

THIRTY-ONE STATIONS AT LOUD-SPEAKER STRENGTH

Amateur Wireless

Every Thursday 3^d

and
Radiovision

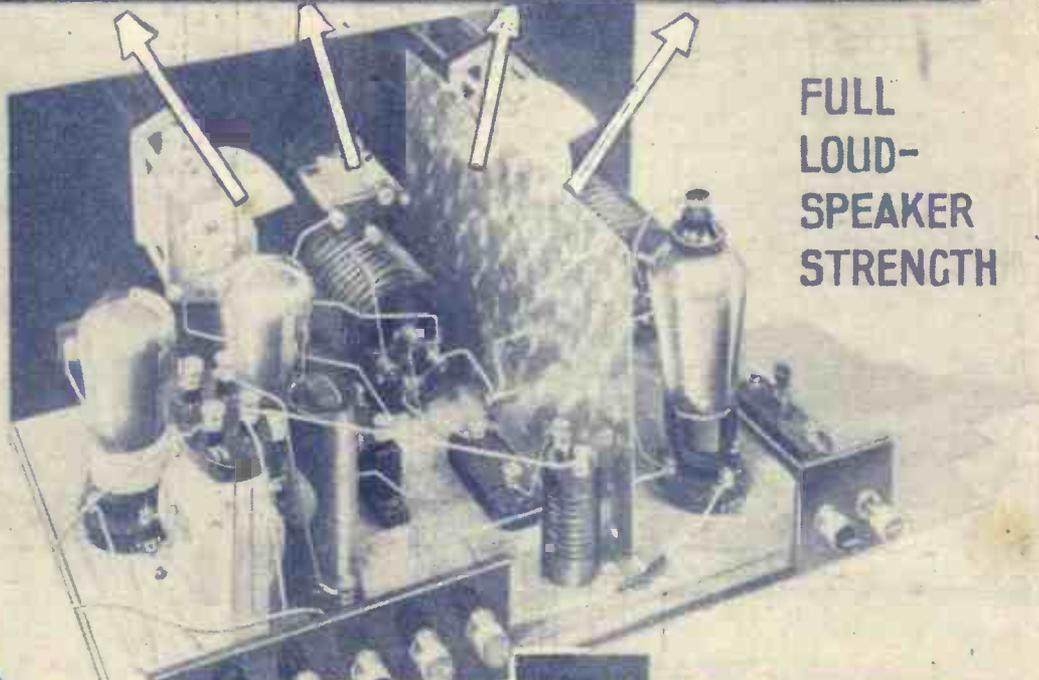
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Saturday, March 16, 1929

31 STATIONS HEARD

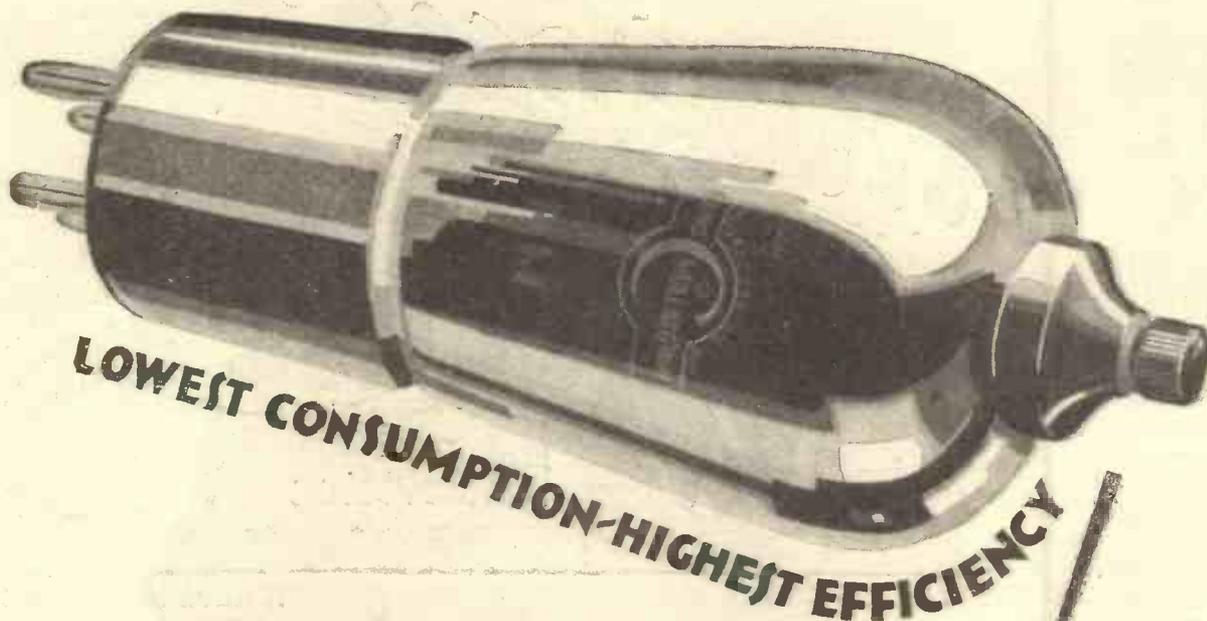
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Don't Forget to Say That You Saw it in "A.W."

Amateur Wireless and Radiovision

The Leading Radio Weekly for the Constructor, Listener and Experimenter

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Television Tests—The Boat-race—The Prince Again—Exit Sparks!—Hallé Benefit—N.E. Coast Show—Fultograph Development—Next Week's Set

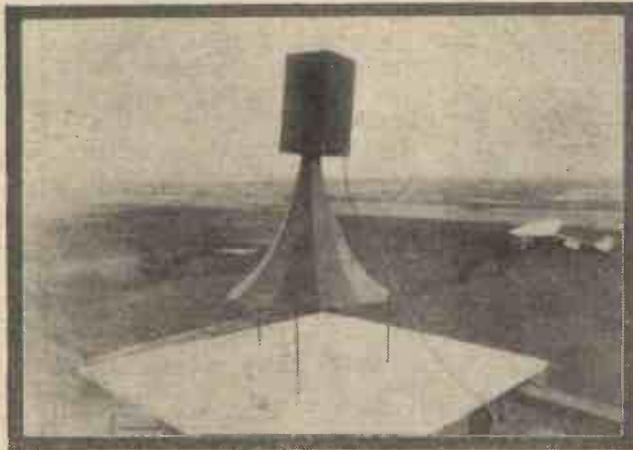
Television Tests—How many readers listened to the recent B.B.C. television test transmitted from 2LO? Doubtless there were one or two enthusiasts who tried, with home-made apparatus, to resolve the sounds into pictures! It is perhaps not generally known that this official test, which was witnessed by a number of M.P.'s, was conducted only between 2LO and a room at the General Post Office. Further particulars of the test are given on page 416 of this issue.

Hearing a Face!—It was very intriguing for those who were able only to listen to the pictures, and quite a good game could have been played in guessing what each scene was, without listening to the accompanying speech! The noise of a face turned full towards the light-cell sounds like "Brump . . . brump . . . brump" . . . while an *absolutely* stationary object results in a continuous steady note. The slightest movement, of course, produces a change.

The Boat-race—Make a note of Saturday, March 23, for it is to be an "all-sport" day. First, from about 12 to 12.35, a running commentary on the 'Varsity Boat Race, from the launch *Magician*. At about 3 p.m. there will be a running commentary on the semi-final of the F.A. Cup and at 7.15 p.m. there will be given an eye-witness account of the Oxford v. Cambridge sports.

The Prince Again—Royalty is not reticent in broadcasting. Only a few weeks ago the Prince of Wales was heard in connection with the "B.I.F." and he is to be heard again on Tuesday next, through 5GB, when he speaks at the Guildhall on the occasion of the Master Mariners banquet.

Exit Sparks!—Spark transmission is dying a slow, but natural, death, and as each new ship equipment is changed from spark to C.W. matters become better for coastal listeners. It is therefore pleasant



"The electric ear" is the name given to the unorthodox-looking piece of apparatus seen above, which, on the approach at night of an aeroplane desiring to descend at the Newark, N.J., air port, automatically turns on the 24,000,000 candle-power flood-lighting system. The sounds of a siren on the aeroplane are reflected up the trumpet by the sounding-board beneath it to the microphone, the currents from which operate the various switches.

news that Marconi's are fitting C.W. transmitters in the Parkeston station and in three new steamers for the Harwich-Hook-of-Holland route.

Hallé Benefit—Most listeners take a great interest in the Hallé Orchestra, owing to the frequency with which it broadcasts. So the annual benefit concert, to be given and broadcast on March 21, is not without interest. A pension fund gives members of the orchestra a pension when they attain

the age of sixty, and the money for this is nowadays obtained largely by subscription and by this annual pension fund concert. There are some "stars" for this year's effort, which is "going out" via London and Daventry.

N.E. Coast Show—Don't overlook the fact that at the North East Coast Exhibition which opens in May at Newcastle, there is to be a section for wireless sets. Gold, silver, and bronze medals are to be awarded in connection with the exhibiting of wireless sets, in common with many other items in the artisan section, and readers' attention is directed towards the advertising announcements, which give further details. But don't forget that there is no entry fee, and that the last day for receiving entries is March 30.

Fultograph Development—It is welcome news that 2LO and 5GB are to give Fultograph transmissions, together with 5XX, and that pictures will be broadcast in the afternoons and evenings. The new times are as follow: 2 to 2.25 p.m. on Tuesdays and Thursdays from 5XX; 12 midnight to 12.15 a.m. from 5XX and 2LO on Mondays and Fridays; 11.15 p.m. to 11.45 p.m. on Wednesdays and Saturdays from 5GB. Possibly by the time this appears in print, transmissions may also be made from Radio Paris in addition to other continental stations already broadcasting.

A "Portable" Next Week—The portable-set season opens with the advent of Easter, and it is advisable to get ahead with the construction of your new portable for 1929. On another page in this issue are given some useful hints under the heading "An Early Trip with a Portable," while there will also be found a preliminary announcement of AMATEUR WIRELESS's new portable, self-contained, super-performance . . . but read for yourself on page 422!

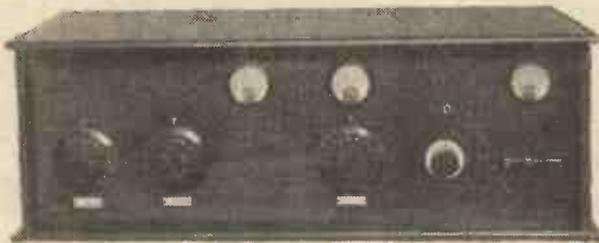
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The B.B.C. Radio Link

DID you know that all the main B.B.C. stations, with the exception of London have six-valve sets permanently tuned in to Daventry 5XX, and that if, for any reason, the studio programme should fail 5XX can be tuned in and its programme rebroadcast?

This is typical of the thoroughness on the



The Daventry Re-broadcast Receiver

engineering side of the B.B.C., for while such a reserve programme is not frequently necessary, when it is needed, it is needed badly. For example, during the heavy gales towards the end of last year, a number of land-lines, controlled by the Post Office, failed and this radio link was used extensively. The London station does not, of

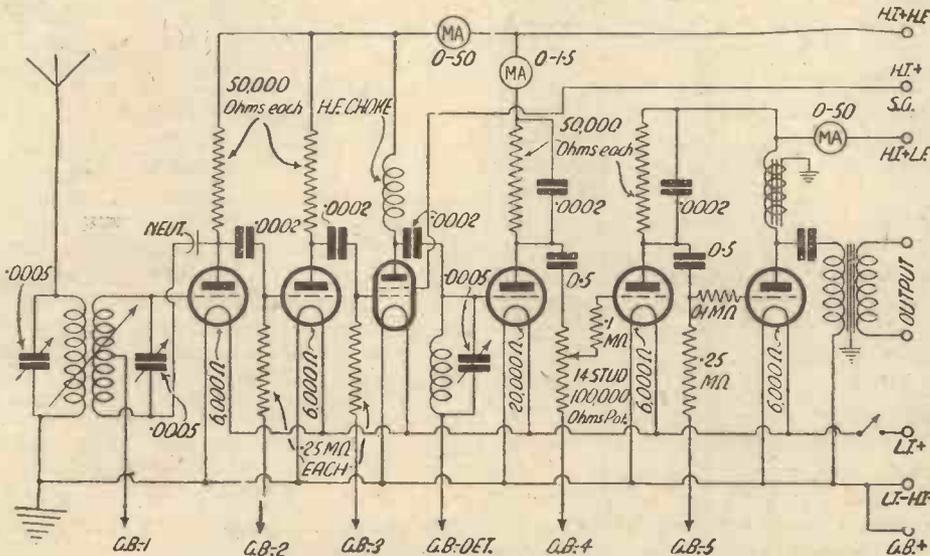
stations, where these receivers are installed, and there is no doubt but that it will interest readers of AMATEUR WIRELESS to know the B.B.C.'s version of a good circuit for re-broadcast work.

You must understand, of course, that the B.B.C. does not consider six valves are essential for receiving 5XX, in the case of amateurs! B.B.C. reception has to be conducted with the best purity and with sufficient volume to modulate a transmitter.

Circuit Arrangements

An accompanying sketch shows the theoretical circuit of a Daventry re-broadcast receiver.

The aerial tuning is loose-coupled, and is, of course, permanently tuned in to 1562.5 metres. First is a neutralised stage of resistance-coupled H.F., the values of resistance, leak and coupling condenser being shown in the diagram. Next is a plain resistance H.F. coupled stage and finally one screen-grid stage, with a tuned



This is the circuit arrangement of the B.B.C. six-valve receiver

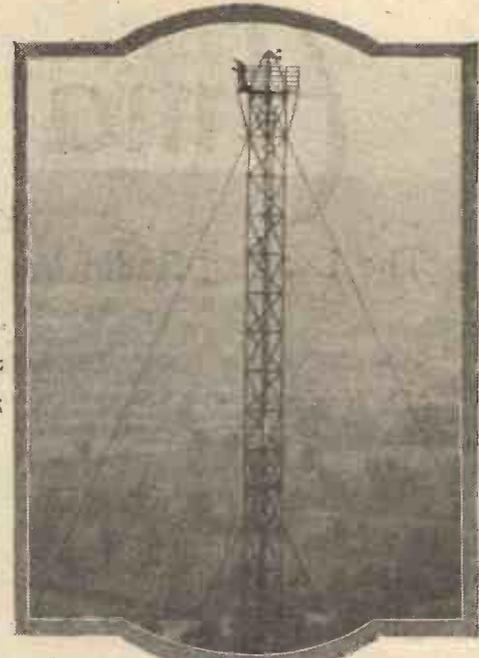
course, need a Daventry re-broadcasting receiver, for 5XX's programmes emanate from Savoy Hill.

I have just come back (writes an AMATEUR WIRELESS Special Correspondent) from a visit to one or two of the northern

choke in the anode circuit.

The detector operates on the bottom bend and is followed by two resistance-coupled valves, with a volume control in the first stage.

At some stations the receiver is acting in



At the top of one of the Daventry Aerial Masts

the control room, and in these cases it can be operated by the control man. Generally, though, it is anything up to eight miles away from the control room and is connected thereto by a private line. Sometimes the set is located in the house of one of the B.B.C. engineers, and in other cases there are specially built huts.

Whenever the re-broadcast outfit is situated at a distance from the control room, there is a plug and jack arrangement by means of which it can be remote controlled from the main transmitter. The whole set is permanently tuned in to Daventry and is given periodical attention; to bring the receiver into action, it is necessary only to place a plug in a jack orifice in order to set things going.

This remote control is very ingeniously arranged, so that the whole circuit is "dead" when the jack is out, but the signal lines and the whole of the battery supply is switched on simply by the insertion of the jack.

At the control room end the received signals go to one of the B.B.C. standard "B" amplifiers, and thence through a volume control to the transmitter.

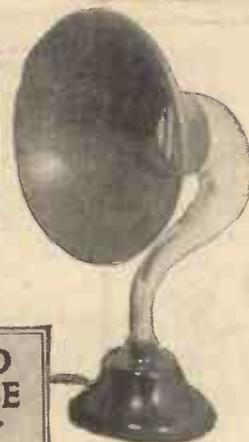
It is, of course, not always announced when the radio link is to take the place of the land-line, and it is, therefore, not a little to the B.B.C. engineers' credit that the six-valvers are to all intents and purposes distortionless: so much so, that the change-over is not appreciated by listeners!

A German writer has decided that neither English, German, nor French would be suitable as an international wireless language. In support of his theory, he gives figures showing that already 211 wireless stations in thirty-four countries are broadcasting either occasionally or entirely in Esperanto.

A SEARCHER UNIT



AN ADD-ON SCREEN-GRID H.F. AMPLIFIER TO GET THOSE DISTANT STATIONS



With the approach of the longer days, increasing difficulty will be found in getting distant stations. The unit described below however will ensure their continued reception

ALREADY the evenings are beginning to lengthen out and within possibly less than a month the reception of fairly long-distance Continental broadcasters may be seriously impaired. With some of the more modern sets such as the "Listener's Three," or the "Clarion Three" described last week, the drop in signal strength will not be very important because these already have a most efficient H.F. stage which is a sure distance-getter.

There are other sets, however, which have been designed for ordinary broadcast work and which are rather hard put to it to bring in the foreigners at good strength under summer time conditions. For these the auxiliary H.F. unit described in this article will be just the thing because it gives them all the "punch" possessed by such a set with an H.F. stage as standard.

Moreover, this little amplifier can be quite simply made up and added to almost any exist-

ing set without altering the original circuit or layout.

Essential Requirements

If you have any pretensions towards being a judge of these things there are several points you will look for in an add-on H.F. unit. For instance, it must be reasonably selective, and the rumour is still current that screen-grid valves give very flat tuning! It should embody a dual-range coil so that the amplifier can cover the same wave range as the receiver and without any chopping or changing of coils. It should have only one tuning control so that the operation of the combined add-on unit and the original receiver is not made too complicated.

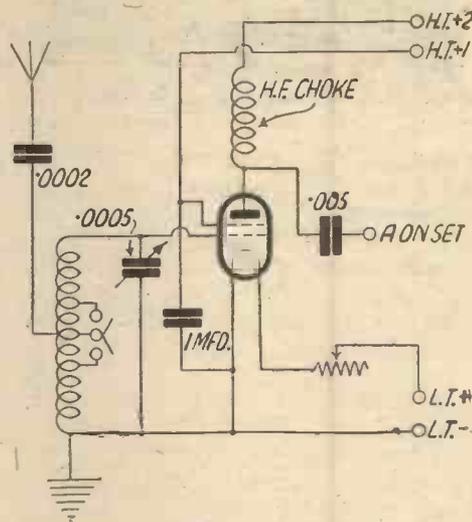
All these points you will find embodied in this unit. Selectivity is obtained by a .0002-microfarad fixed condenser in series with the aerial lead with the aerial tapping taken to a point along the solenoid winding. This series condenser in conjunction with the mid-point tapping results in knife-edge tuning.

Tuning

The coil employed is a panel mounting dual-range job. This is very convenient because it has a range of approximately 250-2,250 metres, and the long and short wavebands are obtained at will, simply by pushing or pulling the switch on the front of the panel. Actually this short-circuits the long-wave section when required.

This coil is tuned by a .0005-microfarad variable condenser in parallel and this is really the only variable control. The other knob on the panel is that of the rheostat in series with the filament of the H.F. valve; you will find this a great convenience when operating, because on the lower travel of the rheostat winding it acts somewhat as

a volume control, while it is also exceedingly useful in that it enables both reaction and stability to be controlled to a fine degree. The unit is coupled to the receiver through a .005-microfarad fixed condenser, between the anode of the H.F. valve and the aerial terminal of the set.



The circuit diagram

Components

The following parts will be required for the construction of this simple unit.

Ebonite or bakelite panel, 9 in. by 6 in. (Raymond, Becol, Ebonart, Paxolin).

.0005-microfarad variable condenser (Formo, Polar, Burndep't, J.B., Burton, G.E.C.).

All-wave tuner (Bulgin multi-coil type A, Tunewell).

12-ohms rheostat (R.I. & Varley, Lissen, Igranic, G.E.C.).

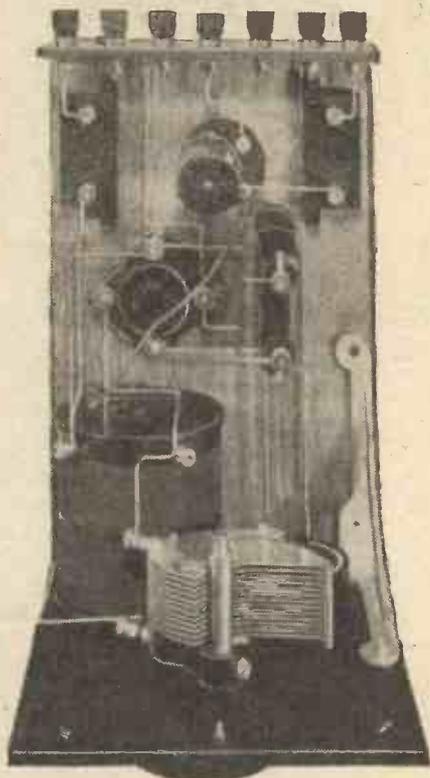
Anti-microphonic valve holder, (Benjamin, W.B., Wearite).



The parts required are few

NEXT WEEK : Full details of a Very Special Portable : SEE PAGE 422

“A SEARCHER UNIT” (Continued from preceding page)



This plan view shows clearly the layout

- 1-microfarad fixed condenser (Lissen, Dubilier, Mullard, T.C.C.).
- High-frequency choke (Wearite, R.I. & Varley, Lissen, Igranic, Burndept).
- .0002-microfarad fixed condenser (Lissen, Dubilier, Mullard, T.C.C.).
- .005-microfarad fixed condenser (Lissen, Dubilier, Mullard, T.C.C.).
- Seven terminals, marked, Aerial, Earth, L.T.+ , L.T.- , H.T.+1, H.T.+2, Aerial 2, (Belling-Lee, Eelex, Igranic).
- Dial indicator (Bulgin).
- Connecting wire (Glazite).
- Single bracket (Magnum, Bulgin).
- Cabinet and baseboard (Imperial Radio).

