1	20/-
8 yds. No. 18 Gauge Tinned Copper Wire	1/2

Necessary Screws, Nuts, and Washers, Free if above lot purchased, and post free.

Try Our 10/11 Feather Phone 4000 ohms.

Newey Snap Terminals 2/6 Complete Set.

L.F. TRANSFORMERS

Eureka Concert Grand	30/-
No. 2 (Second Stage)	22/6
R.I. 5-1 Ratio	25/-
Igranic, 5-1 Ratio	21/-
The Ferranti, 4-1	17/6
The Silvertown, 5-1	21/-
The G.R.C. 5-1 Ratio	15/-
The G.C.R.10-1 Ratio	20/-
Marconi Ideal Power	35/-
Burndept L.F. 5-1 Ratio	25/-
Lissen T. 1 L.F.	30/-
T. 2 L.F.	25/-
T. 3 L.F.	16/6

West End Stockist Polar, Edison Bell, Ferranti, Silvertown, Dubilier, Lissen, Energo, Unidyne, Eureka, G.R.C., Sterling parts, etc.

LOUD SPEAKERS

BABY MODELS

Sterling, 4,000 ohms	£2 15/-
Sterling Dinkie	1 10/-
Brown's 2,000 ohms	2 8/-
Amplion Junior	1 1/6
Dragon Fly	25/-
Ultra	27/6

TOOLS

Set of Spanners	1/8
Taps, 0, 2, 4, 6 B.A. set	2/-
Small Soldering Irons	1/-
7-Twist (H.S.) Drills	1/11

SHIPTON

Strip rheostat 7 ohm, (with fuse)	3/-
30 ohm	3/-
60 "	3/-
Potentiometer 600 ohm	4/6

RAYMOND COILS

25	3/9	150	6/-
35	3/9	200	7/-
50	3/9	250	7/6
60	3/10	300	8/-
75	4/-	400	9/6
100	5/6		

Set of 4 for B.B.C. Wavelengths 15/-

FOR NEUTRODYNE CIRCUITS "Colvern" Ind. Vernier

The low maximum of any vernier is adversely affected by capacity effects, and any vernier which is employed to give fine tuning MUST NOT be in association with the main tuning condenser.

Price 2/6. Post 3d.

MYERS VALVES

Universal	12/6
D. E.	21/-

"RAYMOND" FIXED CONDENSERS

Ebonite Base, Terminal Fittings. Post Free.

·001, ·0001 to ·0005	1/2
·002 to ·004	1/3
·006	1/6
·01 and ·02	1/9
·05	3/3

DIAMOND WEAVE BASKET COILS (5) EXTRA AIR SPACE (DUPLEX WAXLESS)

Equal to Honeycomb. 25, 35, 75, 100. (wavelengths marked). **3/9**

Set of 5

"POLAR" MICROMETER CONDENSER 5/6

PARTS FOR 7-CIRCUIT CRYSTAL SET

·0003 Sq. Law Condenser. Panel, 10 x 8. Burndept Detector. Terminals, Clix. Cardboard Tube, 3 x 7. 16 d.c.c. and Square Tinned Radio Press Transfers. 22/6 the lot, post free.

PARTS FOR ST 100 (Less box and Ebonite). Absolutely Inclusive. £6 6 0 to £10.

CHELMSFORD 5XX

Post price

D.D.C. Coil	1/3
With Adapter	2/3
D.C.C. Extra Air Space	2/11

MANSBRIDGE TYPE CONDENSERS

Best quality obtainable. Accurate, permanent, noiseless, unaffected by atmosphere, beautifully cased, double insulators, two extra fixing lugs, made entirely of finest materials, pass all tests, guaranteed.

1 mfd.	3/6
2 mfd.	3/11

DUBILIER TYPE FIXED CONDENSERS

The cases are a moulded composition of extremely high insulation quality, and are non-hygroscopic; ·002 Ruby mica only is used for dielectric, and the conductive surfaces are cut from the best copper sheet.

·001 to ·0005 each	1/-
·002 to ·006, "	1/3

Post free.

N. & K.

(No. 3)

17/6 LATEST MODEL 17/6

New 3-pole Laminated Magnets, which ensure an even magnetic pull and still greater volume. Windings well insulated. Large size earpieces and Leather head-bands of standard "N. & K." comfortable design. Technically "N. & K." Headphones represent the last word in Wireless Reception.

IMPOSSIBLE TO EQUAL FOR CRYSTAL SETS.

FERRANTI L.F. Better than the Best 17/6

Boxes, all sizes stocked.

Tape Aerial, 100 feet	3/-
Sausage Aerial	2/6
Bus Bar 1/10 square, 15 feet	1/-
Ditto, 18 sq., 15 feet	10d.
16 d.c.c. Wire, per lb.	3/-
100 feet 7/22 and 6 Insulators	3/6

CALLERS!!

These 3 columns for YOU

NO POST ORDER from same

Lead-in tube: 6d., 7d., 8d.	
Valve Pins and Nuts 2 a 1d.	
Stop Pins and Nuts 2 a 1d.	
Nickel Terminals	2d.
Nickel Contact Studs 2 for	1½d.
Nickel Switch Arm (one-hole fixing)	1/-
Loading Coil and Plug	8d.
Gamages Permanite	1/-
Condenser Brushes	6d.
2-meg. Leaks	10d.
Cheap Fixed	6d.

RAYMOND FIXED CONDENSERS

·001, ·0001 to ·0005	10d.
·002, ·003, ·004	1/-
·006, 1/3; ·01, 1/9; ·02, 1/9	
D.C.C. Wire. per ¼ lb.—	
13 g.	9d.
20 g.	9d.
22 g.	10d.
24 g.	1/-
26 g.	1/1
28 g.	1/3
30 g.	1/6 etc., etc.

Terminals complete—

Brass Pillar	1d. 1½d.
W.O. or 'Phone	1d. 1½d.
Fancy Patterns	1d. 1½d.
Extra large	2d. 3d.
Valve Sockets 2 for	1½d.
Machine cut Screws Stocked (Best).	
Pulleys	4½d.
4 Taps and Wrench	2/11
Screwdrivers	6d.

LARGE NUMBER OF BARGAINS TO CALLERS ONLY

ACCUMULATORS

2 v. 40 amps.	9/6
4 v. 40 amps.	16/6
4 v. 60 amps.	18/6
4 v. 80 amps.	23/6
6 v. 60 amps.	27/6
6 v. 80 amps.	33/-
6 v. 105 amps.	38/6

Hart's Stocked. All High Quality.

Neutron Crystal	1/6
Uralium	1/-
Midite	6d.
Enclosed Detectors	9d.
Large, Brass, on base	1/3
Ditto, Nickel, on base	1/6
MicMet Type	2/8
Variometers (special)	1/6
Ditto, with clips. etc.	2/3
Ebonite, D.C.C. and Dial	3/9

Also at 3/11, 4/3, 4/6, up.

H.T. BATTERIES

66 v. N. & K.	7/11
60 v.	7/6
30 v.	4/6
60 B.B.C.	9/6
36 B.B.C	5/6
9 v. B.B.C	2/6
1·5 D.E.	1/9
Ditto	2/- to 3/-

"DE LUXE" SUPER LOUD SPEAKER

2,000 Ohms 24/-

A "REAL" BARGAIN

PHILLIPS' 0.4 TYPE VALVE 15/11

BUS-BA 6

1/16 sq. 15 fee d.

18 sq. 15 fee 5d.

MANSBRIDGE TYPE FIXED CONDENSERS

1 mfd.	3/6
2 mfd	3/11

Legless Valve Holder	1/-
Solid Rod Ditto	1/-
Under Panel Ditto	1/6
Valve Templates	2d., 4d.
Electron Aerial	1/3½
Adhesive Tape Roll	2½d.
Copper Foil per foot	2½d.
1 in. Fibre Strip 3 ft.	2d.
Insulated Hooks 4 for	3d.
Ditto Staples 5 a	1d.
Microstat	2/6
Switch Arms 8d. to	1/-
Flex (Red and Black) per yd.	3d.
Shellac	5d.
Loading Coil and Plug	8d.
Contact Studs 4 for	1½d.
Nickel ditto 2 for	1½d.
Nickel Switch arm	1/-
Sorbo ear caps pair	1/4
Tumbler Switches	1/4

D.P.D.T. SWITCHES

Min Panel	1/-
On China base	1/7½
On Ebonite Base	1/11 1/6

S.P.D.T. SWITCHES

Miniature Panel	10½d.
On China Base	1/1
On Ebonite	1/3 to 1/9
Murray Valve Holder	1/3
Spring Washer	4 a 1d.
Coil Plug on Base	10d.

"ORMOND" L.F. 13/11

A Wonderful Transformer

DUTCH 6 VALVES 12/6

16g D.D.C USUALLY IN STOCK

PHILLIPS 12/6

4 ELECTRODE VALVE FOR 'UNIDYNE"

FIRE STRIP (for Coils)

3 ft. long, 1 in. wide, 2d.

"METAL" (FRENCH) ·06 VALVES, 15/11

BREAST DRILLS 0 to ¼ chuck

Cut Bevel and Gear... 4/9

Twin Flex, 4 yards.	6d.
Twin Silk Small 6 yds.	6d.
D.C.C. Bell Wire 10 yds.	5d.
Knobs, 2 B.A. 2d., 3 d.,	4d.
Small Knobs 6 B.A.	3d.
Small Knobs 4 B.A.	3d.
Wander Plugs pair	3d.
Egg Insulators each	1d.
Tape Aerial 100 ft.	2/-
Valve Windows 4d. to	9d.
Mica	2d.
'Phone Cords 6 ft.	1/- & 1/3
Nugraving	
Empire Tape, 2 yds.	1d.
Allen Var. Grid Leak	1/3
Best Sleeving 3 yds.	10d.
Rubber Lead-in 10 yds.	1/-
Thick ditto, 1d., 2d., &	3d.
Aerial, 7/22 100 ft.	1/10½
Ditto, Extra Heavy 100 ft.	2/3
Anto Cap. Handles	8d.
Tumbler Switches	1/-
De Luxe Crystal Set	7/11
4 Whiskers, 1 Gold	2d.
Coil Plugs (ebonite)	4½d.
Ditto	6d. 8d.
Shaped	8½d., 1/-
5 ohm Rheostat	1/3
Various 1/3, 1/6, 1/9,	1/11
With Dial	1/11
Ormond	1/9
'Phone Connector	1d.
Nuts 2, 4, 6, B.A. doz.	2d.
Washers 12 a	1d.

BROWNIE "IMPROVED" WIRELESS SET 7/6

RAYMOND CRYSTAL SETS 7/11 9/11 12/11

NOTE! OUR WONDERFUL MICROMETER ADJUSTMENT GLASS-ENCLOSED DETECTOR. WHY PAY MORE? 1/11

BOXES

7 x 5	9 x 4	12 x 9
8 x 6	10 x 8	12 x 12

BUY RAYMOND GOODS

4 B.A. rod, per ft.		2½d.
4 B.A. Rod, per ft.		2d.
Basket Holders		8½d.
Also at 10d., 1/-, 1/3,		1/6
2-Way Coil Stands		1/11
3-way ditto		3/11
2-way with ex handles		2/11
3-way ditto		4/9
4·5 Batteries		4½d., 5d.
Brass Coil Former		2/11
5 Waxless Coils 200/2000		1/5
5 equal 25 to 100		1/11
5 ditto, Extra Air Space		2/8
6 waxed 200/3600		1/8
7 waxed 150/3600		1/11
Chelmsford D.C.C.	1/-, 1/3	2/6

With adapter 9d. extra.

Switch Arm, 12 Studs, 12 Nuts, 12 Washers, Lot 10½d.

EBONITE STOCK SIZES 3/16 in.

6 x 6	1/4
7 x 5	1/10
9 x 6	2/-
10 x 8	3/-
12 x 6	3/-
12 x 9	4/3
12 x 12	5/6
14 x 10	5/6

WE STOCK

Cut to size ¼-in.

¼d. sq. in. EBONITE.

K. RAYMOND

WIRELESS DEPOT

27, LISLE STREET, W.C.2

'PHONE: GERRARD 4637

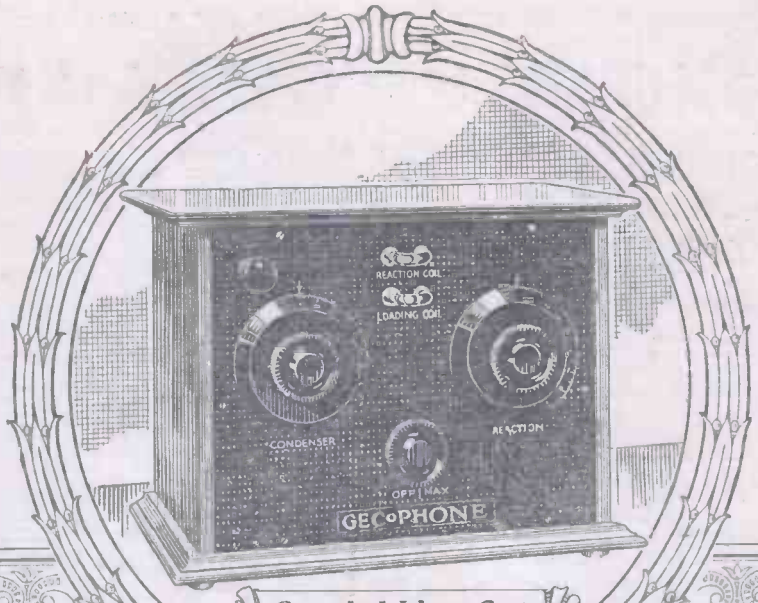
RIGHT OPPOSITE DALY'S GALLERY DOOR

HOURS OF BUSINESS:

DAILY - - 9 to 7.45

SUNDAYS - 10 to 1

No responsibility accepted on post orders unless cheques and postal orders are crossed and made payable to the firm. Moneys sent must be registered



Single Valve Set

For Service & Satisfaction

GECOPHONE

(REGISTERED TRADE MARK)

NEW MODELS

The model illustrated above is the GECOPHONE Single Valve Set which meets the demand for an efficient popular-priced instrument. It is supplied either with D.E.R. Valve for use with an accumulator or with D.E.3 Valve for use with dry battery. In the latter form it is particularly **useful to those living in the country or who do not wish to be bothered with the trouble** of accumulator charging. It covers the British Broadcasting wave-length band, whilst loading coils can be added for Chelmsford or higher wave-lengths. Its range for broadcasting is rated at 80-100 miles. Operation is simplicity itself. Connections are made simply by pushing plugs into sockets.

