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Amateur Wireless

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**SIXTY 3^d.
PAGES**

Vol. XV. No. 384

Saturday, October 19, 1929

Free
Blueprint
Inside

THE MUSIC LEADER

SCREENING BOX PANEL

H.F. T

DUAL WAVE COIL ARCADIAN TYPE

H.F. 5C. VALVE

F. CHOKE R.C.C. UNIT

H.F. CHOKE

100,000 ohms 2 megohm

100,000 ohms

3 megohm

0002 mfd

0005 mfd

To moving plates

To plate

19 turns No. 28 d.c.c. wire

AERIAL TUNING COND. 2 3/8

Frame connections

POWER

**AERIAL
TUNING COND^{SR} 2 3/4**

SCREENING BOX DANCE

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 -0.005 m/s

To moving plates

DUAL WAVE
COIL **ARCADIAN**

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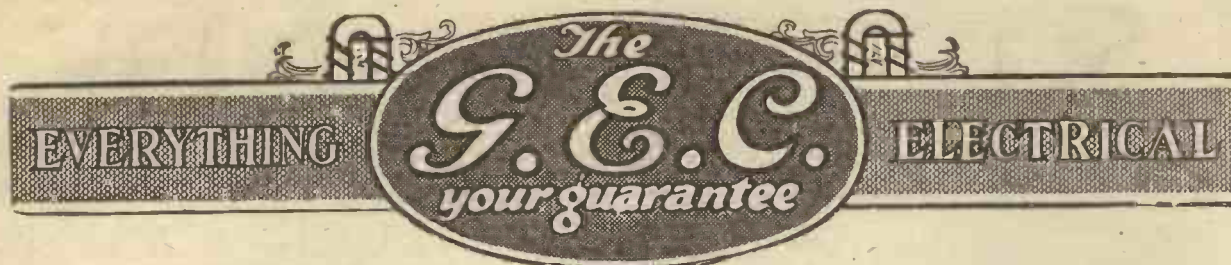
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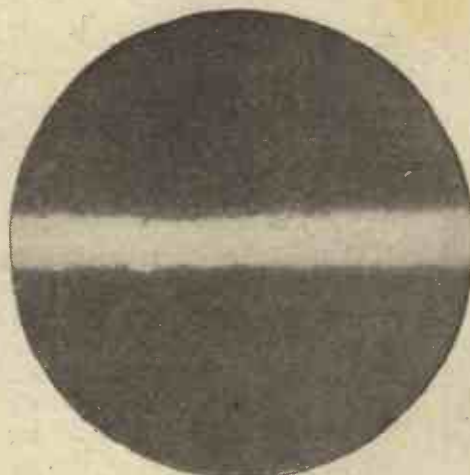


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Broadcasting a "Dirt" Meeting—The Cenotaph Service—Dean Inge's Debüt—He Spoils It—The Science Museum Set—Nerves and Microphone Fright

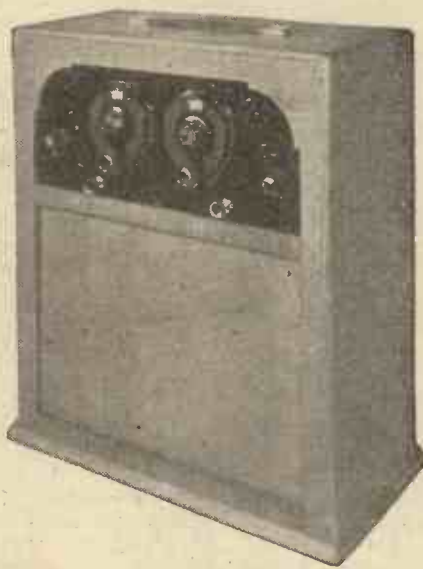
Another Free Gift—Are you interested in "kit" sets? Next week we are making another free gift with every issue of "A.W." which is sure to interest you. Turn to page 580 for full details.

Broadcasting a "Dirt" Meeting—A running commentary on a "dirt track" meeting is to be given on November 7, and this is of particular interest in view of our article on loud-speakers on the dirt tracks, given in a recent issue of "A.W." The event to be broadcast will be run off at the Wembley Stadium, and will be given through London and 5XX, so you won't miss it.

The Cenotaph Service—The B.B.C. is again relaying the service at the Cenotaph, and the arrangements are very much the same as last year. In a forthcoming issue, the technical arrangements in connection with the arrangement of the microphones will be described. One of the difficulties which the B.B.C. engineers have to face is that the microphones must be hidden, and all wires and switches must be out of sight. As a matter of fact, the B.B.C. outdoor van is used for the occasion, and is situated in Richmond Mews, just off Whitehall and near the Cenotaph.

Dean Inge's Debüt—The editor of the *Sunday Express*, Mr. James Douglas, has made some interesting remarks upon Dean Inge's microphone debüt. When the Dean broadcast for the first time recently, he proved to be a very brilliant speaker, and Mr. Douglas thinks that he was too brilliant and too "stimulating" for the radio audience, which can only hear and not see. Mr. Douglas says: "I cannot follow a long literary sentence in the air as easily as I can follow it on the printed page . . . he (the Dean) should study the art of the microphone." So there is a microphone art, after all?

He Spoils It—And then, after making many sensible remarks about radio and the programmes in general, Mr. Douglas comes out



Here is the "Music Leader," the set which forms the subject of the Free Blueprint given with this issue. The original set on which the "Music Leader" was based has been developed and tested since last May, and has travelled a total distance of 9,000 miles during tests.

with this: "I think the B.B.C. should give us more than two or three alternative pro-

grammes, so that highbrows, mezzo-brows, and low-brows could choose their own meat." Now, isn't that what we have all been wanting since the inception of broadcasting!

The Science Museum Set—The AMATEUR WIRELESS correspondence columns are always redolent of interest, and a subject which has been occupying the minds of correspondents recently is that of reproduction given by the receiver in the Science Museum in South Kensington, London. It is generally agreed that this set, England's prime wireless exhibit, should represent in some degree the very best that can be had from radio. And some of our correspondents do not think that the set is anything like perfect. So to clear matters up an AMATEUR WIRELESS Special Correspondent went down to the Museum a few days ago, and the "truth" about the Science Museum set is given on page 579.

Nerves and Microphone Fright—The unfortunate Mr. Philip Drew, who has been occupying the daily papers so much these days, said of the inquest: "It was difficult to give evidence at first, but I soon began to sense what I can only call responsive

waves, just as I do in the theatre." And yet many actors and actresses who have been interviewed by AMATEUR WIRELESS from time to time have declared that there was no such feeling, and that broadcasting (with no audience) is therefore no different from a stage performance. And yet there is such a thing as "mike-fright," and one well-known actress fainted after making her microphone debüt. So perhaps there are responsive waves!

Our Free Print—With this issue we are presenting (as announced last week), a rs. 6d. blueprint *entirely free*. The subject of the print is the "Music Leader," the best transportable for the home which has yet been designed.

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SEE OUR SECOND GIFT OFFER ON PAGE 580

A USEFUL TEST BOX



The completed test box

TO every set owner some sort of testing equipment is indispensable for checking the behaviour of the set or batteries, or the conditions under which they are working, otherwise guesswork as to the cause of defective reproduction is the only means of putting matters right.

The test box about to be described is easy to make and easy to use. Its cost is small and it may save the initial outlay involved. In any case, it is false economy to work without instruments.

The Materials Required

First, the materials required are as follows:—

A small quantity of $\frac{3}{8}$ -in. wood (deal will do) and a small quantity of $\frac{1}{8}$ -in. plywood.

Ebonite panel, 6 in by $3\frac{3}{4}$ in. (Raymond).
Wates volt-amp meter.

Nine-volt grid-bias battery (Lissen).

Six sockets and three plugs (Ealex or Belling-Lee) (shielded).

One pair of Elbetto testing prods.

Making the case is a simple matter, which will not require much description. The details are clearly shown in Fig. 1. The divisions are of plywood and positioned by plywood spacing pieces, which also serve to carry the panel. A false bottom is fixed in the section to hold the prods so that they can easily be got at. The lid is hinged and secured with a small screw and catch. It is a good idea first to make the box in one piece and then saw right across, thus accurately obtaining uniformity of the base and lid.

The Panel

The preparation of the panel is also quite simple. First drill to receive the six sockets as shown in Fig. 1. A 2-in. diameter cut-out must be made also to fit the meter,

and this can be done with a fretsaw or keyhole saw. Mount the sockets with colour indicators on the front, using red to indicate positive, and fit the meter in position. The wiring can be followed from the diagram, which shows the back of the panel. It is recommended that for a test instrument each point of contact should be soldered. Note that a soldered connection is made at the spike of the meter. This completes the construction, and the panel is simply fitted into the box with a grid battery placed for use at the back and the prods and links in the front division as shown in the photograph.

How to Use the Test Box

The simpler tests consist of reading battery voltages. First, the L.T. accumu-

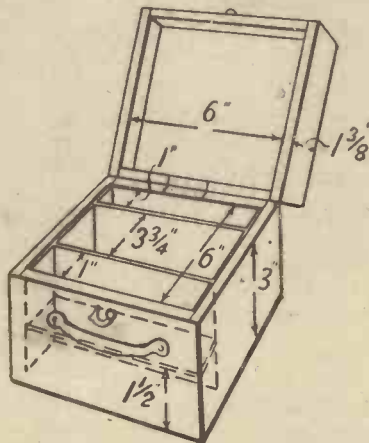


Fig. 1. Details of case

lator. Test this while the set is working to get a true idea of condition and preferably at the end of the programme when it has been in use for an hour or so. Insert the plug of the black prod in the negative socket 1 and the plug of the red prod in socket 2, thus using the 6-volt reading. Place the black prod on the accumulator terminal and the red prod on the accumulator positive terminal and note the reading from the meter. Never test on this scale above 6 volts.

To take a reading of the H.T. voltage, use sockets 5 and 6, and see that negative goes to negative and positive to positive. This test may also be carried out while the set is working.

To take a total

milliamp reading of H.T. current which the set is using, disconnect the H.T. negative plug from the H.T. battery and insert it in socket 4, and in socket 3 insert the plug of the black prod. When the negative socket of the H.T. battery is touched with the prod the meter will give a milliamp reading. This test, of course, must be made while the set is working.

To detect overloading, use the same panel sockets and place the meter in series with the plate circuit of the last valve.

Valve Testing

Valves may be tested to see if the filament is broken by taking a prod from socket 1 to one of the filament pins and the link from socket 2 to the positive socket of the G.B. battery. Then the other prod is taken from, say, the $1\frac{1}{2}$ -volt negative socket of the grid battery to the other valve pin. In the same way any continuity test may be made for low-resistance windings, etc. When testing a valve, do not use more volts than the valve is rated at for the filament.

These examples are only a few of the uses which will be demanded of such an adaptable little instrument.

News has been received from the Russian ice-breaker *Sjedof*, that the experimental wireless station erected on Franz Josephs Land in the Polar regions, is now in regular operation. Transmissions are carried out nightly between 8 and 10 p.m. on a wavelength of 43 metres; the call signs are TSJ, TSR and TSCH.

Experimental transmissions on short waves by the Eiffel Tower, Paris, are now taking place every Tuesday and Thursday between 9.15 and 10 p.m. B.S.T. Several wavelengths are being tried out.

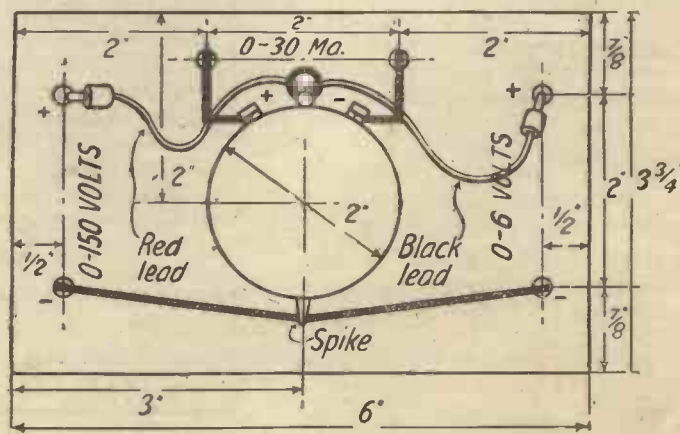


Diagram of Connections



There are many details connected with tuning of which the average listener is unaware. It will be found that the information given below by W. JAMES will be a real help

THE ordinary detector and low-frequency type of set is easily tuned, for the reason that there are only two controls—one for wavelength and the other for volume.

Easy though it is to tune such a set, the beginner is apt to fail to obtain the best results. In the first place, the volume control is not always properly used. Maybe it cannot be used as the designer of the set intended, or perhaps it is not adjusted correctly even when the circuit values are just right.

This control in a modern set takes the form, as a rule, of a variable condenser in the reaction circuit, and by adjusting it the amount of the reaction is varied. A typical circuit is given by Fig. 1. Here the reaction condenser is marked C_1 , the wavelength tuning condenser is C_2 , the grid condenser is C_3 , and the grid leak R_1 .

When listening to the local station, condenser C_1 will probably be set at its minimum value and C_2 will, of course, be so adjusted that the circuit is tuned to the wavelength of the station. The only difficulty here is that the local station may be so strong that the detector is overloaded with the result that it does not function

and not thought to be a defect in the set.

When tuning a more distant station the volume control must be used, and as the

shown by the sudden change in quality or the production of a whistle or howl. Overlap is present when the reaction control has to be turned back past the point where the oscillations commenced, and there is usually a "plop" when the set is passed into and out of oscillation.

Obtaining Greatest Volume

The maximum volume cannot be obtained when the set behaves in this manner, and, further, a user is far more likely to disturb other listeners by oscillating than when the control is nice and smooth.

To remedy this state of affairs the high tension, H.T.+1, Fig. 1, should be adjusted and a different grid leak R_1 be tried. If no better results are obtained, the bottom end of the grid leak should be taken to a potentiometer, as in Fig. 2a, or the scheme of Fig. 2b may be tried. One of these methods will cure reaction overlap.