Simple Construction

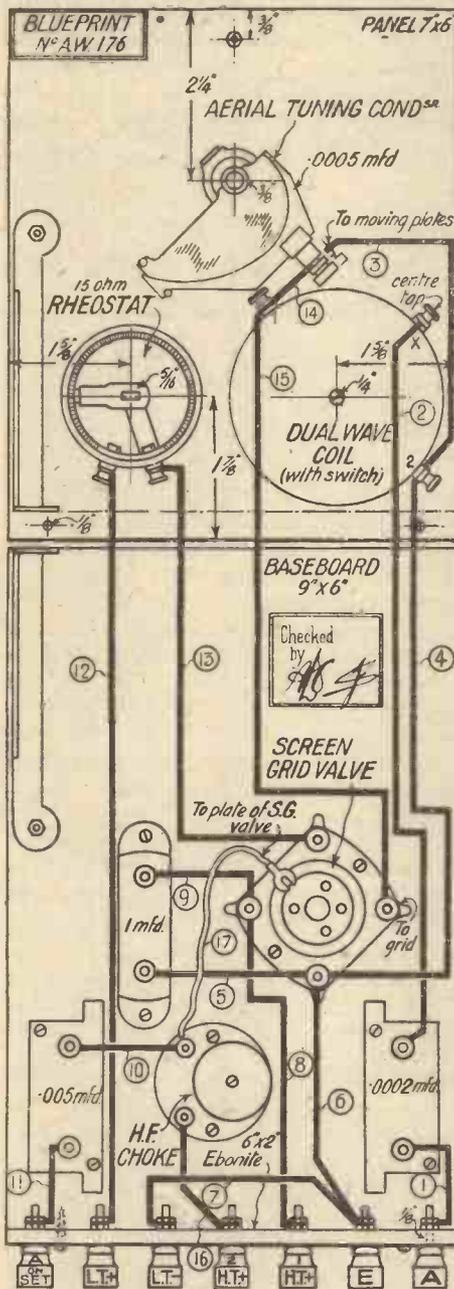
A blueprint is available and can be had, price 1s., post free, from Blueprint Department, AMATEUR WIRELESS, 58-61 Fetter Lane, London, E.C.4. It is a convenience because, although in this case the wiring is reasonably straightforward, the print serves as a drilling diagram and template.

When drilling the panel the fact that all the components mounted thereon are of the one-hole fixing type will be found a great convenience. Note the two small holes at the bottom of the panel, through which wood screws are passed, the small hole at the top for the dial indicator and one hole on the right-hand side (looking from the front) through which a small bolt is passed for attaching the panel bracket. Only one bracket is employed.

The small terminal strip at the back carries terminals for aerial (to which the

outside aerial is connected), L.T.+L.T.—, H.T.+1, H.T.+2, Earth and Aerial (which is connected to the aerial terminal of the set).

Take particular care to get the coil con-



The wiring diagram. Blueprint available, price 1/-

nections right. Terminal No. 1 is connected to one side of the variable condenser (the fixed plate in the case of the Formo component used), and to the grid terminal of the valve holder. The centre terminal marked X is connected to one side of the .0002-microfarad fixed condenser, and the terminal marked 2 is connected to the other side of the variable condenser and to the negative filament terminal on the valve holder.

Wiring is carried out with stiff wire but there is a short flex connection from one side of the H.F. choke to the terminal at the top of the screen-grid valve. The valve used may be of the 2-, 4-, or 6-volt type and for correct operating will require 120 to 150 volts H.T. on the H.T.+2 terminal, and 78-90 volts applied to the H.T.+1 terminal.

The Unit in Use

When adding the unit to a set it is necessary to connect the aerial to the aerial terminal on the unit and to join the “output” aerial terminal on the unit to the normal aerial terminal on the set. For convenience the earth lead should also be taken from the set and connected to the earth terminal on the unit. In most receivers, however, L.T.— is earthed.

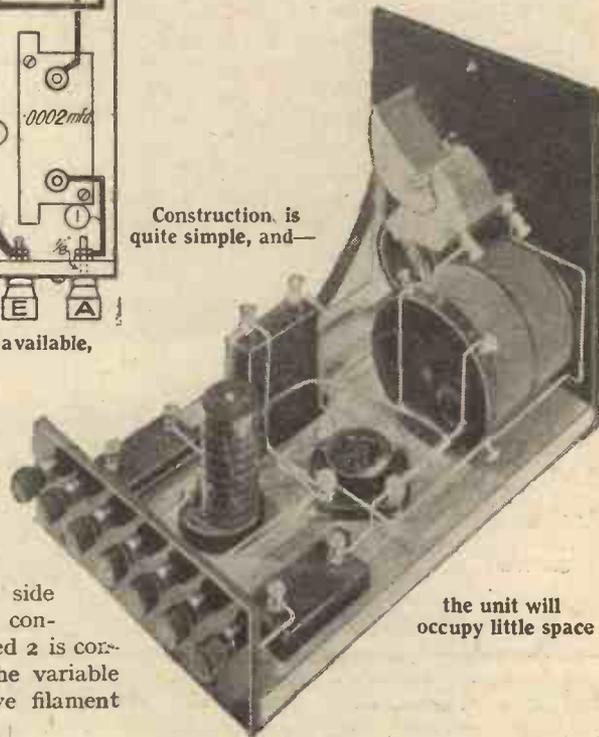
Therefore the unit can be added without any modification or changing over of the earth wire.

BEAM TELEPHONY

TELEPHONY experiments have been successfully carried out between this country and Canada using the short-wave beam station at Bridgwater. It is claimed that the results are even freer from “noise”—which is the bugbear of all long-distance working—than those secured with the long-wave trans-atlantic service between Rugby and the United States. The chief advantage of the beam system, however, lies in the fact that both telegraphic signals and spoken messages can be transmitted and received simultaneously on the same beam aerial without giving rise to any trace of mutual interference.

M. A. L.

Construction is quite simple, and—



the unit will occupy little space



By J. H. REYNER, B.Sc., A.M.I.E.E.

THE detector valve in the average receiver will account for an appreciable loss of signal strength. We have seen in some recent articles that the cumulative grid detector has not, by any means, an infinite resistance between grid and filament, its resistance falling in some cases nearly to 100,000 ohms. We should be horrified if we connected a leak of this order across the tuning circuit, yet this is virtually what is happening when we connect the average detector valve to the tuned circuit.

The figures so far given for grid resistance refer to 2-volt valves. It will be remembered that the resistance for a 2-volt H.F. valve was of the order of 250,000 ohms with a 2-megohm leak connected directly to L.T. +. If the leak was connected across a potentiometer giving less positive voltage, the resistance tended to increase and with a centre tap was of the order of 400,000 ohms. Two-volt R.C. valves had a much lower resistance, the value with the leak connected to L.T. + being 125,000 ohms, this rising to 280,000 ohms with a centre tap. All these resistances constitute quite appreciable leaks, but as a matter of fact when we come to the 4- and 6-volt class of valve, we find that the grid-filament resistance is still lower.

Average Grid Resistance

The table given above shows the average order of resistance for H.F. and R.C. types of valve in the two classes. These figures are taken as in the former instance, by plotting the grid current characteristics of a number of representative types of valve, deriving an average or generic characteristic, and from this estimating the resistance of the valves from grid to filament with a 2-megohm leak connected 1/4, 1/2, 3/4 and the full way across the L.T. The relatively low order of resistance, reaching as little as 50,000 ohms sometimes, will no doubt surprise many readers.

Quality and Frequency

Previous articles on the subject of grid-current dealt with the question of quality and we saw that with the average values used to-day, the quality can be maintained satisfactorily up to 5,000 cycles per second, provided that the resistance of the valve is less than 600,000 ohms. There is thus no necessity, from a quality point of view, to

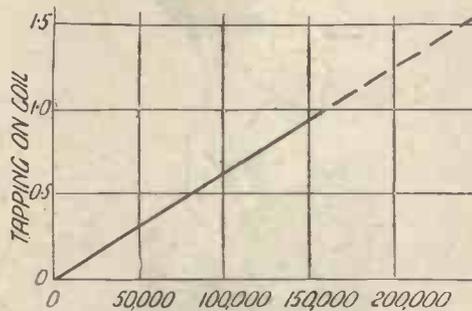
have a very low resistance such as is quoted in the table, but, on the other hand, we suffer considerably from the damping introduced on this score. The effect of a

| Type of Valve | Voltage of Grid connected through 2-megohm leak | Grid-filament resistance |
|---------------|---|--------------------------|
| 4v. H.F. | 1.0 | 300,000 |
| | 2.0 | 210,000 |
| | 3.0 | 140,000 |
| | 4.0 | 100,000 |
| 4v. R.C. | 1.0 | 170,000 |
| | 2.0 | 95,000 |
| | 3.0 | 65,000 |
| | 4.0 | 55,000 |
| 6v. H.F. | 1.5 | 250,000 |
| | 3.0 | 135,000 |
| | 4.5 | 90,000 |
| | 6.0 | 75,000 |
| 6v. R.C. | 1.5 | 200,000 |
| | 3.0 | 130,000 |
| | 4.5 | 100,000 |
| | 6.0 | 85,000 |

relatively low resistance leak, across the tuned circuit such as this will be to flatten the tuning and to prevent the circuit from developing its full voltage.

Increased Damping

The effect of a leak across the circuit is to increase the damping and this can actually be represented by an extra resistance introduced in series with the first. This is often a more convenient way of looking at the problem, i.e., considering



Curve showing optimum tapping points for different shunting resistances

the damping as being introduced by an imaginary extra series-resistance instead of a shunt across the coil. If P is the value of the shunting resistance in ohms, then

the equivalent series-resistance, also in ohms, is given by the expression

$$R_e = \frac{L}{C P} \text{ ohms}$$

where L=inductance in microhenries.

C=capacity in microfarads;

P=shunt resistance in ohms.

R_e=equivalent series resistance to be added to the existing H.F. resistance.

An examination of this expression will show the seriousness of even relatively high resistances across the circuit. For example, if we consider an inductance of 200 microhenries, a capacity of .00025-microfarad and an ordinary circuit resistance of 5 ohms, the introduction of a shunt of 250,000 ohms across the coil (as for example would be done by connecting a 2-volt H.F. valve across the circuit with the grid leak to L.T. +), would increase the resistance by 3.2 ohms making 8.2 ohms in all.

The importance, therefore, of reducing the damping imposed by the detector is obvious. This must be done by increasing the detector resistance as far as possible which, as will be seen from the experiments already described, is carried out by reducing the positive voltage to which the grid leak is connected.

The connection of the grid leak to an intermediate point in this manner is often thought to involve a loss of signal strength, but as a matter of fact, this is not the case, both signal strength and quality being improved. The use of a small potentiometer across the L.T., therefore, is to be recommended as a general practice. This may be of the fixed type having appropriateappings, such as the Polar, or it may be a suitable baseboard mounting pre-set potentiometer.

Tapping Points

Reference to the figures for 4- and 6-volt valves, however, will show that even with centre or quarter tap, the grid resistance is still appreciable. A 6-volt H.F. valve, for example, with a centre tap has a grid resistance of the order of 120,000 ohms, which will still introduce serious damping. Is there no way in which this damping can further be minimised? One's mind turns to the solution adopted in tuned-anode circuits and in crystal receivers, that of

(Continued at bottom of next page)

For the Newcomer to Wireless: A QUESTION OF QUALITY

I AM not quite satisfied with the quality of my reception at present. Just what is the trouble?

Neither speech nor music seem quite as clear as they used to be and there is a certain woolliness about loud-speaker reproduction.

Have you ever found the same sort of thing previously?

Yes; five or six months ago I was bothered in this way. I never found the cause of the trouble. It seemed to disappear by itself.

Did its disappearance coincide by any chance with the fitting of a new high-tension battery?

Now that you come to mention it I believe that it did, though somehow I never connected the one with the other.

I think that one can diagnose the cause of the trouble with a fair amount of certainty.

Do let me hear?

You are using dry-cell batteries?

Yes.

The reason why the voltage of a dry-cell battery gradually falls is that its internal resistance slowly increases as it grows older.

I follow that.

When a battery is new its resistance is only a small fraction of an ohm per cell, but when it is on its last legs it may run to something very big. When a common battery is used the presence of a large resistance within it causes undesirable back coupling to take place between valves.

What is their effect?

They quite commonly produce audio-frequency oscillation in the note-magnifying valves. Sometimes just woolliness is noticeable, though if matters are very bad there may be a continuous low-frequency howl.

Then what do you recommend?

If it requires renewal at the end of five or six months it is clear that your battery is not quite up to the work.

How do you mean?

You have got to remember that the H.T.B. must supply not only voltage but current. In other words it has work to do, for it provides the greater part of the energy conveyed to the valves as well as operating the loud-speaker. Unless the cells of the battery are big enough to cope with the load placed upon them the resistance rises far too rapidly and distortion follows.

My set, you know, is a four-valver and when I measured its current consumption the other day, I found that it needed fifteen milliamperes. What sort of battery would you recommend?

For this kind of load the smallest size that you can use economically is the treble capacity and I would strongly recommend you to go one better.

Is there a bigger capacity?

Yes, there is the quadruple, sometimes known as "super-power."

Be quite sure that if you ask for a "super-power" battery you get what you mean.

How can one do that?

Well, the quadruple, or true "super-power" battery is made up of cells about $1\frac{1}{4}$ inches in diameter by $3\frac{1}{2}$ inches in height. The term is sometimes used, though, for batteries which are really only treble capacity, with cells $1\frac{1}{4}$ by $2\frac{1}{2}$ inches. It is generally fairly easy to discover by measuring its case roughly what the height of the cells is.

Are quadruples much more expensive than trebles?

Not very much, and the extra cost is well worth while since you may expect nearly double the service life.

"SIGNALS LOST IN YOUR DETECTOR!"

(Continued from preceding page)

tapping the circuit in question across a portion of the tuned circuit only.

The reason for this is that the damping effect of a resistance decreases as the square of the tapping. If we connect a resistance across half the circuit, it is equivalent to connecting a resistance of four times the value across the whole circuit so that the extra resistance introduced into the circuit is equal to a quarter of its former value. If, therefore, we connect the detector circuit across half of the coil only, we minimise the damping by a quarter so that the magnification of the circuit increases and a greater voltage is developed across the whole circuit. We are only using half of this voltage, however, and the question we have to settle is whether the increase in the voltage due to decreased damping is more than the reduction due to the tapping.

In the case of the crystal receiver, it is well-known that a tapping, such as this is fully justifiable and in fact, a tapping as low as three-eighths of the the way down the coil will often be found to give the best results. With the idea of obtaining some information on the matter, the problem was investigated mathematically and the optimum tapping was found in terms of the constants of the circuit and the resist-

ance shunted across it. The optimum tap is $1/n$ th of the way up the coil, where

$$n = \sqrt{\frac{L}{CRP}}$$

where L, C, and P are as above, and R is the normal H.F. resistance.

As a matter of interest, the value of this expression has been plotted for the case of an inductance of 200 microhenries and a

capacity of .00025-microfarad, this corresponding to the approximate middle point of the average tuning circuit. The optimum tapping is plotted in the diagram for different values of shunting resistance. It should be observed that the figures still apply if the shunt-resistance is a crystal detector instead of a valve.

This curve must be taken as being an indication only. It is worked out for a particular value of resistance, namely 5 ohms and if reaction is applied round the detector valve, the resistance may be reduced somewhat, in which case the effective tapping will be altered. On the other hand, many coils have a resistance greatly in excess of 5 ohms and with the full reaction applied it is probable that the resistance is not much below 5 ohms. Consequently the chart given serves as a fair indication of average practice. It will be noticed that above 160,000 ohms, the tapping becomes greater than unity. In other words, we should require to use more than the full coil and this is impossible. An equivalent effect might be obtained by using a tight-coupled transformer having a step-up to the detector valve and this is a point which might merit further investigation. Resistances of the order of 80,000 to 100,000 ohms, however, such as are quite often encountered in average practice with 4- and 6-volt detector valves, require a tapping towards the centre of the coil for the best results



Miriam Licette—a Caricature

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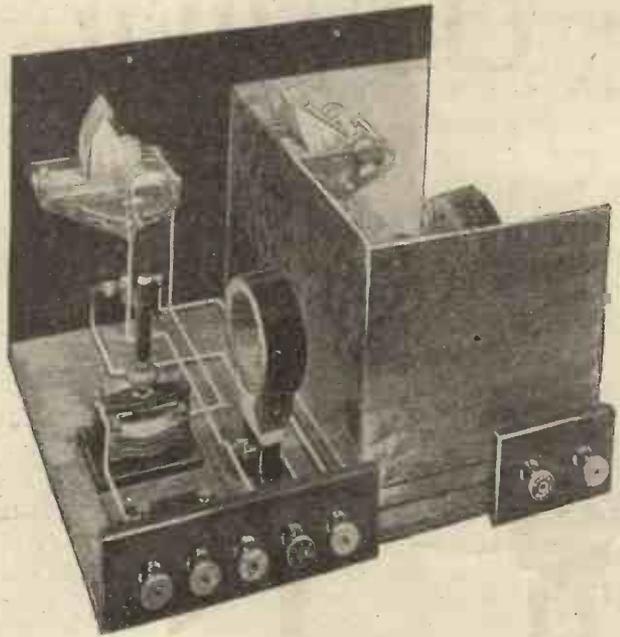
Send at once!

There are many good things in the *March* WIRELESS MAGAZINE

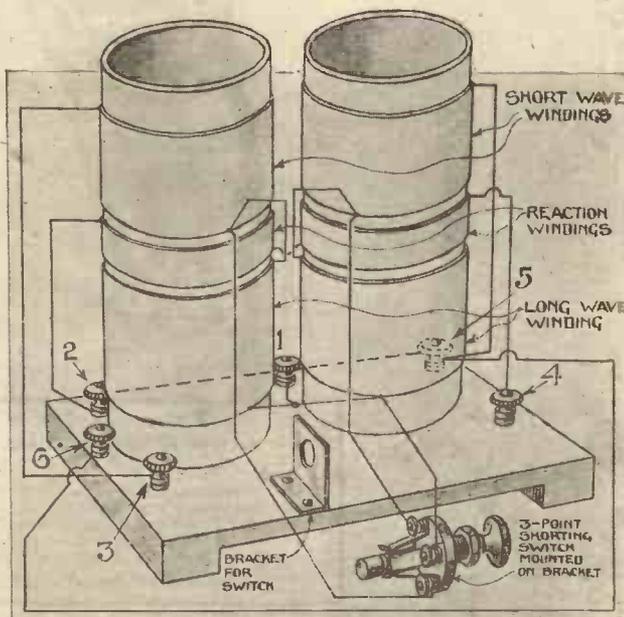
Here are two:—

The Signal Booster

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How to make Dual-range Coils



At the cost of a few shillings only any amateur can make for himself a dual-range coil especially suitable for use in screened-grid valve circuits. Full constructional details of such Binowave (Binocular All-wave) Coils are given by the inventor, W. JAMES, in the current issue of the *WIRELESS MAGAZINE*.

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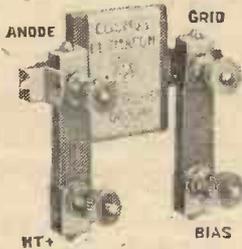


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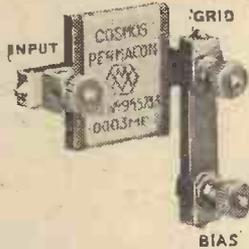
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 Grid Leak 2 megohms . . . }

Extra for Moulded Base . . . 1/3

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Anode & Grid Leak for

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|---------------------|------------------|-------------------|-----------|----------------------|
| 2-VOLT RANGE | | | | |
| C.T.15 ... | .15 | 120 | 18,000 | 7.5* |
| C.T.215H. ... | .15 | 150 | 150,000 | 45.0 |
| C.T.15X. ... | .3 | 120 | 5,000 | 3.5 |
| C.T.15F. ... | .15 | 120 | 30,000 | 16.0* |
| C.T.215S.G. ... | .15 | 150 | 200,000 | 220.0 |
| 4-VOLT RANGE | | | | |
| C.T.10 ... | .1 | 120 | 15,000 | 7.5* |
| C.T.10H. ... | .1 | 150 | 60,000 | 40.0 |
| C.T.10X. ... | .15 | 120 | 8,000 | 4.0 |
| C.T.10F. ... | .1 | 120 | 25,000 | 20.0* |
| 6-VOLT RANGE | | | | |
| C.T.25 ... | .25 | 120 | 10,000 | 9.0* |
| C.T.25B. ... | .25 | 150 | 20,000 | 20.0 |
| C.T.25X. ... | .5 | 150 | 4,000 | 5.0 |
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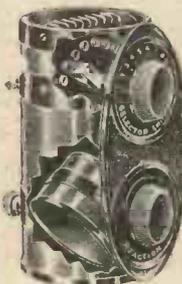
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On Your Wavelength!

Unpopular Aerials

IT is a most extraordinary fact that aerials, especially good aerials, are becoming increasingly unpopular. A few years ago it was every wireless amateur's ambition to possess a fine high aerial of many wires and as long as the P.M.G. would allow. Imitation B.B.C. aerials of the "sausage" type were erected everywhere, and splendid aerials they were for picking up the weakest of signals. The decline and fall of the "colossal" aerial has been due to several reasons; as, for instance, increased efficiency of H.F. stages, the desire for greater selectivity, and the more general use of ultra-short waves.

Changed Conditions

In the old days the damping effect of the relatively high resistance and capacity of the multi-wired aerial was small in comparison with the many inefficiencies of the actual receivers. The shortening of an aerial did increase selectivity somewhat, but at the expense of signal strength, which at that time could not easily be made up for in H.F. amplification. Furthermore, long-wave stations were much more used than they are now.

1,000 Metres

Before broadcasting officially commenced in this country, 1,000 metres was the most popular wave. The few amateurs who transmitted telephony were on that wave, with PCGG (The Hague) just above them and the aircraft telephony just below. Writtle, 2MT, was on 700 metres, and actually sent out a half-hour broadcast programme every Tuesday night. Subsequently the amateurs were moved down to 440 and 200 metres, and 2MT changed from 700 to 460 metres. The aircraft telephony was the great "stand-by" for listeners in the south of England, though little or nothing was to be heard after sunset. The amateur transmitters made great efforts to get down to 440 metres, and presently a few of them gave regular "test transmissions." 2AZ, operated by the late William Le Quex; 2AW, of Wakefield; 2FQ, of Blackheath; and 2ON, of Walthamstow, were a few pioneer transmitters who delighted thousands of pioneer listeners. I was nearly going to call them "good old days," when they were actually nothing of the kind! There was no real broadcasting, and variable condensers cost £2 10s. each!