Cat. No. B.C. 3000, Set only with D.E.R. Valve	£6 18 0
Cat. No. B.C. 3001, Ditto, but with all necessary batteries, headphones, etc.	£10 0 0
Cat. No. B.C. 3050, Set only, with D.E.3 Valve	£7 12 0
Cat. No. B.C. 3070, Ditto, but with all necessary batteries, headphones, etc.	£10 5 0

Ask your dealer to demonstrate this model to you.

GECOPHONE Sets are sold by GECOPHONE SERVICE DEPOTS, Electrical Dealers, Stores, etc.

Ask for price list (No. B.C. 3425).

Advertisement of The General Electric Co., Ltd. (Manufacturers and Wholesale only), Magnet House, Kingsway, W.C. 2.

COMPONENTS YOU CAN RELY UPON

SMALL POWER VALVES.—II

OBVIOUSLY the effect of raising the voltage applied to the plate is to throw the whole curve bodily over towards the left. With 100 volts on the plate of a power amplifier we have a curve with a very long straight portion, a great part of which lies entirely to the left of the vertical line. It now becomes possible to adjust the working point of the valve so that the grid is very considerably negative. This is done by means of the grid-biasing battery, the wiring of which is shown in Fig. 3. As the current flowing from this

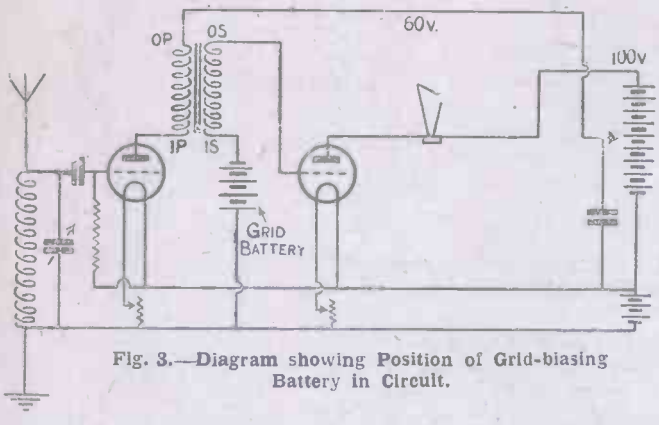


Fig. 3.—Diagram showing Position of Grid-biasing Battery in Circuit.

battery is of minute proportion very small cells will suffice. These should be placed in series between L.T. – and IS of the intervalve transformer, the negative end of the grid battery being connected to IS. Fig. 3 also shows how the extra anode potential required for power-amplifying valves is provided by means of a second high-tension plus lead.

Grid Amplification

Returning to Fig. 2 (page 822), let us suppose that we have adjusted the grid so that its potential is 6 volts negative; the normal working point will then be at X. An oscillation with the same crest and trough values as before—that is, with variations between 1 volt positive and 1 volt negative—will carry the working point up to A with the upper half of each wave and down to B with the lower half. Even at A the grid is still 5 volts negative and no grid current will flow. Neither A nor B are upon the bent portion of the curve. Hence there will be no distortion either through grid current or through bends in the grid-volts anode-current curve. Thus the plate will deliver oscillations of precisely the same form as those which reach the grid of the valve, the only difference being that they are very much amplified.

From what has been said it will be seen that the whole secret of obtaining successful reception with a power valve lies in using a very high plate potential, and in adjusting the grid so that it is considerably negative; it must be so much negative that the tops of oscillations of large amplitude cannot set up any flow of grid current. Grid bias has also another very beneficial effect: it cuts down the amount of steady current passed by the valve and therefore lengthens the life of the high-tension battery.

Properly adjusted, the small power valve will give a tremendous volume of sound whilst drawing only 4 or 5 milliamperes from the high-tension supply. On my own five-valve set, fitted with two DEQ's as high-frequency amplifiers, a DEV as rectifier and two small power valves for note-magnification purposes, the total plate current is only about 10 milliamperes, which should be well within the capacity of any high-tension battery of respectable size.

Plate Voltages

One of the problems with which the designer of power amplifiers found himself faced was that a vast majority of wireless enthusiasts use high-resistance telephones or loud-speakers. This meant that such people could not use a valve working with a plate potential of 300 or 400 volts, which would be far more than the delicate windings of the magnets could stand. It was essential, therefore, to produce a valve which should have all the desirable characteristics when working with a plate voltage of 100 or less. This has been most successfully carried out in a great number of cases, and it is now possible to obtain power valves which can be used perfectly well with high-resistance instruments.

To be on the safe side when working with voltages up to 100 it is perhaps as well to use a 1 to 1 transformer in the way shown in Fig. 4. When this is done the steady current from the battery does not pass through the windings of the loud-speaker, only the modulation at audio-frequency reaching them. Transformers of this kind are quite easily made or they can be purchased very cheaply.

The Mullard Valves

There are both bright- and dull-emitter power valves, and their prices range from about £1 5s. to £2 15s. A good example of the bright-emitter power valve is the Mullard PA3, which has been designed in such a way that it can be substituted for existing general-purpose valves in the note-magnifying part of the set. The PA3 has a filament consumption of .67 ampere at a potential of 4 volts. The anode voltage may be from 70 to 150, excellent results being obtained with 100 volts and a suitable grid bias. It will be seen that this valve makes very little more drain upon the low-tension battery than does an ordinary general-purpose valve, the filament wattage being 2.68, as against 2.28 for the Ora valve. It will be found to give a larger volume of sound than a general-purpose valve, with complete freedom from distortion. It is intended to deal with a moderate volume of sound, and will be found quite suitable for working drawing-room loud-speakers.

If greater strength is required there is a larger bright-emitter available in the PA2, which will pass a much greater amount of current. This valve consumes .85 ampere at 5.5 volts on the filament, and the anode voltage should be from 100 to 200 volts. A transformer should certainly be used with a PA2.

A still more powerful valve is the PA1, which is suitable for filling a large hall with sound or even for open-air work. The filament of this valve requires 1.5 amperes at 6 volts and the plate voltage

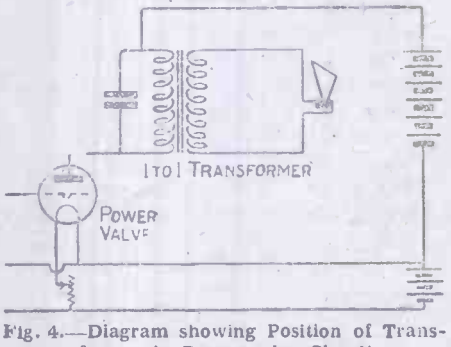


Fig. 4.—Diagram showing Position of Transformer in Power-valve Circuit.

should be a high one, about 200 to 400 volts being required for the best results. A transformer is, of course, essential with a power valve of this type. J. H. R.

(To be continued)

There is a probability that the wave-length of Vienna (Radio-Wien) may shortly be altered, as Austrian and South German listeners complain that it is difficult to tune out Berlin. It is suggested that Vienna's wavelength should be reduced to 300-320 metres.

LISTENING TO THE TRANSATLANTIC TESTS

IT is, of course, too early to be able to say definitely what results have been gained either in this country or others during the Transatlantic tests. But the time is sufficiently advanced for us to form some conclusions regarding the general principles which have governed the tests and the results which have been achieved so far. General atmospheric conditions have not been good, the organisation might, perhaps, have been bettered, and the results have not fulfilled expectations.

2 L O has "got over" and a few Continental stations have been heard more or less faintly in the United States. K D K A has been re-broadcast by the experts at London with more success than has attended any previous effort, and an amateur has done two-way work with Australia. But there the tale of achievements ends.

Bad Reception

It is undoubtedly true that up to the moment of writing, this reception of American stations has been not one degree better during the tests than at any time during the past month or so. In my own personal opinion it has been a good deal worse.

So much for a general review of the situation. Now let me discuss something on which I can speak with more certainty —my own experiences of these tests up to date.

Everybody knows, I think, that recently, after a prolonged spell during which reception was almost perfect, K D K A became almost impossible to get. This unpleasant state of affairs lasted about a fortnight, but for a considerable time prior to the commencement of these tests conditions were almost normal again. The three standard American broadcasting stations, K D K A, W G Y and W B Z, had been coming in sufficiently well to be audible when switched through to a loudspeaker.

Stations Received

Yet the beginning of the tests coincided with a notable decrease in strength again. The three stations named have been coming in as usual, but only just loud enough to identify. Other stations have come in as well, but it has been impossible to ascertain what and where they were. I have received between 3 a.m. and 4 a.m. K D K A, W B Z, W G Y, W F Y and W H A Z at fair strength, along with some dozen other American stations which I have not been able to log. But with the sole exception of K D K A not one of these has been good enough to relay over a telephone line.

Static has undoubtedly been worse than usual, as also has fading. The best reception during the whole of the test period occurred between 3 p.m. and 4 p.m. on November 26, when I tuned-in a station, operating on the wavelength of K D K A,

The writer of this article, Mr. E. C. Davies, has a great reputation for Transatlantic work. His account, therefore, of conditions during the International Radio Week will be of special interest.

which I was able to pass over the line sufficiently well to be fairly clear at the other end. Whether this station *was* K D K A I am not prepared to guarantee.

Possibly K D K A

There was, however, no doubt that the station was working at a great distance, and in consideration of the position on the dials and the general characteristics of the transmission I have little doubt that it was K D K A.

One noteworthy thing about this experience is the fact that static was heavy, an unusual occurrence at that time of the day. But undoubtedly the greatest force operating to the detriment of decent reception during these tests has been the terrible overloading of the ether. The atmosphere has been filled with morse, static and "mush."

The effect is as though every wireless station in the world had been crammed into the narrow limits of the broadcast band and all were working at double their normal power. The few stations which come through are heterodyned out of existence by the "backwash" of those which do not.

Increased Power

Listeners to the Continental stations last Wednesday week must have realised that additional power does not always mean an increase in reception quality. Between 4 a.m. and 5 a.m. it was almost an impossibility to keep the phones on one's head while searching anywhere between 300 and 500 metres, and yet there is no possible doubt that not one of those stations working on greatly increased power but can be received with much more ease under normal conditions. So bad was the general distortion that a violin solo sounded more like a trombone.

It would seem that a better plan would be to detail a certain station to represent each country and dedicate to that station the work of crossing the Atlantic, all other stations keeping silent during the attempt. I think that were this plan adopted no difficulty would be found in spanning the two or three thousand miles which separate the Continent of Europe from that of America, even without greatly increasing the power of the stations operating.

I have on more than one occasion received direct from Los Angeles under quite normal conditions, and have gained the impression that only the trouble experienced through static prevents us at the present time from obtaining perfectly good stuff from any decent station within a radius of some three or four thousand miles. K D K A, for instance, may be received with regularity on a fairly sensitive set as early as 7.45 p.m. almost any evening. A slight increase in the sharpness of the tuning of this transmission would in all probability render it clearly audible to most English enthusiasts at this hour.

In conclusion it may perhaps be permissible to mention that the three greatest and most important lines upon which experiments are needed are: The elimination or filtration of static interference; reception of American telephony during the hours of daylight; and distant reception in general.

Reception Problems

If every amateur would only concentrate upon either of the two first mentioned it would be but a very short time before two-way work was being done between the United States and England with perfect regularity and purity. The number of wireless enthusiasts, professional and amateur, who are concentrating their attention upon problems concerning reception is only too small.

E. C. D.

DO TRANSFORMERS BURN OUT?

SOME people think that low-frequency transformers never really burn out at all, but that their sudden failure is due to quite different causes. When a transformer is under load its windings are likely to vibrate, especially if their fundamental frequency is anything near that of the signals being received.

In some power amplifiers, for example, the transformer usually placed in the plate circuit of the last valve buzzes quite loudly.

This vibration seems to have two effects. It either causes an actual mechanical fracture of the wire or else produces crystallisation. In the latter case the wire becomes brittle and is liable to break at any minute.

To make the windings more elastic some manufacturers wind their transformers with silk threads between the turns of wire.

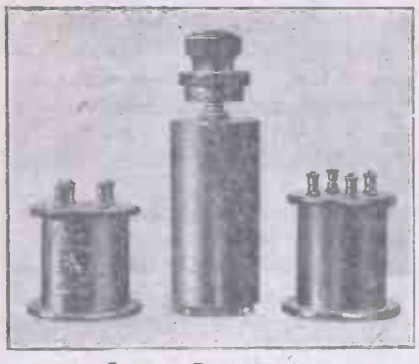
R.