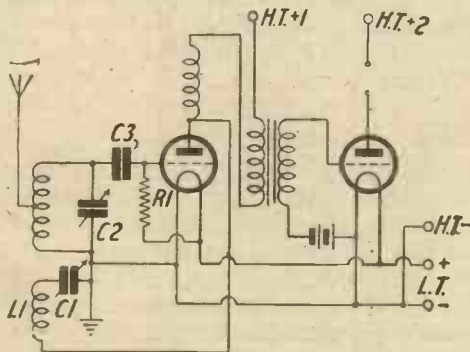


Fig. 1. A simple 2-valve circuit

signals are weaker the control becomes of more importance. It is then that one may notice a defect in the volume control or reaction circuit. Does the control steadily increase the volume until the point of oscillation is reached? If it does, and there is no sign of "overlap" or "popping," the circuit is behaving properly.

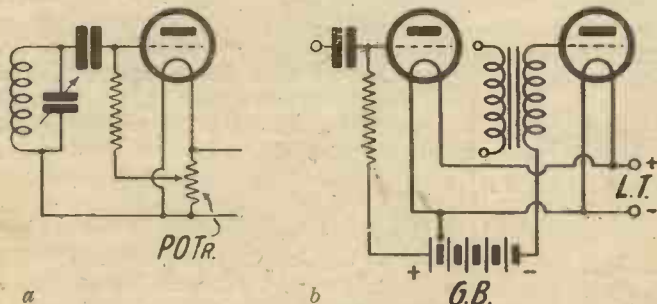


Fig. 2. Methods of connecting grid leak to avoid poor reaction effects

properly. In this event a point on each side of the correct tuning point (as regards wavelength) will be found where the signals are loudest and clearest. This effect is met with only when a strong signal is being received, but should be recognised as such,

Quite often the reverse is true. There is a certain amount of overlap, which perhaps prevents fine tuning. This condition will quickly be noticed. As the reaction is turned the signals increase in strength until presently the circuit oscillates, as

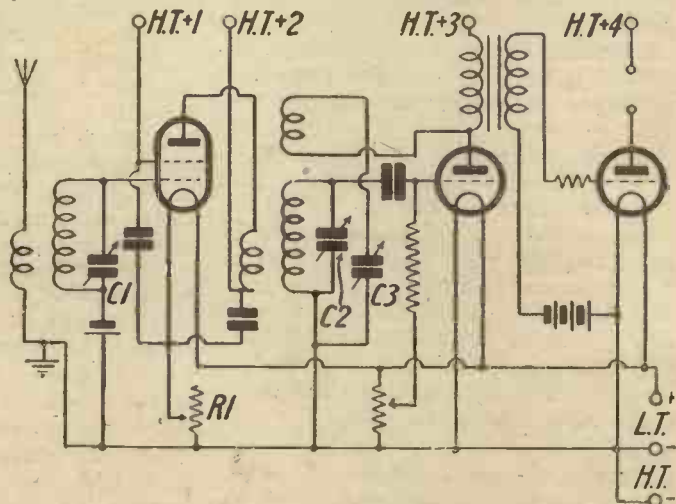


Fig. 3. A typical 3-valve circuit

The only point then remaining is whether the reaction is too fierce. If it is, a few turns should be removed from the reaction coil L_1 , Fig. 1. Having now so adjusted the circuit that the reaction is smooth, it is fairly easy to bring up the strength of a

distant station, for it is only necessary to tune with the aerial condenser whilst slowly advancing the volume control. The set is in its most sensitive condition, and is therefore providing its maximum magnification, when it is just not oscillating.

A careful user will not allow his set actually to oscillate, and will therefore not hear a whistle or howl whilst tuning, but he will hear a gentle "breathing" or "rushing" sound when not actually tuned to a station that is transmitting. When the

condenser c_2 very slowly or, better still, in steps of one degree whilst moving condenser c_1 backwards and forwards about the tuning point. Fine tuning cannot be carried out until a station is heard, and then the reaction should be adjusted with the resistance R_1 in various positions.

The best cannot be obtained from a set of this description unless the various operations are carried out in their correct order, and when the set is selective the various controls must be turned slowly, or stations will be missed.

Owing to the fact that a shielded valve is used, there is no harm in oscillating occasionally, although one must remember that unless the high-frequency amplifier is of good construction the aerial circuit will oscillate and therefore radiate oscillations. I find that the volume control provided in a set of this type is often not used sufficiently, with the result the detector overloads and distorts.

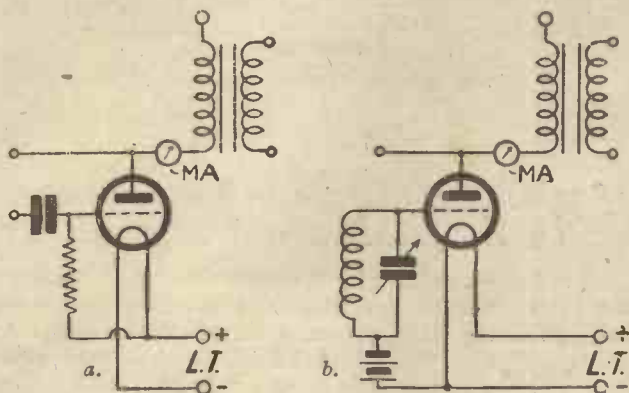


Fig. 4. Diagrams showing positions of meters to indicate strength of signals

station commences to broadcast, the speech and music will be heard as loudly as is possible with that particular set.

H.F. Tuning

A receiver having a stage of high-frequency magnification as well as a detector and a low-frequency stage, generally has three controls at least—probably there are four. It is therefore much more difficult to tune a set of this type, although the tuning should be mastered in a few minutes.

The wavelength controls are in the aerial and detector circuits, the tuning condensers being c_1 and c_2 , Fig. 3. Reaction is controlled by c_3 and there is often the volume control R_1 , which is a filament resistance connected to the high-frequency valve.

When about to tune this set it is advisable to follow a definite procedure. First turn the filament resistance R_1 full on. Then set the two condensers c_1 and c_2 alike, and finally set condenser c_3 at its mid position or at a point where the set is not oscillating. A fine adjustment may now be effected by slowly turning c_2 and c_3 . If a station is heard, c_1 may have to be adjusted a little to bring the aerial circuit into tune.

Resistance R_1 is turned when the volume is too great or when interference is experienced. The high-frequency magnification is reduced by putting more of the resistance into circuit and the selectivity of the set is improved. Signal strength may be maintained by increasing the reaction, excepting, of course, when the full amount is already being used.

When searching for a station move the

Meter Indications

The aim when tuning should be to obtain the desired strength with the minimum of reaction, and the tonal quality may be adjusted, within limits, by maintaining the volume, but using different settings of the reaction and volume controls.

A very good indication that the circuit is properly tuned is a milliammeter connected in the anode circuit of the detector. This instrument will also roughly show the strength of the signal applied to the detector. The circuit of Fig. 4a shows a milliammeter joined to a leaky-grid detector, whilst Fig. 4b shows an anode-bend detector. The current flowing through the instrument will decrease in one instance and increase in the other when a signal is being received.

Thus, in Fig. 4a the instrument may indicate 1 milliamperes when the set is not tuned. When a moderate signal is tuned in the current will fall, say, to .75 milliamperes, and it will fall further, say, to .5 milliamperes when a strong signal is being received.

If this meter is watched whilst tuning, accurate results may be obtained, as the current decreases as the signal strength is brought up in strength. It falls because the grid of the valve is made more negative during reception and shows clearly the relative strength.

The meter of Fig. 4b, which is joined to

an anode-bend detector, normally shows only a small current when no signal is being received. Thus, it might show a current of .1 milliamperes. When a moderate signal is tuned in the current increases, perhaps to .5 milliamperes, whilst a strong signal will further increase the current. The instrument is therefore a guide as to the strength of the signal being received and is often found of great help when tuning.

Slight changes in the tuning usually produce noticeable variations in the indications of the instruments in both arrangements. Low-reading instruments ought to be used. A useful range is 0.1-1.5 milliamperes, as the effect of slight changes in tuning may easily be followed with so sensitive an instrument.

A very strong signal may reduce the anode current of a leaky-grid detector almost to zero, but it will probably be badly distorted. The best results will be obtained when the input is less than a certain amount, depending upon the valve and its high-tension, and experiments will indicate the lowest reading that is safe. In the case of the anode-bend detector the quality is likely to improve as the strength increases, until a certain point is reached, beyond which distortion will be experienced. It will be found that the quality is best when the milliammeter shows a current of about a certain value—less or more than this resulting in distortion.

USING AN AEROPLANE TO DETERMINE THE HEIGHT OF THE HEAVISIDE LAYER

MANY experimenters from time to time have endeavoured to obtain an idea of the height of the Heaviside layer. Various methods have been tried, and the latest—that employed by Messrs. Mirick and Hentschel, of the U.S. Naval Research Laboratory—involves the use of an aeroplane. Radio signals from an aeroplane in flight have been observed to show a regular pulsation in field strength. It is thought that this rise and fall in received signal is due to an interference effect between the ground and the high-angle radiation. As the aeroplane moved to or from the recording station a succession of peaks in signal strength were observed and, knowing the velocity of the plane, the distance between the peaks of fading and the distance from the recording station, the above-named experts calculated the height of the Heaviside layer. In their calculations they assumed that reflection of the high-angle radiation which caused the interference effect took place from a horizontal plane at the height of the layer. By this method an effective height, varying between 60 to 80 miles in daylight, was obtained. These values compare favourably with previous estimates by other experimenters. D.

NEXT WEEK:

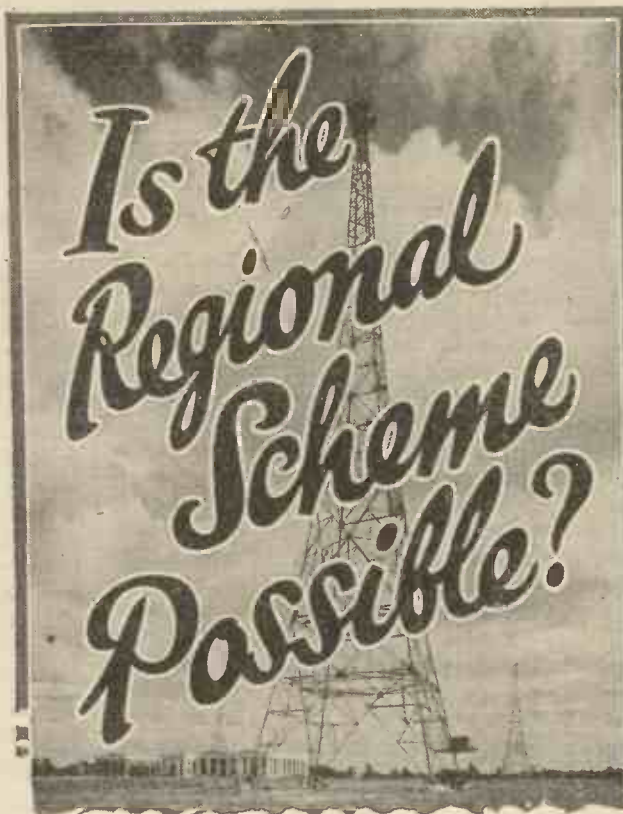
W. JAMES on
METHODS OF
PROVIDING H.T.

THE essence of the regional scheme is that the present eight British main stations and nine relays operating on the medium band (that is, on wavelengths within the 200- and 550-metre limits) shall eventually be replaced by five high-power stations each radiating simultaneously two programmes on different wavelengths. Since each of the new dual stations will be designed to have a service area with a radius of at least a hundred miles, it is hoped in this way to provide every listener in the country, no matter how simple his receiving apparatus, with the choice of two programmes at all seasons of the year. The idea is magnificent, but already many people are beginning to wonder whether the scheme will not have to undergo drastic revision before it can become practicable.

Wavelength Channels

So far as wavelengths—or, rather, "channels"—are concerned, all is plain sailing—on paper, at any rate—for Great Britain has been assigned the necessary ten. Nine of these are at present used as individual channels by London, Cardiff, Manchester, Daventry 5GB, Newcastle, Aberdeen, Glasgow, Belfast, and Leeds, whilst one forms a group-channel for Bournemouth and the nine 130-watt relays. There are, however, many other points to be considered besides this.

Anyone living thirty miles or so north-west of London has now had some kind of opportunity of judging what reception conditions will be like should the regional scheme ever come into operation with the simultaneous broadcasting of dual programmes at high power. He can, at any rate, gauge the wipe-out effect which such stations cause at different ranges, though, for reasons which will be shown in a moment, this does not amount to a full test of reception under the conditions which may obtain in the near future. In my own case I have 5GB some forty miles away to the north-west and Brookmans Park fifteen miles off to the north-east. Imaginary lines drawn from these two stations to my aerial would meet almost at right angles. Using a receiving set designed not so much for selectivity as for good quality, I find that 5GB's wipe-out extends from, roughly, 525 metres down to 440 metres. In frequencies this means that, so far from occupying a channel 9 kilocycles wide, 5GB at forty-five miles covers roughly 108 kilocycles, or twelve times the width of a normal channel.



Considerable doubt continues to be expressed regarding the practicability of the Regional Scheme. Below, R. W. Hallows makes an analysis of the position

With a similar set the wipe-out from Brookmans Park is much greater. Kattowitz on 408 metres is just clear of him, so that we may take the wipe-out as extending to 403 metres. This corresponds to 99 kilocycles above. The wipe-out below is very much worse. The first station, in fact, that can be obtained absolutely clear of Brookmans Park is Königsberg on 276 metres. The wipe-out thus seems to extend to 279 metres, which in frequencies works out at 234 kilocycles!

Though not highly selective, this set, with its moderately efficient stage of high-frequency amplification, is very much more so than the two-valver consisting of detector and one note-magnifier or the three-valver with two note-magnifiers, which are so widely used. It is, of course, infinitely more selective than any crystal set.