Aircraft Telephony

From the point of view of the ordinary listener, aircraft telephony is the only type of transmission which has not improved. The quality of the transmissions has not

improved at all, due, no doubt, to the fact that the old solid-back carbon microphones are still used on both airplanes and at land stations. Though the quality is so poor, intelligibility is good when one becomes accustomed to the peculiar type of distortion which is usually present and the extraneous buzzing and generator hums. A high quality microphone was used on one occasion, when the Savoy Orpheans broadcast dance music from one of the great air liners for relaying through the B.B.C. stations. A special filter circuit was used on the receiver for diminishing the low hum of the propellers as picked up by the microphone and the signals were passed up the land-line to Savoy Hill. I was privileged to be present at the receiving station during this "stunt," and was highly impressed with the elaborate receivers and gadgets used by the B.B.C.

The Solution!

So many years have passed since that occasion when I was down at Keston that I think I will be forgiven if I "let out" a deep and dark secret I accidentally discovered. During the actual "stunt" I was in Mr. Partridge's office, listening to the result on a receiver tuned in to the London station's transmission. Quite a few atmospheric noises were present on the broadcast, apart from the hum of the propellers and the noise of the rush of air. Going through to the main reception-room, I was surprised to hear a comparatively "clean" transmission on a receiver picking up from the airplane direct. The solution to the problem was that the "atmospherics" were noises and interference which found their way on to the lines between Keston and Savoy Hill, these noises being about equal to the average interference experienced on a line as long as from London to Glasgow!

Keston

As a matter of fact, Keston is a far from ideal site for the official receiving station of the B.B.C. Apart from the bad Post Office lines connecting it with Savoy Hill, it is very close to Biggin Hill Aerodrome, where experimental telephony transmissions are carried out, and it is only two or three miles from Croydon Aerodrome. Interference from ship and shore spark transmitters which are off their waves is sometimes a great annoyance—and the site is almost as inaccessible as the middle of Dartmoor. Dartmoor would probably be a better site from the point of view of freedom from interference, though probably some spot in the north of England would be better. The chief aims should be (1) to get as far away from ship transmissions as possible; (2) to be close to a good

line connecting with all B.B.C. stations. I have not found any place so good as Westmorland for general broadcast reception. The main B.B.C. land lines to the northern stations pass close to the town of Kendal, for instance, and this would be an excellent place for the official receiving station.

Dramatic Control Panel

The "talkie" boom has brought to light another marvellous American invention, the microphone "fader," a device enabling all kinds of tricks to be done with a number of microphones! This proves to be nothing more than a copy of the "dramatic control board," a semi-automatic microphone mixer which has been in use at Savoy Hill for several years! The dramatic control panel has only come into prominence with the development of the radio play, but none the less it has been in existence for a long time and was invented by Bayham Honri, a frequent contributor to AMATEUR WIRELESS. The Americans have a habit of getting away with things, haven't they?

The Squeak

Many readers have seconded my suggestions that the B.B.C. should transmit occasional low-frequency calibration signals with their wonderful "squeak" apparatus. The B.B.C.'s attitude to the proposals is that they consider such transmissions would be of no interest to the vast majority of listeners. Well, I may be wrong, but I should imagine that they would receive far wider appreciation than some of the gardeners' bulletins, talks about Egyptology, and the like. In any case, the "squeak" tests could take place outside the normal broadcasting hours. Sunday afternoon, after the usual programme, would be a particularly good time for such an experimental transmission. "Squeak" gramophone records may shortly be available, but these will not be as satisfactory as a broadcast test. For one thing, the average gramophone pick-up has a far from even response to the range of musical frequencies required. Now, then, altogether, boys! *W'e want the "squeak"!* If enough of you drop post cards to the B.B.C. to this effect, perhaps the powers-that-be will give it a try out.

The Multi-beam

Quite a while ago now I told readers something of the wonders of the Marconi-Matthieu system, which enables two morse messages to be transmitted simultaneously and on the same wavelength by beam radio. As a matter of fact, experiments with such transmissions between this country and Canada have been in progress for nearly a year now, and a good many

On Your Wavelength! (continued)

months ago they had been advanced far enough to prove the complete success of the system. Some of the lay papers though have only just awakened to the fact and produced the news with a great flourish of trumpets. If you want red-hot wireless news, look for it in AMATEUR WIRELESS.

Wondrous Sorting-out

There is, of course, no difficulty about sending as many messages as you wish on the same wavelengths; the trouble is to sort them out at the receiving end so that each may be intelligible and entirely free from interference by the others. This is accomplished by a most ingenious filtering system. So perfectly does it work that though the two sets of morse messages are sent automatically at high speed (and most listeners to broadcasting have heard at times what kind of a noise this can kick up!) there is not a trace of any interference from this source when a telephonic conversation is in progress.

Reducing Costs

There can be no question that the Marconi-Matthieu system has a wonderful future before it. It should cheapen long-distance telephony enormously. You see the "beamed" carrier wave would be there anyhow to convey the commercial and press messages in morse. If you superimpose telephony upon it the only extra running costs are those of amplification and modulation, which are trifling. Another strong point is that telephone conversations by radio will no longer be liable to be overheard by all and sundry. Even those in the path of the beam will hear nothing but a confused jumble of sound—unless, of course, they choose to spend a great deal of money in installing the special disentangling apparatus.

A Quaint Experiment

I was much interested in *The Squirrel's Cage*, a play of a new type, illustrating the special technique believed to be demanded by broadcasting which was put on the ether recently. The underlying idea was, I suppose, that the average man's life is largely made up of "don'ts" and monotony from his birth onwards. The little scenes, though most of them were of the rather obvious type, were quite well done; but I didn't care much about the chorus, the effects and the noises off. They were apparently intended to heighten (or deepen?) the atmosphere of monotony—and they did! Personally I don't see much good in harping on this aspect of human life.

A Radio Election!

Somehow I don't think that we shall have at our forthcoming general election anything like the spate of politics via the loud-speaker that took place in the States during the presidential election campaign.

At any rate I for one hope that we shall not. Various M.P.'s have been urging that more broadcasting time should be devoted to politics; some would even have weekly political hours. It is urged that the average man and woman can listen in comfort to the loud-speaker in their own homes and that they will listen to speeches delivered in this way even if they won't turn out to go to political meetings. There is something in this, but I hope that broadcast politics will not be overdone.

Hard Luck!

It was hard lines that the B.B.C.'s relay of President Hoover's inauguration should have ended so poorly after promising so well. The early part of the proceedings came through very well indeed, everything being clearly audible. Just before the President rose, though, fading set in and only a word here and there of his speech could be heard. After ten minutes or so the relay had to be abandoned. The short waves above about 16 metres have been particularly unreliable for the last few months. On some evenings one obtains pretty good reception, but on the majority signal strength is weak all round and fading is very violent. When the sun's countenance becomes freer from spots we may look for a return to the joyous conditions prevailing in 1927, when short-wave reception was so reliable that one never hesitated to ask friends if they would like to hear America.

A Quality Point

The present state of the broadcast band, with its closely packed array of stations, brings home one rather important point in reception. Beside the transmissions of the stations included in the normal band there are always present harmonics from long-wave broadcasting stations and mush from big commercial transmitters. The more use you make of reaction the more trouble you are likely to experience from these sources. The other day I was trying out two sets, the one with a very powerful H.F. side and the other with just one good neutrodyned high-frequency stage. The former brought in numbers of foreign stations with the reaction control at zero or very nearly so; the latter required a fairly tight reaction coupling to give reasonable volume from all but the most powerful transmitters. But the difference in the quality! The set with plenty of genuine H.F. amplification brought in station after station as clear as a bell. That relying on the spurious H.F. magnification produced by a tight reaction

coupling made most of them rather muzzy and mushy.

Moments of Madness

One's head is not at its clearest and best just after an attack of 'flu, and that is possibly why I did a silly thing the other day which produced a most puzzling state of affairs in the receiving gear. Wanting to make a small adjustment inside it, I disconnected the receiving set and took it down to my workshop. It had been working perfectly until then, but when I brought it back again it appeared to be possessed. The milliammeter showed a much higher reading than is normally the case and there was a distinct tendency to a queer kind of oscillation. Signal strength was very poor and tuning was as flat as a hat that has been sat upon. I should explain that this particular set consists of a screen-grid valve plus an anode-bend rectifier and one note-magnifying stage. All the H.T. connections, except that of the plate of the S.G. valve, are formed by normally placed terminals. The plate connection for the screen-grid valve has a lead of its own, owing to the fact that some time ago the set was converted from triode to tetrode.

A Change Over

Now, can anyone tell me off-hand just what I had done to produce these weird effects? Give it up? Well, I had put the wander plug serving the screening grid into the 130-volt socket and that supplying current to the plate of the S.G. valve into the 75-volt socket. For the life of me, I couldn't make out what had happened for quite a while, and I can assure you that this kind of "fault" is a very puzzling one to track down. Curious, isn't it, what absurd things one can do at times?

"Blue" Broadcasting

Mr. Moseley's campaign against "blue" broadcasting has created no small interest and quite a lot of argument amongst wireless men. I can't say that I have heard anything particularly objectionable from a British station for several years, but I admit that I haven't listened to every second of B.B.C. transmission. Some time ago, just before the B.B.C. became a corporation, I remember that strong action was taken in this matter against certain comedians who had overstepped the mark. Since then nearly everything broadcast has acquired a thoroughly "respectable" tone, with perhaps a hint of "over-Sunday-schoolishness" at times. Recently, however, with the development of the radio play, subjects which might give offence to certain listeners have found their way through the microphone. *Hassan*, for instance, a rather dull Eastern play, made quite a number of people blush beneath their headphones.

THERMION.

Let "Amateur Wireless"
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"WORTH-WHILE" ADDITIONS TO YOUR SET



Have you ever realised that by a few simple additions to your set it is possible to effect a wonderful improvement in its efficiency?

ALTHOUGH it is decidedly inadvisable to burden one's receiving set with a multitude of unnecessary gadgets, there are on the market a number of add-on components which when fitted to an ordinary receiving set provide a great many advantages and in some cases reduce considerably the running expenses of the set.

milliammeter are shown in Figs. 1 and 2. The two positions mentioned above are given so that the system best suited to individual requirements can be used.

The addition of an output choke and condenser or output transformer to the set—especially if this is a powerful one—is a really sound investment. All risk of burning out the loud-speaker windings is thereby

that there is little excuse for using the ordinary direct-coupled dials on the tuning condenser controls. In most cases the drilling of one extra hole is all that is necessary for the fixing of these dials. Fine tuning is greatly facilitated by such an addition.

Mention should be made of that recently perfected device the high resistance poten-

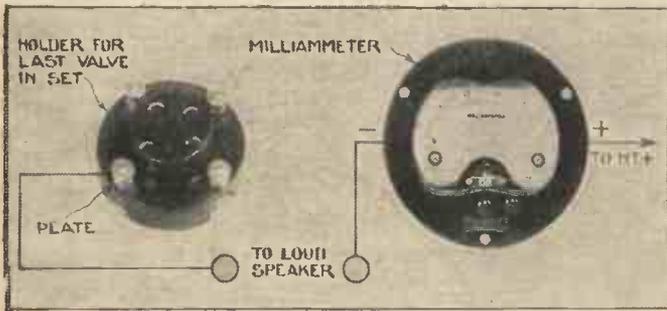


Fig. 1. A milliammeter wired as shown above will show the plate current of the last valve

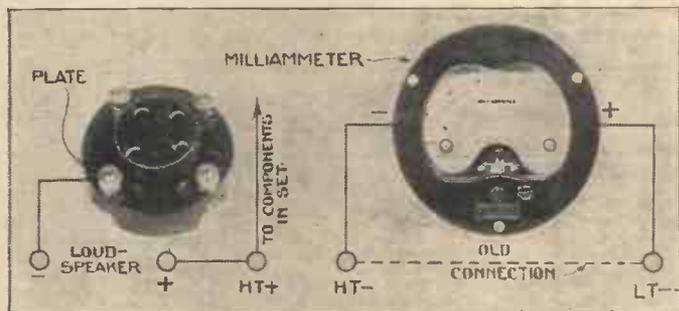


Fig. 2. The total H.T. consumption can be ascertained with this arrangement

In this latter category there is that little used instrument the milliammeter which, although it may not cost more than a good transformer or a couple of valves, is well-nigh indispensable to the listener who cares anything for the quality of the reproduction given by his loud-speaker.

The milliammeter provides a certain indication of the current passing through the last valve if wired into the anode circuit and it will indicate by sudden movement of the pointer any overloading which, of course, means distortion in the loud-speaker.

The milliammeter shows also the exact value in milliamperes of the H.T. current consumed by the last valve, or if wired in the H.T. — lead will indicate the total H.T. consumption of the receiving set. In this way the most economical size of H.T. battery to suit the set can be found by consulting the maker's lists and money is thereby saved in the long run.

The best methods of connecting up a

obviated. For use with a high resistance (2,000-4,000 ohms) loud-speaker a 1:1 ratio transformer can be employed; or alternatively a 20-30-henry output choke and a 2-microfarad fixed condenser can be used. The best methods of connecting up these components are shown in Figs. 3 and 4.

Probably few receiving sets can be found

tiometer. Many cases of distortion in receiving sets are traceable to overloading of the last valve when local station reception is being carried out. The use of a high-resistance potentiometer wired up as shown in Fig. 5 will enable good quality to be maintained at all times without sacrificing volume.

During the past year a number of newly-designed L.F. transformers have been put on the market. The replacement of an old-type transformer by one of these new products is well worth while, for the reproduction of both high and low notes will be found to be vastly improved without loss of amplification. In many cases these new transformers are of smaller size than older types so that no difficulty will be found in fitting a modern instrument to an existing set.

The use of jacks in a set saves both time and trouble when different loud-speakers, headphones or pick-ups are to be connected up. An extremely useful type of jack known

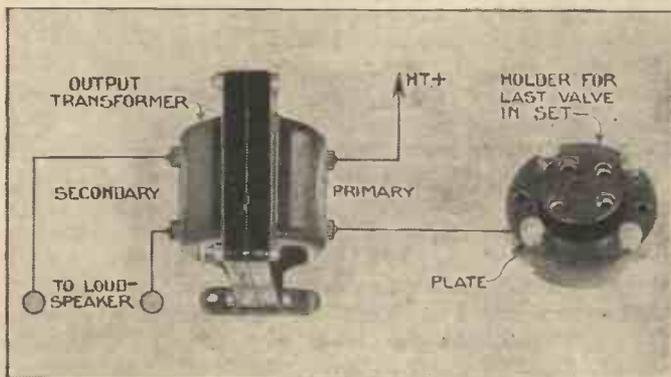


Fig. 3. An output transformer will obviate the risk of burning out the loud-speaker and also improve quality

nowadays which do not incorporate vernier dials; these can be obtained in such a variety of designs and to suit all pockets

MORE "WORTH-WHILE" ADDITIONS TO YOUR SET (Continued)

as a filament-switching and loud-speaker jack switches the filament current on automatically as the loud-speaker plug is pushed home and cuts the current off on withdrawing the plug. The method of wiring up this type of jack is shown in Fig. 6.

A slightly different kind of jack of the type shown in Fig. 7 may be utilised for connecting a pick-up into an anode-bend detector circuit. The diagram shows the connections.

The selectivity of a receiving set using a plain plug-in coil for aerial tuning will—unless a first-class aerial is employed—be noticeably flat; fortunately a good measure of selectivity can be obtained by the simple expedient of substituting a centre or double-tapped coil for the plain coil and connecting the aerial lead-in wire to the centre tap in

the case of the first-named coil or to one of the two taps on the double-tapped coil as shown in Fig. 8. The addition of a .0001

them. If your set records with a "po-o-ong" every movement taking place in the room where the set is, the absence of anti-microphonic valve holders is the cause.

A voltmeter is not quite so indispensable as an ammeter, but its uses are many and valuable. It enables the state of the H.T. and L.T. batteries to be checked up easily—and that is a job which is certainly important if quality is to be always good (run-down H.T. batteries spoil it), and if the L.T. accumulator is going to receive the attention it should for longest life.

An accessory also very useful in checking the condition of the accumulator is an hydrometer, which tells you when the battery should be sent for recharging.

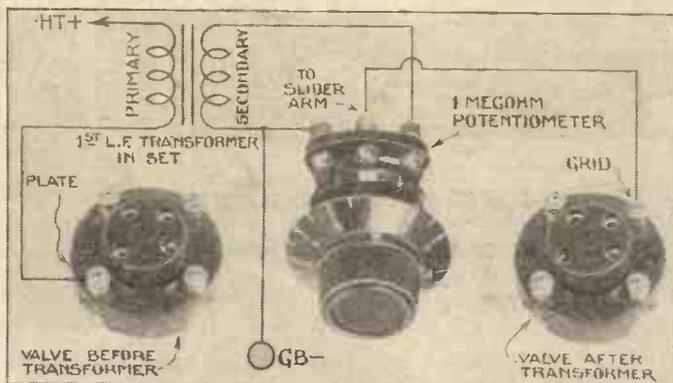


Fig. 5. Another aid to better quality is the potentiometer in the transformer circuit

fixed condenser between the end of the lead-in wire and the coil tap as shown will further increase selectivity.

Supplementary to the foregoing additions, the "worth-whileness" of which can hardly be over-emphasised, there are some minor refinements which will well repay attention.

Antimicrophonic valve holders—well, are hardly in the "minor" category at all. In fact, they would be so conspicuous by their absence in any set that it is hard to think that there is any set still without

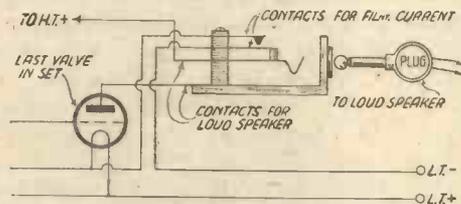


Fig. 6. Method of wiring up loud-speaker and filament jack

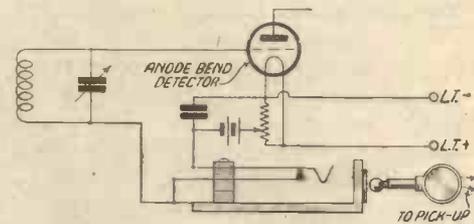


Fig. 7. Method of wiring up jack for pick-up in anode-bend circuit

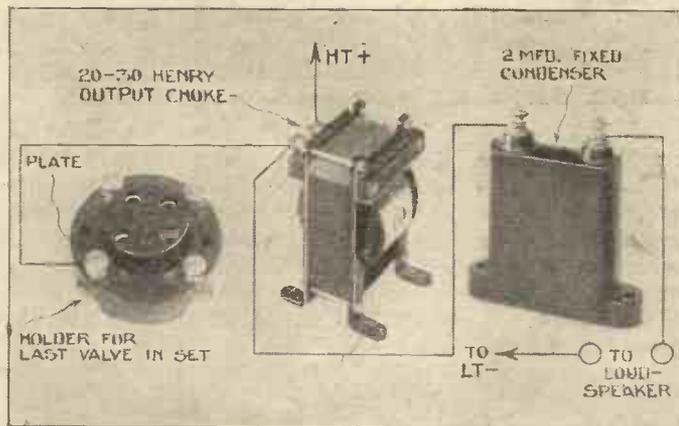


Fig. 4. An output choke and condenser will also prevent the loud-speaker windings being injured

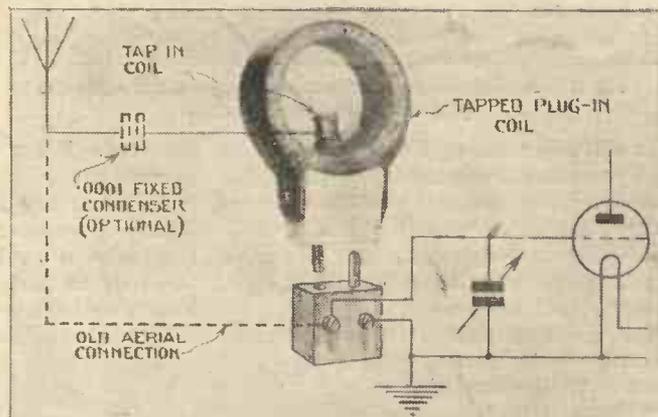


Fig. 8. A double-tapped coil will make a wonderful improvement in selectivity

THE B.B.C. secret test of television took place on Tuesday, March 5, from Savoy Hill. This demonstration was given in the presence of the P.M.G., and a number of M.P.'s of all parties and some notable technical people, including Professor Fleming, the inventor of the valve. The picture transmission was given out from 2LO on the normal wavelength, while this was accompanied by speech on about 300 metres. Jack Buchanan, the personal friend of Mr. Baird, spoke into the "mike" and had his face televised. Capt. Eckersley was also

THE B.B.C. TEST OF TELEVISION

televised, and it was reminiscent of the old Writtle days to hear him repeat the well-known formula of the amateur transmitter: "Hello—1 2 3 4." It is understood that the reception at the G.P.O. was entirely satisfactory. There was no breakdown and no interference was experienced. We understand that more than one television receiver was in operation at the G.P.O., and the witnesses were

very interested in the small portable model, illustrated last week in AMATEUR WIRELESS.

At the time of going to press it is understood that at least one amateur claims to have received the "secret test" on home-made apparatus. We understand that no special synchronising arrangements were used. Baird officials have been informed of this and, of course, are interested in the possibility of television reception by amateurs without proper synchronising means.

MOTORING is an end in itself for those who are keen enough, but I prefer a little diversion in the way of music *en route*, particularly if the route is long. There is so much fun to be had from carrying a portable set in a car, and using it while on the road and when parked by the wayside for a picnic meal, that we (that is, the Party and I) made a mental note not to be late in the "portable" field this season.