AROUND THE SHOWROOMS

Success Components

WELL-FINISHED apparatus always looks as if it ought to be efficient and in practice it usually is. This applies particularly to the range of Success components made by Beard and Fitch, Ltd., of 34-36, Aylesbury Street, E.C.1.

In the photograph are shown two low-frequency transformers and a reactance-capacity coupling unit. The transformers are enclosed in neat lacquered brass cases,



Success Components.

with ebonite tops and bottoms. I have found that the standard ratio model (which sells at 16s.) gives excellent results.

For the Constructor

ANY constructional work is facilitated, and therefore made more pleasurable, by the use of the right tools for the job. Therefore two Aermonic devices should find a place on every amateur's bench. The first is a valve-socket marker that takes the form of a metal disc with four raised points, attached to a wooden handle; its utility needs no emphasis.

The second tool is a special pair of pliers for making sharp right-angle bends in wire when connecting up a set. Having decided where you want the wire to bend, place the pliers there, grip tight, and a neat bend is the result. Both these devices are made by A. F. Bulgin and Co., of 9-10, Cursitor Street, Chancery Lane, E.C.4.

Uralium Crystal

IT will always be a debatable point, I suppose, whether natural or synthetic crystals make the most efficient rectifiers. I have had crystals of both kinds that are equally good to use.

An excellent example of a good natural crystal is Uralium. I have tested this and found it to give remarkably good signals. It is supplied in a neat box with a silver catwhisker for 1s. 6d. by Bower Electric, Ltd., of 15, Grape Street, Shaftesbury Avenue, W.C.

Quality Components

A GREAT disadvantage of many plug-in coil holders is that they take up a considerable amount of space when mounted on a panel. For this reason the Goswell Engineering Co., Ltd., of 12A, Pentonville Road, N.1, have produced a neat and cheap panel-mounting holder.

Connections are made to the fixing nuts and bolts at the back of the panel, thus doing away with flexible leads.

Belling-lee Set

NOW that wireless apparatus generally is so much cheaper than it was a year ago it seems that a crystal set would in many

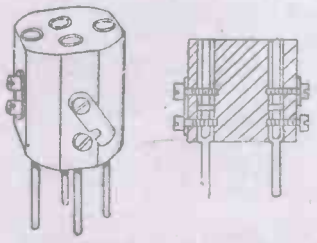
Belling-lee Set.

cases make an ideal Christmas present. A neat Belling-lee set, that gives excellent results, I find, is shown by the photograph. This has a special glass-covered detector, a socket for a loading coil and terminals for using several phones. The makers are Belling and Lee, Ltd., of Ponders End, Middlesex. VANGUARD.

PROGRESS AND INVENTION

Valve Holder

ONCE a set has been constructed and housed in a cabinet it is usually a matter of difficulty to alter the circuit to any considerable extent, but a special type



Valve Holder (223,337/24).

of adaptor described in Patent No. 223,337/24 (W. E. H. Humphrys, of Hendon) overcomes this trouble.

As can be seen by the diagrams, the adaptor is similar to an ordinary valve holder except that the sockets are broken into two, each half being provided with a terminal.

By plugging one of these adaptors in position it is possible to make almost any desired alteration to the circuit. For instance, an extra inductance can be placed in an anode circuit or grid bias applied to an amplfier.

Valve Electrodes

THAT the valve manufacturer must also be an expert metallurgist is proved by Patent No. 223,306/24 (H. J. Osborn, of Salford, and W. L. Turner, of Purley Caldy).

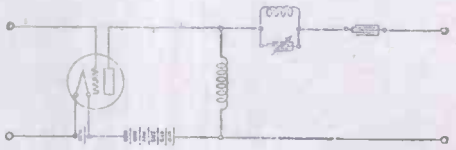
In the specification it is stated that nickel, tantalum, tungsten and molybdenum, while used for making valve electrodes, occlude relatively large quantities of gas which, unless carefully removed during the manufacture of the valve, make the valve soften.

A special chrome-iron alloy is found to occlude less gas than most metals.

Amplifier Coupling

INCREASED selectivity is the object of a new method of high-frequency coupling that is similar to the tuned-anode system.

A tuned circuit comprising a condenser in parallel with a coil is placed in the anode circuit in series with a fixed condenser. Thus the parallel coil and condenser, with the fixed condenser in series



Amplifier Coupling (222,331/24).

form an acceptor circuit, while the parallel circuit forms a rejector.

The arrangement is more fully described in Patent No. 222,331/24 (Western Electric Co., Ltd., of London, and G. H. Nash, of Sidcup).

THE COMPACT CRYSTAL SET

SOME INQUIRIES ANSWERED

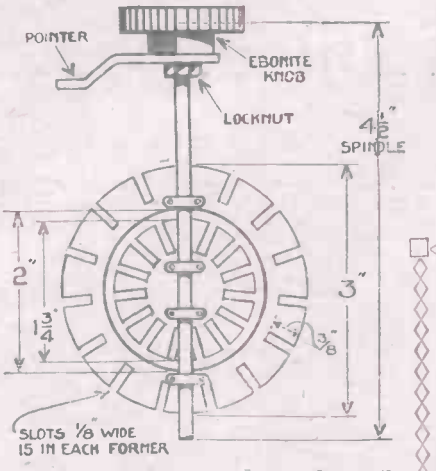


Fig. 1.—Variometer Former and Spindle.

IN No. 120, on page 343, there appeared an article entitled "A Compact Crystal Set that Gives Results." Several inquiries have been received asking for further particulars of this receiver. The layout of the panel can easily be seen in the photograph published with the original article.

The basket-coil variometers can be made in the following manner: Cut the formers (as shown in the diagram Fig. 1) out of stout cardboard (two of each kind will be required) and give each a thick coat of shellac varnish. When thoroughly dry wind No. 34 enamelled wire on one of the inner formers. After forty-eight turns have been wound on, cut the wire, leaving a length of about 6 in. for connection. Make a small hole in the edge of the former (see Fig. 2) and pass the loose end through once or twice in order to make it secure.

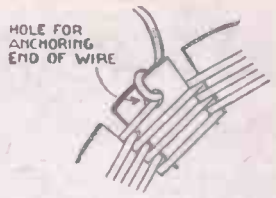


Fig. 2.—Method of Winding.

Next wind the outer former. When twenty-four turns have been wound on, cut the wire and secure it in the same manner as before.

Now proceed to wind the two remaining basket coils, winding fifty-eight turns on the inner and thirty turns on the outer former.

The two inner coils are to be permanently fastened to each other, and the outer coil of the secondary is hinged in order to vary the coupling (see Fig. 1, page 343).

The outside end of the winding of one of the inner coils is connected to the inside end of the fixed outer coil. This forms the primary variometer. The outside of the remaining inner coil is connected to the inside of the hinged outer coil. This completes the secondary variometer. For the remaining connections see Fig. 4 on page 343.

If these instructions are carefully followed no difficulty should be experienced in making the set, which, when completed, will well repay the time spent in its construction. When properly adjusted it will give excellent results. G. O. R.

USING THE FLEWELLING RECEIVER

A Short Article upon the Operation of the Set Described in the last issue

WHEN attempting to adjust the set to secure super-regeneration results the coils must be closely coupled—that is, almost tight up—and the anode voltage fixed at about 30 volts. After adjustments and whilst receiving signals the anode voltage may be increased up to 60 or 100 volts, but remember that one valve is doing all the work.

As a Portable Receiver

If it is intended to use the set as a portable receiver the leads from the batteries should always be kept as nearly as possible the same length, otherwise readjustments may be necessary if the length of wire becomes excessive. It may also be found that after adjusting the set in the house and on a wooden floor or table and then placing it outdoors on damp earth that the sensitivity is affected so far as super-regeneration is concerned, thus entailing further adjustment.

It should be noted that the circuit Fig. 1 (p. 840) is not suitable for the frame aerial and is perhaps the most easily managed and reliable of the two circuits.

Using the Frame-aerial Circuit

The same general remarks as to operations apply to this circuit and aerial as to the former arrangement, except that tuning is possibly more critical and the frame aerial has to be oriented in the direction of the station from which it is desired to receive signals. Clear strong signals are received when using the set as a plain regenerator and great sensitivity is displayed by the super-regenerative arrangement.

In this case, however, it appears unnecessary to vary the size of the reaction coil; for either purpose Nos. 75 and 100 honeycomb or Nos. 3 and 4 Burndept coils were found suitable for the arrangement. It will not function with an ordinary single wire as did the circuit shown first. Taken all round, the set is an ideal one-valver.

The Functions of the Condensers

It will be noted from Fig. 2 (p. 840) that three fixed condensers of a value of .006 microfarad are specified and two variable resistances. The receiver depends for its regenerative action upon the action of these resistances and condensers in blocking and freeing the valve. The desired signals are received on the grid of the valve, by which they are rectified in the usual manner, and in the meantime the reaction coil and the aerial acts on the feed-back principle—the signals again and again being fed to the grid and built up to maximum intensity.

Another function is performed, however, whereby the received and built-up impulses of high- and low-frequency are fed back to the grid of the valve via the resistance and .006 condenser C3 and R2 and the grid leak and condenser C4 and R1. This action and the regenerative action causes an audible howl or whistle in the telephones, which may be verified by the fact that variation of the grid leak R1 varies the pitch until it becomes almost inaudible.

The Cause of the Howl

The howl is caused by the blocking and freeing of the grid of the valve, which in a properly adjusted set can be varied from a series of clicks or thumps easily countable to the high-pitched whistle referred to, which is explained by the fact that the accumulated charge is being freed from the grid at a very high rate. In practice it will be found that the resistance R2 may be set at a value of about 2 megohms and left so whilst adjustments are made on the resistance R1.

It will be seen that whilst the grid of the valve is being blocked and freed at a very high rate, the .006 condenser is being also charged and discharged, the discharge being into the grid circuit; this gives regeneration with the added discharge of the .006 condenser. A. T. C.

EXPERIMENTS WITH DOUBLE-GRID VALVES

VALVES with two or more grids have for some years been more in favour among amateurs on the Continent, particularly in France and Germany, than in this country. Recently they have been used here to some extent in certain circuits in which the main object has been to dispense with the plate battery. Whatever may be the merits of abolishing high-tension, it is certain that the four-electrode valve is not being employed to the best possible advantage in such arrangements.

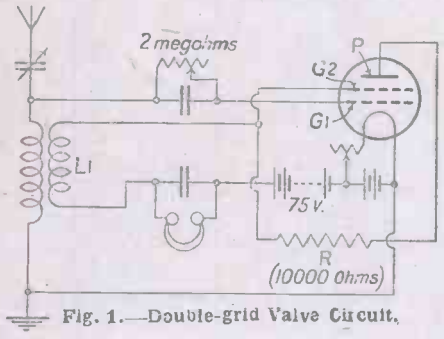


Fig. 1.—Double-grid Valve Circuit.

Fig. 1, for example, shows a receiving circuit comprising only one four-electrode valve by means of which a well-known French amateur has succeeded in reproducing 2 L O on a loud-speaker at Strasburg and in hearing American broadcast with good audibility on the headphones. This is an achievement which demonstrates the interesting possibilities of long-range work with such valves, provided the standard H.T. battery is retained.

It will be noticed that the plate P and second grid G2 are joined through a resistance R of 10,000 ohms and that both are connected to the positive pole of a high-tension battery of 75 volts in series with a coil L1 back-coupled to the aerial tuning coil L. The latter is connected across the filament and first grid G1 through a grid condenser and variable leak. The grid condenser has a somewhat higher value than usual, namely, .05 microfarad, and is shunted by a variable resistance of at least .2 megohms.

Fig. 2 shows another four-electrode circuit, due to Capt. Round, in which the second grid G2 is connected to the positive high-tension, the plate lead being brought round to a potentiometer across the filament battery. In this arrangement the grid G2 acts in much the same way as the plate of an ordinary valve so far as the attraction of the electron stream is concerned, the space between G2 and P being used to produce a rectifying effect.

The merit of this particular arrangement is that it combines the work of two valves in one, namely, an H.F. amplifier plus a detector. The input signals from the aerial A are applied directly across the first grid G1 and the filament. Owing to the high voltage existing on the grid G2 it attracts the electrons just as does the plate of an ordinary valve, so that an amplified current is set up in the coil L in the second grid circuit.

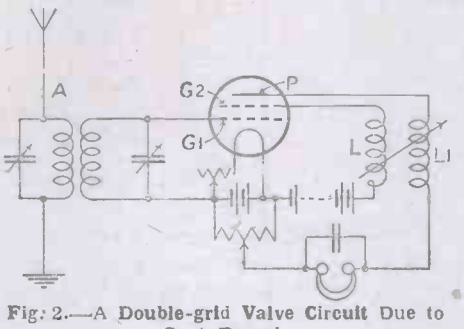


Fig. 2.—A Double-grid Valve Circuit Due to Capt. Round.

The initial or adjusted potential of the plate P is the same as that of the filament—that is, it is negative with respect to G2, so that any electrons that shoot past the open spaces of that grid are pushed back from the plate and do not flow through the outer circuit P L1.

It will be noticed, however, that the coil L is closely coupled to the coil L1 in the plate circuit. Accordingly, the amplified high-frequency currents flowing in the coil L will transfer corresponding voltages to the coil L1, and these will have the effect of throwing the plate P alternatively positive and negative with respect to the filament.

The negative pulses simply decrease the existing potential of the plate and have no other effect. The positive pulses, on the other hand, cause the plate P to attract (instead of repel) some of the crowd of electrons that are drawn up to and through the spaces of the grid G2. This accordingly gives rise to a current in the outer circuit P L1 corresponding to each positive half-cycle of the high-frequency oscillations in the coil L. The value of this current fluctuates according to the average amplitude of the positive half-cycles.