Nearby Wavelengths

It is proposed, one understands, that when Brookmans Park gets under way with dual transmissions these will take place on the present wavelength of 356 metres and on 261 metres. Assuming that the wipe-outs of the two transmissions are similar, we may expect that upon 261 metres the blanketing effect above will also extend 99 kilocycles, which brings it up to 286 metres and causes it to overlap

the lower wipe-out of the 356-metre transmission.

Yet another very important factor comes in here. Instead of coming from directions almost at right angles to one another, the transmissions will reach one's aerial from the same point. This will probably increase the difficulty of separating them when an outdoor aerial is used, and it also means that the directional properties of the frame cannot be utilised.

Wipe-out Troubles

The wipe-out is, of course, very much less when a selective receiving set is employed, but even so it is considerable. The highly selective set can bring in Brussels, 36 kilocycles away from 5GB, without any interference; but one has to go dangerously near the point of oscillation in order to receive Milan, which is 27 kilocycles from 5GB, without a background from the British station. The wipe-out on wavelengths below is about the same. But such is the strength of

Brookmans Park at short range that the aerial seems to suffer from something like shock excitation, and the blotting out of this station is still very

great with the same receiving set. To obtain either Hamburg or Brunn properly a wavetrap must be used.

After making tests with my own set, I went round to the houses of several friends to see what their receiving apparatus would do under similar conditions. The majority of those that I visited use not very up-to-date apparatus so far as the high-frequency side is concerned. Some of the sets were bought ready made; others are home-constructed receivers. Most of the latter have had improvements made in their low-frequency intervalve and output circuits since they were first built, but the high-frequency side, having been found to do all that was necessary up to the present time, has not been altered. Sets of the two types referred to are, I fancy, typical of those used by the average man throughout the country. The state of affairs found when such sets were employed for reception purposes whilst Brookmans Park and 5GB were both working was an eye-opener. Not a few of them could not separate the two transmissions; both of which I must add, in all fairness, are very strongly received in my locality. Of those who could obtain one station without a background from the other, not a single one could tune in any home or Continental station with a wavelength

(Continued at foot of next page)

For the Newcomer to Wireless: THE PENTODE VALVE

I AM thinking of using a pentode valve in the next set that I build; can you give me a simple idea of the way in which it works?

The pentode valve is really a development of the screen-grid system. You know that the screen-grid valve gives enormous amplification at high-frequency and possibly you know, too, that it is useless for low-frequency work.

Yes, I have heard that, but I don't think that I know the reason why.

It is quite simply that the characteristic curve of the screen-grid valve has not a sufficiently long straight portion for the purpose. Actually its characteristic is shaped rather like a capital "N" with the lower part of the first stroke and the upper part of the third prolonged.

How is the kink caused?

As the plate potential is raised steadily from quite a low figure the plate current continues to rise as one would expect. When, however, the plate potential is approaching that applied

to the screening grid, the velocity of the electrons which pass through the meshes of the latter is sufficient to drive out of the plate further electrons by the force of their impact.

What happens to these?

A proportion of them makes its way to the screening grid. The result is that at this portion of the curve there is a dip in the plate-volts plate-current characteristic since the plate is losing so many of its electrons.

What follows next?

The dip continues as the plate potential is raised until it is a few volts more than that of the screening grid. At this point the secondary emission, as it is called, begins to stop and the characteristic resumes its straight line form until the saturation point is reached.

I think I see what you are driving at; in order to obtain a valve with a straight portion long enough for low-frequency work some means has got to be found of preventing the secondary emission from taking place.

You are on the track. Secondary emission cannot be entirely prevented, but its effects can be eliminated.

How is that done?

A third grid, connected to the middle of the filament, is interposed between the screening grid and the plate. Electrons travelling from the filament pass through this quite easily on account of their enormous speed. On reaching the plate they drive out other electrons as before and these begin to move, at a much lower velocity, towards the screening grid. On their way, however, they encounter the third grid which, on account of the way in which it is connected, contains a crowd of electrons. These exercise a powerful repulsive force on the electrons that have left the plate and serve to drive them back again to their proper place.

I see; then the result is that the flow of plate current is kept up and there are no kinks in the curve.

Exactly.

"IS THE REGIONAL SCHEME POSSIBLE?"

(Continued from preceding page)

between 356 and 479 metres without a background of interference, more or less pronounced from either 5GB or Brookmans Park.

Ten High-power Stations at Once

What would be the effect if ten 30-kilowatt transmissions were on the air at the same time in this country? My own belief is that, so far from providing the average listener with a large variety of programmes, it would tie him down entirely to the two provided by his local regional station. Until recently anyone with an efficient three-valve set could receive on most nights at least a dozen alternative programmes from home and foreign stations. We can hardly look upon it as a step forward if Continental stations are completely blotted out and nothing is available but one of two programmes from a near-by source.

And what of our receiving sets? No one can doubt that if the scheme were pushed through something much more selective than the present-day receiver in general use would be required. The public has been assured that the regional scheme is all for its good, but it strikes me that it will be a difficult matter to persuade it that this is really so if the scheme entails, as seems likely, if it goes through in its present form, the scrapping of thousands of sets and the almost complete rebuilding of thousands of others. To take an in-

stance, many portable sets rely for their selectivity very largely upon the directional properties of the frame; these at short range would probably bring in not one of the dual programmes, but both at once.

Is the Scheme Obsolete?

Like so many things that take a considerable time to work out and develop, the regional scheme was probably obsolete before the finishing touches were put to the Brookmans Park station. It was founded upon the idea that a service area meant a region within which reception could be assured with a crystal receiving set. But crystal receiving sets are nowadays rare—much rarer, I venture to say, than the B.B.C. believes. Cheaper valves, cheaper components, and cheaper forms of current supply have made it possible to build and maintain a valve set at but a fraction of the cost which would have been entailed only a year or two ago. Looking through the advertisement pages of any issue of AMATEUR WIRELESS of 1926, one found numerous offers of crystals and detectors. During 1929 I cannot recall having seen a single advertisement of this kind in AMATEUR WIRELESS. A "crystal service" is no longer required for a transmitting station now that almost everyone has a valve receiving set. Increase the power of the present main stations to 4 kilowatts and there is hardly a soul in this country who will not have all the broadcasting service that he could desire!

A Suicidal Policy

In broadcasting we appear at present to

be faced with something very much akin to the race in armaments, of which so much has been said and written. Every country is pursuing the suicidal policy of obtaining a place in the ether by shouting down all the rest. We who have done so much in the past towards straightening out the chaos in the ether on this side of the Atlantic appear to have committed ourselves to this fatal policy with our programme of ten 30-kilowatt transmissions on the medium waves, plus a 25-kilowatt station on the long waves. Continental nations can only follow our unfortunate lead if they wish to save themselves from being blotted out. That is why we find, amongst others, Bordeaux proposing to increase his power to 30 kw., Madrid to 20 kw., Milan to the same figure, Rome to 50 kw., and Prague to 60 kw. If anything like a general increase in power takes place the Prague Plan immediately becomes hopeless, and it will be impossible to find any other scheme which will be satisfactory.

The Real Solution

The only real solution is for all countries to abandon the kilowatt race and to impose an all-round limit of 4 or 5 kilowatts. America is nearly two years ahead of us in the matter of giant stations, and already feeling over there is running high against the super-power transmitter. We are suffering now from an attack of "megawattomania." Let the authorities realise, before it is too late, that what the public wants is a valve-service area, and not a *surfeit* area.

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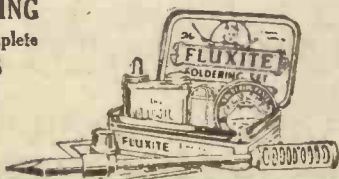


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On Your Wavelength!

A Curious Experience

I HEARD of a very curious thing the other day in connection with the Show. A friend of mine who was busily engaged on one of the stands observed that the quality of reproduction suddenly appeared to have become slightly thinner than before. His attention was occupied with other matters and he did not think about it very much, but he was conscious of a feeling that the quality did not sound quite as pleasant as before. He dismissed the matter from his mind, assuming that some alteration had been made to the B.B.C. amplifier supplying the loud-speakers throughout the exhibition.

The sub-conscious mind, however, is a strange thing, and in this instance refused to be satisfied. My friend continued to be conscious of a feeling of uneasiness until he suddenly realised that the noise to which he was listening was not coming from the loud-speakers, but from the band itself! I think the less comment I make about this story the better, but I can certainly vouch for its truth.

The Speaker Demonstrations

In my opinion, one of the most remarkable features of the show was the way in which almost every loud-speaker in the exhibition reproduced the music supplied by the B.B.C. from the common amplifier. Quite apart from the fact that some of the loud-speakers will never again produce such wonderful music, owing to lack of proper feeding, when they get into the hands of the average owner, the incredible thing is the manner in which they stood up to the large input without any apparent overloading. I certainly heard one or two rattling rather badly, but the number was surprisingly small, but this appears to me to afford striking proof of the fact that 95 per cent. of the overloading encountered with the average set occurs in the last valve, and not in the loud-speaker.

The fact is that the average user has neither the facilities nor the money to feed his loud-speaker with really good quality reproduction. There is a very large difference between the moderately good quality which can be achieved relatively cheaply and which is satisfactory for all normal purposes and the really super-quality supplied to the exhibition speakers. I think it is encouraging to feel that, provided one has a reasonably good speaker, the quality of reproduction is limited more by what one chooses to put into the amplifier rather than by the loud-speaker itself.

A Dealer's Views on Portables

The other day, while speaking to the sales manager of one of our largest radio

manufacturers, I commented on the extraordinary popularity that the portable set was enjoying at the present moment. While I am well aware of both the advantages and the limitations of portables it seems to me that many people buy sets of this type who would be better served, except for a very small percentage of their listening time, by a set using a separate aerial and earth.

Radio dealers prefer to sell portables to the exclusion of sets requiring aeri-als. The whole thing turns on service. A dealer has only to walk into a probable customer's house, demonstrate the set, possibly sell it, and then walk out again. There are no installation charges. With the other type of set a temporary aerial and earth must be established, which, since it takes a considerable time, represents a dead loss if no sale results. Even when a set is sold the erection of the permanent aerial, for which only a nominal charge can be made, also eats into the dealer's profit; so, taking things all round, dealers push the sale of portables as far as they can. It would appear from this that the installation of a set which enthusiastic amateurs light-heartedly undertake for their friends is a serious problem for the average radio dealer.

Effect of a Moving-coil Speaker on New Listeners

Incidentally, the same informant told me that, in his opinion, a dealer whose principal sale was portable sets was nothing short of a "mug" if he had a moving-coil speaker demonstrating in his showroom. His company had lost a lot of possible purchasers, evidently new to radio, who were disappointed that the reproduction from the portable models was not up to that of the moving-coil speaker and its expensive and bulky amplifier equipment. Had there been no moving-coil to fix a standard of reproduction they would probably have been quite satisfied.

"Regional" Doubts

Of the many people with whom I have chatted on wireless subjects at one time or another of late, very few seem anything like enthusiastic over the future of the regional scheme. Now that we have had a taste of Brookmans Park and a fair experience of 5GB, people are becoming a little doubtful whether high power is really "all jam"—if I may put it so. Perhaps, though, that is a rather unfortunate expression, because some people do maintain that it *will* be "all jam" in the sense that huge local wipe-outs will keep one tied down to the two programmes of the local dual transmitter. What I

meant was that the reception of a 30-kilo watt transmission may not be all sweetness and straightforwardness and plain sailing for the man in the street, who uses simple apparatus and wants his fair share of good quality.

The Quality Problem

What I find when either Brookmans Park or 5GB are going full blast at moderate range is that the detector valve begins to start all sorts of little problems of its own. You see, comparatively huge voltage swings arrive upon its grid, and then the band begins to play. The grid-leak-and-condenser rectifier is inclined to pack up if voltage swings are at all on the large side, and very unpleasant distortion can be caused if it is overloaded. We turn, therefore, to anode-bend rectification, hoping that here we shall find a complete solution. But do we? My experience is that we don't, unless we are prepared to use a high plate voltage and a correspondingly large negative grid bias on the detector; otherwise the grid swings from a giant station may be quite sufficient to make this kind of detector indulge in a variety of funny tricks.

Another point is that with its craze for providing the crystal service area, the B.B.C. does not err on the side of under-modulating its transmissions. A deeply modulated transmission is simply fine for the crystal man, though it may cause the valveite, who values purity of reproduction to tear his hair. My own experience certainly is that I obtain much better quality from the Oxford Street transmitter than from either Brookmans Park or 5GB.

Battery Fashions

It is curious to find how battery manufacturers have to cater for the different habits on the part of the user in various countries. I am referring principally to the dry-cell high-tension battery, which still shows signs of being very much alive, though, according to the prophets, the eliminator should have killed it stone dead long ago. The British battery user likes to get the very last ounce of service out of his high-tension battery, and he not infrequently keeps it at work until the voltage has dropped to half what it originally was. He expects to find a fairly rapid fall to about 1.25 volts per cell, and after that he wants a discharge curve showing a nice gentle fall to the neighbourhood of .75 volt per cell. Often he will keep up his plate voltage by wiring a new high-tension battery or a portion of it in series with an old one. In America quite a different state of affairs prevails. The majority of batteries reach the dustbin before their voltage

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On Your Wavelength! (continued)

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has dropped to 1 volt per cell. Thus it happens that the American maker must provide something with a small initial drop, followed by a gentle curve down to about 1.1 volt per cell, and then a very rapid tail-off.

Adaptable Construction

Though the general public does not realise it, you can do all kinds of amusing things with a dry cell if you have the necessary chemical knowledge. If, for example, you don't mind giving it a rather short shelf life (shelf life means the time that a battery will last if simply stored away and placed under no load), you can enormously increase the capacity; that is, the number of milliampere hours that it will give under a reasonable load. Again, you can put up the initial voltage at the expense of capacity, and so on.

In fact, by carefully adjusting your ingredients, you can give a dry cell almost any kind of discharge curve that you can think of. It is for this reason that the high-quality battery scores so heavily. Not a small part of the price that you pay for it goes into research work of the utmost value to yourself and to all other dry-battery users. Cheap foreign batteries are made by people with neither facilities to conduct research nor the desire to do so. They work, as a rule, simply on a "quack" formula and are quite content with the hit-and-miss principle.