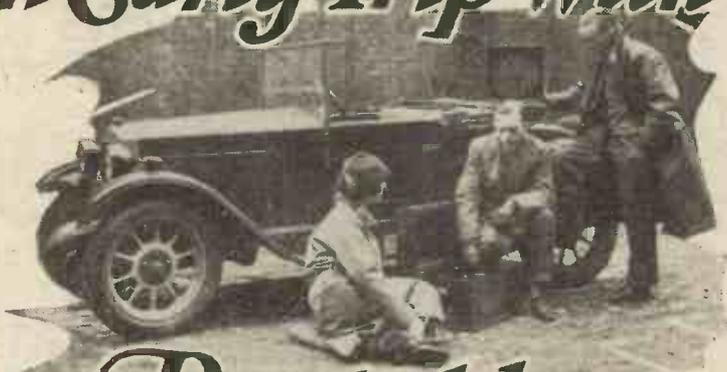
So last week-end saw us touring a corner of Essex which has a host of historical connections with King Harold, and still reeks regally of the Saxon kings. We had with us the "House Portable," described in *AMATEUR WIRELESS*, No. 346. This, you may remember, is a four-valver with one screen-grid H.F. stage and resistance- and transformer-coupled L.F. stages, the whole being contained in a box with a frame aerial in the lid, but with no incorporated loud-speaker. On the score of size, this is not an ideal car portable, for it is bulky, but it has one or two technical advantages which, from our short week-end test, I think should be found in conventional portables for motorists.

Plenty of H.T.

This particular set has a large compartment at the back for H.T., L.T., and G.B., and as it is a "four," the great need is for plenty of H.T., more especially as during our trip the final stage valve was a PV215, which, in common with all other power valves, needs ample "juice" for proper operation. So the L.T. accumulator was removed and the valve filaments were run direct from the car battery; this left space for a super-capacity H.T. battery and a 24-volt G.B. battery.

Other motorists may like to know how the valves were worked from the starter battery without modification of the car wiring. The circuit was tapped at the fascia-board lamp, the bulb being removed and a plug inserted carrying a long length of flex. The total filament consumption of the set is .5 amp, Ediswan SG215, 210HF, 210LF, and PV215 valves being used. By placing a small half-amp fascia-board bulb in series with the filaments they could therefore be run direct from the 12-volt battery. The only point is that the small series bulb employed must be a good one and carrying almost exactly the current stated by the makers. A series rheostat was used to allow for current variations, but as a matter of fact the Osram bulb used passed nearly exactly .5 amp. A small amount of rewiring of the interior of the set allowed an existing rheostat, formerly in series only

An Early Trip With a Portable



By KENNETH ULLYETT

with the screen-grid valve, to be used to control the whole set.

The only occasion on which the rheostat was used was when the set was operated while the car was in motion, and the dynamo was therefore charging the starter battery. The charging rate is about 12 amps, so that the voltage of the battery rises somewhat during charge: this might have had a bad effect on the valve filaments if a little of the rheostat winding had not been brought into circuit.



To be quite frank, it is not at all easy to use a portable set in a car in motion, even if the operator is not the driver. "Mag" interference and the noise of the car itself make reception hardly worth while, and amplification has to be pressed almost to the limit. Added to this is the difficulty of keeping the frame in line with the transmitter and of overcoming the screening effect of the metal-panelled car body.

A Radio Picnic!

It is quite different when the car is drawn up, off the beaten track, for a quiet "listen-in." We found just such a spot near Nazeing, and emboldened by the almost complete disappearance of the Great Frost, we were able to have radio accompaniment to

a picnic meal. As it was early in the afternoon, it was not possible to emulate the big "bag" of stations given in the official test of the "House Portable." Also there was some dance music from 5GB, and the feminine element of the party insisted on syncopation! But, later, a round of the dials showed that there was a useful number of stations to be had, and at least three or four of them were strong enough for pleasant outdoor audition on the loud-speaker.

Car Shielding Effect

The shielding effect of the car itself was a drawback, and signal strength was not good if the set was worked only a foot or so from the metal body. To get the best results we placed the set about 15 ft. away from the car, using a loud-speaker lead of similar length, so that the instrument could be comfortably listened to while we were seated in and around the car during the picnic. Some portables with incorporated loud-speakers might have been put to it to give the same performance, and it is suggested that in the case of a set for car use the loud-speaker should be removable, and on a length of flex. Thus the set can be placed in a good position for reception and the loud-speaker stood where required.

So far as portability is concerned, the valves were in antiphonic holders and were unaffected by car vibration. A point which arises is that everything else in a car portable should be protected from vibration, and there is no harder test for badly soldered leads! Battery wander plugs tend to come adrift. In our case the straying of a grid-bias battery plug caused a little puzzled head-scratching, and in future "portable" outings very tightly fitting battery plugs will be used.

At the conclusion of the run the set was tried in a friend's car, this having a fabric-covered saloon body with wooden framework. This might have been expected to give no shielding, but the results were disappointing. It is possible that the shielding effect is due just as much to the metal of the chassis frame as to the metal panelling of the body.

The Federal Radio Commission of America is exerting pressure to get as many broadcast transmitters out of the cities and into the country as possible.

Endeavours are being made by the B.B.C. in Scotland to persuade serious musical organisations which accept invitations to broadcast to include at least one work by a Scotsman in their programmes.

CHASING THE WILY FRENCHMAN —AND SOME OTHERS

Jottings from My Log—By JAY COOTE

THE *Plan de Bruxelles* is responsible for the wandering through the entire broadcast band of several stations which, up to the present, had suffered but few attacks of restlessness. Radio Toulouse, after having rocketed up to some 540 metres and worried Munich, amongst other friends, without warning, has suddenly slid back into his allotted position—or as near thereunto as he can safely get—on 382 metres.

An Exciting Chase

Now, hunting Toulouse in the course of his travels was an exciting game, and I took it there was a reason for his sudden return home. There was; it was all due to the *Theatre de la Capitole*, from which the operatic relays are regularly taken. Squabbling had been going on for some time in that southern city with the PTT competitor, until a compromise was suggested. "You, Radio Toulouse," said the French State, paternally, "will be given a land line if you share it with PTT, but the latter's microphone alone must be installed at the theatre. But on one condition, that you go back again to where you belong." So Radio Toulouse went home and that, for the time being, is the end of the escapade.

Then, take Lille (PTT Nord), a broadcaster whose concerts are well heard on this side. Finding himself crowded, he tried 247, then 264, then returned to 252 metres, all without success; to-night, as I write these lines, I find him on 306 metres, just above Belfast. How long will

SOME BATTERY!

LISTENERS who have had some experience with the maintenance of "super" high-tension supply for their receiving sets will not envy the task of the Westinghouse International Co.'s engineers who are now in charge of the biggest H.T. battery in existence. The battery is capable of producing a terminal pressure of no less than two million volts. It is used for testing the insulators employed for suspending the power transmission lines of an electric-distribution system carrying current at 220,000 volts. The battery installation has been called the "world's most powerful lightning generator." B.A.R.

he stay there? Better log him temporarily in pencil on the chart.

This station is supposed to be using the song of a canary as an opening signal, and a live bird at that. Personally, I have not yet heard it, but how does one induce such a studio pet to sing just at the right moment?

By the way, the identification of the provincial PTT stations is becoming more difficult, especially when they are relaying the programme of their mother broadcaster, the *Ecole Supérieure* at Paris, for the latter uses a gramophone record of a military march, "Les Trompettes de la Garde" (no need to translate). The result is that from six different places you will hear a reiterated and rather monotonous fanfare of bugles, followed by a collective call, which gives no clue whatever to the station from which you have picked it up.

Talking of French-speaking studios prompts me to mention that Radio Strasbourg has again cropped up on 268 metres, a somewhat unfavourable spot in which to search for him. The call, however, is a distinctive one and should prove helpful,

namely, *Radio Club du Bas Rhin*; the transmissions are opened and closed with a carillon of Westminster chimes slightly suggestive of those used by Radio-Paris.

Radio Belgique

Have you noticed how the signals from Radio Belgique, Brussels, vary in strength? On some nights you may hear them at full loud-speaker volume; on others, considerably weaker. Do not put it down to atmospheric conditions on all occasions, for the strength of the transmission does actually vary. On Saturdays and on Mondays the new high-power plant is being tested, and consequently on those days you will secure better reception.

If you have nothing more suitable to do on Sunday morning, try for Brussels at 8.30 a.m., when you should hear the pigeon broadcast, not that the bird is brought to the microphone, but *vice versa* the "mike" is taken to some spot whence the "homers" are released. A running commentary is given of the proceedings, and you are supposed to hear the flapping of many thousand wings (I have not, so far, but if you do, boast about it in the 8.30 up). Brussels will carry on these broadcasts as a regular feature during the pigeon-racing season.

A regular newcomer to the ether is the new Genoa station, now operating nightly on 387 metres; you should find it slightly below Hamburg.

ANODE-BEND RECTIFICATION

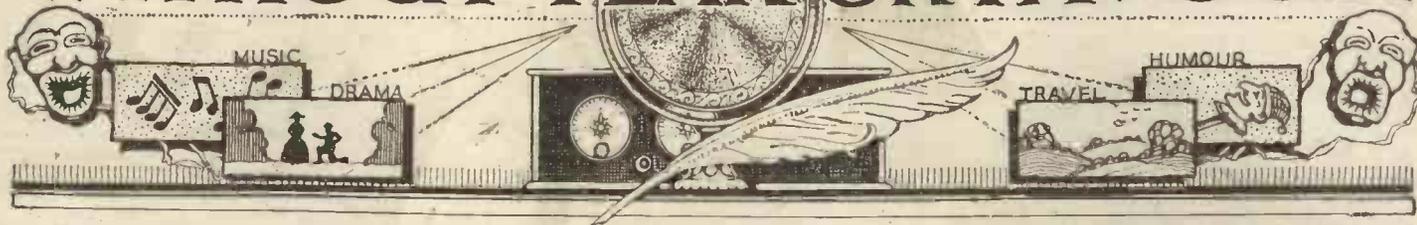
THE chief advantage of anode-bend rectification over the usual condenser and grid leak is due to the fact that no grid current can flow if the valve is properly adjusted. This not only prevents distortion but also avoids any damping of the tuned circuits preceding the rectifier, and so improves the selectivity of the set.

When grid-current flows, the rectifier acts as a high-resistance shunt across the tuned plate circuit of the previous valve, and any tuned circuit shunted with a resistance leak must fall off in selectivity. Anode-bend rectification gives the best results when followed by a resistance-capacity coupled low-frequency amplifier. B. M.



A world-wide radio audience listened to President Hoover's inaugural address on March 4. The picture shows engineers of the National Broadcasting Company making arrangements for the broadcast in front of the Capitol at Washington

WITHOUT FEAR OR FAVOUR



A Weekly Programme Criticism by Sydney A. Moseley

SO, you see, we were right about bands being paid to play tunes to suit publishers rather than listeners. The inside news came from my correspondent "Harold" and, as Savoy Hill generously admits, it was the ventilation in these columns that actually resulted in action being taken.

However, I don't think we have heard the last of the matter.

The Leicester Brass Band Festival, with no fewer than fifteen bands, was a worthy affair. The massed bands under the baton of Lieutenant J. Ord Hume played exquisitely. "Largo" especially was beautifully rendered.

Pity Robert Bridges had a cold. In truth, however, he was far more interesting than I expected. He is generally regarded as the "King's bird which won't chirp"; but I should imagine he went up one as a result of his dignified and scholarly talk.

"Harold" writes:—

"I shed no tears on hearing that Elizabeth's band would not be broadcasting again. It is perhaps a good band, but too far advanced for the average listener. The kind of tunes they favour bear the same relation to jazz as Stravinsky's compositions to classical music. Too impressionistic and not really tuneful enough."

Dorothy McBlain (the girl who whistles in her throat) is certainly clever, but not very entertaining. The only really acceptable siffleur I have heard on the wireless is Ronald Gourley.

5GB has given us some good opera transmissions at various times. For instance, we recently had excerpts from *Pagliacci*, *Carmen*, *The Magic Flute*, and *Cavalliera Rusticana*. A reader wants to know why they included an obscure opera by Mozart called *Ibomenia*. (As a change, I imagine!)

Light music was recently given from 5GB by a gipsy ensemble. The playing was extremely good and the singers—Nino Maudini in particular—were excellent. And plenty of Strauss. Can we really have too much of this tuneful composer?

I have received a backing of my criticism of *Airy Nothings* from quite an authority. He agrees that it had the makings of a good wireless revue. Spoilt, however, by too much singing of jazz tunes. The organisers should realise that we hear enough of these tunes all day long from office-boys and barrel organs. In fact, when we listen-in to revues we expect something new. The little acts between the songs all promised to be amusing, but were cut off before they really got going. The "turn" from the "Collodium" was quite funny, but there was not enough of it. The burlesque radio drama was amusing; in fact, all the participants were good, but their capacity for comedy was left almost unexploited.

"B.D." of Shepherd's Bush, writes: "If it were possible to measure entertainment value I think it would be rather interesting to see how some of the wireless 'top-liners' would fare. Pretty badly in some cases, I should imagine. And it is quite possible that certain unassuming people would have quite good marks. One turn in particular I have in mind. It is a band—and it does its bit quietly. It is not heralded by an announcer handing out compliments or a burst of applause from the studio. It is Frank Westfield's band. It caters for everybody; and personally I'd give it ten out of ten every time."

"Just think of it!" exclaims "Bonzo," of Notting Hill. "Tommy Handley, Gracie Fields, Stainless Stephen, Clapham and Dwyer, Jack Hylton's Band, Norman Long, Julian Rose, and Billy Mayerl—all in one evening!"

He continues: "No—I didn't say it was coming off—but just think of it!"

More interesting views of correspondents. "As a strong supporter of your 'Death to Dirt' campaign," writes Charles B. Ball, of the City Hospitals, Sheffield, "may I draw your attention to the enclosed paragraph?"

The cutting refers to the recent banned broadcast turn which I have already noted. He points out an alleged comment of one of the artistes banned: that the elimination of too daring turns "left nothing worth broadcasting."

On another subject he refers to an hour's broadcast from 5GB as "the worst solid hour of futility and amateurism ever broadcast. Don't you also agree with 'Middle-brow' in his views on Sunday broadcasts? Thank goodness for foreigners. Even the *Plan de Bruxelles* can't spoil all of them!"

I stayed up late recently to hear the famed Abe Lyman's Band from 5XX. My opinion of it is obvious when I say that I shall be asleep next time they are relayed.

I was cheered considerably by 5GB's recent "Old Folks' Hour." But I think there was a little too much back-chat. It sounded more like a rehearsal than finished act.

A report from The Hague states that on February 17 the Dutch Radio Service succeeded in establishing direct radio telephony communication between Sydney and the Dutch station at Kootwijk, a distance of over 10,000 miles.

Volcanic eruptions, which have cost thousands of lives in the past, can be made free of danger by the use of microphones, thinks a noted French scientist, Mr. Jean Bonnin, who suggests placing microphones at "strategic" points on the craters, so as to give warning to neighbouring inhabitants.



Russell Thorndike—an Impression



The CLARION SCREEN-GRID

Under

Also Included are Final Construct

The connections are slightly more complicated in the case of the H.F. coil owing to the position of the reaction winding. The terminals are connected as follows.

THE wiring of the "Clarion Screen-grid Three" is very simple to carry out. Lewcos bare connecting wire is used for simplicity, though insulated wire, such as Glazite, can be used if desired.

There are two points at which insulation is necessary if the bare wire is used and these are near the copper screen. The wire joining one terminal of the screen-grid valve-holder to the L.T. positive terminal, and that passing from the anode terminal of this valve-holder, through the screen, to the H.T.+1 tapping, are, if not insulated, both in danger of shorting to the screen itself. To prevent this, short lengths of insulated tubing such as Systoflex should be passed over the wires.

There is a flex connection passing through the screen from one side of the H.F. coupling condenser to the terminal at the top of the H.F. valve, and insulated flex must be used, for otherwise H.T.+2 would "short" to the screen.

A READER'S TEST OF THE "CLARION THREE"—THIRD

Conducted by Mr. B. A. Barton, of Wallwood

Not a little flattered by being handed for test the "Clarion Three" by the "A.W." Technical Staff, I was anxious to see how its performance compared with that put up by other AMATEUR WIRELESS sets which I have made up recently. I must let the following results serve as a guide to enable other readers to judge for themselves.

My aerial is not ideal, and the locality in which I tested the "Clarion" is reputed to be only fair for reception. It may interest other readers to know that in this test I used 2-volt valves (a screen-grid valve, H.F. detector, and DEP power valve) and a 120-volt dry-cell H.T. battery.

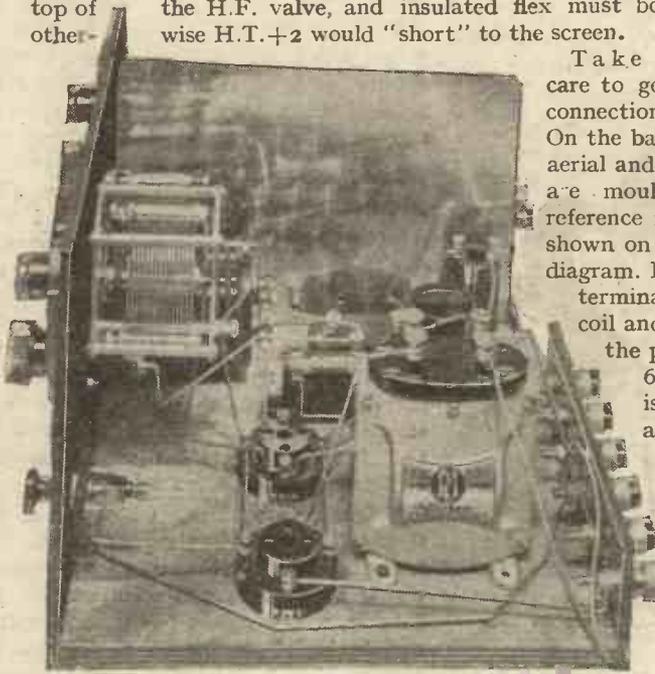
The anodes of all three valves were given the full available voltage, while the screen-grid tapping H.T.+1 was given approximately 80 volts. This was the makers' recommendation, and certainly worked well.

On the shorter wavelength range of the coils 36 identified stations were

MEDIUM-WAVE BAND

| | H.F. Aerial |
|---------------------|-------------|
| Ljubljana | 90½ 88 |
| *Budapest | 84 81½ |
| *Vienna | 81 78 |
| *Brussels | 78 76½ |
| *Milan | 76 74 |
| *5GB | 72 70 |
| Berlin (Voxhaus) .. | 70 68 |
| *Langenberg | 67 66 |
| Rome | 64 63½ |
| Brunn | 62 62 |
| *Madrid | 61½ 61½ |
| *Frankfurt | 61 61 |
| *Kattowitz | 60 60 |
| *Dublin | 59 59 |
| Berne | 57½ 57½ |
| Glasgow | 56½ 56½ |
| *Hamburg | 55½ 55½ |
| *Stuttgart | 52 52 |
| *London | 48½ 48½ |
| Barcelona | 46 46 |
| *Goteborg | 45½ 45½ |
| Prague | 45 45 |
| Copenhagen | 44 44 |

Take particular care to get the coil connections right. On the bases of both aerial and H.F. coil are moulded small reference numbers and these are clearly shown on the blueprint and in the circuit diagram. In the case of the aerial coil, the terminal 5 is the centre tapping of the coil and is connected to one side of the pre-set condenser. Terminal No. 6 is the grid end of the coil and is connected to the grid terminal of the H.F. valve holder and to the fixed plates of the variable condenser. Terminal No. 3 is the earth end of the coil and is connected to the L.T. negative terminal on the H.F. valve holder and to the moving plates of the aerial tuning condenser.



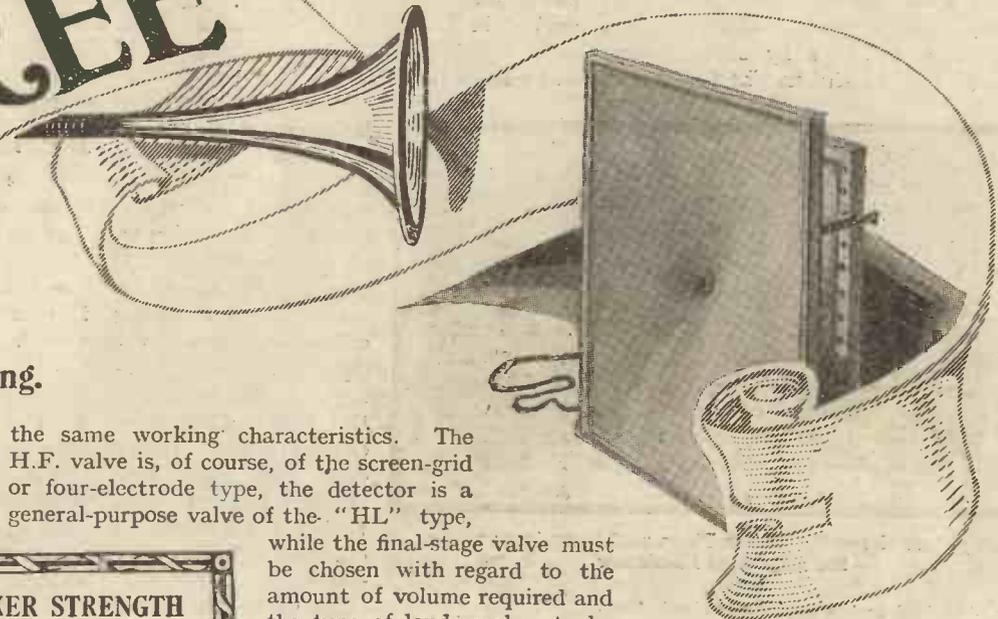
No. 1 (centre tapping), to a .01-microfarad coupling condenser; No. 5 (the grid end) to the grid condenser and the fixed plates of the H.F. tuning condenser; No. 3 (the earth end and one side of the reaction

SUITABLE TWO-VOLT VALVES TO

| Make | Coscor | Cosmos | Cleartron | Ediswan |
|----------|--------|--------|-----------|---------|
| H.F. .. | 220SG | — | 215SG | SC215 |
| Det. .. | 210HF | SP16G | CT15F | HF210 |
| Power .. | 220P | SP18RR | CT15X | PV215 |

coil) to the moving plates of the H.F. tuning condenser and to the screen; No. 6 (the free end of the reaction coil), to the moving plates of the midget reaction condenser. These wiring instructions should be

ON EN-GRID THREE r Test



Additional Notes and Hints on Operating.

followed in conjunction with the blueprint.

Check the Wiring

Check over all the wiring when complete,

the same working characteristics. The H.F. valve is, of course, of the screen-grid or four-electrode type, the detector is a general-purpose valve of the "HL" type,

while the final-stage valve must be chosen with regard to the amount of volume required and the type of loud-speaker to be operated. For normal work in a reasonably sized room, however, a power valve of the "DEP" variety is eminently suitable and in the accompanying table other valves having approximately the same characteristics as this are shown.