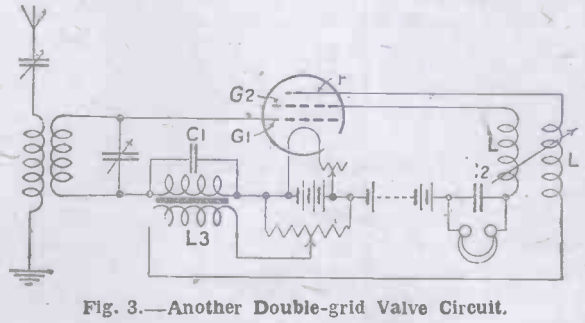


Fig. 3.—Another Double-grid Valve Circuit.

In other words, a process of rectification takes place between the grid G2 and the plate P, and the resultant current is detected by the phones in the ordinary way. The applied signals have, however, undergone a double process of amplification (1) by the ordinary valve action between the high-potential grid G2 and the filament, and (2) by the step-up effect between the high-frequency transformer coils L L1. In addition they have been rectified in the manner just described.

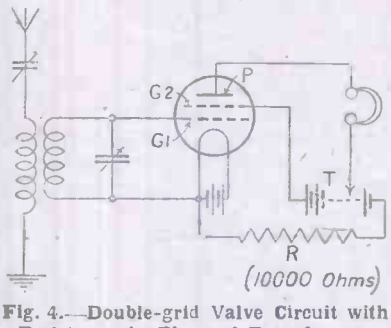


Fig. 4.—Double-grid Valve Circuit with Resistance in Place of Transformer.

Fig. 3 shows a further development of a double-grid valve circuit. In this instance a single valve is used to amplify on the high-frequency side, then to rectify, and finally to re-amplify the resultant low-frequency currents.

As before the input currents applied to the first grid G1 are amplified in the second grid circuit G2 L, and are then transformed into corresponding voltages across the H.F. transformer L L1. The negative pulses are eliminated and the positive pulses are rectified into a low-frequency current flowing in the external plate circuit.

Instead, however, of inserting the telephones in this circuit they are replaced by the primary of a low-frequency transformer L3, the secondary of which is inserted in the circuit of the first grid or input G1. The rectified currents are therefore re-applied as low-frequency voltages and are again amplified across the grid and filament, just as in G2 the well-known reflex circuits used with ordinary valves.

A condenser C1 shunts the secondary of the low-frequency transformer in order to short-circuit this coil for radio-frequency currents; otherwise these would be choked back and would exercise no effect in the first instance. A second condenser C2 provides a similar short circuit for the ampli-

(Concluded on page 890)

A "DOUBLE-DUAL" OR DUPLEX-RE

A novel receiver which incorporates two valves (each acting as a high- and low-frequ a crystal detector and an extra note-magnifying valve. In addition, a system of s several novel circuit combinations to be used.

THE set about to be described was developed in the first instance from an attempt to work two high-frequency amplifiers followed by a valve detector, using two high-frequency transformers as couplings between the valves, with no damping or reverse reaction of any kind to check self-oscillation and using thick-wire inductances and fairly loose coupling throughout. This was the writer's first attempt at using two H.F. valves, and consequently a great deal of useful information was picked up in a very short time.

The First Arrangement

The most important point that was learnt was that the first valve showed no tendency to oscillate, owing to the damping introduced by the aerial; the second valve, however, having only a thick wire coil in its grid circuit and another in its plate circuit, oscillated on the very slightest provocation, for the detector that followed provided almost no damping. To supply a little wholesome damping to this second valve, a crystal detector was substituted, when the set performed excellently, the second H.F. valve becoming at once perfectly stable; moreover, the comparatively flat tuning of the crystal circuit made it quite easy to find the desired station on the remaining two condensers. This set then, with two high-frequency amplifiers and a crystal, as shown in the diagram of Fig. 1, was used as the basis for the more elaborate set which finally superseded it.

The high-frequency transformers are of the greatest importance, and, as they are retained unchanged in the double-dual set, are worthy of a little consideration. They consist essentially of two basket coils mounted in a two-coil holder, the primary being untuned and the secondary tuned. By this means it is possible to control oscillation with much more ease than when the usual reaction coil is used, owing to the inevitable coupling due to the capacity between the grid and the plate of each valve.

When the two coils are widely separated, the untuned primary has no more inclination to cause the valve before it to oscillate than an ordinary untuned reaction coil, but when the secondary is brought close to it and is tuned to the same wavelength as the grid circuit of the valve the valve will oscillate freely. The effect is exactly comparable with that commonly observed when a close-coupled fine-wire transformer of the conventional plug-in type is used; the two coils act practically as though they were one, and tuning the one appears to have the effect of tuning the other also, so that the valve behaves as though it had a coil in the plate circuit tuned to the same wavelength as the grid circuit—which means that oscillation will take place.

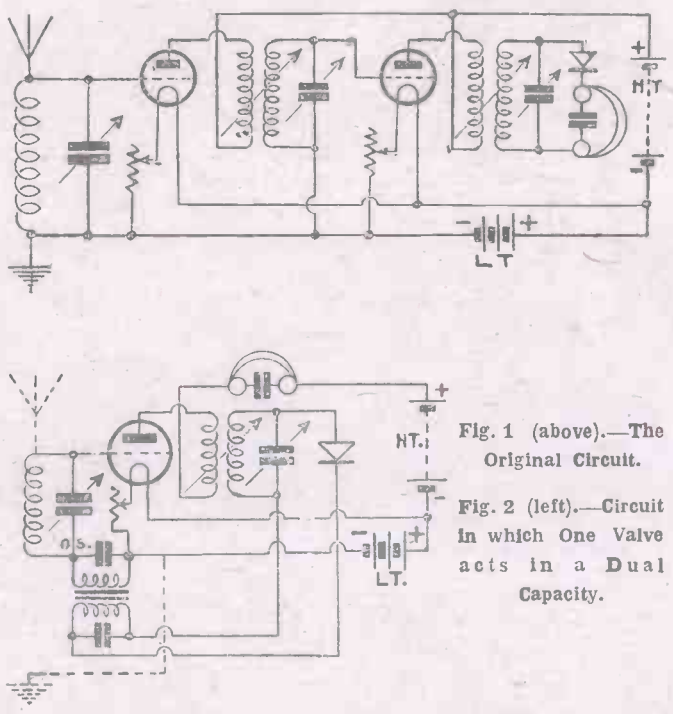


Fig. 1 (above).—The Original Circuit.

Fig. 2 (left).—Circuit in which One Valve acts in a Dual Capacity.

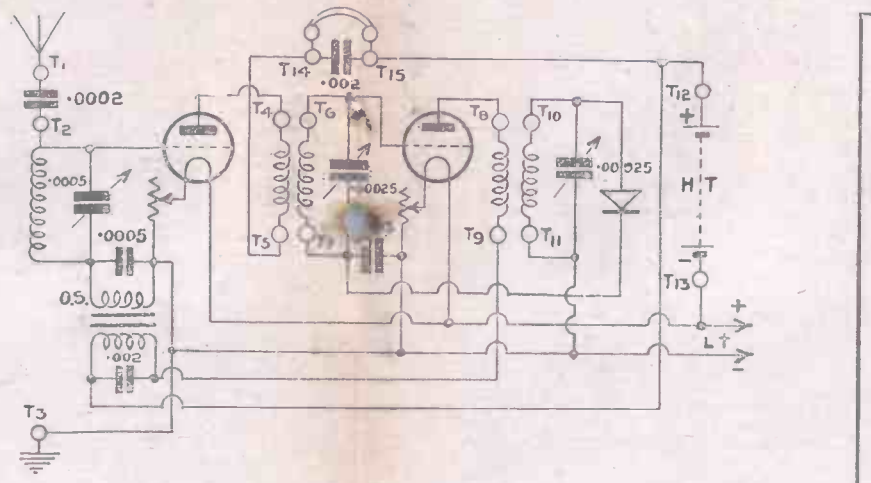


Fig. 4.—The Second Stage with Two Valves.

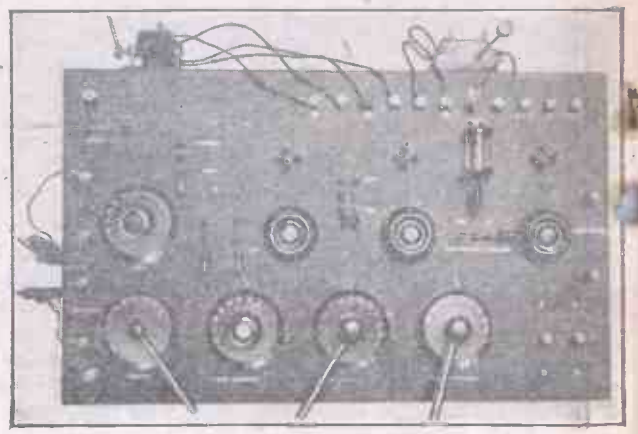
It will be seen, then, that this type of transformer allows of the introduction of any desired degree of reaction up to the maximum natural to the set, while there is no need whatever to resort to any wasteful methods of damping, either by potentiometer or by using fine-wire inductances, to control the natural tendency of the second valve towards oscillation. Thus a high degree of amplification per valve is obtained, together with the utmost power of control possible. The more important transformer of the two is thus seen to be that between the second valve and the crystal. In the circuit of Fig. 1 a tuned anode might be substituted for the first transformer without loss of efficiency or stability, but this would inevitably produce buzzing in the dual circuit to be described.

"Dualling" a Valve

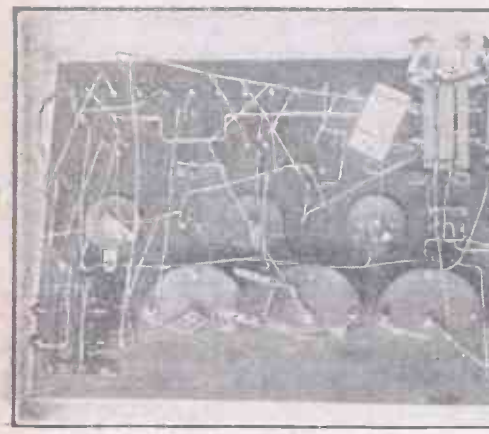
Reverting to the history of the set, it was next decided to "dual" one of the valves, passing back the rectified impulses in the crystal circuit to the second valve for further amplification. Now there are two common methods of doing this, which are typified in Figs. 2 and 3 (in which aerial and earth are added in dotted lines to complete the one-valve set). It will be seen that the only difference between them lies in the fact that in Fig. 2 a low-frequency transformer is used, while in Fig. 3 the rectified impulses are fed directly from the crystal to the grid of the valve—in both cases via the tuning inductance of course.

Use of a Transformer

There are marked differences in be-



Arrangement of Components on Panel.



Back of Panel showing Wiring.

FLEX SET

ency amplifier),
witching allows

haviour between these two circuits, and these differences are worthy of note. The circuit of Fig. 2 is admirable for short-range work, but fails to make the most of distant signals for two reasons: Firstly, it is very difficult to use reaction really effectively, as a deafening buzz at low-frequency generally marks the beginning of incipient oscillation; secondly, *faint* signals are *not* stepped up by the transformer, but are lost altogether. This, of course, is not a new discovery; it is known, though not so widely as it should be, that a note-magnifier should be coupled *without* a transformer to a crystal set if the signals to be amplified are very weak, and that only if they are strong does the transformer add appreciably to their power.

In view of these two shortcomings of circuits of the type shown by Fig. 2, that shown in Fig. 3 was adopted for the second valve in spite of the fact that the power on short range is considerably less than that of the circuit of Fig. 2. Here, and indeed all through the design, attempt has been made to get the highest possible efficiency on the high-frequency side, combining this with as much efficiency on the low-frequency side as could conveniently be obtained. Fig. 3, then, shorn of its dotted aerial and earth, represents the circuit of the second valve of the set at this stage of its development, while the first valve remained as shown in Fig. 1.

This alteration to the set, of course, resulted in a gratifying increase in volume; signals from all British stations could now be received at fair telephone strength on a tiny indoor aerial with a gas-pipe as earth. But still the writer felt that the first valve might be made to do a little more work, and so this also was called upon to perform a stage of note magnification.

The question arose at once as to whether the first H.F. valve should be the second note magnifier, which would involve only trifling changes in the wiring, or whether the currents should be fed from the crystal to the first valve and then on to the second. The points for and against each of the two arrangements were carefully considered; both have their advantages, both their difficulties. In a "straight double-dual," in which both high- and low-frequency currents pass through the valves in the same order, the last valve has very heavy work to do, in that it has to carry both the biggest H.F. and the biggest L.F. currents, and this may lead to distortion. Also any "earth-hum" due to electric light or other causes is magnified in such a set by *two* valves, while in an "inverse-dual" by one only.