Little Things That Matter

If you buy a battery of reputable make you may have a comfortable feeling of assurance that it will give you a standard performance or that if it doesn't the makers will meet you most fairly on your reporting the matter to them. Buy foreign batteries and you never know quite what is going to happen. You may strike a comparatively good one by a stroke of luck, but the next one of the same make that you buy is more than likely to give quite a different performance. The reason why this kind of unevenness occurs amongst cheap batteries is to be found in the lack of tests applied to the raw materials. One batch of manganese dioxide may look very like another, but laboratory tests may show a heap of difference. There are grades of manganese, just as there are of sal-ammoniac and other chemicals used in dry-battery construction, and zinc is one of the most difficult of metals to deal with, since it is always found in a very impure state, and getting rid of the impurities is no easy business. It is attention to all these small points that makes all the difference to battery performances.

An Historic Relay

The relay of Mr. Ramsay MacDonald's reception on his arrival in America, though

carried out under considerable difficulties, was wonderfully well received. A broadcast of this kind is one of those landmarks which show us what a big part wireless is playing first of all in bringing the man in the street into direct contact with events of world importance and, secondly, in promoting much closer union between nations widely separated from one another upon the earth's surface.

A Heterodyne Question

The other day a friend who lives on the south coast was chatting with me, and naturally wireless formed the main topic of our conversation. Knowing him to be a keen long-distance man, I asked how he found the Prague Plan working up to the present. To my astonishment, he said that at his station heterodynes were so appalling that hardly a station was to be received upon the medium band without interference—bad enough completely to spoil one's pleasure in listening to it. Allowing for slight exaggeration (I think he must have been missing his little daily dose), I was rather flabbergasted, for my own experience does not bear out his at all. I mentioned Toulouse as being a pretty useful foreign station. "Always heterodyned by Hamburg," he said. I pointed out that Toulouse and Hamburg were 18 kilocycles apart and that if there were any heterodyne it must be caused by Manchester, which is between the two. And then I referred to other stations that I receive pretty well, though he declared that every one of them was completely messed up—at any rate, before it reached his aerial. It would be very interesting if readers living in different parts of the country would send in accounts of their experiences of long-distance reception under present conditions.

A Negative Televised Picture

I expect many people were puzzled at one interesting portion of the published reports dealing with the first experimental television transmission by the Baird system. It was stated that the first televised face, which in this instance happened to be Sir John Ambrose Fleming, looked most

peculiar, since all the dark portions were light and all the light details black. In other words, Sir John's white hair looked as though it had turned black in a night, while his face resembled that of a nigger minstrel! The reports further stated that this was due to a negative picture being received and that the matter was soon rectified. The puzzling feature arises as to how this effect is brought about in television and what steps are taken to rectify it.

A Reversal of Signal Direction

Perhaps some readers have overlooked the fact that if we have a receiver in which the first low-frequency stage is resistance-capacity coupled and the second stage transformer coupled, then the signal on the plate of the detector valve is in the opposite direction to that on the plate of the output valve at the same instant. If both stages are transformer coupled, however, the signal is in the same direction. This reversal of signal direction through each successive low-frequency stage may not have any effect as far as aural reproduction is concerned, but when looking at a televised picture obviously signal direction must be correct.

Again, turning to the detector stage of a receiver, it is well known that, whereas grid-leak rectification causes a drop in current if a meter is joined in the plate circuit, anode-current rectification causes an increase. Thus, we have two possible signal directions according to the type of rectifier employed, and if one gives a negative picture the other gives a positive.

How to Make the Change

On the day referred to I gather that a pair of line transformer connections had been reversed, and, of course, the normal condition was secured by changing them over as this reversed signal direction. With the tests as now conducted a positive picture is secured with an anode-bend detector, followed by three stages of resistance-capacity coupling. If grid-leak detection is substituted, then it will be necessary at the receiving end to use two stages of R.C. If a transformer is included on the L.F. side, then the change to positive or negative is effected, as mentioned previously, by changing either primary or secondary connections. This is a very important point, and one which readers will do well to bear in mind when the time comes for commercial televisions to be available for public use. Several alternatives present themselves if one should get this negative picture, and the individual can choose that which he prefers or is most convenient; that is, change mode of rectification, add or subtract low-frequency stages, or reverse transformer connections.

THERMION.

Are you interested in

"KIT"
Set Building?

We make a special offer on
page 580



The complete Music-lover's Gramo-Radio

THIS is the last constructional stage in making up the "Music-lover's Gramo-radio." In previous issues of AMATEUR

This is the fourth and concluding article on the construction of the Gramo-radio Receiver with Linen Speaker that attracted so much attention at Olympia. The first three articles dealt with the receiver and loud-speaker and the present one deals with the general assembly

The overall dimensions are $23\frac{3}{4}$ in. by $14\frac{1}{2}$ in., and the wood used should be $\frac{3}{4}$ in. in thickness, in order that it shall be of adequate strength. A motor board which bends under the weight, or subsequently warps, is an endless source of trouble.

The motor used is a Peto-Scott, but almost any type of good motor can be used if the constructor has one at hand, or, for instance, is taking a motor out of a mechanical gramophone which is to be discarded in favour of the "Music-lover's" set.

as with a mechanical job, but nevertheless by no means an advantage!

There is a fair amount of space in the cabinet to accommodate a good-size motor, and if one is going to take pride in the finished "Music-lover's" set, then it is well worth while investing in a really good motor.

The blueprint gives the drilling centres for the Peto-Scott motor used, but all good motors are supplied complete with a template, and no difficulty should be experienced in plotting new drilling centres for a motor of a different make. All dimensions are clearly shown on the blueprint, a small reproduction of which is given herewith. This blueprint is No. 202c, and can be obtained, price 9d., post free. The prices of all blueprints, covering each section of the "Music-lover's" set, are given in an accompanying panel

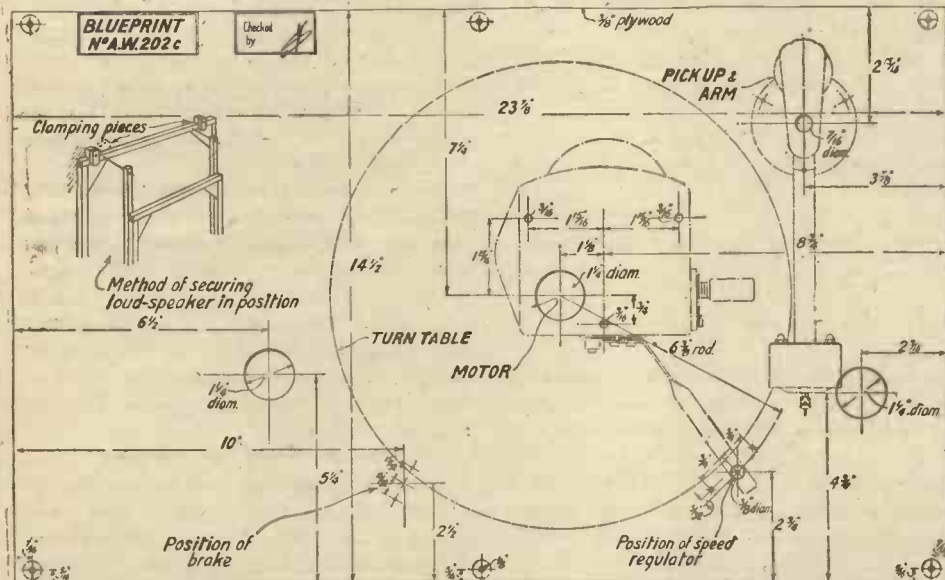


Diagram giving details of motor board. Full-size blueprint available, price 9d.

WIRELESS have been described the receiver section and the "Music-lover's" linen-diaphragm loud-speaker. The receiver section was fully described in AMATEUR WIRELESS Nos. 381 and 382, while the special linen speaker was described in AMATEUR WIRELESS No. 383. This linen speaker is equally suitable, of course, for any receiver, but is designed chiefly for use with this "super" gramo-radio installation, for which it is particularly suitable.

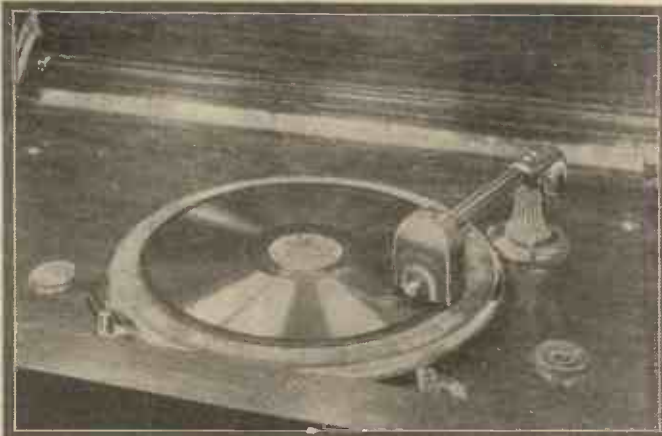
And now we come to the motor board unit, which is the last stage in construction. It is assumed that most constructors of the "Music-lover's Gramo-radio" will have made up the receiver in the special Clarion cabinet illustrated, but full details of the board will be given for the benefit of those who are also making up the cabinet themselves. The board is, of course, included with the Clarion cabinet.

Too much emphasis cannot be placed on the fact that a cheap motor is a stupid economy. It will, perhaps, not run the full length of a 12-in. record without showing a drop in speed, even when new, it will need rewinding after each playing and, what is even worse, it may cause a momentary drop in speed on a large record in deep engravings. Each loud passage on the record will thus cause a noticeable drop in tone. Moreover, the motor itself may be noisy—a fact not so important with an electrical gramophone

Pick-up Mounting

The only point which needs to be given particular attention is the drilling of the hole for the winder shaft. This hole has to be drilled in the side of the cabinet to coincide with the threaded winder projection on the motor chassis. Careful measurement and adjustment is needed, because although a very small error is permissible, owing to the fact that a small metal plate surrounds the hole for the handle, a genuine mistake will necessitate a plate being placed over the incorrectly-plotted hole, and a new hole will have to be made.

The pick-up should be mounted in accordance with the blueprint. If a pick-up



Turntable with electric pick-up

"COMPLETING THE MUSIC-LOVER'S GRAMO-RADIO" (Continued from preceding page)

of a different type is used then the greatest care must be taken to see that it is mounted in accordance with the makers' directions. An incorrectly-mounted pick-up will accentuate record wear, and will not allow the most to be obtained from electrical reproduction.

And now for complete assembly. The motor board bearing the motor, pick-up, and needle bowls, is placed in the top of the cabinet and firmly screwed down. A trial should be made to see that the motor runs evenly and winds freely. The speed, too, should be checked over, either with a proper tester as sold by most gramophone dealers, or by the rough-and-ready method of making a mark on the edge of the turntable and counting the number of revolutions a minute.

Loud-speaker Fixing

The loud-speaker fixing deserves special mention. A light wooden frame should be made up from $\frac{1}{2}$ in. by 1 in. wood, and over this a cushion cover of some fancy design should be tightly stretched. The cover should not be of too thick material, or it will have, at least, some effect on the sound output of the linen speaker. This frame complete with the artistic front is slipped in place in the cabinet, and secured with screws.

A narrow batten is then screwed to the base of the loud-speaker compartment, a little distance away from the frame carrying the artistic front. Two wooden clamps are made from four small pieces of wood, and attached to the top of the front frame, as shown by the inset drawing in the blueprint. They should not be screwed

wired direct to the two terminals on the set, and the battery connections are made by means of the flexes, which for ease of

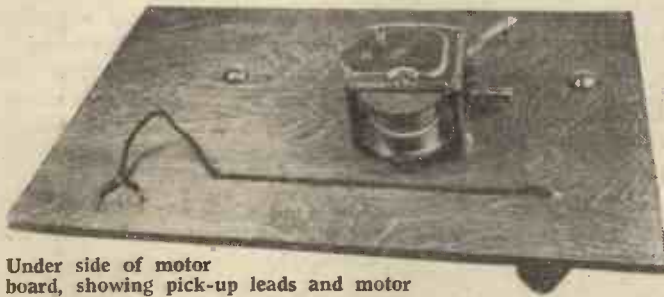
Components for the "Music-lover's Gramo-radio" Receiver

Ebonite panel, 21 in. by 7 in., and two strips, one 7 in. by 2 in., and one 3 in. by 2 in. (Becol, Raymond).
Two .0005-mfd. variable condensers (Cydon, "Junilog," Lotus, Lissen, Ormond).
.0001-mfd. reaction condenser (Peto-Scott, Bulgin, Polar, Dubilier, Lissen).
1-megohm volume control (Igranic, "Megostat," Gambrell).
Two slow-motion dials (Bowyer-Lowe, Lissen, Brownie, Lotus, Burndept).
Panel brackets (Ready-Radio, Bulgin, Raymond).
Double-pole double-throw switch (Utility, Lotus, Lissen).
Four valve holders (W.B., Lotus, Wearite, Benjamin, Igranic).
Dual-wave aerial coil (Lewcos, D.B.A.).
Dual-wave screened-grid transformer (Lewcos, D.B.G.).
Ganging switch for coils (Lewcos).
Screen (Parex, Ready Radio).
.0002-mfd. fixed condenser (Lissen, Dubilier, T.C.C., Graham-Farish).
.0001-mfd. fixed condenser (Lissen, Dubilier, T.C.C., Graham-Farish).
.005-mfd. fixed condenser (Lissen, Dubilier, T.C.C., Graham-Farish).
1-mfd. fixed condenser (Lissen, Dubilier, T.C.C.).
Two 2-mfd. fixed condensers (Lissen, Dubilier, T.C.C.).
Pre-set aerial condenser (Formodenser type J, Igranic).
Grid leak holder (Lissen, Ediswan, Dubilier).
3-megohm grid leak (Dubilier, Lissen; Ediswan, Graham-Farish).
H.F. choke (Lewcos, Lissen, Tunewell, Ready-Radio).
150,000-ohm anode resistance with holder (Ready-Radio, Ferranti, Lissen).
50,000-ohm anode resistance with holder (Ready-Radio, Lissen, Ferranti).
L.F. transformer, ratio 4 to 1 (Marconiphone "Ideal," Ferranti, Lissen, Varley, Igranic).
L.F. choke (R.I., Ferranti, Igranic, Varley).
Variable resistance 250 ohms to 4 megohms (Regenstat, Clarostat, Volustat).
Six terminals marked, Aerial, Earth, Pick-up (2), L.S. (2), (Belling-Lee, Eastick).
Baseboard, 21 in. by 10 in. (Clarion, Raymond).
Seven yards of thin flex (Lewcoflex).
Six wander plugs, marked, H.T.—, H.T.—, G.B.—, G.B.—, G.B.—, G.B.— (Belling-Lee, Eastick).
Spade terminals (Clix).
Connecting wire (Glazite).

wiring should have name tags attached

At this point it is opportune to make a brief resume of the object attained by the

"Music-lover's Gramo-radio," so that those who have missed the previous instalments can satisfy themselves on any little points that might have arisen, and which might have made them hesitate before "plunging" into the construction of a big set.