TY-ONE STATIONS AT FULL LOUD-SPEAKER STRENGTH

Wood Lodge, Gainsborough Road, Leytonstone, Essex

| | H.F. Aerial | |
|---------------------|-------------|-----|
| *Gleiwitz | 41 | 41 |
| *Cardiff | 40½ | 40½ |
| *Breslau | 39½ | 39½ |
| *Aberdeen | 35 | 35 |
| Paris (Radio Vitus) | 34 | 34 |
| *Belfast | 31½ | 31½ |
| *Konigsberg | 30 | 30 |
| *Turin (?) | 28 | 28 |
| *Kaiserslautern | 26½ | 26½ |
| *Cologne | 24 | 24 |
| *Horby | 23½ | 23 |
| *Nurnberg | 17 | 16 |
| Cork | 12 | 10½ |

received, all clearly audible. Of these, 25 were at full volume on the loud-speaker, and these are marked with an asterisk in the accompanying table. In order to make the most of the set on the medium waves I found it advisable to make good use of the pre-set condenser in series with the aerial. So far as I am able to judge, a capacity of .0001 microfarad resulted in the best selectivity without loss of volume.

On the long waves, with the coil switches pushed in, only Motala was not really at generous loud-speaker strength. There was no trouble in separating one long-waver from another. Against each station in the accompanying list are given the H.F. and aerial condenser settings, and you will see that, with a proper setting of the pre-set condenser, these readings can be made identical over the greater part of the tuning range on the medium waves. It may be of interest to note that all these stations were "bagged" between 7 and 9.45 p.m.

LONG-WAVE BAND

| | | |
|-----------------------|----|----|
| *Radio Paris | 79 | 70 |
| *Berlin (Zeeseen) | 73 | 63 |
| *Daventry 5XX | 69 | 63 |
| *Paris (Eiffel Tower) | 64 | 57 |
| Motala | 57 | 50 |
| *Kalundborg | 43 | 37 |
| *Hilversum | 37 | 35 |

An Independent Test

As explained last week, the "Clarion Three" was designed not to be a complicated box of tricks but as a super-performance set for the average man. It was thought, therefore, that the best way of showing the capabilities of the set would be to place it for a time in the hands of an enthusiastic AMATEUR WIRELESS reader. We were not in any way biased in our choice of the lucky man to have this set on test! The only rule was that for convenience he would have to be a Londoner, because the "Clarion" was described last week and there would not have been time to make tests in other parts of the country.

So we asked a very keen reader, Mr. B. A. Barton, of Wall-wood Lodge, Gainsborough Road, Leytonstone, Essex, to try out the "Clarion" and give us a frank test report on it. This is given on this page, together with operating notes, dial readings and so on.

and this can most readily be done if the blueprint is used as a wiring guide and each lead is separately followed out and marked off on the blueprint.

In an accompanying table is shown a

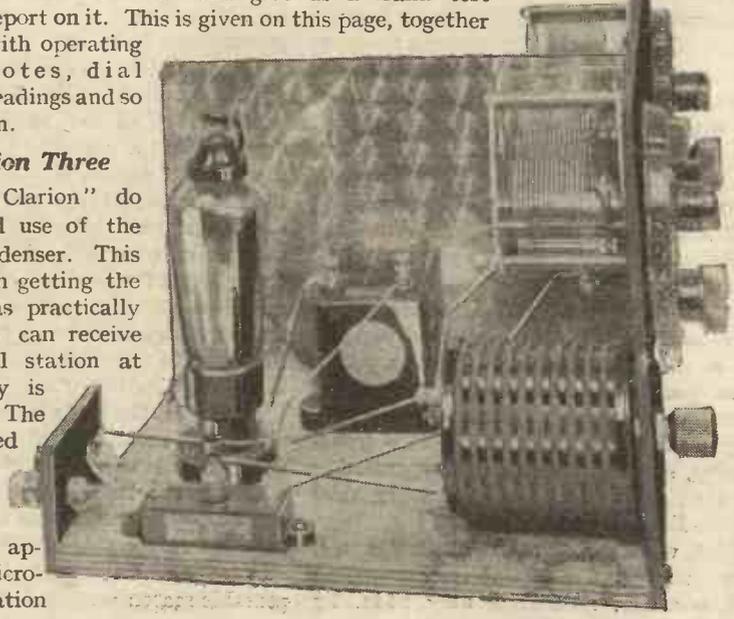
USE WITH THE "CLARION THREE"

| Marconi | Mullard | Mazda | Osram | Six-Sixty |
|---------|---------|-------|--------|-----------|
| S215 | PM12 | — | S215 | 215SG |
| HL210 | PM1HF | GP210 | HL210 | 210LF |
| DEP215 | PM2 | LF215 | DEP215 | 215P |

selection of suitable 2-volt valves to use with the "Clarion Three." It must be quite clearly understood that four- or six-volt equivalents can be used if desired, and it is important only to note that they have

How to Work the Clarion Three

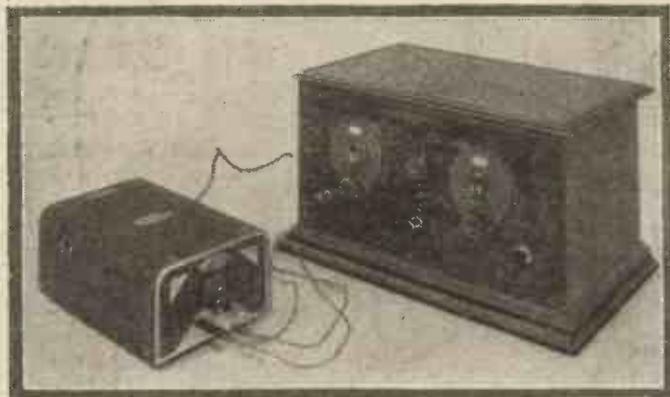
When operating the "Clarion" do not forget to make good use of the variable series aerial condenser. This is a great convenience in getting the utmost selectivity, and as practically every listener nowadays can receive 5XX, 5GB and a local station at good strength, selectivity is rather badly needed. The pre-set condenser employed (Formo-denser type J) has a maximum capacity of .0003-microfarad and a minimum capacity of approximately .000025-microfarad. For local station



"THE CLARION THREE" (Continued from preceding page)

reception it is usually better to work with the series condenser out of circuit, and this can be done by shifting over the spade tag, on the end of the length

pulled out for short-wave reception and pushed in for the long waveband. The total wavelength range is approximately 200-2,000 metres.



This picture shows the Clarion Three used in conjunction with the Regentone Eliminator

of flex attached to the aerial terminal, from one side of the pre-set condenser to the other.

Wavelength Range

The wave change knobs on the coils are

There is really no need to encase the set in a metal cabinet, for the existing screening is amply sufficient. A tendency towards uncontrolled oscillation of the H.T. valve can generally be checked by variation of the screen-grid voltage on the H.T. + 1

When tuning make judicious use of reaction and, up to a point, the reaction knob can be used as a volume control, but quality is, of course, impaired if there is too much reaction. The H.F. tuning condenser, that is the right-hand knob, looking at the front of the panel, gives more critical control than does the aerial condenser, and the final tuning is therefore effected with the H.F. control.

tapping. A little experimenting can usefully be carried out with this tapping and it is a convenience if an H.F. battery allowing of graduations in small-voltage steps is employed.

H.T. Values

There is no objection to using an H.T. voltage of so much as 150 if this is available. The makers of most screened-grid valves state that these can be used with between 100-150 volts H.T. The H.T. + 2 tapping is common to the anodes of all three valves: It is automatically reduced to a more reasonable figure for the detector owing to the D.C. resistance of the primary winding of the L.F. transformer.

For the efficient working of modern sets it really is essential to have plenty of H.T. and if electric light mains are available then an H.T. eliminator is the most economical way of getting plenty of anode "juice." In our preliminary tests the Clarion was used in conjunction with an eliminator, the Regentone, model W.I.B., working on A.C. mains. This proved entirely satisfactory and showed no tendency to cause the set to motor-boat.

A SPECIAL "A.W." PORTABLE NEXT WEEK

EVERYTHING points to the summer of this year seeing more numbers than ever before of portable wireless sets at picnics, at the seaside, in the car, or on the river. Indeed, radio music will be a commonplace accompaniment to almost every summertime pastime, and at every holiday haunt. You will feel lost without a compact little portable, to give music wherever you go, and to keep you in touch with the towns, and with the Continent, no matter how hard you try to get away from civilisation for a few weeks' rest.

Just the set you want will be described next week, and the AMATEUR WIRELESS Technical Staff is feeling very proud of it, because (pardon the alliteration) it is a Portable with a Punch! It stands up to the closest technical criticism, and you will not be surprised that it possesses a punch when you know that it is a screen-grid "four" with two transformer-coupled L.F. stages, using the new special-core transformers, with a frame aerial incorporated in the case, and (a very special feature, this) a linen-diaphragm loud-speaker!

Next week's AMATEUR WIRELESS will show just how the layout is arranged so that in a case measuring only 18 in. by 18 in. by 8½ in. the four-valver, the frame,

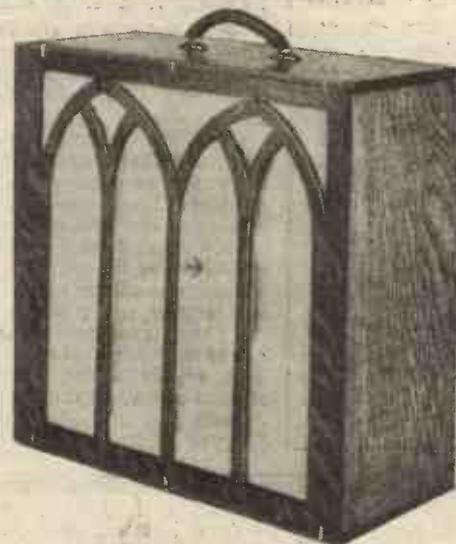
the linen-diaphragm speaker and ample-capacity batteries can be contained.

Of equal importance to the signal-strength punch is the purity given by this portable, and this will come as a very pleasant surprise to those who have been accustomed to old-fashioned portables of the "bad gramophone" variety.

One other feature which will give this new portable a warm welcome is *simplicity*. A portable set should be just as easy to operate as is a portable gramophone, and if the panel carries a mass of knobs, then the non-technical user can't be blamed for fighting shy of the set. Usually a large number of control knobs is necessary in order to get the best out of the set, but an ingenious ganging system incorporated in this portable reduces tuning, for all practical purposes, to a one-thumb-control business. Simplicity itself!

Note, too, that this is an all-wavelength set, for it incorporates dual-range tuning arrangements which are changed from the short to the long waves, and *vice versa* simply by the movement of two push-pull switches on the side of the cabinet.

AMATEUR WIRELESS is opening the portable season well in describing this new set, and even the owners of existing port-



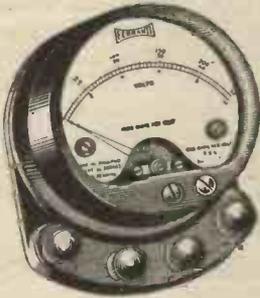
The Special "A.W." Portable to be described next week

ables will have to confess that the general use of screen-grid valves, linen-diaphragm loud-speakers and so on has brought about a new era, and has simplified the job of the builder of a portable.

Even if you haven't resolved to have a set for the out-of-doors this year, the description of this new set will make interesting reading. Make sure of getting next week's issue!

Bucharest's high-power station will begin testing towards the end of April; its aerial power is to be 25 kilowatts.

Notes for Newcomers.



In your search for true radio reproduction don't trust to the ear—use a Ferranti Radio meter.

Base your adjustments on certainty rather than imagination.

The instrument shown is the portable 3 range instrument Type PR3A, No. 26, 1000 Ohms per volt. It measures accurately the H.T., L.T. and grid bias volts.

In every way an instrument worthy of its producers. Price £2 : 17 : 6.

FERRANTI LTD. HOLLINWOOD
LANCASHIRE

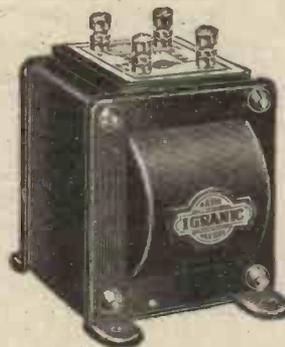
UP-TO-DATE 'IGRANIC' COMPONENTS



IGRANIC PENTOFORMER OUTPUT TRANSFORMER

The Igranic Pentoformer is essential in any circuit employing a pentode valve as the impedance of the loud-speaker must be matched with that of the valve. Tappings are provided so that the necessary step-down ratio may be obtained, thus giving maximum output and pure straight line reproduction.

30/-



IGRANIC DUAL IMPEDANCE COUPLING UNIT

This interesting L.F. Coupling Unit contains two iron-cored inductances with a coupling condenser of values calculated to give maximum amplification of marked purity. It possesses many advantages over resistance-capacity coupling and, for a given H.T. voltage, enables greater amplification to be obtained.

30/-



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Mention of "Amateur Wireless" to Advertisers will Ensure Prompt Attention

TRANSMISSION PROBLEMS

THE POSSIBILITY OF FREQUENCY MODULATION

By MORTON BARR

SO much attention is given to the necessities of wireless reception that, by contrast, the various problems peculiar to the transmitting side of the subject are apt to be overlooked. This is natural enough, because, in the first place, the ordinary listener is not particularly concerned as to how the broadcast programme is conveyed through the ether, so long as it is delivered from the loud-speaker in satisfactory quality and volume.

In the next place, the design of wireless receivers, although still elastic, has nevertheless been standardised within definite limits, and any drastic change in the present methods of transmission would be widely opposed if it necessitated the introduction of an entirely new type of receiver.

Ether Congestion

At the same time, some such revolutionary change may become necessary in the not far distant future, if only as a remedy for the ever-growing problem of ether congestion.

We stand practically at the threshold of future broadcast development. As time goes on, more and more stations are bound to come into operation. Meanwhile the modern type receiver is continually increasing its powers of reaching-out and bringing more and more stations within range.

Unfortunately, the ability of the receiver to select or discriminate between one programme and the next is not progressing at the same rate. Even if it were, another

factor exists to put a definite limit to the number of stations that can operate, without overlap, inside the present restricted band of broadcast wavelengths.

In transmission, each modulated signal wave is accompanied by a spreading "fringe" of so-called side bands which carry the essential voice or musical frequencies. Unless the "tuning" of the receiver circuits is sufficiently broad to embrace, not only the carrier, but also its "fringe," the quality of reception must suffer.

Side-band Difficulties

The existence of side bands presents a double difficulty. On the one hand, it definitely limits the number of transmitting stations that can be accommodated within the 200-600 metre band to which the bulk

of European medium-wave broadcasting is confined. In fact, the International Committee in Geneva ruled that there must be a separation of at least 10 kilocycles (10,000 cycles) between every broadcast station working within these limits. Otherwise the side-band frequencies so overlap in the

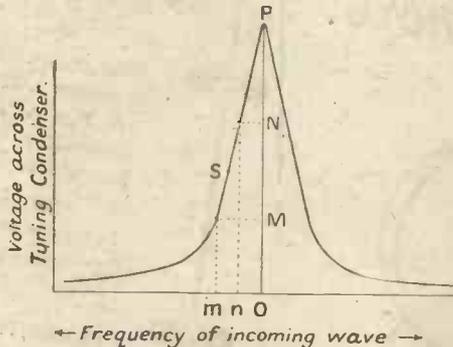


Fig. 3. Resonance curve in reception

ether that it becomes impossible to separate one programme from its nearest neighbours, even on the most selective type of receiver.

On the other hand, the presence of the side-band fringe places an equally effective limit upon the degree to which selectivity

accommodated without overlap is limited to a total of 100.

Regional Schemes

Meanwhile the falling cost of loud-speaker reception is steadily widening the circle of European listeners, and increasing the demand for further programme facilities, particularly those having a local or regional interest.

To some extent the difficulty has been met by operating a considerable number of different stations on the same wavelength, a checker-board system of distribution of the uni-wavelength stations being relied upon to reduce "overlap" and possible heterodyning. Using such a system, the same wavelength can be duplicated several times, with a corresponding increase in the previous maximum number of permissible stations.

An alternative solution is to modify existing methods of transmission. Under normal circumstances, when the microphone current is applied to the carrier wave at the transmitting station, two series of side bands or modulation frequencies are created, one extending above the original carrier frequency, whilst the other spreads out to an equal distance below it.

Single Side-band Transmissions

Now either the upper or the lower side band is alone capable of carrying the essential musical or speech tones imparted by the microphone. In existing methods of transmission

both side bands are radiated, occupying a double width of the valuable ether space.

It is quite possible, however, to eliminate the carrier wave and one side band, either the upper or the lower, before the signal energy reaches the transmitting aerial. If this method of transmission, which is at present actually used for commercial transatlantic telephony, were brought into general use, say for broadcasting, congestion in the ether would be reduced by, roughly, one half. In other words, double the number of broadcasting stations could be brought into operation without increasing the many present difficulties of selective reception.

Unfortunately this system of modulation involves certain complications in the

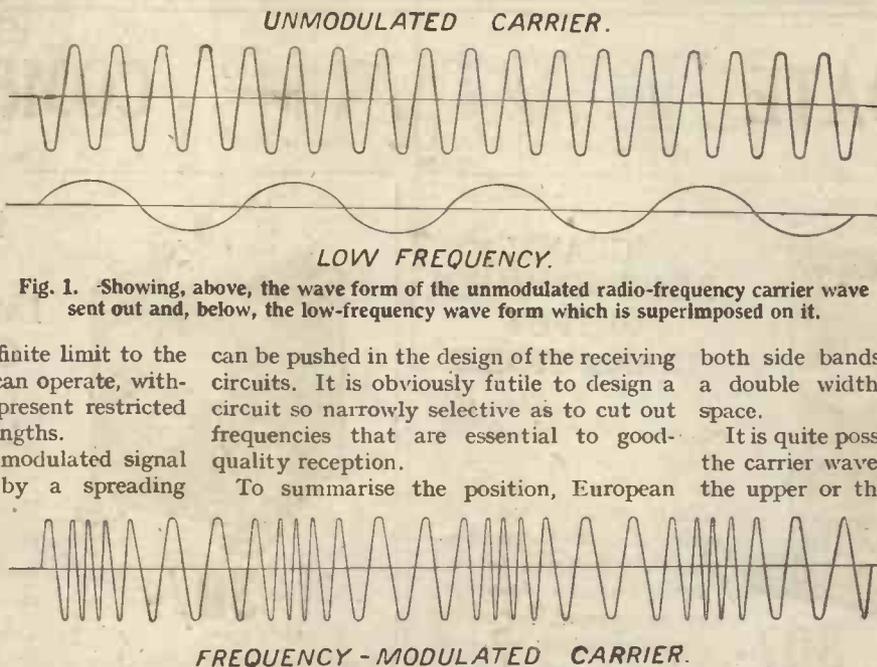


Fig. 1. Showing, above, the wave form of the unmodulated radio-frequency carrier wave sent out and, below, the low-frequency wave form which is superimposed on it.

Fig. 2. The wave form of a frequency-modulated carrier

can be pushed in the design of the receiving circuits. It is obviously futile to design a circuit so narrowly selective as to cut out frequencies that are essential to good-quality reception.

To summarise the position, European

medium-wave broadcasting stations must—with a few exceptions—work on wavelengths between 200 and 600 metres, which is equivalent in the frequency scale to a band of from 1,500 to 500 kilocycles, or 1,000 kilocycles in all. Dividing this band into gaps of 10 kilocycles, as required by the Geneva Committee, we see that the maximum number of stations that can be

circuits at the receiving end. In order to reproduce the original sound values, it is necessary to restore, in the receiving-set, the frequencies abstracted at the transmitter. This, in turn, necessitates the use of a local oscillator valve (or heterodyne), together with special filtering circuits.

Ultra Short-wave Radiation

Another possible change in transmission methods that is to some extent already foreshadowed by the increasing use of short-wave radiation, would be to shift the present 200-600 metre broadcast scale down to, say, the band of wavelengths lying between 20 and 100 metres. Strange as it may seem, this latter range of wavelengths covers a frequency band of no less than 12,000 kilocycles, or twelve times that afforded by existing broadcasting wavelengths.

Other things being equal, this would at once open the way to a twelvefold increase in the present number of transmitting stations, without causing any greater congestion in the ether.

On the receiving side certain modifications in the standard type of circuit would be necessary in order to handle the shorter waves. So much progress has already been made in this direction, however, that the necessary change-over should involve no great difficulties. Sets designed to receive wavelengths between 20-100 metres are, of course, already available for the reception of the short-wave programmes transmitted from Chelmsford, Nauen, Hilversum, etc.

Frequency Modulation

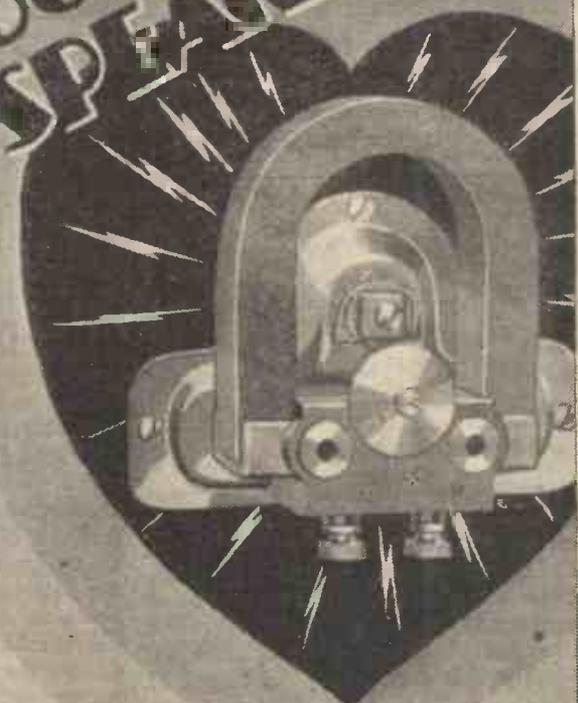
Another suggestion to reduce overcrowding in the ether is one that depends upon an ingenious method of modulation, whereby voice and musical signals are transmitted through the ether in the form of *frequency variations* imposed upon the original carrier wave.