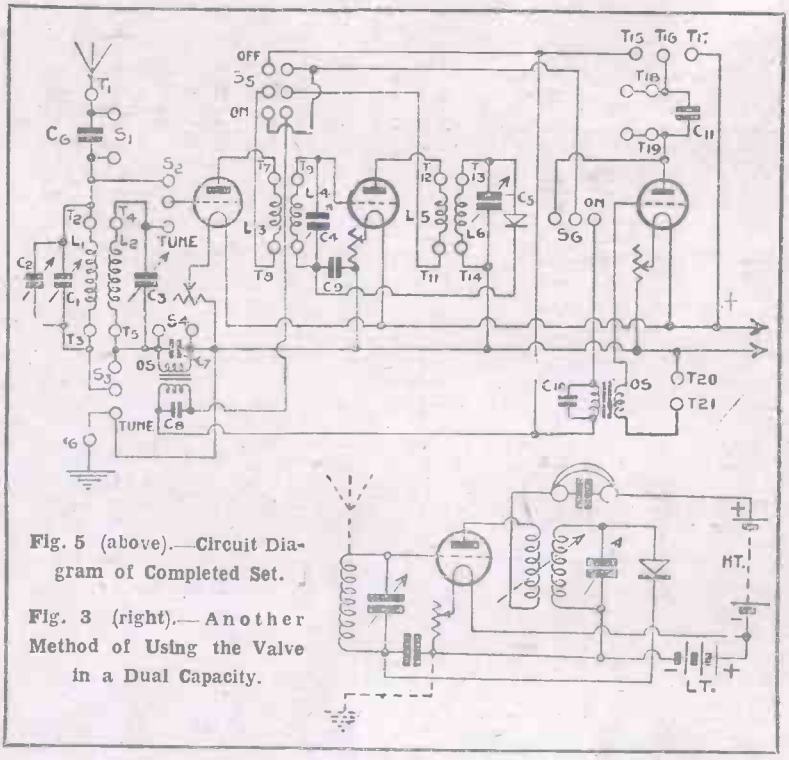


Fig. 5 (above).—**Circuit Diagram of Completed Set.**

Fig. 3 (right).—**Another Method of Using the Valve in a Dual Capacity.**

The Inverse-dual

The only drawback to an inverse-dual (where the second H.F. valve is the *first* L.F. valve and signals are more evenly

divided between the valves) is that if any L.F. impulse at all can stray by way of the H.F. coupling from the first valve to the second, it is magnified and handed back to the first valve by the normal working of the circuit, and so a chain of low-frequency reaction is set up, resulting in an uncontrollable L.F. howl. It was, however, considered that the type of H.F. coupling employed, the two coils being but loosely coupled, would pass no L.F. impulses at all, and so the inverse type of dual circuit was chosen.

There being now no need to consider weak signals, a transformer was naturally used to convey the currents from the plate circuit of the second valve to the grid of the first, and so its secondary was connected in the grid circuit as indicated in Fig. 2, so that the accumulator was earthed. The telephones were shifted to the plate circuit of the first valve, the primary of the transformer taking their place.

The circuit was then as shown in Fig. 4, and proved both amply powerful for telephones and capable of receiving over long distances with the most inadequate aerials. Indeed, an American broadcasting station (W G Y, Schenectady, New York) was heard on four successive nights in April using this circuit on the tiny indoor aerial already mentioned (just bell wire across a very small upstairs room). The set at this stage was perfectly satisfactory for reception on telephones, but would not work a loud-speaker except at quite short ranges; moreover, it was an untidy "hook-up" and not at all suitable for use outside a wireless shop. Finally the decision was made to rebuild it, using a large panel, incorporating a third valve as simple note magnifier and adding an aerial secondary circuit to help to get rid of morse and other interruptions that trouble the listener-in when receiving over long ranges.

The photographs show the result; it is fairly tidy and extremely effective. Practically every station in Europe can be heard on the loud-speaker, using an extremely poor outside aerial; the "Ello" of the Frenchman and the "Achtung" of the German are common sounds in the house, while occasionally we go still farther afield and indulge in torrents of rapid Spanish from Radio Iberica.

The Three-valve Circuit

Fig. 5 shows the circuit diagram of the completed three-valve set, including all the switching arrangements, and corresponds exactly to the wiring shown in the photograph. It looks much more complicated than it really is on account of the six switches that have been introduced for various purposes. The first of these, marked in the figure S1, merely short-circuits the small fixed condenser C6, which has a capacity of .0002 microfarad. This condenser is very useful on occasion, for the arrangement shown, in which the tuning condenser is always in parallel with the tuning coil (while a small series condenser can be added as required) takes the place of the more usual arrangement embodying a series-parallel switch.

When the aerial used has a high capacity, either through being unusually large or from being unduly close to earthed objects, this small condenser enables a reasonable size of coil to be used in the aerial circuit, and permits of tuning down to lower wavelengths than would otherwise be possible. Also its use increases selectivity very considerably, and by minimising the damping effect of a heavy aerial allows of a greater degree of reaction in the first valve. All this is on short waves; for long waves the condenser offers rather a large resistance to the incoming impulses and should be cut out by means of the switch. A. L. M. S.

(To be continued)

WIRE FOR INDUCTANCES

MANY experimenters are at a loss to know what gauge of wire to use for their inductances. Possibly they use No. 20 and are surprised to find that a friend seems to get equally good results with No. 26 (probably due to some minor advantage in the aerial). The table given on this page will be helpful to those who are seeking efficiency and economy.

The figures are all calculated for a hypothetical tuning coil wound on a 2-in. tube, without shellac or wax, to tune to 375 metres wavelength as an A.T.I. on a standard aerial without a condenser; they are, of course, comparable for the whole of the band of broadcast wavelengths.

On distant stations the low-resistance coils will give loud signals when the high-resistance coils render the signal barely audible.

Working with crystal circuits it is important to avoid all losses, and a marked advantage may be found in keeping the resistance as low as possible.

The variometer is a convenient form of tuner, but it is not sufficiently selective for those who live near the coast; a fixed series condenser will improve the tuning, but the use of low-resistance wire is an even greater help towards obtaining freedom from jamming, especially if the resistance is further diminished by restricting the maximum wavelength of the coils and thus avoiding an unnecessary length of wire.

Some readers may be trying the fascinating task of coaxing a crystal set to run a loud-speaker without further amplification. For this it is, of course, necessary to keep the capacity down to the lowest possible figure, but it is also important to keep the resistance down to get a sharp peak on the tuning curve.

The cost of the special stranded wire is a considerable item when designing a new set of coils. The 9/36 wire costs between 3s. and 4s. per 100 ft. and the twenty-one-strand wire is about three times the price. It is quite possible to make up satisfactory wire from the secondaries of old ignition coils. These are frequently wound with 40-gauge single-silk-covered wire, though some, however, are wound with bare wire and it is not worth while to pay much for an old coil on chance.

There is sufficient wire on an old ½-in. ignition coil to make about 300 ft. of twenty-one-strand wire. It is worth noting that a "burnt out" coil is generally found to be defective in the condenser or in the primary; the damage, if any, to the secondary is usually very slight.

It is important to avoid any broken strands of wire and to see that all the strands are soldered together at the ends.

H.F. Resistances of Inductances for Broadcast Wavelengths.

130 microhenries, 80,000 cycles per second. Solenoid winding on formers 5 cm. diameter.

S.W.G. and Insulation.	Number of turns per cm.	Length of coil cm.	Total number of turns	Length of wire metres	D.C. Resistance ohms.	H.F. coefficient	Total resistance D.C. H.F.
20 D.C.C.	8·3	9·3	77	12·1	·312	3·55	1·11
22 D.C.C.	10	6·9	69	10·9	·465	2·75	1·28
24 D.C.C.	11·6	5·5	64	10	·691	2·35	1·62
26 D.C.C.	13·3	4·5	59	9·3	·96	1·85	1·775
28 D.C.C.	14·7	3·8	56	8·8	1·34	1·6	2·15
30 D.C.C.	16·3	3·35	53	8·3	1·8	1·37	2·46
9/36 S.S.C.	10	6·9	69	10·9	·7	1·07	·75
9/40 S.S.C.	14·7	3·8	56	8·8	1·41	1·0009	1·41
21/40S S.C.	8·3	9·3	77	12·1	·635	1·0009	·835
30/40S.C.	6·5	14.	91	14·3	·69	1·0009	·69

Worked from formulae in Spon's "Electrical Pocket Book" and "The Radio Experimenter's Handbook."

L. H. F.

"EXPERIMENTS WITH DOUBLE-GRID VALVES"

(Continued from page 871)

fied high-frequencies across the telephones.

Fig. 4 shows a final circuit in which the high-frequency transformer used in Figs. 2 and 3 is replaced by a high resistance R of 10,000 ohms inserted in the plate filament and second grid-filament circuit somewhat similar to the arrangement of Fig. 1.

Currents flowing in the circuit G2 R will give rise to differences of potential across the ends of the resistance R. These voltage fluctuations, combining with the potential of that part of the high-tension battery included in the plate circuit, increase or diminish the normal plate potential and so give rise to a rectification effect between P and G2 in precisely the same manner as previously described. Care must be taken to adjust the tapping point T from the plate to the H.T. battery to the correct position in the first instance.

M. A. L.

IT is proposed to broadcast news of the prevailing weather conditions in London in foggy weather, so that listeners living some distance from the City might start for their offices earlier in the morning (*sic*).

A loud-speaker has been installed at Lloyd's to assist the crier in his duty of calling out the names of the brokers and underwriters.

This Christmas we are to have carols by wireless, but, unlike the usual outdoor variety, they will be tuneful. On December 20 a carol concert held at the Royal Albert Hall, under the conductorship of Sir Hugh Allen, will be relayed.

Serious damage has been done to L.N.E.R. property by people breaking open battery boxes and stealing dry cells and accumulators suitable for wireless sets.

The first of the new concerts from Chelmsford will be on December 15, when it is intended to transmit a performance of the opera *Prince Igor,* played at the Brussels Opera House.

Worcester guardians are providing wireless sets for the workhouse.

Officials at the Edinburgh broadcasting station are busy with the technical difficulties to be overcome in order to broadcast the cries of the animals at the Corstorphine Zoo Gardens.

It is stated that 80 per cent. of the people in Great Britain can receive broadcasting of some sort on sets which cost less than £3.

Sir George Newman, chief medical officer of the Ministry of Health, will talk on "Public Health" from 2LO on December 5.

The B.B.C. now has 1,000,000 subscribers, and receives in revenue £375,000 a year.

Comparison between the Greenwich time signal and Big Ben has revealed the fact that the latter's chime was only one second in error in 293 days.

On December 9 the Roosters' Concert Party will give a programme in the form of a musical extravaganza.

A well-known firm of wireless manufacturers is producing phones at the rate of 12,000 a week.

Complaints have been received by the B.B.C. of interference between Glasgow on 420 metres and Belfast on 435 metres.

A Dublin schoolboy, only 16 years old, has listened for two hours to WBZ (Springfield, Mass.) on a home-made two-valve receiver.

Nearly 600 convicts at Parkhurst were entertained recently by a wireless concert.

An enterprising scheme has been adopted in Belfast whereby wireless receivers will be installed in all the hospitals. £800 to £1,000 will be necessary to carry out completely this extensive scheme.

It is rumoured in Kettering that the B.B.C. have inspected a site near the Council's housing estate as a possible position for the new high-power station.

Speaking at Glasgow, Captain Eckersley disclosed that the B.B.C. was taking into account the claims of nationality, and that the establishment of Scotland as a separate district, with headquarters at Glasgow, was in contemplation.

(*Continued on next page*)

RADIOGRAMS *(continued from previous page)*

The London Board of Trade has given instructions that special wireless sets are to be installed in one motor lifeboat on every liner with fifteen boats or more.

Mr. Hall, of Matlock, is reported to be able to hear music and broadcast speech when wearing phones, although he has been stone deaf for 40 years.

The question as to whether the Swansea station is to relay programmes from Cardiff or London still continues to agitate listeners in the Swansea district.

Daventry Rural Council has decided to install a wireless set at the Isolation Hospital.

Over 250 firms are taking part in the Berlin Wireless Exhibition, which is taking place on December 4. According to German estimates, this will constitute a record, inasmuch as up to the present no other country has built a special hall for the purpose.

Reception of broadcasting with loud-speakers in a Glasgow park was heard well for a distance of 200 yd., despite the noise of passing traffic.

Those parts of the British broadcasting programmes that include time signals from Big Ben have the chief interest for American listeners. Everybody wants to hear the historic national timepiece.

Complaints have been received by the broadcasting authorities of morse interference in the Wolverhampton district.

Reports have been received of the operations of a bogus wireless inspector in the Twickenham district who is collecting "extra" fees for himself.

Mr. G. K. Chesterton, who broadcast from Edinburgh recently, said that if he grossly insulted his listeners he would feel a horrible and almost diabolical sense of security. They could not storm the platform or tear him to pieces!

A wireless message to the King was received on the night of November 24 from an Australian amateur station.

A Dublin experimenter has received Radio-Iberica (Madrid) on a simple one-valve set, using an indoor aerial only 25 ft. long.

A proposal has been made in France by the Herriot Government to transform wireless telephony into a State monopoly.

A cable from Montreal foreshadows the reorganisation of the Canadian Marconi Wireless Company.

Over four hundred American vessels have been fitted with wireless apparatus in order to intercept communication between "bootleg" rum smugglers and the shore.

A wireless telephony service is being carried out between Belgrade (Jugoslavia) and Beirut (Asia Minor) by the French Radio-Orient Company.

More signals from M. Louis (8 B F, of Orleans) have been picked up by M. Perroux (8 B V, of Nîmes). A three-valve set without an aerial was used for reception.

At 7.30 p.m. on December 12 half an hour's cheery entertainment will be given by the Novelty Trio at 2 L O.

At present 535 broadcasting stations are operating in the United States.

A harpsichord performance will be given by Mrs. Violet Gordon Woodhouse on December 12.

The band of the Royal Air Force will give a programme of bright music on December 13.

Every relay station wants London, states a broadcasting official, and refuses to recognise any merit in its nearest main broadcasting station.