Under side of motor board, showing pick-up leads and motor

tightly to the fancy front, but should be left so that they can turn to allow the loud-speaker to be put in place.

The loud-speaker should now be placed against the front frame, so that the bottom edge of the loud-speaker is secured by the narrow batten. The top two clamps can now be turned to secure the speaker front frame, and screwed down fairly tightly.

The set can next be slipped into its compartment in the cabinet, the batteries can be placed at the bottom, at the back of the loud-speaker (or an eliminator can be used if desired; there is ample room), and all connections can be made. The pick-up is

Blueprints for the "Music-lover's Gramo-radio"

For the complete Gramo-Radio instrument, three blueprints have been prepared: blueprint for four-valve set (A.W.202a), 1s. 6d.; blueprint for linen-diaphragm loud-speaker (A.W.202b), 1s.; blueprint for motor board (A.W.202c), 9d. Total, 3s. 3d.

Provided all three are ordered at one time they will be sold at an inclusive price of 2s. 6d.

The receiver portion of the "Music-lover's" instrument is a good-quality four-valver, having one H.F. stage, efficient change-over arrangements for "radio" or "gramophone," an R.C. stage and a transformer stage. The tuning arrangements are such as result in a very high degree of selectivity, which is a most important point in view of the Regional scheme. Coupled to this receiver, all in the one handsome cabinet, is a specially-designed linen-diaphragm loud-speaker, and a complete electric pick-up and gramophone drive.

With the complete gramo-radio instrument, at the touch of a switch one can have either radio or gramophone reproduction at its best.

The instructions so far given should enable the average man to have the whole gramo-radio outfit in working order, but for the benefit of those who do not take a deep interest in technicalities, a few notes on operating will be given in next week's issue.

SELENIUM CELLS

ONE type of selenium cell consists of two strips of nickel spaced about two centimetres apart and cemented on to a ground-glass surface. The selenium is smeared into the space between the two. The current passes from one nickel strip to the other over a path about 2 cm. long and 4 cm. wide. Such a cell will have a normal resistance in the dark of over 100 megohms. On exposure to light the resistance drops to anything between one-fifth and one-tenth of this value.

If, instead of the amorphous variety, a strip of crystalline selenium about one millimetre long and two centimetres wide is used, the normal "dark" resistance is reduced to the neighbourhood of 10,000 ohms.

B. A. R.

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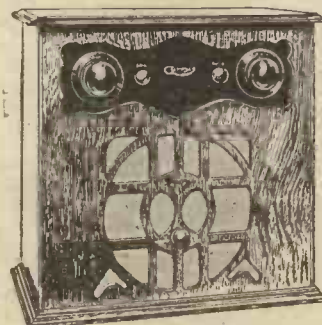
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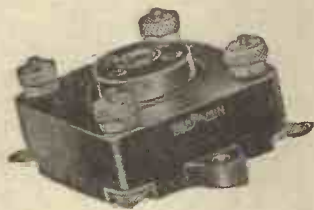
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THE TRUTH ABOUT THE SCIENCE MUSEUM SET

By KENNETH ULLYETT

THE AMATEUR WIRELESS correspondence columns have been very active recently about the receiver installed at the South Kensington Science Museum in London. Most of us are agreed that this set should represent radio at its best. But some of the letters from correspondents seem to indicate that the set is not at its best at present. Some, indeed, have been rude enough to hint that the set was designed three years ago and that lots of things have happened in the wireless world since then!

The Lions' Den

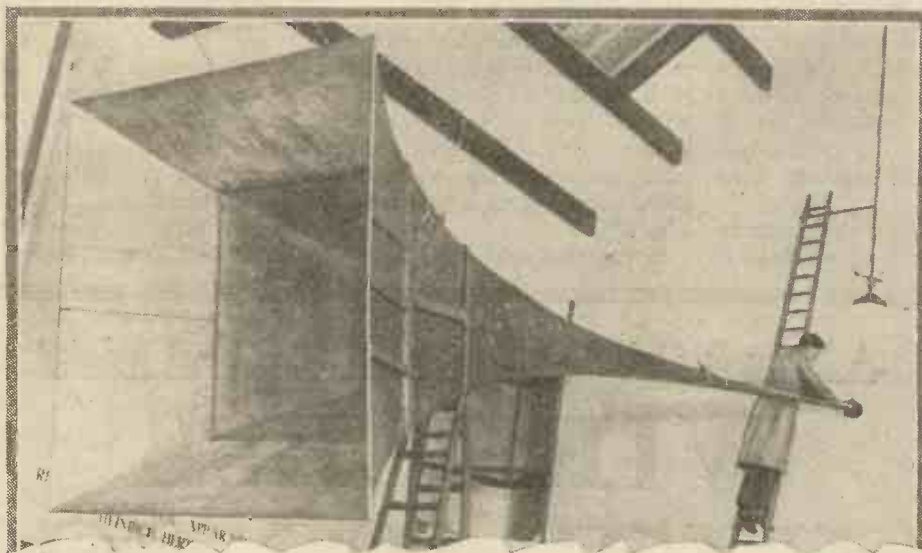
So, when the phone rang recently and a Science Museum official asked me on behalf of AMATEUR WIRELESS to come and learn the truth about the Science Museum set, I felt that it was rather like entering the lions' den.

Anyway, I plucked up my courage and went to South Kensington, there to experience the first shock. One usually imagines museums to be rather dead things, and when I found at South Kensington a most charming official in charge of a well-equipped radio "lab.," complete with a full gamut of testing apparatus, a "squeak," and so on, I was rather surprised. On mentioning my surprise (tactfully, of course) I was told that radio is quite a live thing at South Kensington and a deal of experimenting is always taking place.

Without beating about the bush, the official told me that in his opinion some of the AMATEUR WIRELESS contributors to the correspondence columns have been rather misinformed; secondly, that there are many vague and incorrect rumours about the Museum installation; thirdly, that he himself has been personally responsible for most of the radio installation and any unfair criticism cuts him to the quick!

Not The King's Set

Regarding the set first of all, there is a rumour abroad that it was designed by Captain Eckersley for the use of H.M. the King. Well, this is all wrong. What really happened is that the Museum official approached the B.B.C. when a demonstration was needed, and together the B.B.C. and Museum engineers worked



The exponential horn with the Western Electric drive at the South Kensington Science Museum

out an ideal circuit for the job. Part of the set, too, was made by the B.B.C. and part by the Museum engineers.

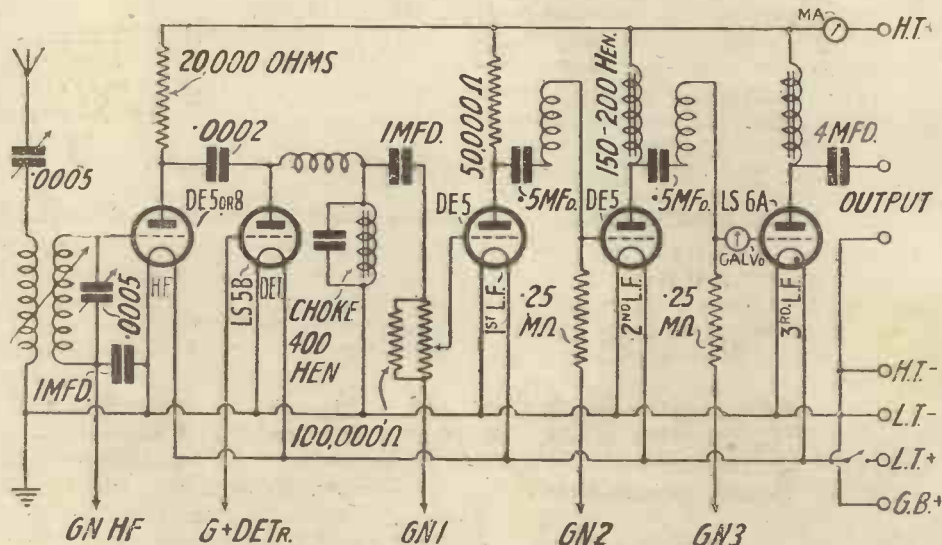
The circuit is shown herewith. There is nothing "secret" about it, as has been hinted, and a blueprint was prepared by the Museum authorities and thousands sold. The set is a five-valver. It is not claimed that it is an ideal set for the average man, but it does give absolutely distortionless (or perhaps I should say "rectilinear") reproduction. It is entirely reliable and is switched on by one knob. It has to be worked by the ordinary non-technical Museum warders, and so simplicity is vitally necessary.

Kirkifier detector, a choke-coupled L.F. stage, followed by a resistance-coupled and a further choke-coupled L.F. stage. Interesting points are a volume control preceding the first L.F. stage, a grid-current meter in the grid circuit of the last stage, and a milliammeter showing the total anode current. By watching the milliammeter in conjunction with the grid-current meter it is possible to see any distortion.

H.T. is derived from motor generator and approximately 300 volts is applied to the last stage. "What is this last stage?" will be asked by those correspondents who have disputed the point.

One Output Valve Only

Formally three LS5A's were used in parallel, but these have been replaced by one LS6A, which does the job as well. Of course, this receiver might be "condensed" a little and perhaps one stage cut out, if the whole thing were modernised, but the cost might be as much as £200. It would not be worth it, for a straight-line output is given by the present set, and you cannot



The circuit of the Museum five-valve set

If you care to glance at the circuit you will see that it has loose-coupled tuning (quite selective enough for the regional scheme), an aperiodic H.F. stage, a three-electrode valve acting as a two-electrode

very well make a straight line straighter!

And now for the loud-speakers which have been so much discussed. First of all, there is the giant logarithmic horn, hung
(Continued on page 607)

RADIO AND G.M.T.

Jottings from my Log. By Jay Coote

ALTHOUGH perhaps many of us reluctantly put back our clocks one hour to coincide with G.M.T., the change over offers many compensations to most listeners to foreign programmes, for it gives us, as one advantage, an undisturbed period after the British stations have closed down.

From the time I adjusted the clocks in my own home, nightly I have searched

transmitter, can be picked up at great volume on most evenings, and is so sharply tuned that there is no difficulty whatever in separating it from either Vienna or Munich. You will experience no difficulty in identifying this studio, for it possesses a lady announcer who, at the end of every item, clearly gives out the call: "Hallo, Riga!"

Kovno also, which I had lost for some

an enigma, for, although said to be transmitting on 1,481 metres, its wavelength appears to be very variable, inasmuch as on some evenings I find the station above Eiffel Tower and on others below; on some occasions, too, they heterodyne each other badly. Also, between Kalundborg and Motala, you should hear a very powerful Russian transmission, which at first I took for Moscow, but which later—inasmuch as

Another Gift Issue!

Following on the exceptionally fine Blueprint presented with this issue (of a set which in itself is a new departure of great interest), we are giving free with every copy of next week's issue of AMATEUR WIRELESS a booklet of quite a new kind.

Everybody knows that groups of manufacturers have introduced what are called "Kit" sets, comprising in many cases a set of parts complete to the smallest detail, the design and method of assembling being so simple that the mere listener—as distinct from the wireless amateur—can put the set together with every likelihood of complete success. During the last two months we have made it our special business to examine in great detail

THE MANY "KIT" SETS

now on the market, and one of the first tasks entrusted to our new test-room and laboratory in Fetter Lane, E.C., has been the assembling and testing of such sets. Consequently, we have acquired much information which it is difficult and almost impossible for an individual to gain for himself. Of this information we have made an

A New & Original Booklet FREE next week!

WIRELESS "KIT" SETS

Another New Departure!

absolutely new booklet, in which our Technical Staff—in particular Mr. Alan Hunter—have been at great pains to present a bird's-eye view of the chief kit sets on

the market, and in this way to afford readers means of making a choice.

Next week's free booklet will show how various kit sets are assembled and operated, and will give readers an idea of the results to be expected. The booklet will have great practical value. It will contain a very fine series of illustrations which have been prepared in our own test-rooms, and each of the sets will be amply described and illustrated. This booklet, then, is

STILL ANOTHER NEW DEPARTURE

and an even wider public than that which ordinarily reads AMATEUR WIRELESS will be deeply interested in it. For that reason we particularly invite every reader to tell at least one friendly listener of our next week's enterprise. Let everybody place his order immediately—the only way of ensuring a copy. We shall most certainly go "out of print" on the day of publication.

"Order your Copy NOW," says the Editor

systematically different sections of the broadcast band, and it is surprising, since the advent of shorter days and more favourable atmospheric conditions, how long-lost transmissions have forced their way through the mush which had blotted them out during the summer months.

Now, in fact, is the time to recast the log of all wavelengths captured, and if this is done, as I suggest, by working carefully over small portions of the wave band at one sitting, a great number of stations will be found which may not have been picked up previously.

The task has been facilitated by the fact that in some cases since last winter a number of transmitters have been endowed with more energy. Such, for instance, is the case of Riga, which now a 3-kilowatt

time, has reappeared on my horizon, and on most evenings offers a programme which you will find well worth while to tune in.