At present the effect of applying speech or musical currents to a radiated ether wave, is to cause the amplitude of that wave to fluctuate after the fashion shown in Fig. 1. Under the influence of the modulating current, the amplitude of each successive cycle of the carrier increases or diminishes progressively as indicated. The resulting outline or "envelope" forms a replica of the applied signal frequency, and the carrier is, in fact, reduced or restored to this form by the action of the detector valve in reception.

According to the new method of "frequency-modulation," the amplitude of the carrier wave is maintained absolutely constant for each cycle. The applied signal current is, however, made to vary the frequency of successive cycles, so that at one moment they are crowded together, and at the next spaced apart, as shown in Fig. 2. These fluctuations in spacing or frequency, follow the rhythm of the applied modulating current, the crowded portions corresponding to crests in the low-frequency

(Continued on page 432)

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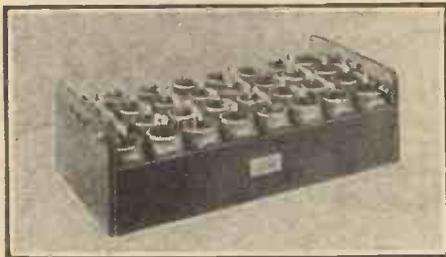
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"A.W." TESTS OF APPARATUS

Conducted by our Technical Editor, J. H. REYNER, B.Sc. (Hons.), A.M.I.E.E.

Standard Wet H.T. Battery

WE have just completed a test on a number of large capacity Leclanché cells, supplied by the Standard Wet H.T.



Standard Wet H.T. Battery

Battery Co., of 184-188 Shaftesbury Avenue, W.C.2. These are supplied in cases of 32 cells showing a voltage of approximately 45.

The glass containers in which a central sac element and circular zinc are fitted measure, 2 in. by 2 in. by 4 in. high. The central carbon electrodes project $\frac{3}{4}$ in. above the cell making a total height of $4\frac{3}{4}$ in.

The large capacity of these batteries merits a fairly high discharge rate; our tests therefore commenced with a discharge of 30 milliamps. The cells were left on discharge through the same resistance for nearly 450 hours until the voltage and consequently the current consumption had fallen to half the original value. During this period of continuous discharge, just over 10,000 milliampere-hours were withdrawn from the battery, i.e., more than 10 times as much as from a small size dry battery. The results of this test, therefore show that the cells will stand up to continuous hard work, while, under normal conditions when the discharge is not continuous, the voltage will, of course, fall still less rapidly than under our test conditions.

The battery may be recommended for heavy duty work.

Centralab Modu-Plug

IT is a matter of considerable difficulty to produce a high-resistance volume control which will enable the operator to adjust with precision and ease the volume from his loud-speaker. On many controls a correct adjustment is obtained only after very careful setting. One of the chief difficulties encountered by the designer of volume controls is to obtain a range sufficiently high and yet one in which the lower values of resistance may be varied within fine limits.

Such a control, marketed by the Central Radio Laboratories of Milwaukee, has been

submitted for test by The Rothermel Corporation, Ltd., of 24-26 Maddox Street, Regent Street, W.1.

It is known as the Centralab Modu-Plug and is made in three types, one of which is suitable for inserting in the usual loud-speaker jack, while a second type is fitted with a 24 in. cord, the ends of which may be clamped on to the loud-speaker terminals, and a third type, for remote control is supplied with 20 ft. of cord.

When high-resistances of the order of $\frac{1}{2}$ -megohm are required some form of carbon resistance must be employed; the difficulty hitherto has been to obtain a moving contact over the resistance element which does not ultimately cause wear on the surface of the element. One of the chief features of the Centralab Modu-Plug is that a rocking disc contact is employed; the rotating arm, controlled by a bakelite knob, moves over a specially shaped metal disc causing this to make contact with the desired portion of the resistance element without in any way scraping it. The motion of the Modu-Plug is commendably smooth and owing to the fact that a taper resistance element is employed, the resistance variation is less rapid at the lower values and in consequence the volume may



Centralab Modu-Plug

be controlled with far greater accuracy. The maximum value of resistance is 700,000 ohms.

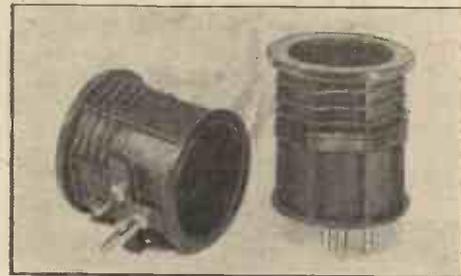
This component can be thoroughly recommended to readers.

Cason Short-wave Coils

IT will interest those of our readers who run a Cossor Melody Maker to know that the short waves are now accessible to them, since a set of suitable short-wave coils have now been marketed by Cason Mouldings of Chiswick Road, Lower Edmon-ton, N.9. The coils are plugged in in place of the ordinary coils.

To test the coils we decided to sit up one night and see what we could do in the way of the American short-wave stations. We found at first that the handling of the set on these wavelengths was rather tricky

owing to the necessity for keeping the two condensers in step; after a little while, however, we were able to pick out the various stations without much difficulty.



Cason Short-wave Coils

Soon after 11 p.m., we picked up the carrier of 2XAF and soon obtained music and speech at good loud-speaker strength.

The coils can be recommended to readers.

Cleartron 215SG Valve

THE four-electrode valve is becoming increasingly popular in modern high-frequency circuits. The reasons for this are two-fold. In the first place, the use of an auxiliary grid between the control grid and the anode enables an improved mutual conductance to be obtained, resulting in higher amplification for a given A.C. resistance.

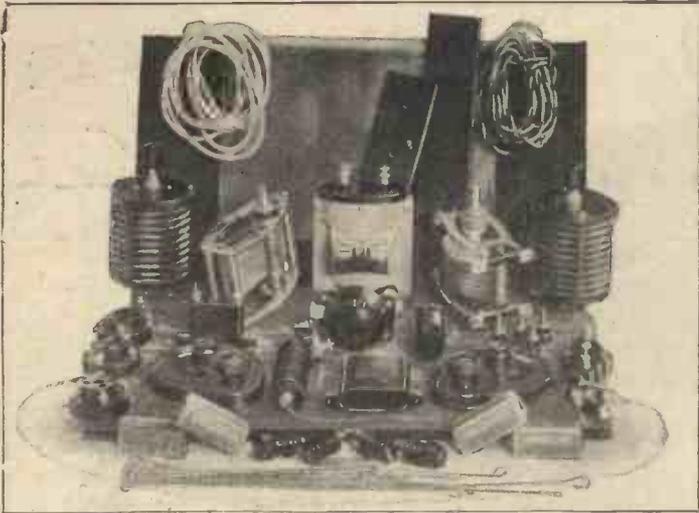
This might, by itself, constitute a disadvantage if it were not for the second property of the valve, which is to some extent incidental. The extra grid, which is connected to H.T.+, acts as a screen between the control grid and the anode, thereby reducing the capacity coupling.

It is well-known that such capacity coupling gives rise to self-oscillation in amplifiers, particularly at high frequencies, and the minimisation of this coupling is one of the principal assets of the modern four-electrode valve. Actually this shielding is deliberately sought in the normal types of valve, enabling as it does the amplification factor to be increased to a very high figure without danger of feedback through the valve itself.

The question arises, however, as to how far this screening inside the valve is necessary. The more careful the screening the higher can the mutual conductance of the valve be made, but if we are content with a mutual conductance of the same order as that obtained in a standard triode, then we can do with much less perfect screening.

This is the case in the new Cleartron screen-grid valve. In it the construction follows the ordinary Cleartron practice,

(Continued in third column of page 428.)



SUCCESS ASSURED! BUILD THE CLARION THREE

NOTE OUR EASY TERMS

Don't be content with just your local station, build a set which will enable you to listen in to Europe's finest programmes; Paris, Brussels, Madrid, Rome, Berlin. **No soldering.** Panel and terminal strips drilled ready. All connecting wires cut, looped and numbered. Mistakes impossible.

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COMPLETE KIT OF PARTS £4-4-0
Cabinet in Oak, 14/6 Extra.
Three suitable valves for this set, 45/6 Extra.
(MULLARD, COSSOR, MARCONI).

OR 15/- down and 5 payments of 15/-.

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COMPLETE KITS AND ALL PARTS IN STOCK

CLARION THREE CV3 KIT.—Complete Kit of parts including three specially matched valves, MARCONI, MULLARD or COSSOR. Cash price £6-9-6

Or 18/- down and 10 payments of 12/-.

CLARION THREE CV33 KIT.—Complete kit as CV3, but including Cabinet, 120-volt EVER-READY battery, OLDHAM, EXIDE accumulator and AMPLION speaker A.R.9. Cash price £10-5-6

Or 25/- down and 12 payments of 16/3.

James' Binowave Three (A.W., Feb. 16), complete kit. Cash price £5-10-0

Valves £1 13s. 6d. Or 20/- down and 10 payments of 10/-.
Complete kit and valves, 34/- down and 10 payments of 13/3.

GRADUAL PAYMENTS

The very best terms possible on all wireless apparatus (Speakers, Kits, Valves, H.T. Units, Wet Batteries, etc.) State your requirements and we will quote you by return. Immediate delivery. Carriage Paid on all orders. R.E.P.T.A. Members supplied.

Listeners' Three Kit (A.W., Feb. 2), complete kit. Cash price £4-10-0

Coils 9/6 and 10/6 per pair. Valves, 45/6 extra.
or 16/8 down and 10 payments of 8/4; or complete with valves and 2 pairs coils, 25/- down and 12 payments of 12/2.

Titan Three Kit. Complete. Cash price £3-7-6

Or 15/- down and 6 payments of 10/-.
Complete with valves; £1 down and 10 payments of 10/-.

The lowest priced kit of first-class components.

Beginner's Two (A.W., Feb. 9). Complete kit 52/- Valves 23/- extra.

Or 15/- down and 4 payments of 11/3.

Titan Three Coils 15/-. Binowave Coils, R.I., 12/6. Listeners' Three

coils, s.w., 9/6, l.w., 10/6. Tunewell dual range coils, as

specified by the designer of the Clarion Three, 21/- per pair.

Solve your H.T. troubles with EKCO Units.

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Weekly Tips,
Constructional
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DEN

By
W. JAMES

For the
Wireless
Amateur

NEWS that a slight modification has been made in the characteristics of the well-known LS₅A super-power valve (its magnification factor having been increased a little) reminds me that amateurs sometimes have the idea that an output valve must have a low magnification factor before a large grid swing can be handled.

This is far from the truth. As valves are made more effective by increases in their magnification factors, their anode impedances being unaltered, it is possible to obtain the same output power or volume from a smaller input.

Which comes to: when an improved output valve of this type is used, less low-frequency magnification is necessary or, alternatively, a valve having a lower impedance may be employed in the output circuit.

Altering Grid Bias

I have mentioned before how foolish it is to remove grid-bias connections while high tension is applied to the valve.

Not only is there the possibility of the valve softening as the result of an excessive anode current, but other apparatus may be damaged. A soft valve is useless for amplifying and, although it may appear to harden after a time, it will probably always give trouble and will certainly have a relatively short life.

Always remove the high tension before touching the grid-bias and—another point—do not forget, when trying new valves for the first time, to provide them with a little more than the bias recommended by the makers. Then, when tests have proved the circuit and valves to be satisfactory, adjustments may be made for maximum output combined with the best quality of reproduction.

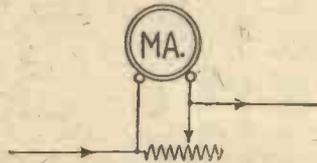
Push-pull Grid Leaks

A short while ago I recommended that when an ordinary transformer is used in a push-pull amplifier with a pair of grid leaks across the secondary, two leaks of one-quarter megohm each be employed. These values may seem rather low ones, but they are perfectly satisfactory. Moreover, tests have shown me that it is not advisable to employ leaks of high resistance, such as two or three megohms. I discovered, in one experiment, that the valves in the push-

pull circuit were not responding properly to grid bias when the grid leaks were of one megohm each, but the results were normal when lower resistances were fitted.

Protecting the Meter

Amateurs who employ milliammeters to a considerable extent are liable, no matter how careful they may be, to damage their instruments in the event of a faulty



A variable resistance in shunt is the best meter protector

connection being made, a valve failing, or of some other unforeseen occurrence.

Therefore, I think, a fuse should be connected to each instrument; if the fuses are suitable, a measure of protection is afforded.

I have found a shunting resistance useful, particularly a variable one, and I often employ an ordinary filament rheostat.

This is connected as shown above. When the current passing is to be measured the rheostat is turned to its off position. After the reading has been taken the rheostat is turned on and the current reduced to about one-quarter of its normal value.

Bias That H.F. Valve!

Low-frequency amplifying valves should normally be worked so that no grid current flows. That everybody knows and therefore, valves are correctly—negatively—biased. But why is it one so often sees high-frequency valves without bias?

Grid bias usually improves selectivity enormously and I, personally, always apply it. At one time I used to employ a single dry cell for this purpose, but lately I have fitted a resistance in the negative filament lead to the valve. There is a drop in voltage across the filament resistance and the valve is therefore biased negatively by this amount. When the resistance is increased in order to cut down the strength of a powerful station the grid bias is automatically increased. This is just as it should be.

To Mains Users

I often wonder whether those who employ

a direct-current mains high-tension unit appreciate the possibility of electric shocks through touching certain parts of the receiver unless suitable precautions are taken.

Everyone connects a condenser in the earth circuit in order to avoid short-circuiting one of the mains wires, but how many connect a condenser in the aerial wire to the set? Not many, I think, and yet, if this is not done, and the positive main happens to be the one more nearly at earth potential, the aerial will be at high voltage with respect to the earth, and the filament-heating accumulator with it.

“A.W.” TESTS OF APPARATUS

(Continued from page 426)

namely, there is a V-shaped filament surrounded by flat cylindrical electrodes there being an inner control grid, an outer screen grid and an anode. The inner grid is connected to the grid pin, the screen grid to the anode pin and the anode to a terminal on the side of the valve cap.

It will be clear from the construction that no attempt has been made to reduce the capacity to a very small value, reliance being placed on the shielding effect of the screen-grid. A test on the characteristics of three valves shows that the average mutual conductance with zero grid volts is .35. Thus, the efficiency of the valve is relatively low, and it is therefore quite stable in use, the screening provided being adequate for the purpose.

Tested in a standard screen-grid set having a simple capacity shield between anode and grid circuits, but no other special precautions, the valve was found to be perfectly stable although the signal strength was less than that obtained with a normal type of screen-grid valve. It was noticeable, however, that the selectivity was definitely increased, this being due to the fact that the Cleartron valve has a high internal resistance.

On the laboratory valve bridge a test taken at zero grid volts, with 70 volts on the screen-grid and 100 volts on the anode, showed that the average A.C. resistance was 350,000 ohms and the average amplification factor 120. As the valve sells at 12s. 6d. only it should afford an opportunity to many readers who have not hitherto tried this form of amplification.

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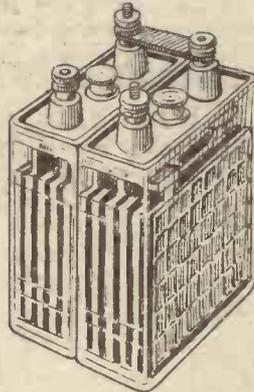
- No. 1. Panel, 16 in. x 7 in. Cabinet, 2 ft. 6 in. high, 1 ft. 8 in. wide, 12 in. deep. **27/6 Each**
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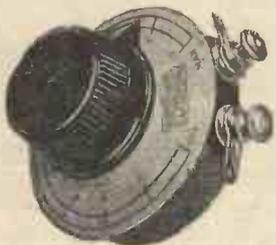
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amplification than transformer and everyone who has tried them agrees that "Precision Radio" Wire-wound Resistances are the best and most dependable. Price from 3/6.

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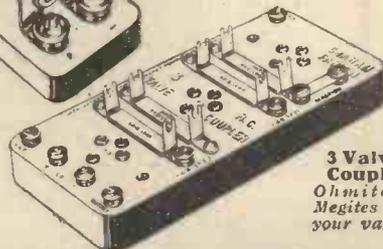
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RADIOGRAMS

LOVERS of sport will find in March 23 a red-letter day, for from 12 to 12.35 (approximately) they will hear a running commentary given by Mr. J. C. Squire and Mr. G. O. Nickalls on the Varsity Boat Race. The transmission, as in former years, will be carried out from the steam launch *Magician* following the crews from Putney to Mortlake. At about 3 p.m. a running commentary on the semi-final of the F.A. Cup will be broadcast, and at 7.15 p.m. Mr. H. M. Abrahams will give his account of the Oxford v. Cambridge Inter-Varsity Sports.

A play, *The Billiard Room Mystery*, adapted from a story by Stephen Leacock will be presented at the 2LO studio on March 22.

The Easter Morning Service at York Minster, on March 31, will be relayed to 2LO, 5XX and the usual stations taking the London programme; it will include an address by the Archbishop of York.

A young Glasgow labourer, Mr. T. M. Watson, who took up play-writing during a spell of unemployment, has obtained an engagement with the B.B.C. for the production of a Clydeside comedy, *Diplomacy and the Draughtsman*, to be given from the Glasgow studio on March 19.

Pass the Mint Sauce is the title of a topical spring-time revue in seven scenes to be broadcast from the Manchester station on March 20; it is described as possessing "little rhyme and less reason but warranted entirely innocuous."

On March 25, Mr. Filson Young will act as narrator for the broadcast of Sir Arthur Sullivan's romantic opera *Ivanhoe*.

Two German transatlantic liners are shortly to be equipped with picture receiving apparatus in order that passengers may be given illustrated daily editions of the ships' wireless journals.

Coinciding with the opening of the Barcelona International Exhibition it is proposed to double the power of the Union Radio broadcasting station in that city; Madrid also contemplates an increase in power this year.

In view of the interference caused to the Daventry 5XX transmissions by the Kiel (German) coastal telegraphy transmitter on 1,600 metres, the latter has dropped its wavelength to 680 metres.

A record number of SOS broadcasts were made through 2LO and 5XX during the month of February, the total number attained being sixty.

The listening habit has greatly developed in Hungary now that possessors of even two-valve receivers can hear the broadcasts from both Budapest and Milan. The equipment of a number of express trains on the main line from the capital to Szeged and to Debrecen has so greatly appealed to the travelling public that arrangements are being made to fit up slow trains on other parts of the system in a similar manner.

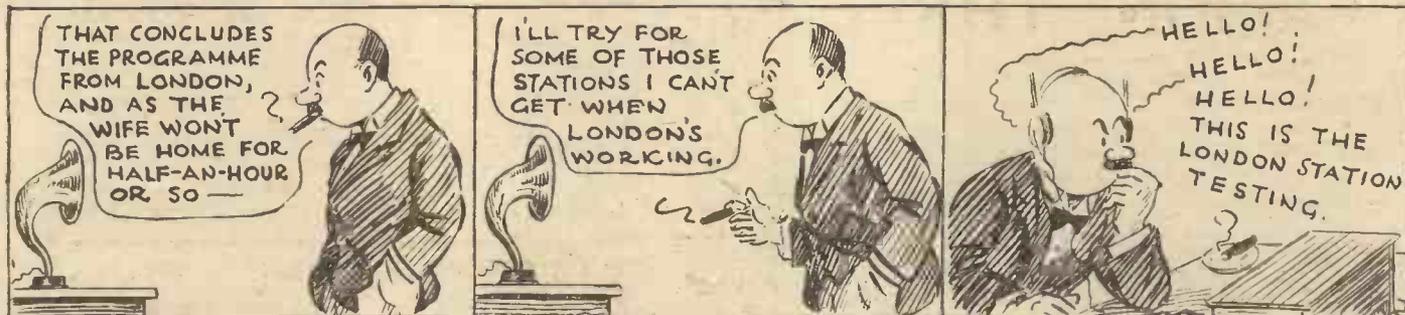
Test transmissions from the PHOHI short-wave station, Huizen, will now take place at the following times, on a wavelength of 16.88 metres: Mondays, 14.00-18.00 G.M.T.; Tuesdays, 18.00-24.00 G.M.T.; Wednesdays, 12.00-16.00 G.M.T.; Thursdays, 00.00-07.00 G.M.T.; Fridays, 14.00-17.00 G.M.T., and Saturdays 07.00-12.00 G.M.T.

According to German radio papers, the loud-speaker was invented by one of their nationality, an engineer, Karl Frischen. On February 28, 1889, he demonstrated a trumpet connected to a hidden telephone apparatus at a fete celebrating the fiftieth anniversary of the Polytechnic Society at Berlin.

The construction of the new "world-broadcasting" short-wave transmitter at Zeesen, Germany, is nearing completion; work on the installation of the electrical equipment is being pushed forward, and it is expected that towards the middle of the summer, the station will regularly relay the Berlin programmes for the benefit of distant listeners.

The Italian Broadcasting Corporation is to carry out shortly a regular service of picture transmissions from Rome, on the Fultograph system.

HELLO! HELLO! HELLO! THIS IS THE LONDON STATION—



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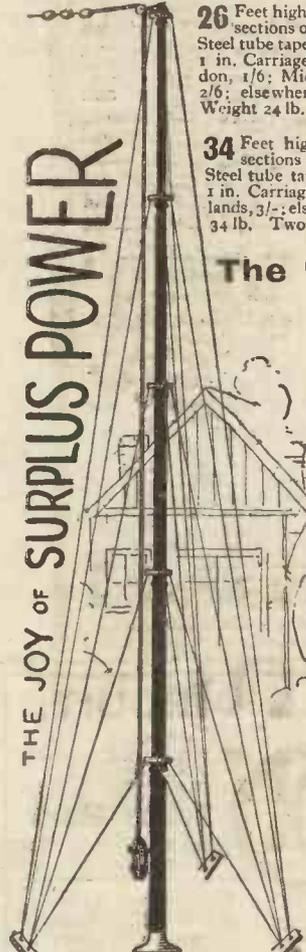
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52 Feet high. In 5 sections of heavy 1 1/4 in. Steel tube tapering to 1 in. A real bargain. Carriage, London, 2/6; Midlands, 3/6; elsewhere, 4/6. Weight, 46 lb. Two masts 55/- **29/6**

are made of British Steel in **P.R. MASTS** 9 feet lengths, from 1 1/2 in., tapering to 1 in., and are supplied with cast-iron bed plate, steel ground pegs, stay rings, galvanised steel flexible wire stays cut to lengths, pulleys, bolts, and fullest erecting instructions. No further outlay necessary.