A "Whiff of Devonshire" will be given on December 5 by Harry Rice from 2 L O.

December 6 will be a popular night, and the programme will include items by the Wireless Orchestra and the Savoy bands.

The 2 L O Military Band, under Mr. Dan Godfrey, jun., will broadcast from 2 L O on December 7.

It is reported that up to October 4 this year 15,000 people have subscribed to the Vienna broadcasting service.

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

GREAT BRITAIN

The times given are according to Greenwich Mean Time.

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

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

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

CONTINENT

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

AUSTRIA.

Vienna (Ravag), 530 m. (1 kw.). 08.00, markets; 10.00, con.; 12.00, time sig.; 12.20, weather; 14.30, Stock Ex.; 15.00, news, con.; 15.15, children (Wed.); 17.15, lec. (Mon., Tues., Fri.); 18.30, news, weather; 19.00, time sig., con., news; 20.00, dance.

BELGIUM.

Brussels (SBR), 265 m. (1½ kw.). 17.00, orch., children (Wed. and Thurs.); dance (Tues. and Sat.); 18.00, news; 20.00, lec., con., news (opera, Mon. and Wed.).

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

CZECHO-SLOVAKIA.

Kbely (OKP), 1,150 m. (1 kw.). Weekdays: 09.00, 10.30, 12.30, 16.00 and 17.00, Stock Ex.; 18.15, lec., news, weather, con. (time sig., 19.00), daily; 10.00, con. (Sun.).

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

DENMARK.

Copenhagen (Kjobenhavns Radiofonistation), 470 m. 19.00, con. (Sun., Wed., Thurs.); also tests on 750 m. other days.

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

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

FRANCE.

Eiffel Tower, 2,650 m. (5 kw.). 06.40, weather (exc. Sun.); 11.00, markets (exc. Sun. and Mon.); 11.15, time sig., weather; 14.45, 15.35, 16.30,* Stock Ex. (exc. Sun and Mon.); 18.00, con.; 19.00, weather; 22.10, weather (exc. Sun.).

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

Radio-Paris (SFR), 1,780 m. (10 kw.). Sundays: 12.45, orch.; 13.45, news; 16.45, con.; 20.30, news, con.; 22.00, dance. 12.30, news, Stock Ex., orch.; 16.30, markets, Stock Ex., con.; 17.45, Stock Ex., news, women's hour; 20.30, lec., news, con.; 22.00, dance (not daily). Special con. by *Le Matin*, Paris, every 2nd and 4th Sat. in month at 22.00.

L'Ecole Sup. des Postes et Télégraphes (PTT), 449 m. (500 w.). 16.00, lec. (Tues. and Thurs.); 20.30, Eng. conv. and con. (Tues.); 20.30, lec. or con. On 3rd Sun. of each month, organ recital, 20.45.

"Le Petit Parisien," 340 m. (500 w.). 21.30, con. (Sun., Tues., Thurs.).

Lyons-la-Doua, 550 m. 10.30, news and con.; 11.30-11.45-12.15, 16.15, Stock Ex.; 20.00, news and con.

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

Pic-du-Midi, 350 m. (300 w.). Testing.

Issy-les-Moulineaux, 1,600 m. Tests.

GERMANY.

Berlin (2), 505 m. (1½ kw.): 08.00, sacred con., educational lec. (Sun.), markets, news; 10.00, gramophone con. on 430 m. (weekdays); 10.35, 11.15, Stock Ex.; 12.00, time sig., news, weather; 13.15, 14.00, Stock Ex.; 13.45, sacred con. (irr., Sun.); 14.30, children (Sun. and Wed.); 15.15, Stock Ex., orch.; 17.20, women, lec.; 18.00, French lesson (Mon.), lec. (other days); 19.30, con. or opera, weather, news, time sig. All daily except where otherwise stated.

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

Eberswalde, 280 m. 22.15, con. (Mon.).

Königswusterhausen (LP), 2,450 m. (5 kw.). 09.40, con. (Sun.). 2,550 m. (5 kw.): Wolff's Buro. Press Service: 06.00, 19.40. 2,800 m. (5 kw.): 10.50, con. (Sun.). 3,150 m., Telegraphen Union: 06.00-20.00, news (weekdays). 4,000 m. (10 kw.): Express News Service, 06.00-20.00 (daily).

(*Continued on page* 896)

BROADCAST TELEPHONY (*continued from page 894*)

Bremen, 330 m. (1 kw.). Relays con. from Hamburg.

Breslau, 418 m. (1½ kw.). 10.15, Stock Ex., weather; 11.00, sacred con. (Sun.); 11.55, time sig., weather (Sun.); 12.25, time sig., weather, Stock Ex.; 14.00, Berlin news; 15.00, children (Sat. and Sun.); 16.30, orch., lec. (Sun.); 18.30, Esperanto (Mon.); 19.30, con. (Sun.); Eng. conv. (Thurs.); con., lec. (other days).

Frankfort-on-Main, 470 m. (1½ kw.). 07.00, sacred con. (Sun.); 10.10, news; 10.55, time sig. and news; 15.00, con. (Sun.); 15.10, markets; 15.30, orch.; 16.00, children (Sun.); 17.00, lec.; 18.30, lec.; Esperanto (Fri.); 19.00, lec., Eng. conv. (Mon. and Wed.); 19.30, con., opera; 20.30, news, weather; 20.50, tech. lec.; women's hour; 21.00, time sig., con. (irr.).

Hamburg, 395 m. (1½ kw.). Weekdays: 06.25, time sig., news; 11.45, markets; 12.00, time sig.; 13.30, markets; 14.00, news, women, markets; 17.00, con.; 18.00, lec.; 19.00, con. or opera; 21.00, weather, markets, sport; 21.50, news (in English), dance (not daily). Sundays: 07.55, time sig., weather, news, lec., women; 10.15, sacred con.; 11.15, chess; 12.15, con.; 14.30, photo talk; 15.30, children; 16.30, con.; 17.45, English conv.; 19.00, con. or opera; 21.00, on as weekdays.

Königsberg, 463 m. (1½ kw.). 07.10, markets (Wed., Sat.); 08.00 sacred con. (Sun.); 10.15, markets; 10.30, con. (Sun.); 11.55, time sig.; 13.15, news, Stock Ex.; 15.00, markets; 15.30, orch., children (Wed., Fri.); 18.00, lec.; 19.00, con., weather, news; 20.10, dance or con. (irr.).

Leipzig, 454 m. (1½ kw.). 08.00, sacred con. (Sun.); 10.55, markets; 11.58,* time sig.; 12.00* and 15.00*, Stock Ex. news; 15.30, con., children (Wed.); 17.00*, markets (exc. Sat.); 18.00, lec., Esperanto (Mon.); 18.30, lec., chess (Wed.); 18.45, Eng. lec. (Tues.); 19.15, lec., con. or opera; 20.30, news; 21.00, dance (Sun.). * Except Sunday.

Munich, 485 m. (1½ kw.). 09.30, sacred con. (Sun.); 13.00, time sig., news, weather; 15.30, con.; 16.00, children (Wed.); 16.30, Eng. conv. (Mon.); Esperanto (Thurs.); 17.00, markets, news, women's hour (Tues. and Fri.); 17.30 and 18.30, con., lec.; 19.30, con., news, weather, time sig.; 20.00, dance, news, weather, time sig. (Sat.).

Munster, 410 m. (1½ kw.). 06.55, time sig., news.; 10.00, sacred con. (Sun.); 11.30, Stock Ex.; 12.00, time sig.; 14.30, markets, news; 15.00, orch; 18.40, children (Wed. and Sat.), weather, news; 19.15, con. dance (Sat.); 20.15, news. Sun.: 19.00, con., news, dance.

Nuremberg (relay), 340 m. Programme relayed from Munich (q.v.).

Stuttgart, 443 m. (1½ kw.). 10.30, con. (Sun.); 11.00, markets; 15.00, con., time sig., news (Sun.); 15.30, news; 16.30, markets, con., weather, time sig., children (Wed., Sat.), women (Fri.); 17.00, news, time sig. (Sun.); 17.30, weather, time sig.; 18.30, lec. (Mon. and Tues.), Eng. lec. (Fri.); 19.00, lec., con., weather, time sig., news.

HOLLAND.

Amsterdam (PA5), 1,050 m. (200 w.). 19.40, con. (Wed); 20.40, news; 21.10, con. (irr.). (PCFF), 2,125 m.: News and Stock Ex. almost hourly from 07.55 to 16.10.

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

Hilversum (NSF), 1,050 m. (500 w.). 19.40, con. (Sun.); 20.40, lec. (Fri., irr.); 19.45, children (Mon.).

HUNGARY.

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

ITALY.

Rome (1RO), 425 m. (1½ kw.). 19.40 to 21.40, con.

JUGO-SLAVIA.

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

PORTUGAL.

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

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

RUSSIA.

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

SPAIN.

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

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

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

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

SWEDEN.

Stockholm (TV), 440 m. 10.00, service, relayed (Sun.); 11.45, weather, time sig.; 18.10, con., news (exc. Mon.).

Gothenburg, 460 m. 18.10, con. (Tues., Fri. and Sat.). 680 m.: 18.10 (Mon., Wed. and Thurs.).

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

SWITZERLAND.

Geneva (HB1), 1,100 m. (500 w.). 13.15, lec. No Sun. transmissions.

Lausanne (HB2), 780 m. (300 w.). 07.05, weather; 12.30, weather, markets, time sig., news; 16.00, children (Wed.); 17.55, weather, news; 20.15, con. (exc. Wed.), dance (Thurs. and Sat.).

Zurich (Höngg), 650 m. (500 w.). Tests are also being made on 515 m. 08.00, con., news; 12.00, weather, news, Stock Ex.; 15.00, con.; 17.15, children (Mon., Wed., Fri.); 18.00, weather, news; 19.15, lec., con., news, weather, dance (Sat.). Sundays: 15.00 and 19.15, con., news, weather.

The Newest of Loud-speakers

SIR,—May I be allowed to point out that the loud-speaker shown by the photographs on page 767, No. 129, is not of German origin, but was made by the author.

The original idea is German, but not the actual article shown by the photographs.—A. J. C. (London).

A Good Circuit

SIR,—As a champion of 5 Y M's circuit (see page 791, No. 129), which I have used for two years and find unbeatable, I should like to give readers of "A.W." who use this circuit two good tips. First use a 1-2 L.F. transformer, the best and biggest possible, and, secondly, use an aerial composed of 7/18 wire, rubber and cotton covered.—C. J. C. (Darlington).

5 Y M's Single-valve Circuit

SIR,—May I be permitted to testify to the efficiency of the above circuit (see page 791, No. 129). I have not yet found any circuit to equal it. 5 I T comes in at great strength at a distance of seven miles, and is much too loud for headphone strength unless damped down, and distant stations come in wonderfully clear. This set works my Ethovox loud-speaker at good strength in an ordinary room, and with the addition of a note magnifier gives loud and clear reception which can be heard all over the house. Recently I dismantled the set for overhaul, and after rewiring was surprised to find the volume had greatly decreased. However, upon reversing the reaction leads reception was as good as ever. I also get better results with a small variable condenser across the reaction coil.—"ONE VALVE" (Birmingham).

Wireless and the Fair Sex

SIR,—I think that there is a tendency to deprecate the idea of we of the "other" sex having any progressive interest in wireless. Perhaps the following will be of interest to many of the male "fans" and D.X. enthusiasts.

Having no facilities for an outside aerial, I have had to erect one inside, which consists of two strands of No. 18 d.c.c. copper wire stretched across my bedroom, which is 18 ft. long. Connected to this "magnificent" aerial I have a simple two-valve autodyne receiver (direct reaction) consisting of 1 det. and 1 L.F. The first week I tried it out I logged 2 L O, 6 B M, 2 Z Y, 5 N O, 2 B D, 5 W A (?), 5 I T, but not, for some reason, Glasgow. In addition the following stations were received at very good strength: Breslau, Frankfort, Munich (?) and Ecole Supérieure Frankfort came in as strong as 5 I T.

In view of the poor conditions and absence of H.F. valve, I think that this reception can be, at least, classified as "good."—(MISS) W. K. T. (London, N.W.).

Other Correspondence Summarised

C. J. G. (Kent), referring to the tip on soldering earth plates in No. 128, states that washing the spirit off with strong soda-water, instead of cold water, prevents the article so soldered from rusting.

F. P. (Birmingham) has received all B.B.C. stations and sixteen Continental stations on his one-valve set.

S. J. E. (Wandsworth) states that soldering of connections can be eliminated by using No. 18 gauge wire and flattening and tightly clamping the ends between two

(*Continued on page 900*)

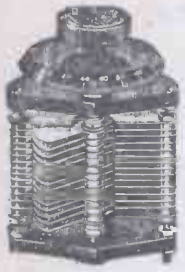
HIGH-CLASS COMPONENTS AT POPULAR PRICES—

A FEW OF THE MANY BARGAINS LISTED IN OUR INTERESTING 1924/5 CATALOGUE

The MICROSTAT

Universally used as the finest form of filament control extant, giving micrometer variation from zero to 100 ohms. Ideal for dull emitter, bright emitter, or power valves. New model has improved knob and screw terminals. British Patent No. 218523—beware imitations.