Just above Radio Paris and not far short of Huizen—namely, on 1,796 metres—you should search for Lahti. During the past few nights I have been able to realise that it is a 40-kilowatt station, for its programmes have been available on my loud-speaker. Searching over the long band, I have also encountered various Russian transmissions which have greatly puzzled me. Leningrad, for instance, on 1,000 metres is an easy capture, and on many occasions would prove a useful addition to the day's wireless fare were it not for the fact that it is being constantly interrupted by those wailing fog beacons. Moscow, on the other hand, is something of

the latter was transmitting at the same time—proved to be Kharkov on 1,304 metres. It possesses the same peculiarity as that of the big Komintern station, as it draws out its news items to a very late hour.

Finally, on the long waves well below Leningrad pause for a while with a view to obtaining the signals of what appears to be the new Moscow P.T.T. experimental station on 825 metres.

Apart from some interference from morse on Hilversum, Kalundborg, and Kovno, and the Air Ministry's spasmodic interference on Motala, most of the long-wave stations can be clearly received; in fact, almost nightly I am able to pick up fifteen transmissions in that band, and all at loud-speaker strength.



THE MANCHESTER RADIO EXHIBITION

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On the stand of the London Radio Manufacturing Co. will be found Orphean and standard cone and cabinet loud-speakers. A cone unit selling at 15s. will be of special interest.

Belling & Lee, Ltd., are, of course, showing the full range of Belling-Lee terminals and connectors. The Belling-Lee safety plug and socket is a new line which will be of interest to all set users.

Stand No. 12 is the AMATEUR WIRELESS stand. Don't miss it on any account. Current issues of AMATEUR WIRELESS and *Wireless Magazine* and helpful text books.

Lissen, Ltd. are exhibiting a complete range of two-volt valves, which have just been placed on the market. The range of Lissen parts for the home constructor needs no introduction. The remainder of the Lissen exhibits will be occupied by D.C. eliminators, receivers, and radio-gramophones.

The British Ebonite Co., Ltd., is showing moulded ebonite parts for all purposes and a number of panels in various finishes

DO NOT FAIL TO VISIT THE "A.W." STAND No. 12

The "A.C. Screened Seven" is a star receiver on the stand of Burndept Wireless, Ltd., while the "Burndept Portable" receiver, which has earned such a good name for itself, is also on show. Burndept are also exhibiting a number of receivers of the two- and three-valve variety which are very modest in price.

Batteries, of course, form the basis of the display on the stand of the Ever Ready Co (Great Britain), Ltd., H.T. batteries, particularly of the power and super-power capacity type, will be of particular interest to amateurs

Philips is a name which has become well known in connection with a number of simple and efficient A.C.-operated sets. These will be seen on the stand of Philips Lamps, Ltd., together with a display of Philips cone and moving-coil loud-speakers.

Climax Radio Electric, Ltd., are showing the popular Auto-Bat mains units, together with a number of Climax loud-speakers, both in the popular plaque and cabinet forms.

M.P.A. Wireless, Ltd., formerly well known for a number of excellent portable



Exide DHG Accumulator



G.E.C. Plaque Speaker

until 10 p.m. An interesting feature is a number of competitions organised by the Manchester *Evening Chronicle*, which is providing prizes to the value of £250.

Space forbids a lengthy description of individual exhibits, but the following is a brief review.

Prominent Features

A prominent feature on the Watmel stand is a display of Watmel four-pole balanced armature loud-speaker units. A range of two, three, and baby grand receivers and a super-radio-gramophone is also of interest.



Gecophone Transformer



Siemens Grid Cell



M.P.A. Cabinet Speaker

sets, have added to their laurels with a number of well-ried mains components and complete battery eliminators, all of which are shown.

Formo condensers are of major interest on the stand of Formo Co. The new dual gang condensers and midget reaction jobs are of particular interest, as also is the new vernier dial, priced at only 3s.

Ekco battery eliminators are shown by E. K. Cole, Ltd., together with two interesting mains-driven complete receivers.

Exide batteries for all radio purposes are on show on the stand of the Chloride

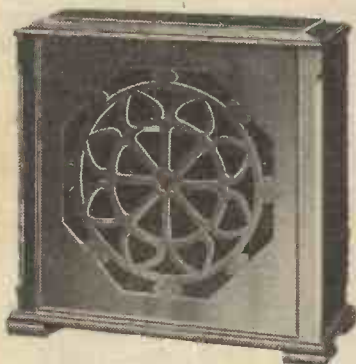
THE MANCHESTER RADIO EXHIBITION *(continued from preceding page)*

Electrical Storage Co., Ltd. An interesting new Exide line is the type WY10 H.T. battery suitable for multi-valve sets. New features of Exide batteries are the non-interchangeable red and blue terminals, and octagonal positive terminals, easily distinguishable from the round negative terminals.

The new range of Amplion receivers and, of course, the Amplion Lion loud-speaker are being shown by Graham Amplion, Ltd.

The Dubilier display consists of fixed and variable condensers for all purposes. The new Dubilier triple condenser, thumb operated, is of particular interest.

Marconiphone Co. Complete receivers, valves, and loud-speakers are the centre of interest on this stand. As it is equally a



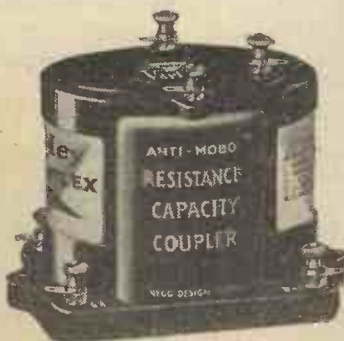
A Reed-type Celestion Speaker

transportable as well as a portable, the new Marconi type 55 five-valve portable is of particular interest. This is a complete receiver which can be carried from room to room.

Celestion loud-speakers of all types will be on show on the stand of Celestion, Ltd.

Oldham & Son, Ltd., and C. A. Vandervell & Co., Ltd., are two firms who specialise in accumulator manufacture, and on Stands 43 and 44 respectively will be found the range of radio accumulators offered by these two concerns.

Peto Scott, Ltd., are showing a number of receivers made up according to various



Varley Resistance-capacity Coupler

specifications, and a feature of interest in the Peto Scott range is a novel electric gramophone in which can be fitted many types of popular receiver.

The whole range of Mullard valves is being shown on the stand of the Mullard Radio Valve Co., while descriptions of some of the well-trying Mullard receivers are also of interest.

The Osram "Music Magnet" is the "magnet" of attraction on the General Electric Co. stand, on which also is shown the whole range of Osram valves and complete receivers.

Igranic components for the home constructor are well displayed on the stand of the Igranic Electric Co. Components of particular interest include the popular Igranic condensers and low-frequency transformers.

Ferranti, Ltd., are showing a full range of mains units and components, together with the new Ferranti moving-coil loud-speaker.

The range of McMichael receivers, portable and otherwise, is displayed to advantage on the stand of L. McMichael, Ltd.

Varley components for the home constructor and a number of Varley complete receivers, mains driven, are being shown on the stand of Oliver Pell Control, Ltd. A component of particular interest is the new Varley Nicore L.F. transformer.

The Wates Star speaker unit and three-in-one testing meters are on show on the stand of the Standard Wet Battery Co.



Kolster-Brandes Cabinet Speaker

A new cartridge unit for wet batteries has been introduced which greatly simplifies the task of assembling batteries of this type.

Wearite are specialising in a number of chokes and choke output circuits, and also components for A.C. mains units. In addition, there are the usual Wearite H.F. choke, switches, coils, jacks and plugs, and dual-range tuners.

Kolster-Brandes, Ltd., have just produced an excellent range of receivers and

loud-speakers, and these are being shown to advantage on this stand.

Telsen "Ace" and "Radiogrand" transformers are rapidly earning an enviable reputation, and these popular components are being shown on the stand of the Telsen Electric Co., Ltd.

The new Cossor "Melody Maker" and the entirely new range of Cossor valves is



New Amplion Receiver

bound to attract considerable interest, and Cossors have a very convincing display on their stand.

A.C. rectifiers suitable for inclusion in home-built eliminators are to be found on the stand of the Westinghouse Brake and Saxby Signal Co., Ltd.

Siemens Bros. & Co., Ltd., the well-known battery manufacturers, have an excellent display of H.T. batteries for every type of set. A new range of L.T. accumulators on this stand is also of great interest.

Claude Lyons, Ltd., have a display which will be of interest to all home constructors; the chief component of interest is, of course, the Clarostat, the popular variable resistance which has been specified in so many AMATEUR WIRELESS receivers.

The Epoch Radio Manufacturing Co., Ltd., are specialising in a high-quality moving-coil loud-speaker which is shown to advantage on this stand.

A number of moving-coil loud-speakers of all types are being shown by Bakers Selhurst Radio, and all amateurs interested in using the moving-coil type of reproducer will be interested in this display.

The outstanding new line on the stand of Harlie Bros. is the Volustat, an infinitely variable resistance of the graphite-mica type which can be put to so many uses in a receiver.

In the foregoing review it has not, of course, been possible to mention every individual exhibitor at the Manchester Show, which is now open, but enough has been said to show that the exhibition is of outstanding interest, and no amateur in the locality can afford to miss the opportunity.

And don't miss the AMATEUR WIRELESS stand!

Since August 26 the Konigswusterhausen short-wave transmitter has been broadcasting regularly on 31.38 metres (9,560 kilocycles). Its power for the present is 8 kilowatts, but within the next few weeks it is to be increased.

**"WIRELESS
'KIT' SETS"
A FREE BOOKLET WITH NEXT
WEEK'S ISSUE.**

WITHOUT FEAR OR FAVOUR



A Weekly Programme Criticism by Sydney A. Moseley

A GAIN I ask what the B.B.C. is going to do about those self-satisfied parsons who keep a world of listeners waiting while they go on uttering their platitudes.

Those responsible for the relaying of the service from Glasgow Cathedral must have been aware that they delayed the "Week's Good Cause," the news, and the programmes throughout the whole country.

Is this courteous? Is it stupidity or is it an indifference?

One is getting tired of the inevitable announcements which follow these services:



Lissenden's idea of Mischa Mots

"I must apologise for being rather late, owing to the service being rather long."

Say—just whadya think of the way those Amurricans serenaded our Ramsay Mac? Bully for you, Premier!

But, to get down to English, the relay of the Prime Minister's reception in New York was a great thrill. Technically speaking, the transmission was excellent and, speaking from a programme point of view, the whole thing was a wonderful achievement. It was inspiring to hear the New Yorkers making a first-class fuss of Ramsay.

Interesting, too, was it to hear the American way of putting over a "running commentary." With all due respect to our broadcasting friends across the Pond, I think that the verbal high-speed of our announcing cousins must have sown in every English listener's breast the seed of a new love for our own lucid commentators.

Strange how people's opinions have varied regarding the Co-optimists. Some say there wasn't a laugh in the whole broadcast. Others thought their recent show was splendid entertainment.

By the way, why doesn't the B.B.C. take a leaf out of the Co-optimists' book and form a standing troupe of light concert artistes who would be "on the strength," in much the same way as the B.B.C. Dance Band? No charge for this brilliant suggestion!

P.S.—Since writing the above an almost similar suggestion comes from another critic!

"Harold" pops up with a criticism of a new dance feature.

"The relay of the Royal Opera House dances is not good," he writes. "The place is too big to do justice to the bands. Instead of being able to pick out and listen to the individual playing of the musicians, we are treated to an echoing jumble of noise."

I have pointed out repeatedly that as a solo artiste Tommy Handley is supreme, but when he gets into a sketch or playlet he loses his individuality. Moreover, he always seems to get into shows which are not up to his standard. The latest I have heard him in—*Lost Pearls*—was a rather feeble effort.

In the same programme was a duologue by Angela Baddeley and Glen Bryan Shaw. It had a Nihilist flavour and was truly ridiculous. The whole affair was carried out in the cheapest possible "penny-dreadful" manner. The wind howled most of the time (as if we haven't had a surfeit of that particular effect) and the players recited their lines like barnstormers.

Those effects which were not overdone were badly underdone. The train smash was absurd—it sounded exactly like a

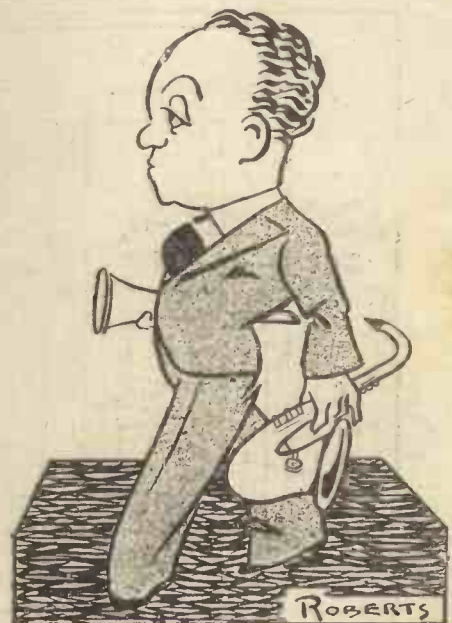
biscuit tin falling off a shelf. Was this a leg-pull on the part of the programme people? Or do they imagine this kind of rubbish is on a level with our intelligence?

I made a special note of listening to Leonard Henry's return broadcast. He started off well—his patter being packed with laughs. Then he sang, and slumped badly.