NO HOLES TO DIG ONE MAN'S JOB

Any intelligent man can assemble and erect a P.R. Mast in a couple of hours. The Mast being tapered, it is easy for anyone to raise it from the ground into position. The wire rope is sent cut to size—a saving of endless worry. Minimum Radius 3 ft. 6 in. The easiest Mast to erect.

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PRICE OF ACCESSORIES.

P.R. Colloid Covering sufficient for a Mast—with brush, 2/6. Halyard Log Line—Ryland's patent rot-proof: For 20-ft. Mast, 1/6. 34-ft., 2/-. 42-ft., 2/6. Per 100 ft., 3/-. Note.—Double length supplied to make lowering of Aerial easy.

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IF YOU USE VALVES it will pay you to write to us for particulars of the famous 3/6 range of P.R. valves. Each valve has a written guarantee of life and performance.

"Transmission Problems"—and the Possibilities of Frequency Modulation

(Continued from page 425)

current and the widely-spaced portions to troughs or hollows.

The fundamental difference between "amplitude" and "frequency" modulation lies in the relative width of the side-band frequencies produced in the two cases. In the former system the extent of the side-band fringe depends entirely upon the pitch or timbre of the modulating note; it spreads over an equal distance on each side of the carrier, irrespective of loudness, or intensity, or of any other factor except that of pitch.

In frequency modulation, the whole range of audible frequencies can be transmitted on a side-band fringe of adjustable width, the actual extent of the fringe being governed entirely by the loudness or intensity of the modulating signals. In other words, the spread of the side bands depends upon the percentage modulation of the original carrier, and is, therefore, completely under the control of the operator at the transmitting station.

Reception

It is claimed that clear telephonic communication can be effected on a frequency-modulated wave having a side-band fringe of only 100 cycles on each side of the carrier frequency. For broadcast musical transmissions, the fringe would probably be increased to approximately 1,000 cycles. Even so, it compares most favourably with the minimum separation gap of 10,000 cycles now necessary. Incidentally, it would result in finding additional elbow room for from five to ten times the present number of transmitting stations.

In order to receive a "constant frequency" signal wave, the principal requirement is a highly-selective aerial or input circuit. Apart from this essential, the standard type of receiver could be used.

Given a sharply-tuned circuit, it is well known that maximum voltage is built up across the condenser when the applied frequency is identical with that to which the circuit is tuned. This "peak" voltage corresponds to the point P on the typical resonance curve shown in Fig. 3. For other frequencies, the voltage built up across the receiver will fall off along the sloping sides of the curve.

If now the constant-frequency signal wave has a frequency corresponding to the point P on the curve, and the receiving circuit is adjusted to a point such as S on the sloping sides of the curve, then every fluctuation in the incoming carrier frequency between M and N will cause the built-up voltages to vary between the values O M and O N.

In this way the varying frequencies are translated into corresponding voltage variations. These exist across the tuning condenser of the input circuit and are applied to the grid of the first valve. Thereafter

they are passed on for rectification and subsequent amplification in the ordinary way.

CONDENSER MICROPHONES

THE condenser type of microphone is even more sensitive than the ordinary instrument, in which the effective resistance of a mass of granular or powdered material is altered in sympathy with the pressure of the incident sound-waves. The condenser microphone consists of a very light metallic plate mounted parallel to and in close proximity with a second plate. Sound waves falling upon the first plate deflect it slightly and so alter the overall capacity of the condenser. This causes a corresponding change in the value of the voltage across the plates, which in turn gives rise to a fluctuating current, reproducing the original sound, in a shunt circuit.

Not only is the condenser microphone extremely sensitive, but it also has the additional advantage of giving a constant response, independent of frequency, and of maintaining this constant over long periods of time without being liable to "packing" or other defects of the variable-resistance type.

B. M.

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LETTERS TO THE EDITOR



The Editor does not necessarily agree with the views expressed by correspondents.

Correspondence should be brief and to the point and written on one side of the paper.

Linen-diaphragm Speaker

SIR,—Having just completed your latest linen-diaphragm speaker, I found that reproduction is more than you claimed it to be. No vibration or jarring occurs, and the *high* and *low* notes are as good as any moving-coil speaker I have heard.

The total cost of this instrument was 32s. (including unit). Wishing your excellent paper every success.

T. F. B. (London, N.W.).

"Britain's Favourite Three"

SIR,—I write to let you know of my results with "Britain's Favourite Three," which I hooked up temporarily two months ago; as I have had wonderful results both on very short waves and medium, I intend now to give the set a good cabinet, for it is a sure winner. Stations I have received on ultra short waves are: 2XAF, 2XAD, KDKA, 2NM, 5SW, PCJ, PCL, and 3LO. On the medium waves I receive on loud-speaker: Langenberg, Hamburg, Frankfurt, Prague, Madrid, and 5GB, with numerous stations on phones. Above 1,000 metres on loud-speaker I receive 5XX, Paris, Moscow, and Zeesen with two or three others on phones. As regards volume, tone, and purity on the local, 5SC, I could not wish for a better three-valver. Thanks to AMATEUR WIRELESS for such a good all-round three on all wavelengths.—F. (Glasgow).

A Good Three

SIR,—Several months ago I decided to build "Britain's Favourite Three," as described in your pages. I have built several sets, both before and after, but have not found one to touch this for distance, volume, and quality. I am using a Lissen R.C. unit, and a .0003-mfd. variable condenser for reaction. Up to the present I have received about twenty-five stations on the loud-speaker (cone type).

Recently I constructed a separate H.F. unit and with this before the detector the results are astounding. I hear distant stations, previously unheard, as loud as 5GB or 5XX.—W. (Northampton).

The Chapman-Reinartz Two

SIR,—Not having seen any reports from your readers with reference to the "Chapman-Reinartz," recently published in AMATEUR WIRELESS, I should like to say I have made up this set with an extra valve and it is easily the best set I have made up. I have omitted the five-point switch, but use a four-socket holder and mount coils on a

stand with four valve pin contacts. I think this is easier than having a switch and two coils. I have also tapped grid coil and made contact with flexible lead from condenser. I find this makes it very selective and foreigners come rolling in on the speaker.—S. (Acton).

A Good Distance Getter

SIR,—I built your "Globe D.X. Two" a few weeks ago and am amazed at the results obtained. I have tested it on a small and distinctly inefficient indoor aerial. The power was what one might have expected from a one-valve set on an outdoor aerial.

Reaction was pleasingly smooth on the broadcast wavelength, but the set would only oscillate when the two circuits were in tune on the long wavelengths.

The variable resistance is a very useful addition to the set. Selectivity was extremely good, very few stations could not be separated.—R. (Godalming).

Transmission Quality

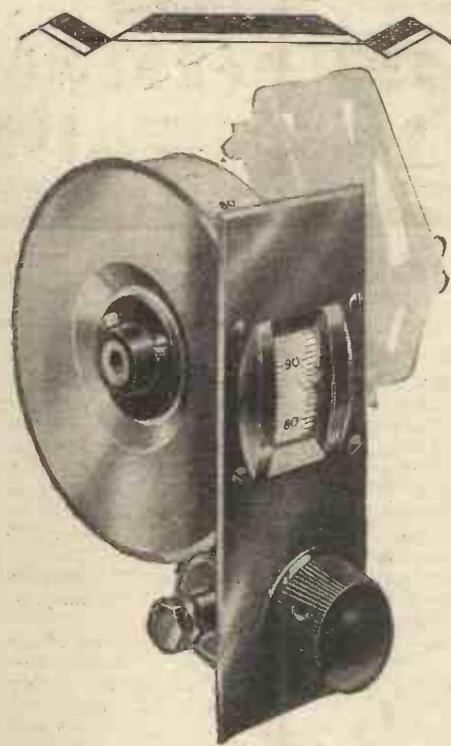
SIR,—Like J. W. (Upminster), I find that the transmission from Daventry is frequently very coarse indeed. I believe that the trouble is in the studio conditions, and not in the engineering section, for I find that, while the studio programme comes through coarse in quality, a sudden change by the station to an outside broadcast comes over remarkably sweetly. We find that in any case the outside broadcasts are superior in programme quality as well as in transmission results, and certainly the Daventry programmes are now very monotonous indeed, and the "humorous" (?) turns lacking in humour. We are also weary of the eternal piano, this is a grand instrument but we get so much of it that it becomes an exasperation. There are many other instruments suitable for solos and why not use them in turn in the musical intervals?

—W. J. F. (Redruth)

The "James' Special Three"

SIR,—Please allow me to thank Mr. James for the "Special Three," which is the best three-valve receiver I have ever handled. It does all that is claimed for it, and is better than you claim, because, although I am badly situated here, being under two miles from 2ZY, I can receive at least six stations on the long waves and about twelve on the medium waves, all on the loud-speaker, with an indoor aerial. I

(Continued at foot of centre column on next page)



A Real DRUM DIAL

It has been left to J.B. to improve on models of recent years and to produce a perfect Drum Dial—the only *real* Drum Dial.

The design is most ingenious, the control knob being placed just under the scale, which is thus flush with the panel plate and easily readable. Positive Friction Drive eliminates backlash. This new product reaches that high standard of finish and precision found in all J.B. instruments.

The Condenser may be mounted on left or right of Dial. The drive will handle a heavy gang condenser with ease. Panel Plate in either bronze or oxydised silver.

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The Drum Dial is designed so that it can conveniently be used as a Dual Gang Unit by adding one left-hand Condenser and bracket. Price, complete, .0005; £1-10-6; .0003, £1-8-6



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Advt. of JACKSON BROS., 72, St. Thomas' Street, London, S.E.1. Telephone: Hop 1837.



RULES.—Please write distinctly and keep to the point. We reply promptly by post. Please give all necessary details. Ask one question at a time to ensure a prompt reply, and please put sketches, layouts, diagrams, etc., on separate sheets containing your name and address. See announcement below. **Address Queries**—AMATEUR WIRELESS Information Bureau, 58/61 Fetter Lane, London, E.C.4

H.T. Battery Exhausted.

Q.—When my receiver was first installed, the accumulator used to last for about two weeks with a full charge. Now I find that if the receiver is used for a week the accumulator wants recharging. I have taken up the matter with my local charging station and they inform me that the battery is always fully charged before it leaves their station. Can you explain why it is that the battery will not last so long as originally? I would mention that I am still using the original valves and the receiver has only been installed for about four months.—D. G. (Manchester).

A.—The trouble you are experiencing is due to your H.T. battery being exhausted, or nearly so. When the accumulators are freshly charged the valves appear to work with ease, but as soon as the accumulator becomes half discharged the failing H.T. introduces trouble. If you renew your H.T. battery you will get good results.—C. A.

Switching for "Q" Coils.

Q.—In the issue of "Amateur Wireless"



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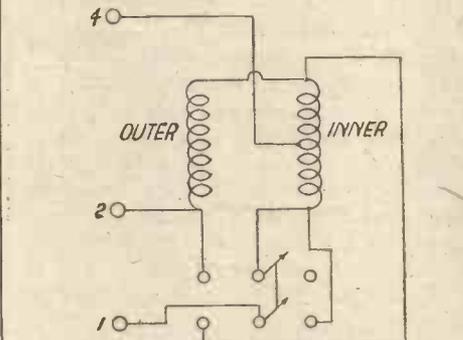
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ADDRESS..... A.W.16/3

OUR INFORMATION BUREAU

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PLEASE write briefly and to the point

A Fee of One Shilling (postal order or postage stamps) must accompany each question and also a stamped addressed envelope and the coupon which will be found on the last page. Rough sketches and circuit diagrams can be provided, but it will be necessary to charge a special fee (which will be quoted upon request) for detail layouts and designs.

A.—One connection is omitted from the diagram, but in addition to this the connec-



The correct connections for the modified QA Coil
tions shown are for an entirely different type of switch. The switch arms shown in the original

"LETTERS TO THE EDITOR"
(Continued from preceding page)

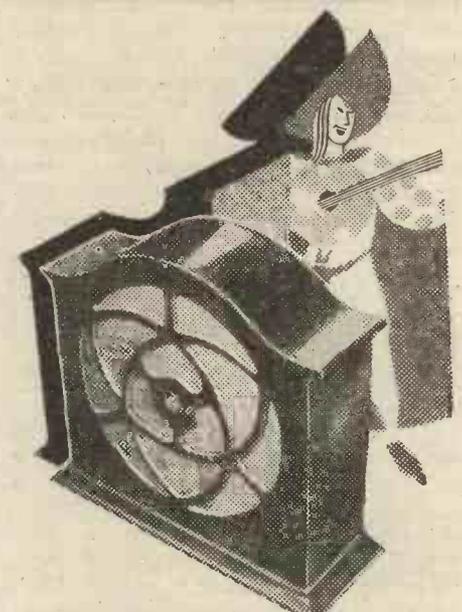
would like to point out a snag in the wiring, however, which I met with, and which may cause trouble to others if not pointed out. When I first switched on, smoke rose from the 600-ohm resistance in the plate circuit of the first valve; on tracing this out, I found that the H.T. current had a circuit through this resistance and the coils, on to the grid condenser. Now on the diagram of connections, this condenser is shown as having an earthed screen fixed behind it, and as negative H.T. is also earthed, there was a complete circuit, which caused the trouble. I insulated the screen from the condenser, and all was well.—M. (Manchester).

drawing were put in by mistake. As most amateurs will use a simple two-pole change-over switch, it is thought that it will be best to show the connections using such a switch. Below is reproduced another diagram showing the connections to a simple change-over switch.—C. L.

Howling in Multi-valve Sets.

Q.—I have recently installed a four-valve set. I use 2- μ pt valves and a standard 120-volt H.T. battery. This set worked quite well for about a week, after which a howl developed, which has gradually become louder until now it is impossible to hear anything else. Can you tell me its cause, and how to remedy it?—H. J. (Barnes).

A.—Your four-valve set consumes on an average 12-15 milliampers of H.T. current, and no standard-capacity dry-cell H.T. battery will stand up to such a discharge for more than a week or so. The maximum discharge rate of a standard-capacity battery varies, with different makes, between 6 and 9 milliamps. Since your set, when supplied with 120 volts H.T., will consume as much as 15 milliampers, it will be very advisable for you to use a triple-capacity battery.—C. L.



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- All-wave Screen-grid Three (HF, D, Trans.) WM110
- Gramophone Three (D, 2RC) WM115
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- Festival Three (D, 2LF-dual Imp.) WM118
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WIRELESS IN PARLIAMENT



From Our Own Correspondent

BROADCASTING and its future—particularly political broadcasting—was discussed in the House of Commons on the Post Office Estimates.

An interesting statement was made by the Postmaster-General, Sir W. Mitchell-Thomson, who, in comparing broadcasting in America with broadcasting in this country, said that when they came to consider how they could settle broadcasting in this country on a permanent basis, they were quite definitely driven to the conclusion that in some form or other broadcasting must be a monopoly and that there could not be unlimited competition. That conclusion was being forced on them every day by the shortage in the wavelengths. Our wavebands were being very seriously congested, and we were able to have only ten exclusive wavelengths for our own use. The problem was how to make the best use of those wavelengths. In such a matter of high policy he consulted the B.B.C., and it was a matter of very anxious consideration between them as to the way in which they could best make use of the ten exclusive wavelengths of this country.

The Monopoly Question

Although they started broadcasting under a private monopoly system, they had had to abandon that system, and instead of having a State monopoly they had a monopoly in the hands of a public corporation. He would be very sorry to think that in this country broadcasting and its control should fall entirely into the hands of the Government of the day, to be used for their own purposes of propaganda.

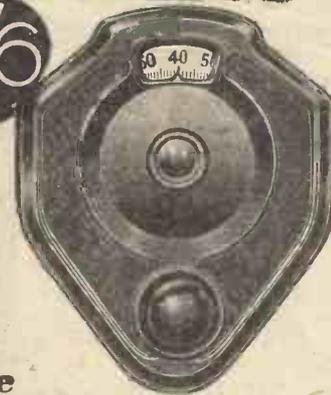
That would be a most serious proposition. To-day the work was being conducted in the public interests by a public corporation, and not run by the State itself. As to political broadcasting at the coming election, it was obviously impossible to have, at the best, anything more than a comparatively small number of speeches by the leaders of the political parties. It was not unreasonable for the Government to adopt the attitude that for every one attack delivered against them there ought to be one opportunity for reply.

At question-time on Tuesday, March 5, the Postmaster-General said that a private demonstration of the Baird Television System took place that day by arrangement with the B.B.C. and the Baird Company. A few members of Parliament of all parties were present, and the results of the demonstration were under consideration.

Australia is to start a radio-photo service between Sydney and Melbourne within the next six months.

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wireless

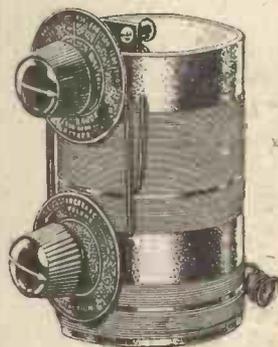
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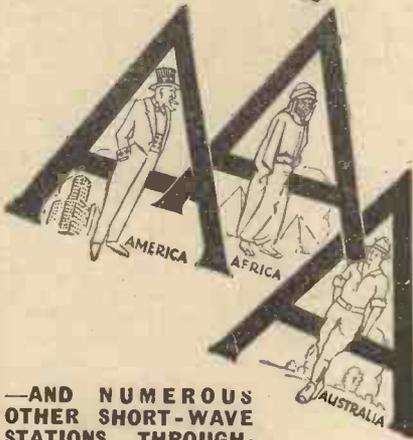
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BROADCAST TELEPHONY

(Broadcasting stations classified by country and in order of wavelengths)