One-hole fixing, with four pipes for gripping underneath panel. **2/9**

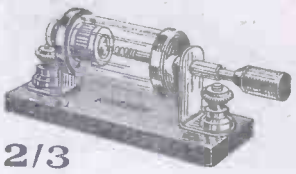


KINGSWAY VARIABLE CONDENSER

Universally popular owing to their smooth and pleasing movement, for which dead accurate assembly under modern production methods is responsible. The plates are of best aluminium sheet, whilst ebonite end pieces and handsome "Troilite" knob and 3 in. graduated dial are standard. .001 8/- ; .00075 7/- ; .0005 6/- ; .0003 5/6 ; .0002 4/6 ; .0001 4/- AND 3 plate vernier 3/9.

"KINGSWAY" DETECTOR

An enclosed Crystal Detector of finest quality, supplied with tested Shaw's Hertzite. Moulded unbreakable, base and nickelled parts.

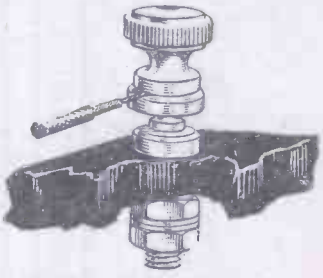


2/3

BRASS PARTS, TERMINALS, ETC.

Our brass parts are of the highest quality and finish throughout, at keen prices only made possible by modern production methods. They are exact and reliable.

	per doz.
Valve Sockets	8d.
Valve Pin with Collar	8d.
Terminals, Heavy Pattern 2 B.A.	2/2
Terminals, W.O., 4 B.A.	1/-
Telephone Terminals, 4 B.A. ...	1/-
Small Barrel Terminals, 4 B.A.	1/-
Fancy Terminals, 4 B.A. ...	10d.
3-Part Terminals, 4 B.A. ...	10d.
Wander Plugs, complete red and black	4½d.
Spade Terminals	1/-
Contact Studs, 5 B.A.	4d.
"SETAW" Terminals (illustrated)	4½d. each



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WATES BROS., LTD.,

Head Office: 12, 13, 14, GT. QUEEN STREET, KINGSWAY, W.C.2.

'Phone : Gerrard 575-6. **Works: LONDON, BIRMINGHAM, and WESTCLIFF.** *'Grams : Zywateseng, Westcent.*

1/6

THE CRYSTAL SUPREME!

Experimenting with crystals is a thing of the past—for why seek to improve on perfection?—if you buy the

VALPO

(Valve Power) **CRYSTAL**

Trade Enquiries Welcomed.

Super-sensitive all over—no dodging around the crystal during the "star" item! Use a "VALPO" Crystal and your catswhisker becomes a fixture. Each "VALPO" Crystal tested and **GUARANTEED.** Loud reception on crystal alone; beautiful pure tone for amplification by one, two, or more valves.

Price 1/6 complete with silver catswhisker. Of all reliable Wireless Stores, or post free direct from

MERTON DAVIS, PARNELL & CO. 359 STRAND, LONDON, W.C.2. Regent 4232

WINDSOR HIGH GRADE

Coil Holders and Fittings

Best Quality Verniers. Very accurate adjustment. Special Gearless, 6 6 each. Geared Pattern, 7 6 each

Coil Plugs. Plain 8d. each. Curved 9d. each. Basket Holders 1/3 each.

All ebonite Matt finish 2-Way 3/11 each. 3-Way 6/- each.

Trade enquiries invited—

WINDSOR WIRELESS WORKS,

413a, Brighton Road, S. CROYDON.

A REAL EQUIVALENT

NEW VALVES FOR OLD

The burnt-out Valves renewed by the G.W.I. latest process are improved beyond recognition and are GUARANTEED to function equal to new Valves. This is amply proved by the regularly increasing demand, and we are catering for this by considerable extension of our producing plant. The additional equipment is the most up-to-date, enabling us to utilise the very latest process and accommodate the renewal of practically every type of Valve.

G. W. I. VALVE RENEWALS

Standard types	Bright emitter	from 6/6	each.
Dull emitter	·25 amp. type	— 10/6	„ delivery 7-14 days.
„ „	·06 „ „	— 12/6	„ delivery shortly.

Myers and Wecovalves. Prices and delivery shortly.

We have a special Express service of exchange with great economy. Particulars on Application.

G.W.I. Ltd., 43 GRAFTON ST., TOTTENHAM CT. RD. W.1. and IMPERIAL WORKS, LONDON, N.W.1.

The original and largest repairers of Valves.

Agents Wanted throughout the Country. Guaranteed deliveries.

YOURS FOR 20/-

Send 20/- to-day, together with your order for the "Tonyphone," and this wonderful set, which receives *all* B.B.C. stations, will be *delivered complete*, including all accessories. You pay a further £1 each month afterwards. The total cost is only £15 9s., or, if you prefer, £14 5s. cash.

'TONYPHONE' SUPER TWO VALVES

Complete with Accumulator, H.T. Battery, Aerial, 1 pair 4,000 ohms Headphones, and two Valves—one High Frequency and one Detector. All Royalties paid.

Send to-day and enjoy broadcasting NOW

BRITISH ENGINEERING PRODUCTS CO.

(Tonyphone Dept.), Windsor House, Victoria Street, London, S.W.1

S.S.A.

CHIEF EVENTS OF THE WEEK

SUNDAY, December 7.

London	3.0	Military Band Programme.
	8.30	Rt. Rev. Bishop Taylor Smith.
Birmingham	8.30	Rev. Thomas Towers.
Cardiff	3.0	Band of H.M. Grenadier Guards.
Manchester	3.0	Beethoven and Mendelssohn Programme.

MONDAY

ALL STATIONS (*Except Bournemouth and Belfast.*)	7.30	*Rosemary, That's for Remembrance*, and two other plays.
Bournemouth	7.30	Winter Gardens Night.

TUESDAY

London	7.30	*A Day in the Country.*
Birmingham	7.30	Symphony Programme.
Bournemouth	7.30	Old Pantomime Favourites.
Manchester	7.30	Light Music, Songs, and Stories.
Newcastle	7.30	"John Henry" and "Blossom."
Glasgow	7.30	Watteau Night.

WEDNESDAY

ALL STATIONS (*Except Belfast.*)	8.0	International Symphony Concert relayed from The Royal Opera House, Covent Garden.

THURSDAY

Manchester	7.35	Hallé Concert.
Newcastle	7.35	Selections from Wagner's Operas.
Aberdeen	7.35	*When Greek Meets Greek.* "John Henry" and "Blossom."

FRIDAY

London	9.0	Opening of ths Swansea Relay Station—Speech by Mayor of Swansea.
Birmingham	8.0	A Mystery Programme and Competition.
Manchester	7.30	2ZY Gala Night—Opening of the New Studio.

SATURDAY

London	7.30	Royal Air Force Band.
Bournemouth	7.30	Lucky-dip Night.

CORRESPONDENCE (*continued from page 898*)

nuts on a terminal shank behind the panel.

T. G. L. (West Croydon) writes that he found that phone terminals could be used instead of crystals and detectors when operating the multi-phone crystal set described in No. 124.

G. T. M. (Surrey) objects to the use of a crystal in multi-valve circuits as he finds that extra controls are necessary, as the anode of the last H.F. valve has to be tuned; a damping effect is introduced, with consequent lack of selectivity; the crystal easily becomes overloaded with amplified H.F. current and a sensitive spot has to be found.

J. R. L. (Finchley, N.3) has received KDKA on his one-valve reaction circuit.

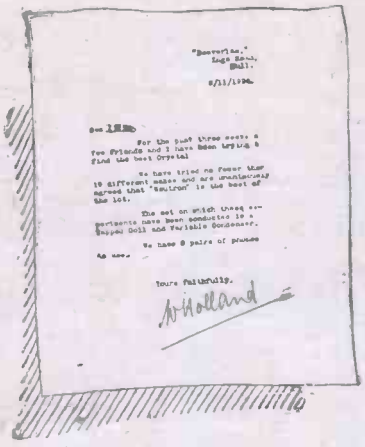
J. McL. (Inverness) has received WKAQ (West Indies) and nine American stations on his three-valve and crystal set.

H. N. S. (Whitley, nr. Coventry) has received all the main B.B.C. stations, Radio-Paris, *Le Petit Parisien*, and Radio Iberica on his crystal set.

S. MacS. (Ireland) receives WGY, WOR and WBZ as easily as 2LO on his three-valve set.

G. W. F. (Walthamstow) would like to get into touch with an enthusiast in his district with whom he could practise morse.

They tried 19 makes



"Somerlea,"
Eagle Road,
Hull.
6/11/1924.

For the past three weeks a few friends and I have been trying to find the best Crystal.

We have tried no fewer than 19 different makes and are unanimously agreed that 'Neutron' is the best of the lot.

The set on which these experiments have been conducted is a Tapped Coil and Variable Condenser.

We have 6 pairs of phones in use.

Yours faithfully,
A. Holland

Here is another remarkable letter of testimony, one of several received in the same mail. It is photographically reproduced on the left, and reads :—

"For the past three weeks a few friends and I have been trying to find the best crystal. We have tried no fewer than 19 different makes, and are unanimously agreed that 'Neutron' is the best of the lot. The set on which these experiments have been conducted is a Tapped Coil and Variable Condenser. We have 6 pairs of phones in use." ... and did you notice the last sentence ?——

'We have Six Pairs of Phones in Use."

Sooner or later, *you* will use Neutron, and then stop searching for *better* results. You *may* secure a good crystal by just asking for "a crystal" ; but you may also try twenty or thirty first. On the other hand, if you ask for Neutron, in the black-and-yellow tin, you will inevitably secure optimum results *at once*—and save the expense of further tests. The reason why you can depend on Neutron is that each Neutron is carefully tested and selected, and before ever it reaches your crystal-cup it has been proved at maximum efficiency, for loudness, clearness and complete sensitiveness.

and NEUTRON (TRADE MARK) was the best of the lot"

Stocked by the Best Radio Dealers. Packed in tin, with silver cats-whisker. Insist on Neutron, in the Black and Yellow Tin, **1/6**

Long-distance Circuit Diagram FREE

Ask your Dealer for Free Diagram (given on request to every purchaser of a Neutron) of the circuit used by 5 B T in receiving Brussels from Chiswick on a Neutron. We send one direct with sample Neutron if you enclose stamped envelope and 1/6 with Dealer's name.

Sole Distributors :—V. Zeitlin & Sons, 144, Theobald's Rd., London, W.C.1. 'Phones : Museum 3795 & 6841.

Produced by :—Neutron Ltd., Sicilian House, Southampton Row, London, W.C.1. 'Phone : Museum 2677.

District Agents;

Scotland : R. F. Miller & Co., 22, York Place, Edinburgh.

Plymouth : Mumford & Sons, 68, Mutley Plain, Plymouth.

B'gham : Cooke & Whitfield Wireless Ltd., St. Paul's Buildings, 24, St. Paul's Square, Birmingham.

North-East Yorks : Smith & Jordan, The Arcade, Redcar, Yorks.

Manchester : Garnett's, Islington Grove Works, Salford, Manchester.

Ireland : Pettigrew & Merriman Ltd., 8, Corporation Street, Belfast.

N. Staffs : H. W. Teeton, Foundry St., Hanley.

The Concert-Tested and Guaranteed Radio Crystal

E.W.8

TRADE NOTES AND CATALOGUES

AN illustrated leaflet of the Ferranti intervalve L.F. transformer has been sent us by J. E. Wildbore, of Bever Street, Oldham.

Notice of a change of address has been sent us by the Watmel Wireless Company. This firm has moved to larger premises at 332A, Goswell Road, E.C.1.

D. M. Henderson and Co., Ltd., of 66A, Farringdon Street, E.C.4, are in a position to supply turned machine-cut screws and fine precision parts in brass, steel, iron, nickel and silver.

Three interesting Gecophone booklets, dealing with receiving sets, components and loud-speakers, have been received from the General Electric Company, Ltd., of Magnet House, Kingsway.

From the World's Wireless Stores, of 82, Manor Road, Wallington, Surrey, we have received particulars of Miracle Master Valve receiving sets.

An illustrated pamphlet and price list of cabinets and cases in all kinds of wood has been received from the Caxton Wood Turnery Company, Market Harborough.

A pamphlet describing the Liberty safety wander plug for H.T. connections has been received from the Radiarc Electrical Company, Ltd., of 1, Warwick Street, W.1.

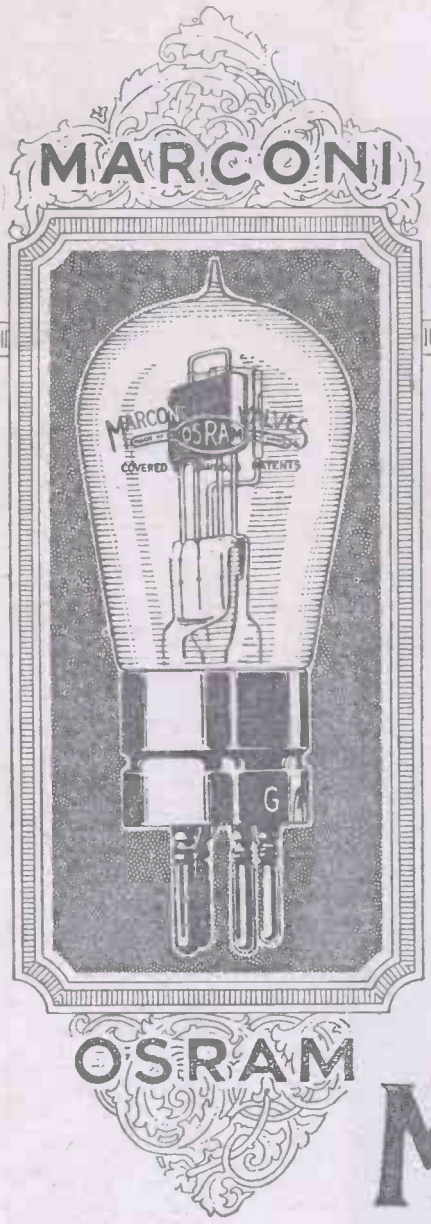
An attractive Watmel showcard, illustrating both grid leaks and anode resistances, has been received from the Watmel Wireless Company, of 332A, Goswell Road, E.C.1.