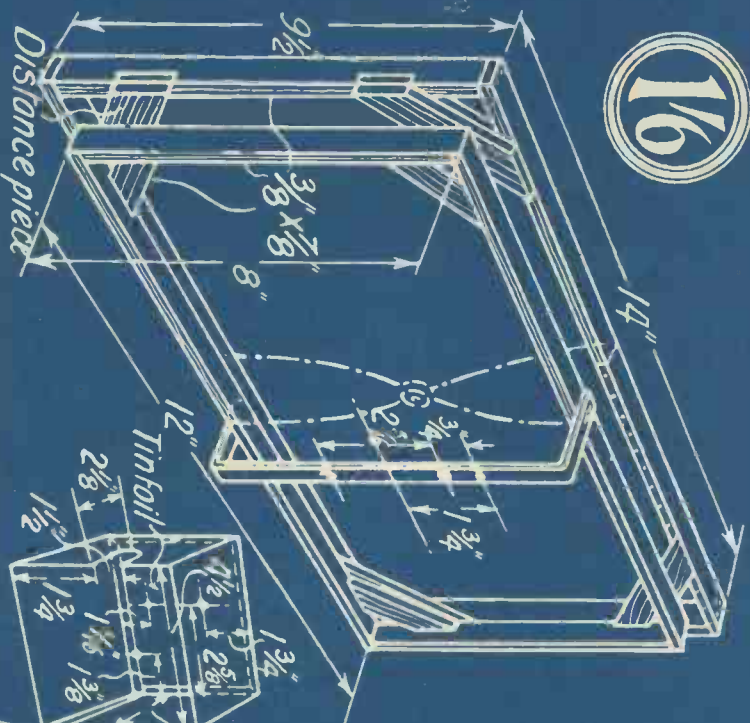
The enthusiasm at the last Promenade Concert must have been an eye-opener (or ear-opener) to a good many pessimists who have stated that we were an unmusical race. A mad musical race, my masters.

I wonder whether there will be any more suicides reported as a result of the reading of the poems of James Stephens. As for me, I am a strong-minded person, and consequently did nothing worse than burst into tears.

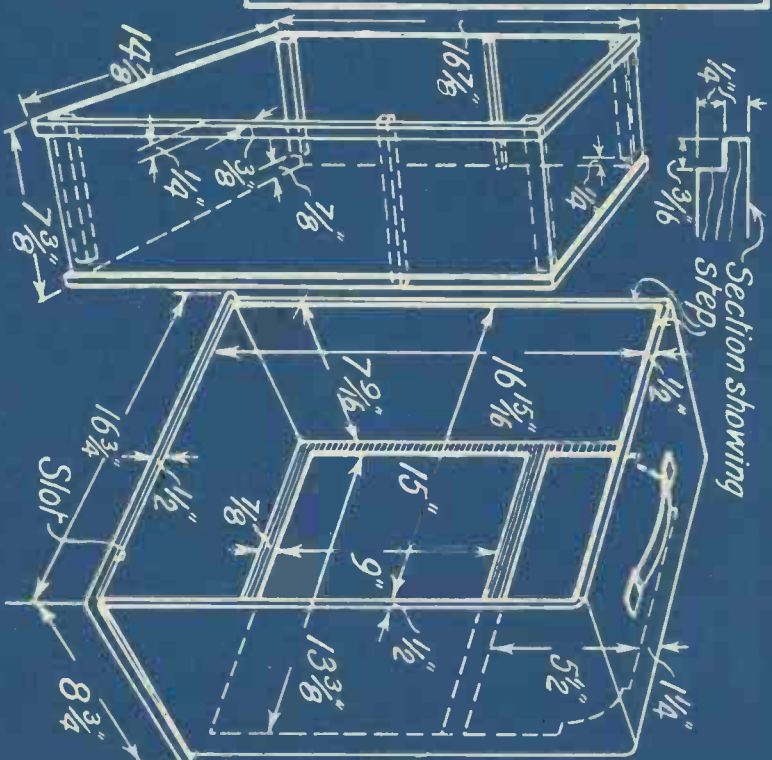
I confess I like the pianoforte transcriptions as played by Leslie England, comprising a number of different composers rather than a big chunk from the same composer. This time we had Chopin, Schubert, Schumann, Mozart, and Glinka. A nice basketful.



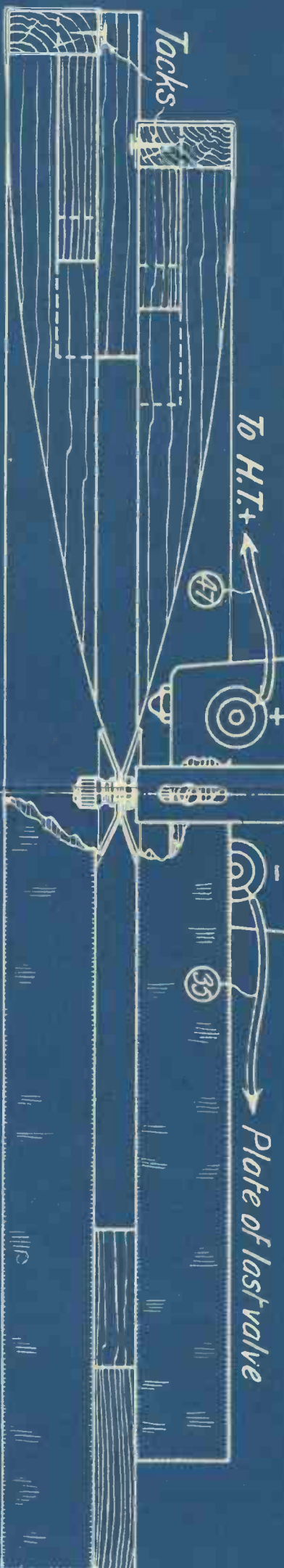
An Impression of Sid Phillips



No External Aerial; No Earth;
A Transportable "Four" for Home Use



BLUEPRINT N° A.W.203





THE UNUSUAL ST

"There is an interesting story attached to the 'Music Leader,' that two young men staff visited the U. S. middle of last summer, and they brought them a portable set, ample scope on the 'Majestic,' in mar U.S.A., and on the ously, the experienced the set out of the arduous conditions. The receiver portable 'Leader' is practically that of the portable. It is this same receiver formed so well over mately 9,000 miles, occupying the time Department in deus since last May."

LISTENERS are gradually developing a growing distaste for wires hanging about their wireless sets. Once upon a time one thought nothing of a maze of aerial and earth cables, battery leads and loud-speaker cords and what not, and the result was that the corner wherein the receiver was situated was a kind of holy sanctum to be approached only by the expert wireless operator of the family!

Now this is all changed. It is no use having a set which can be worked only by *paterfamilias*, or the radio-enthusiastic boy

when he is home from school. The demand is for receivers which can be worked by anybody, and the worst barrier which can be put up is a mass of wires, some of which can give quite an unpleasant shock if not treated with due regard.

True, with the average set nowadays, things are not so bad as they used to be. Quite often a grid-bias battery is enclosed in the cabinet; sometimes, also, a battery eliminator is employed. In any case, the number of battery leads is reduced. But with the exception of "super" sets, one

NO EXTERNAL BATTER

unsightly wires, poles and other fixings, and if you have more than once tripped over the battery leads.

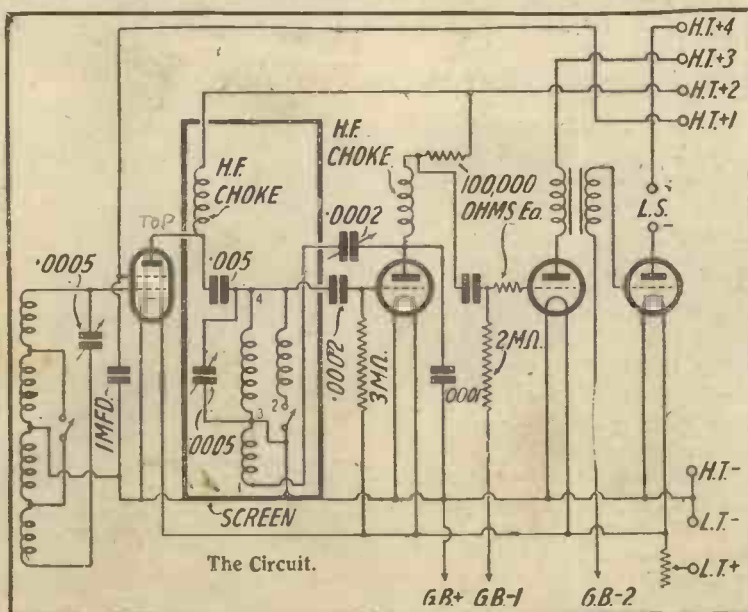
Entirely Self-contained

In the "Music Leader" everything is self-contained. You won't need any external aerial, earth, loud-speaker, or batteries. The set complete can be carried from room to room.

The "Music Leader" is not an ordinary portable in the ordinary sense of the word, for many portables have had to be designed with weight as the prime factor. This has meant that batteries, accumulators, and so on, have had to be cut down with the consequent reduction in efficiency. This has not been the case with the "Music Leader," for while it is reasonably light in weight, and quite portable so that it can be carried from room to room, it is not meant primarily to be an outdoor portable, and efficiency, rather than extreme lightness of weight, has been the main point aimed at in design.

In brief, the "Music Leader" is a four-valve receiver having one screened-grid H.F. stage, a leaky-grid detector, one R.C. coupled L.F. stage, and a final transformer-coupled power stage. For the benefit of the non-technical it may be explained that this circuit arrangement results in good distance getting, ease of control, and the best possible purity.

In the case there is ample room for the



still must have wires for aerial, earth and loud-speaker, even if all the juice is obtained from the mains.

But we are wrong! We have said "we still must have wires." The advent of the "Music Leader," the set now to be described, has changed all this. The "Music Leader" is just the kind of receiver you will be wanting if you have yearned to rid the garden of

LEADER

STORY OF THIS SET

Interesting piece of his development of the set may be recalled by members of the "A.W." United States in the winter. They took with them a portable set which was given to them on their journey aboard the ship. The cities of Eastern return trip. Obviously gained in working the set in foreign country and under conditions which was invaluable. One of the "Music Leader" sets which has been taken to the States. The set which has performed a trip of approximately 9,000 miles and which has been of the Construction Department in developing and testing



IES, AERIAL OR EARTH

batteries, large enough to operate the set to complete satisfaction, a frame aerial and, finally, a linen-diaphragm loud-speaker. The whole set is easy to tune—in fact, it is just as easy to operate as a table grand gramophone, and it is just as portable. The set covers both wavelength bands at the touch of a switch, and the quality of reproduction would please the most fastidious.

There is an interesting piece of history attached to the development of the "Music Leader." It may be recalled that two young and zealous members of the AMATEUR WIRELESS staff visited the United States in the middle of last summer. They took with them a portable set which had been designed by a technical staff member, Mr. J. Sieger. The set was given ample scope for its capabilities on the journey aboard the *Majestic*, in many cities of Eastern U.S.A., and on the return trip.

Guaranteed Performance

Obviously, the experience gained in working the set out of the country and under arduous conditions—strange conditions too, with the wide gamut of American stations—was invaluable. This same experience will be reflected in forthcoming AMATEUR WIRELESS portable receivers, and the receiver portion of the "Music Leader" is practically identical with that of the portable taken to the States.

It is this same receiver which performed so well over a trip of approximately 9,000 miles, and which has been occupying the time of the construction department in developing and testing since last May!

As was pointed out in several articles at the conclusion of the American trip, selectivity is the great feature demanded of every receiver to suit U.S. conditions. The same applies from now on in this country, for the coming of the Regional scheme makes selectivity a *sine qua non*.

As a preliminary, for those interested in

technicalities,

glance at the theoretical circuit diagram. It will

be seen that the frame aerial is of the dual-range type and is coupled direct to the grid of the screened valve. This valve in turn is coupled in a most efficient manner to the detector, an aperiodic choke in the anode circuit, by-passing the D.C. current, but acting as a stopper for H.F.

The tuning portion, which

consists of a dual-range coil, has one side connected to earth potential, and this results in extremely simple control. The coupling condenser between the H.F. valve and the detector has a value of .005 microfarad. The detector circuit does not embrace any special feature, the grid circuit components having the values of .0002 microfarad for the condenser and 3 megohms for the leak. The reaction condenser has a maximum value of .0002 microfarad.

In the anode circuit of the detector is a 100,000-ohm resistance, while a stopper

LIST OF COMPONENTS

- Ebonite panel, 14 in. by 6 in. (Becol, Resiston, Raymond, Ebonart).
- Transportable cabinet, complete with 7 in. baseboard and frame (Clarion).
- Two .0005-mfd. variable condensers (Formo, Cydon, Burton).
- .0002-mfd. reaction condenser (Bulgin, Peto-Scott).
- 7-ohm panel-mounting rheostat (Lissen, G.E.C., Burton).
- Two "on" and "off" push-pull switches (Bulgin, Lotus).
- Special screening box, 4½ in. by 4½ in. by 5 in. (Parex, Ready-Radio).
- Screened-grid valve holder (Parex).
- Three small valve holders (W.B., Lotus, Formo, Burton).
- Special dual-wave coil, Arcadian type (Wearite, Ready-Radio).
- Two high-frequency chokes (Peto-Scott, Wearite, Ready-Radio).
- 3-megohm grid leak (Lissen, Ediswan, Dubilier).
- Resistance-capacity coupling unit with 100,000-ohms anode resistance (Lissen, Ashley, Trix).
- 100,000-ohm grid resistance with holder (Lissen, Ediswan).
- .0001-mfd. fixed condenser (Dubilier, Lissen, T.C.C.).
- .0002-mfd. fixed condenser with series clip (Dubilier, Lissen, T.C.C., Graham-Farish).
- .005-mfd. fixed condenser (Dubilier, Lissen, T.C.C., Graham-Farish).
- Low-frequency transformer (Cossor, Varley, R.I., Burton, Telsen).
- Connecting wire (Glazite).
- Two small slow-motion dials (Brownie, Ormond, Formo).
- Four yards of thin flex (Lewcoflex).
- Seven wander plugs marked H.T.—, H.T.+1, H.T.+2, H.T.+3, G.B.—, G.B.—1, G.B.—2 (Belling-Lee).
- Two spade terminals marked L.T.—, L.T.— (Belling-Lee).
- Balanced-armature loud-speaker unit (Ormond, Blue-Spot, G.E.C., Hegra, Lissen, Watmel).
- Nine feet of ¼ in. by ¾ in. wood.
- Half yard of fine-weave embroidery linen.
- Small piece of art. silk to cover large diaphragm of speaker.
- One foot of strip brass, ½ in. by 3/32 in.
- Two 4 B.A. bolts and nuts, ½ in. long.
- ¼ lb. 28 d.c.c. wire (Lewcos).