| Kilo-Metres | Station and Call Sign | Power (Kw.) | Kilo-Metres | Station and Call Sign | Power (Kw.) | Kilo-Metres | Station and Call Sign | Power (Kw.) |
|-------------------------------|---|-------------|----------------------------------|---|-------------|--------------------|------------------------------|-------------|
| GREAT BRITAIN | | | | | | | | |
| 25.53 | 17,751 Chelmsford (5SW) 15.0 | | 301 | 997 Bordeaux (PTT) 0.5 | | 275 | 1,090 Turin (test) ... 0.5 | |
| 243.9 | 1,230 Newcastle (5NO) 1.0 | | 305 | 982 Agen 0.3 | | 332 | 904 Naples (Napoli) 1.5 | |
| 258.6 | 1,160 *Leeds (2LS) ... 0.13 | | 307 | 980 Lille (PTT) ... 0.8 | | 387 | 775 Genoa 3.0 | |
| 270.3 | 1,109 *Sheffield (6LF) 0.13 | | 310 | 568 Marseilles (PTT) 0.5 | | 443.8 | 676 Rome (Roma) ... 3.0 | |
| 288.5 | 1,040 *Bournemouth (6BM) 1.0 | | 322 | 930 Vitus (Paris) ... 2.0 | | 456 | 658 Bolzano 0.3 | |
| 288.5 | 1,040 *Bradford (2LS) 0.13 | | 354 | 846.7 Algiers (PTT) ... 2.0 | | 604.2 | 595 Milan 7.0 | |
| 288.5 | 1,040 *Edinburgh (2EH) 0.35 | | 370 | 811 Radio LL Paris 1.0 | | JUGO-SLAVIA | | |
| 288.5 | 1,040 *Hull (6KH) 0.2 | | 382.2 | 785 Toulouse (Radio) 9.0 | | 308.3 | 973 Zagreb (Agram) 1.25 | |
| 294.1 | 1,020 *Dundee (2DE) 0.13 | | 400 | 749 Mont de Marsan 0.4 | | 580 | 517 Ljubljana 5.0 | |
| 294.1 | 1,020 *Liverpool (6LV) 0.13 | | 414 | 724 Radio Maroc (Rabat) 2.0 | | LATVIA | | |
| 294.1 | 1,020 *Stoke-on-Trent (5ST) 0.13 | | 416.6 | 720 Grenoble (PTT) 1.5 | | 528.2 | 568 Riga 2.0 | |
| 303 | 991 Belfast (5B) ... 1.0 | | 449.3 | 668 Paris (Ecole Sup. PTT) 0.7 | | LITHUANIA | | |
| 311 | 964 Aberdeen (2BD) 1.0 | | 470 | 638 Lyons (PTT) ... 5.0 | | 2,020 | 148.4 Kovno 15.0 | |
| 323 | 928 Cardiff (5WA) ... 1.0 | | 1,488 | 201 Eiffel Tower ... 8.0 | | NORWAY | | |
| 358 | 838 London (2LO) ... 2.0 | | 1,745 | 171 Radio Paris ... 8.0 | | 242 | 1,240 Rjukan 1.0 | |
| 378 | 793 Manchester (2ZY) 1.0 | | GERMANY | | | 297 | 1,070 Notodden 0.7 | |
| 396 | 757 *Plymouth (5PY) 0.13 | | 14.83 | 20,230 Nauen 20.0 | | 366 | 820 Bergen 1.0 | |
| 400 | 749 Glasgow (5G) 1.0 | | 37.05 | 7,968 Doberitz 5.0 | | 387 | 775 Fredriksstad ... 1.0 | |
| 482 | 622 Daventry Ex. (5GB) 25.0 | | 41.50 | — | | 456 | 658 Aalesund 1.0 | |
| 1,562 | 192 †Daventry (5XX) 25.0 | | 67.65 | 4,434 Bergedorf 3.0 | | 456 | 658 Porsgrund 1.0 | |
| *Relay stations. †Relays 2LO. | | | 51 | 5,882 Flensburg 1.5 | | 496 | 604 Oslo 1.5 | |
| AUSTRIA | | | 219 | 1,370 Nürnberg 4.0 | | 500 | 600 Tromsö 1.0 | |
| 248 | 1,209 Linz 0.5 | | 250 | 1,200 Kiel 0.7 | | 566 | 350 Hamar 0.7 | |
| 277.8 | 1,080 Salzburg (under construction) 0.5 | | 250 | 1,200 Cassel 0.7 | | POLAND | | |
| 354.2 | 847 Graz 0.5 | | 263.2 | 1,140 Cologne 4.0 | | 314 | 955 Wilno 1.5 | |
| 456 | 694 Klagenfurt ... 0.5 | | 267.8 | 1,120 Muenster 1.5 | | 314 | 955 Cracow 1.5 | |
| 456 | 694 Innsbruck ... 0.5 | | 272.7 | 1,100 Kaiserslautern 1.5 | | 336 | 890 Posen 1.5 | |
| 52.0 | 577 Vienna 20.0 | | 280.4 | 1,070 Königsberg ... 4.0 | | 416.1 | 721 Kattowitz 10.0 | |
| BELGIUM | | | 283 | 1,061 Berlin (E) 0.7 | | 1,395 | 214 Warsaw 10.0 | |
| 220 | 1,360 Chatelineau ... 0.25 | | 283 | 1,061 Stettin 0.7 | | ROUMANIA | | |
| 250 | 1,200 Schaerbeek-Brussels 0.5 | | 283 | 1,061 Magdeburg 0.7 | | 306.3 | 757 Bucharest 4.0 | |
| 275 | 1,090 Ghent 0.5 | | 317.1 | 946 Dresden 0.75 | | RUSSIA | | |
| 280 | 1,070 Liège 0.5 | | 321.2 | 937 Breslau 4.0 | | 825 | 363.5 Moscow (PTT) 25.0 | |
| 312 | 960 Arlon 0.25 | | 326.4 | 919 Gleiwitz 6.0 | | 925 | 323 Homel 2.5 | |
| 403 | 595 Brussels 10.0 | | 329.7 | 910 Bremen 0.75 | | 1,000 | 300 Leningrad ... 20.0 | |
| CZECHO-SLOVAKIA | | | 361.9 | 829 Leipzig 4.0 | | 1,438 | 208 Moscow 30.0 | |
| 265 | 1,130 Kosice 2.0 | | 374.1 | 802 Stuttgart 4.0 | | 1,680 | 178 Kharkov 15.0 | |
| 296.2 | 1,006 Bratislava ... 0.5 | | 391.6 | 766 Hamburg 4.0 | | SPAIN | | |
| 343.2 | 874 Prague (Praha) 5.0 | | 421.3 | 712 Frankfurt 4.0 | | 285 | 1,050 Barcelona (EAJ13) 2.0 | |
| 432.3 | 694 Brunn (Brno) ... 2.4 | | 452 | 664 Aachen 0.75 | | 309 | 970 Oviedo (EAJ19) 0.5 | |
| DENMARK | | | 455.9 | 654 Danzig 2.5 | | 348 | 857 Barcelona(EAJ1) 3.5 | |
| 389 | 883 Copenhagen (Kjobenhavn) 1.0 | | 462.2 | 649 Langenberg 0.75 | | 370 | 801 Seville (EAJ5) 0.5 | |
| 1,156 | 259 Kalundborg ... 7.5 | | 475.4 | 631 Berlin 4.0 | | 400 | 750 San Sebastian (EAJ3) 0.5 | |
| ESTHONIA | | | 536.7 | 559 Munich 4.0 | | 404 | 744 Radio España... 1.0 | |
| 408 | 735 Reval (Tallinn) 1.3 | | 566 | 530 Augsburg 0.5 | | 405 | 740 Salamanca (EAJ22) 0.55 | |
| FINLAND | | | 566 | 530 Hanover 0.7 | | 423 | 708 Madrid (EAJ7) 3.0 | |
| 374 | 800 Helsingfors (Helsinki) 0.8 | | 577 | 520 Freiburg 0.7 | | SWEDEN | | |
| 1,523 | 397 Lahti 20.0 | | 1,650 | 182 Zeesen 20.0 | | 261 | 1,149 Hörby 10.0 | |
| FRANCE | | | 1,650 | 182 Norddeich 10.0 | | 265 | 1,130 Trollhattan 0.4 | |
| 30.75 | 9,755 Agen 0.25 | | GRAND DUCHY OF LUXEMBOURG | | | 315.7 | 950 Falun 0.5 | |
| 200 | 1,500 Fécamp 0.3 | | 1,280 | 234.2 Radio Luxembourg 250w. | | 346.8 | 865 Goteborg 6.0 | |
| 211.3 | 1,420 Beziere 0.1 | | HOLLAND | | | 433 | 655 Stockholm 1.5 | |
| 211.3 | 1,420 Toulouse (PTT) 1.0 | | 81.4 | 9,554 Eindhoven (PCJ) 25.0 | | 645.5 | 550 Sundsvall 1.0 | |
| 233 | 1,260 Bordeaux (Radio Sud-Ouest) 2.0 | | 88.8 | — Kootwijk (PCL) 32.0 (Wed. 12.40 G.M.T.) | | 770 | 290 Ostersund 2.0 | |
| 252.1 | 1,100 Juan-les-Pins ... 0.4 | | 387 | 889 Huizen (until 5.40 p.m.) 5.0 | | 1,200 | 350 Boden 2.0 | |
| 253 | 1,185 Montpellier 0.25 | | 1,071 | 280 Hilversum (ANRO) 5.0 | | 1,345 | 223 Motala 30.0 | |
| 268 | 1,118 Strasbourg 0.3 | | 1,840 | 163 Huizen (after 5.40 p.m. and on Sundays) 5.0 | | SWITZERLAND | | |
| 273 | 1,100 Limoges (PTT) 0.5 | | 1,840 | 163 Scheveningen-haven 5.0 | | 406 | 739 Berne 1.0 | |
| 280 | 1,070 Rennes 1.5 | | 545 | 551 Budapest 15.0 | | 489.4 | 613 Zurich 0.6 | |
| 291.3 | 1,030 Radio Lyons ... 1.5 | | ICELAND | | | 680 | 441 Lausanne 0.6 | |
| | | | 333.3 | 900 Reykjavik 1.0 | | 700 | 395 Geneva 0.5 | |
| | | | IRISH FREE STATE | | | 1,010 | 297 Basle 0.25 | |
| | | | 222.2 | 1,355 Cork (5CK) ... 1.5 | | TURKEY | | |
| | | | 411 | 730 Dublin(2RN) ... 1.5 | | 1,230 | 243.8 Stamboul 5.0 | |
| | | | | | | 1,840 | 163 Angora 5.0 | |

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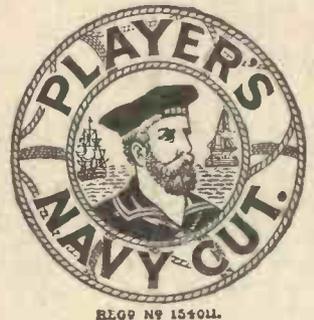
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CHIEF EVENTS OF THE WEEK

- LONDON AND DAVENTRY (5XX)**
- Mar. 18 Irish programme.
 - " 20 *The Count of Como*, a comic opera.
 - " 21 Studio concert.
 - " 22 Running commentary on the Grand National, by Mr. R. C. Lyle and Mr. W. Hobbiss.
 - " 23 *Up to Scratch*: Ronald Frankau and his Cabaret Kittens.
- DAVENTRY EXPERIMENTAL (5GB)**
- Mar. 18 Selections from popular operas.
 - " 19 *The Count of Como*.
 - " 20 New Friends in Music: Stravinsky, introduced by Percy Scholes.
 - " 21 A revue: *All the Winners*.
 - " 23 *Madam Butterfly*, from the Opera House, Manchester.
- CARDIFF**
- Mar. 18 Welsh programme.
 - " 20 Scenes from "A Tale of Two Cities."

- MANCHESTER**
- Mar. 20 *Pass the Mint Sauce*, a revue.
 - " 21 Hallé concert.
 - " 23 My Programme.—1, Arranged by Sir Boyd Merriman.
- NEWCASTLE**
- Mar. 19 *The King of Zenoa*, a drama by Edwin Lewis.
 - " 23 *Radioptimists*.
- GLASGOW**
- Mar. 18 Irish music.
- ABERDEEN**
- Mar. 20 *The Secret of the Stars*, a duologue by Mary H. Debenham.
 - " 23 Popular concert.
- BELFAST**
- Mar. 18 Jazzing the classics.
 - " 19 *Alhambra*.
 - " 22 British composers

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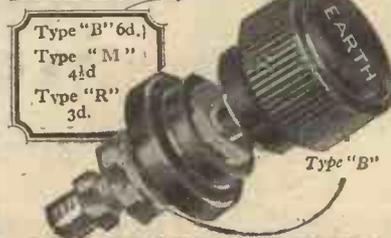
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**RADIO IN FRANCE
A COMPARISON
By Jean Surac**

IN the world of radio, France, as the nearest foreign neighbour to Great Britain probably comes in for its fair share of criticism, and there is no doubt that the French broadcasting stations are not among the best in Europe. As to whether this is so or not, listeners, if they have a good receiving set capable of reaching out, can judge for themselves; but it may not be everybody who is conversant with the general trend of design and radio reproduction in receivers in that country.

As a resident in France until a short time ago, the writer has been interested in wireless since its inception as a practical entertainment proposition, and can say that in practically all departments of the art, France has been, and is still, months behind Britain. The fact that sets containing one and sometimes two stages of unneutralised tuned-anode H.F. amplification are still being sold, is sufficient evidence in itself.

Couplings

The best French set, although giving quite pleasing reproduction, when placed side by side with a good representative British make, would offer no comparison, yet it must be admitted, in justice to the French, that the general quality of reproduction of sets in the possession of the smaller English retailers are not all they should be and can only be placed in the mediocre class.

Neither R.C. nor choke coupling is, broadly speaking, ever incorporated in manufactured sets in France, two stages of transformer coupling being used instead and here, perhaps, is the explanation of their inferior reproduction. Very few of the numerous transformers of French origin could be considered worthy of inclusion in a "quality set," and if one imagines, for a moment, a receiver embodying two stages of L.F. transformer coupling (both transformers having "skimmed" primaries and cores), it is to be marvelled that results are as good as they are.

Of loud-speakers, there are numerous types on the market, some having even attained the grotesque, being supposedly responsive to the demand of the curious and somewhat far-fetched French artistic temperament. In many homes the small horn type is much in evidence, although at the beginning of 1928, the cone was gradually beginning to come into favour, and is probably by now in the majority. Several well-known English manufacturers have exploited their products in the country, but the higher price of these, owing to Customs and freight charges, prevent them from reaching any but the more wealthy.

Valves, until the arrival of the Philips
(Continued on next page)

**LISTENERS
FLY**



**THREE READINGS ON
ONE DIAL.**

0-6 VOLTS
0-150 WATTS
0-30 MILLI-AMPS
RES. 5,000 OHMS

Crystallised black finish, fully guaranteed. Can be used as a Pole finder.

Price **8/6**

If you want to get the best from your set—use a Wates Meter and surprise yourself with the wonderfully improved reception that this super-meter ensures. It gives both volt and amp. readings that any expert will tell you are the essentials to perfect set control. It costs but 8/6 and gives three dead beat readings from one clearly engraved dial. Fully guaranteed. From your dealer or direct complete with explanatory leaflet. Stocked by Halford's Stores, Curry's Stores, and all radio dealers.

"CERTAINLY WORTHY OF A PLACE ON YOUR WIRELESS TABLE."—Vide "THE DAILY MIRROR."

Tested against very much more expensive instruments the "volt amp" shows accurate readings. Possession of this "Three-in-one" meter will greatly help towards the better running and care of a Receiver and Batteries, for it is perfectly simple to use... convenient in size... very reasonable in price... certainly worthy of a place on your wireless table. Extract from "The Daily Mirror," Feb. 14th, 1929.

**TO THE
WONDERFUL**



The Standard Wet Battery Co.,
Dept. A.W., 184-188 Shaftesbury Avenue, London, W.C.2.

Another Epidemic Sweeps the Country!

Everywhere people are asking for a better L.F. Transformer. The 1929 re-designed EUREKA completely fulfills this demand. Concert Grand No. 1 10/6; No. 2 9/6; Baby Grand No. 1 8/6; No. 2 8/6. Smoothing Chokes Model "A" 10/6 P.O. to-day, goods to-morrow. Money returned if not satisfied within 7 days. Sole Manufacturers L. PERSON & SON, Dept. 6, 63, Shaftesbury St., London, N.1. Established 1872 Trade Supplied Phone Clerk, 7139

**OUR BLUEPRINT
SERVICE**

Constructors of receivers described in this journal should make full use of our Blueprint Service and avoid all risk of failure.

"RADIO IN FRANCE"

(Continued from preceding page)

range, were always in a sorry state, and only within the last eighteen months have power valves been in general use. Four-volt valves are considered as standard, the two-volt class having only appeared, in one make, at the beginning of 1928, and six-volters, as far as the writer is aware, have never existed. Screen-grid valves and pentodes are practically non-existent, and owing to their comparatively high cost, can be considered as such for some time to come. A type of valve which had a considerable vogue, and is still extensively used in some of the French super-heterodyne circuits, is the bigrille (two grids). A set comprising four of these (H.F., det., 2 L.F.) and using a high tension of eight volts, gave loud-speaker results, in the north of France, on 5XX and Radio-Paris, the receiver being approximately 150 miles from both stations.

Super-het. Most Popular

Regarding receivers as a whole, the most popular in France, especially in the capital, appears to be the super-heterodyne. In Paris, when the Tour Eiffel is arc-transmitting, the interference on all wavelengths is so intense, that the ultra-selective set is an absolute necessity if the slightest enjoyment at all is to be derived from wireless. Second in favour is perhaps the circuit known as the C119 Bis, which comprises one stage of untuned semi-aperiodic H.F. amplification, leaky-grid detector and two stages of L.F. transformer coupling. Since Daventry 5XX is the mainstay of the French, even well down towards the south, crystal sets are not seen to any great extent.

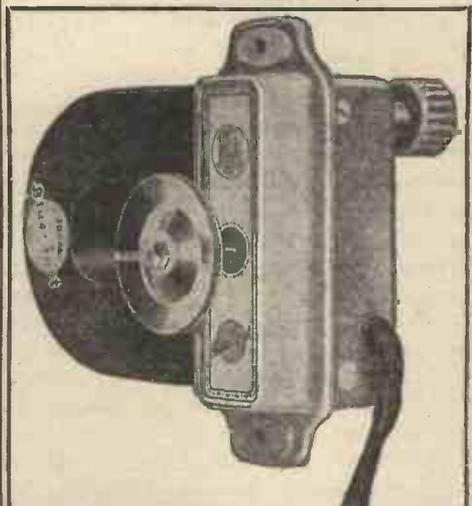
As even the most remote outlying country districts are supplied with A.C., H.T. eliminators, owing mainly to the efforts of Les Etablissements Ferrix de Nice, have enjoyed great popularity.

Variable condensers and dry H.T. batteries are perhaps two products which can be said to have at least equalled those of the British. Some excellent variables, embodying good design and good workmanship, are obtainable.

A word of praise for France, after so much adverse criticism—the enterprise, in the face of so many difficulties, of Radio-Toulouse. It would be interesting to take a consensus of opinion of DX listeners as to which is the best all-round Continental station heard in the British Isles. The writer's vote would go every time to Toulouse.

The new motor-ship *Vulcania* of the Cosulich Line, and its sister ship *Saturnia* are to be equipped with the latest radio-telephone devices. These two ships and the *Leviathan*, are the only vessels in the world that have complete "ship-wide" telephone service. The *Vulcania* has 300 telephones.

SEE FULL PAGE "A.W." MAR. 9th or REPRINTS FREE



BLUE SPOT 66K (101)
ADJUSTABLE MODEL
4 POLE BALANCED ARMATURE **25/-**

HANDSOME OAK POLISHED SPEAKER CABINETS
13 x 13 x 6
12/11 Post 1/3



Cannot guarantee exact pattern of front panel, but all good designs.

BLUE SPOT UNIT 25/-
66K (101)

CABINET BLUE SPOT 66K 35/-
12 in. BUCKRAM CONE Post Free

SQUIRE (LATEST) 15/6
CRADLE (assembled), 9 in. FLOATING CONE (Duplex Woven). Spare KRAFT CONE KIT.

Squire Aluminium Cradle, its enamelled frame polished and burnished at the edges, completely assembled with a special woven floating cone and front clamping board. In addition, with each complete assembly you are given a genuine Squire Kraft Cone Kit which you can easily assemble according to the simple instructions given. All you do is to add a unit and a cabinet or baffle board. For all Balanced Armature Units.

OAK SPEAKER CABINET to take SQUIRE CRADLE 16/11 → **CABINET BLUE SPOT SQUIRE CRADLE (assembled) The Lot 50/-**

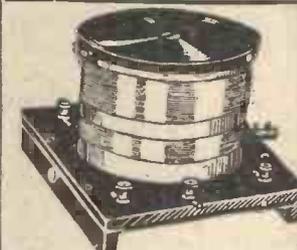
CLARION THREE

KIT OF PARTS ("A.W." 9-3-29)
Any other condenser, H.F. Choke, or L.F. Transformer supplied by adding balance.
2 Polar '0005, No. 3, at 5/9. .0001 Reaction, 4/- 2 Dual range C.T. Coils, with Reaction (Tunewell), Anode, 10/6; Aerial, 10/6. 3 Lotus or Formo V.H. at 1/3. Formo-densar, "J," 2/- Dubilier 1 mfd., 2/6. .01 Fixed, T.C.C., 1/9. 3-meg. Lissen or Edison Bell, 1/- S.G. H.F. Choke, P.-Scott, 5/- H.F. Choke, Lissen, 5/6. L.F. Transformer, R.I. & Varley, 15/- Ebonite Strips. 14x7 Ebonite Panel. Screen, 8x6. 8 Engraved Terminals. Push-pull Switch, Flex, Plugs, 16 g. Wire, 2 S.M. Dials.
The Lot 70/- Post Free
Or with CABINET, American Type, hinged lid (with base-board) 14 x 7 x 9. H.T., 120 volts., L.T., 2 volt, Exide,
Above Lot £4 : 17 : 6
Cash with order. Carr. extra.
VALVES FOR ABOVE SET, S.G. 22/6; D. 10/6; P. 12/6, ALSO CLEARTRON S.G. 12/6; D. 4/-; P. 6/-

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A.C. with Valve and Royalty ... 78/6
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New Aperiodic Tuner 200/2000 ... 25/-
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All R.I. Varley Components
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Special Price for SETS OF PARTS over 25/- Kindly forward list of goods required. (Or call)

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Coils for all Circuits

CLARION THREE TUNEWELL, ANODE or AERIAL. Push Mtg. each 10/6

MULLARD 5 PORTABLE
Special Offer : Kit of Parts
CABINET SPEAKER £10
UNIT, 5 VALVES

Case, packing and carriage 10/-.
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This Coupon entitles you on EVERY 30/- worth of Goods you buy To purchase for 3d. extra

ANY ONE OF THE FOLLOWING LOTS—
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A HAPPY COINCIDENCE

ARRANGEMENTS are already being made by the Royal Institution to celebrate the centenary in 1931 of the discovery of the laws of electro-magnetic induction by Michael Faraday. Faraday's work laid the foundation of the whole structure of modern electrical engineering. It had previously been known that magnetism could be produced, artificially so to speak, by passing an electric current through a coiled wire. Faraday by a series of classical experiments proved the apparently simple converse, namely that an electric current could be created by passing a wire through a magnetic field.

Simple as this may appear it led directly to the production of the dynamo and the electric motor, and so to the harnessing of electricity in the service of man. Strangely enough the year 1931 is also the centenary of the birth of Clerk Maxwell, the mathematical genius who by his broad interpretation of the work of Faraday paved the way for Hertz, Marconi, and the other pioneers of wireless communication. As Sir Ernest Rutherford has already pointed out, it is a happy chance that enables the modern scientific world to celebrate at the same time two such heroic figures in the field of electrical research. B. A. R.

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AMPLIFIERS, 30V. 3 VALVE ALL-STATION SET 5s.
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TRADE NOTES

THE Chloride Electrical Storage Co., Ltd., of Clifton Junction, near Manchester, have just issued a very attractive coloured poster (20 in. by 30 in.), dealing with the well-known series of Exide DTG, DFG, DHG, and DMG 2-volt cells. Supplies of this poster are obtainable on application to the Publicity Department, Exide Batteries, Clifton Junction, near Manchester.

Mr. Marcus Scroggie, the chief engineer of Burndep Wireless (1928), Ltd., has left on the *Berengaria* for a tour in the United States.

The Sifam Electrical Instrument Co., Ltd., have asked us to point out that in their advertisement which appeared in our issue of March 2, due to a printer's error, the voltage range of the pocket voltmeter was given incorrectly. It is, of course, 0-6-120.

Attractive pedestal cabinets suitable for the Clarion Three and other similar AMATEUR WIRELESS sets can be obtained from the Miscellaneous Trading Co., of 143 High Holborn, E.C.4.

The world's largest broadcasting orchestra is said to be that under the direction of Erno Rapee, playing for the National Broadcasting Company's network, in America. It contains more than fifty internationally known musicians.

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The Neutrodyne from A to Z

"The Book of the Neutrodyne"

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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," 58-61 Fetter Lane, London, E.C.4.

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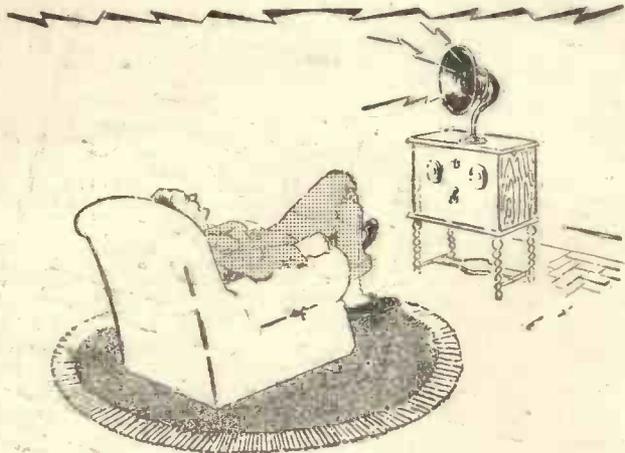
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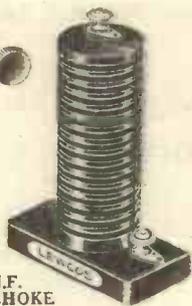
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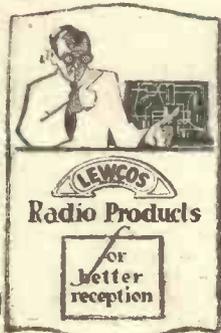
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There is a complete range of models, covering a wavelength band from 22½ to 2,000 metres.

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PRICES (complete with Holder)

- Broadcast Toroid, 230/600m. (Red) . . . 10/6
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This set incorporates the latest developments in Receiver design—full constructional details free on request.



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POWER VALVE
ever designed**

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Marconi Valves are consistently good because they are triple tested.

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MARCONI

DEP 215

TRIPLE TESTED

MV23-132

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