The British Thomson-Houston Company, Ltd., inform us that for the benefit of customers in the neighbourhood of Cardiff they have taken commodious premises at Jotham's Buildings, 26 and 27, St. Mary Street, Cardiff.

From the General Electric Company, Magnet House, Kingsway, we have received an attractive showcard illustrating the Marconi-Osram wireless valve—"the valve in the purple box."

Literature on components and complete sets has been received from L. McMichael, Ltd., of Hastings House, Norfolk Street, W.C.2.

Transmissions from the Eiffel Tower are still being maintained on a wavelength of 115 metres, although the very short-wave tests have been temporarily suspended.



LEADERSHIP

THE design of the Valve in the Purple Box is directed from the leading laboratories in the science of Wireless —those of the great Marconi and Osram organisations.

It is made at the factory with the greatest experience in valve manufacture in the British Empire—the Osram Works.

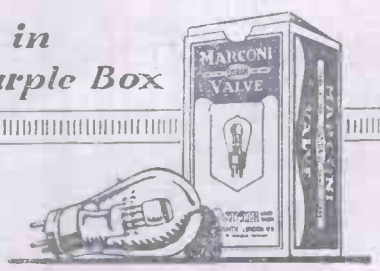
The characteristics of each type of valve have been decided on as the result of the unrivalled experience of experts, not only in valve design, but also in the design of wireless sets.

MARCONI VALVES
MADE AT THE OSRAM LAMP WORKS

Sold by Wireless and Electrical Dealers, Stores, etc.

¶ *Read the authoritative wireless book, The Book of M O V. Get a copy from your dealer, or write direct to The M.O. Valve Co., Ltd., Hammersmith, London, W.6.*

Get the Valve in the Purple Box



ANNOUNCEMENT OF THE M.O.VALVE CO. LTD

Mullard Double

Mullard H.F. & L.F. Dull Filament Master Valves

The introduction of the dull filament valve was met with sincere appreciation from those who realised the marked advantages made possible by this design. With customary thoroughness, the Mullard dull filament type valves showed steady improvements in design, till to-day you can obtain Mullard specialised dull filament valves for both H.F. and L.F. operation.

The "REAL" Long-Distance Valve.

Mullard Double Ring Valves (named to distinguish them from the Bright Filament H.F. and L.F. Single Ring Valves) have an efficiency in operation that will surprise you, the secret of their reliability and power being the wonderful precision in design and assembly that is maintained during their manufacture, and the extreme care that is taken to ensure their perfect evacuation and final testing. Their sensitivity does not become weakened in service, and their mechanical strength does not permit any possible internal contact between the filament and electrodes.

Mullard

THE · MASTER · VALVE

OBTAINABLE FROM ALL ELECTRICIANS, WIRELESS DEALERS, IRONMONGERS, ETC., ETC.

Ring DULL FILAMENT Valves

Are you Missing

(1) POWERFUL AMPLIFICATION.
(2) MINIMUM CURRENT CONSUMPTION.
(3) REDUCED BATTERY COST AND TROUBLE.
(4) LONG FILAMENT LIFE.
(5) PURITY OF TONE.
(6) CONSTANT SENSITIVITY.
(7) MECHANICAL ROBUSTNESS.

Then you need Mullard H.F. and L.F. Dull Filament Valves in your set.

Ask for Mullard H.F. Double Red Ring Valves for H.F. AMPLIFICATION.
Type D.3 for Accumulators. 21/- each
Type D.06 for Dry Cells. 25/- ,,

The "REAL" Long-Distance Valve.

Ask for Mullard L.F. Double Green Ring Valves for L.F. AMPLIFICATION.
Type D.3 for Accumulators. 21/- each
Type D.06 for Dry Cells. 25/- ,,

The "REAL" Pure Tone Valve.

The "REAL" Pure Tone Valve.

Mullard
THE · MASTER · VALVE

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

St. Anns Radio Association

Hon. Sec.—MR. W. R. ARMSTRONG, 73, Tarset Street, Newcastle-on-Tyne.

ON November 14 Mr. Phillips gave a talk entitled "Power Amplification," illustrated by blackboard diagrams.

Kensington Radio Society

Hon. Sec.—MR. J. MURCHIE, 33, Elm Bank Gardens, Barnes, S.W.13.

AT the meeting held on November 6 Mr. Symonds introduced the study of telephony as one closely allied to that of wireless, and enumerated the principles underlying the construction and wiring of telephone systems in order to obtain the maximum speaking and signalling efficiency. He concluded with a short description of trunk-line working.

Hackney and District Radio Society

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

AT a meeting held on November 17 a film, which was loaned by the G.E.C., entitled "An Englishman's Home," was shown. The technical committee reported that the society's seven-valve set, which is in course of reconstruction, is nearing completion, and an early try-out will be given.

Beckenham and District Radio Society

Hon. Sec.—MR. A. WEST, 3, Manor View, Beckenham.

ON November 20 a novel coil holder was constructed during the evening which was remarkable for its low cost and simplicity.

Stoke-on-Trent Wireless and Experimental Society

Hon. Sec.—MR. E. A. HALIBURTON, 73, Stafford Street, Longton, Stoke-on-Trent.

AT a meeting held on November 20 a lecture was given by Mr. Ratrick on "The Amplification of Radio Frequency." A short talk on the neutralising of potentials across the grid and plate circuits followed.

Tottenham Wireless Society

Hon. Sec.—MR. A. G. TUCKER, 42, Drayton Road, N.17.

A DEMONSTRATION of valves was given by Mr. F. J. A. Hall on November 16. Altogether he used 24 different valves in his demonstration, grouping them as bright emitters, 2-volt valves, .06- and 1-volt dull-emitters.

Coventry and District Co-operative Radio Society

Hon. Sec.—MR. A. CURTIS, West Orchard, Coventry.

ON November 19 Mr. F. Clegg lectured on the Armstrong circuit, for which an outside aerial is not required. Recently a party of members visited the Birmingham station of the B.B.C. and inspected the studio and transmitting station.

ANNOUNCEMENTS

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

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

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

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

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

Cut out the noises

Cracklings, atmospherics, and other interruptions can be eliminated by using Exide Accumulators instead of Dry Batteries for High Tension supply.

THE
LARGEST BATTERY WORKS
IN THE BRITISH EMPIRE

Chloride Batteries
FOR
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EVIDENCE

Mr. H. Bacon, Sutton Scarsdale, Chesterfield, who in 1923 received a complete programme from W G Y, writes :—

"I have tested with Dry Batteries but there is not the clearness or sharp tuning I can get with your batteries."

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"H.T. must be absolutely silent, and lengthy experiments have led me to the conclusion that up to now you make the only battery that is of the least use for this work."

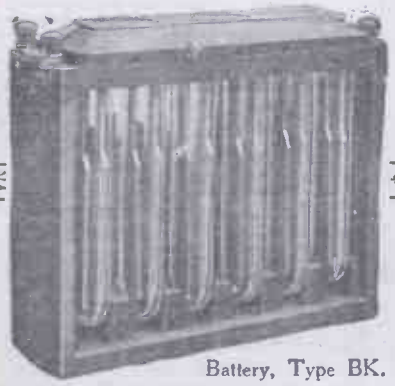
Type BK in Units of 24 Volts cost 1/- a volt

Types AYG and RG 1 cost:—

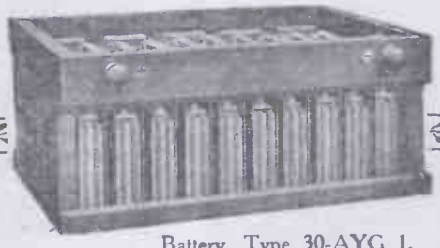
	32 Volts	48 Volts	60 Volts
RG 1	£4 10 0	£6 10 0	£8 0 0
AYG	£5 10 0	£8 0 0	£9 15 0

Exide

THE LONG-LIFE BATTERY



Battery, Type BK.



Battery, Type 30-AYG 1, with lid removed.

Type RG 1

Showrooms and Depots :
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219-229, *Shaftesbury Avenue, W.C.2.*
BIRMINGHAM :
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Manufactured by
THE Chloride ELECTRICAL STORAGE COMPANY LIMITED.
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ADVERTISEMENT INSTRUCTIONS for "Amateur Wireless" are accepted up to **first post on Thursday morning** for following week's issue, providing space is available.

PREPAID ADVERTISEMENTS.

Advertisements under this head are charged FOURPENCE PER WORD, minimum charge FOUR SHILLINGS.

PATENTS and Trade Marks obtained.—H. T. P. Gee, Patent Agent, Member R.S.G.B., 51, 52, Chancery Lane, London, W.C.2. Phone, Holborn, 1525.

HEADPHONE REPAIRS.—Rewound, re-magnetised and readjusted. Lowest prices quoted on receipt of telephones, delivery three days.—The Varley Magnet Co., London, S.E.18.

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Cossor

No one can use this Valve before *you* get it

FOR the past year Wireless Magazines have consistently advocated some method of packing Valves which would absolutely guarantee that every purchaser gets one that is quite new and unused. Many difficulties stood in the way of an immediate solution of this seemingly simple problem. Obviously it would not be any use merely sealing the Box because the Dealer would not know whether he was buying perfect Valves or whether some had their filaments broken in transit.

The credit for evolving the first sound method, however, is due to Cossor. Here we have a scheme which is definitely proof against everything.

The Valve before being packed in its cradle of cotton wool and sealed in its carton—has attached to its filament legs two wires. These wires are brought through to two metal studs on the foot of the box.

If a small flash lamp and battery is placed in contact with these studs the current will pass through the filament and—completing the circuit—will light the lamp. On the other hand, if the filament of the Valve is broken the flash lamp will not light.

This idea is utilised in a Testing Showcard supplied to all Dealers. When you go to your Dealer next time and purchase a Cossor Valve you will know that the seal placed on the Box was put there by us after the Valve had completed the last of its tests in our works. *It is a definite guarantee that we gladly make ourselves responsible to you for its long life and satisfactory service.*

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P1, for Detector and L.F. use	12/6
P2, (with Red top), for H.F. use	12/6
WUNCELL DULL EMITTERS	
Model A. (*With resistance in base for use with 2-, 4-, or 6-volt accumulator.*)	
WR1, for Detector and L.F. use	23/6
W.R.2 (with Red top), for H.F. use	23/6
Model B. (*Without resistance, working direct from 2-volt accumulator.*)	
W1, for Detector and L.F. use	21/-
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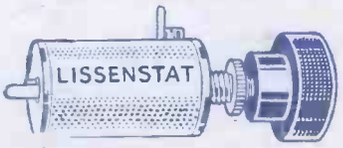
Advertisement of A. C. Cossor, Ltd., Highbury Grove, London, N.5.

No need for the Dealer to break the seal to test the filament

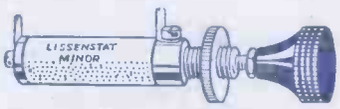
Gilbert Ad. 1854

LISSENIUM

Control the energies of your valve—



LISSENSTAT (patents pending) gives the most acute tuning possible **7/6**



LISSENSTAT MINOR (patents pending) is replacing thousands of discarded and inefficient rheostats. Provides LISSENSTAT control at a popular price **3/6**

LISSENSTAT UNIVERSAL (patents pending)—with its protective device for dull emitters **10/6**

Think of a mountain cataract, rushing wildly away—think of it again, harnessed and directed, providing power for factories, light for cities.

Think of the electron emission of your valve—rushing violently against the grid—inadequately controlled by an inefficient rheostat.

Think of it once more under LISSENSTAT control—sensitive to a touch—responsive to every fractional turn of the knob—improving distant reception—putting a fine edge on detection—making tuning sharp at the critical point—the boon of LISSENSTAT control is a thing no user should deny himself.

Made in three models—all have LISSEN ONE-HOLE FIXING, OF COURSE.

WITH LISSENSTAT CONTROL YOU CAN FEEL FOR THE POINT OF FINE DETECTION—AND UNERRINGLY FIND IT.

SENSITIVITY

and its allied control, the LISSEN GRID LEAK

LISSEN ONE-HOLE FIXING, OF COURSE—POSITIVE STOPS BOTH WAYS **2/6**

LISSEN VARIABLE ANODE RESISTANCE (pats. pend.) 20,000 to 250,000 ohms, same outward appearance as the LISSEN VARIABLE GRID LEAK. **2/6**

Every valve you use has different characteristics—every circuit, too. Whether you are out for distant stations, or undistorted reception of near-by stations, you will find the LISSEN VARIABLE GRID LEAK (patents pending) very important in its effect. Only by using it can you be sure that you are using the correct grid potential for every condition of reception.

It covers a wide range of resistance values, with continuous variation throughout.

SMOOTH OUT YOUR LOUD SPEAKER DISTORTION BY PUTTING A LISSEN VARIABLE GRID LEAK ACROSS THE SECONDARY of the last transformer, or across the loud speaker itself. First position is best. The difference will be very noticeable.

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Phones—3380, 3381, 3382, 1072 *Riverside.* *Grams*—"*Lissenium, London.*"

PARTS THAT PULL TOGETHER—BUILD WITH THEM

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