"THE MUSIC LEADER" (Continued from preceding page)

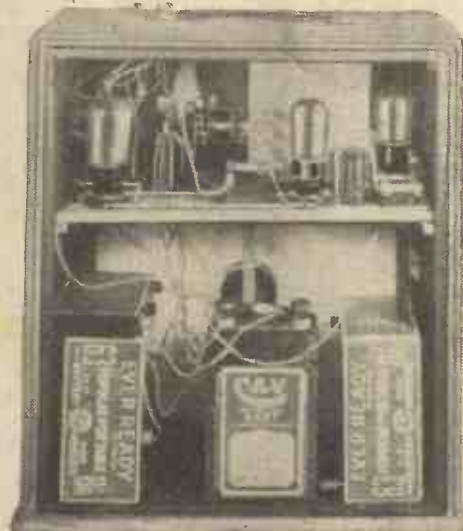
resistance of a similar value is placed in series between the R.C. coupling condenser and the first L.F. valve grid. This is a point which merits special attention.

One of the new small-size super-efficient transformers with a special alloy core is used for coupling between the first and second L.F. valve. The transformer, in this case a Cossor, is the product of one of the foremost radio designers, and has well earned an excellent name for itself.

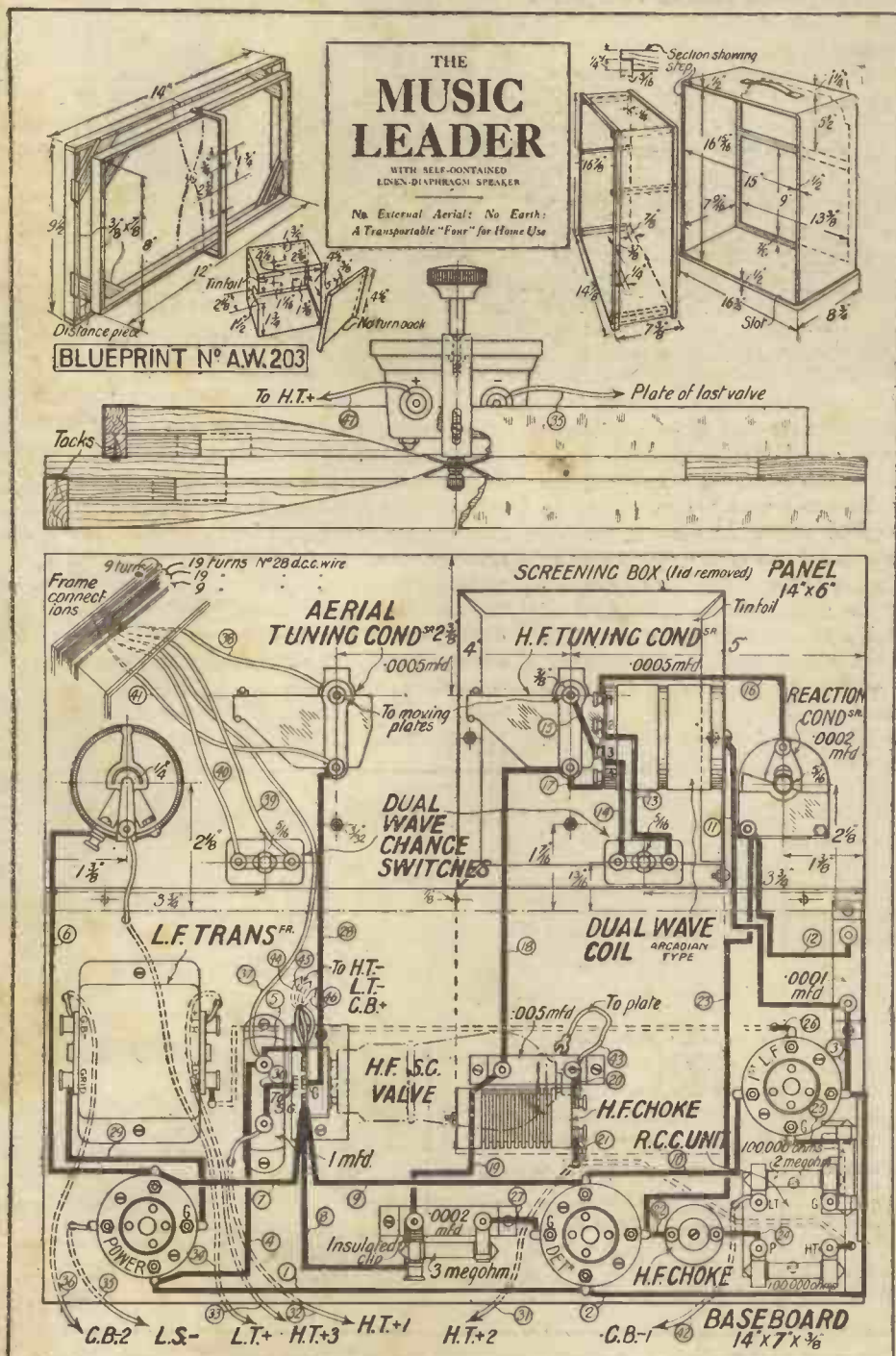
Further points in the circuit will be dealt with as they arise during construction. In the meantime it may be noted that the

receiver section itself is quite conventional. It is made up in the form of a panel at right angles to the baseboard, and there is a completely screened section in which is placed the H.F. side of the screened-grid valve (so far as is possible the valves of the present construction) and the H.F. coupler components, including the dual-range anode coil. The receiver unit slides out from within a wooden frame on which is wound the aerial turns. The construction of the frame will be dealt with later, but, of course, the frame includes turns for both the medium and long wavelengths, and the

wave-changing is effected by means of a switch on the panel. A similar switch matched up on the panel changes over the anode coupling coil from one waveband to another.



A photograph of the interior taken from the back



Reduced reproduction of the blueprint presented free with every copy of this week's issue

The controls on the panel are very simply placed as you will see from examination of the photographs. In the centre are two large slow-motion dials, which, of course, are for tuning. The left-hand dial tunes the H.F. section, while the frame-aerial windings are tuned by the right-hand condenser. To the extreme left is a small knob which is the reaction control, while a similar matched knob to the extreme right, is the control for a rheostat regulating the current for all four valves. To the bottom of the panel are the two small wave-changing knobs. The left-hand one controls the anode coil, while the right-hand one is the frame-aerial switch. This point does not need to be remembered however, for both knobs should be pushed in or out simultaneously.

The Free Blueprint

The construction of the receiver section will be described first, and it must be emphasised that this presents no special difficulty.

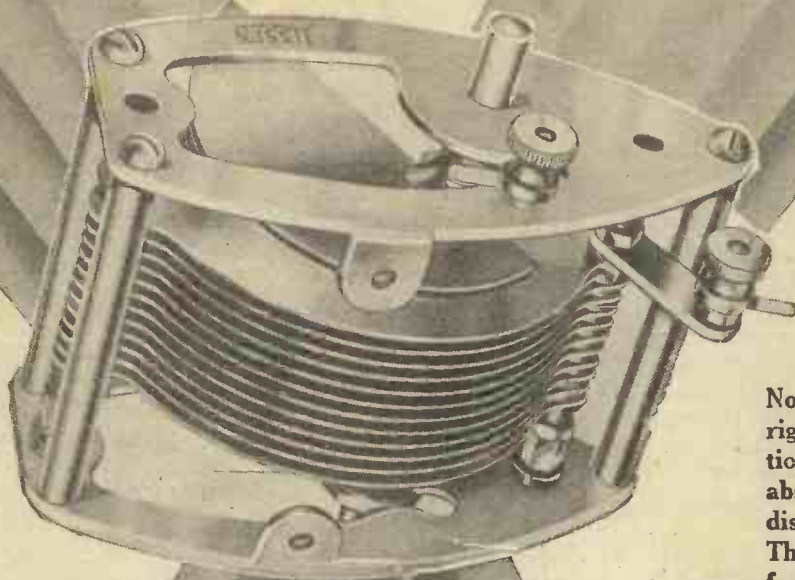
To assist constructors a special blueprint has been prepared covering the complete receiver, loud-speaker and frame aerial, and this is being given away free with this issue. It will be obvious that a great deal of work is entailed in the preparation of these prints—one of which is made for each AMATEUR WIRELESS receiver. The usual charge for this present blueprint for the "Music Leader," would be 1s. 6d.

But as a special gift to AMATEUR WIRELESS readers, and in view of the popularity which the "Music Leader" will undoubtedly attain, the blueprint is being given entirely

(Continued on page 602)

FOR "REGIONAL" TUNING fit LISSEN Condensers

The Lissen Low Loss Variable Condenser is the one to use when building a receiver for the Regional Scheme. It gives you free and facile tuning, and definite separation of stations close together; it passes stronger signals to your valves, because there are no condenser losses. It gives you wide capacity variation, so that Brookman's Park or any other local station comes in or out at will.



Notice the unshakable rigidity of its construction, the long bearing, the absence of end pressure or distortion of the vanes. The spindle is extended for ganging purposes, feet are provided for baseboard mounting, or you can mount it on the panel with standard one-hole fixing. Notice, too, the new and convenient position of the fixed vane terminal, well away from any danger of accidental contact with the moving vanes.

PRICES:

.0001 Mfd. capacity	5/9
.0002 " "	6/-
.0003 " "	6/-
.00035 " "	6/3
.0005 " "	6/6

LISSEN REACTION CONDENSER

.0001 mfd. Universally adaptable for all panels from 1/16 to 5/16. Fitted with bakelite bush and nut, making it suitable without alteration for use on metal panels

4/-

For every published circuit—or to bring your old set up to date—ask any radio dealer firmly for

LISSEN

VARIABLE CONDENSERS

LISSEN LIMITED, WORPLE ROAD, ISLEWORTH, MIDDLESEX. Factories also at Richmond (Surrey) and Edmonton (Managing Director: T. N. COLE)

My Wireless Den



Weekly Tips—Constructional and Theoretical—by W. JAMES

A "Safety" Connector

ONE of the most useful of the little gadgets introduced recently is a "safety" connector for joining the anode of a shielded valve and its circuit.

This connecting wire carries high-tension current, and I know that a large number of valves have been destroyed as the result of the anode end of the connecting wire touching a shield or wire in the set. The end of the wire has been allowed to fall whilst changing or adjusting the screened-grid valve with disastrous results.

One of the safety connectors comprises a shell of insulating material and a spring contact which is so placed in the recessed part of the holder that it cannot touch a shield or wire. It is therefore quite safe to use, the spring contacts gripping the screwed part of the anode terminal quite firmly.

Another type has a small connecting tag and a large ebonite bush. This, too, is satisfactory in practice.

A Strange Whistle

Some of the new transformers having cores of special steel seem particularly sensitive to stray capacities, and may cause a high-pitched whistle to be heard with the broadcast.

This may be avoided, as a rule, by reversing the wires connected to the terminals of the secondary, and this should therefore be tried in the event of trouble arising.

Particular attention should be paid to the wiring. Keep connecting wires short, especially grid and anode wires. Also keep other wires away from them, in an endeavour to avoid capacity effects.

Getting Selectivity

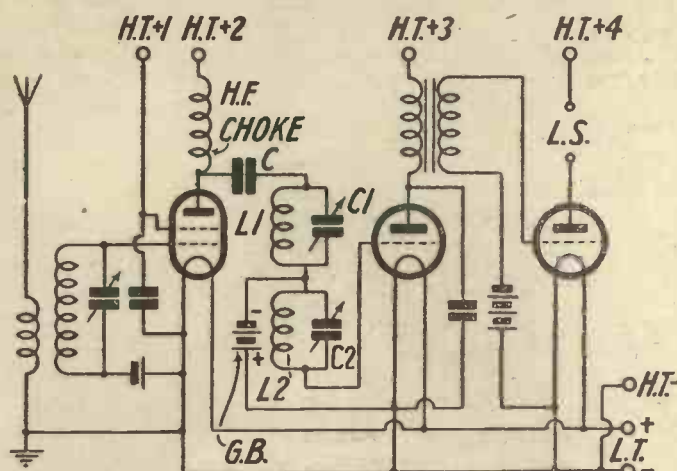
I am sometimes asked for the circuit of a set having rather better selectivity than is usual in three-valve arrangements, and also one which provides rather better quality.

The accompanying diagram shows the connections. It will be seen that a coupled circuit is used between the anode of the shielded valve and the grid of the detector.

This, by the way, works as an anode-bend type, a grid-bias battery being used.

The special feature of the set is the arrangement of the couplings. There is an H.F. choke and a stopping condenser *c*. These prevent high-tension from passing to the tuned circuits. Condensers *c1* and *c2* are ganged, and should therefore be alike. The two tuning coils *L1* and *L2* should also be alike.

Selectivity is dependent to an extent upon the construction of the coils, but it may be adjusted by altering their coupling.



A very selective three-valve arrangement which provides good quality

When testing, therefore, one of the coils should be moved with respect to the other until the selectivity is sufficient over the whole tuning range.

Coils having windings of fairly fine wire should be used, or the high-frequency stage may oscillate, and it would also be advisable to wind the coils astatically or, at all events, so as to minimise their stray field. If this is not attended to the aerial coil may couple with the anode coils and spoil the stability and magnification of the set.

There is sometimes a little difficulty in balancing the circuits, and it is therefore advisable to employ a small condenser across *c1* or *c2* in order to balance the two tuned circuits.

Those Bad Earths

A frequent cause of instability in a set having a shielded-grid stage is, I find, a

poor earth connection. This is usually particularly noticeable when receiving the longer wavelengths.

It cannot be too strongly emphasised that a good earth is essential when a high-frequency stage that is providing considerable magnification is used. The earth wire should be as short as possible and the actual earth a good one. Use a good earthing clip when a water-pipe is conveniently situated or buy a sheet of metal two or three feet square so as to have a short connection.

Leaky Grids!

Some tests that I have lately been making have served once more to bring out the importance of not using too low a voltage in the anode circuit of a leaky-grid detector.

The tendency of such a detector to distort is greatly increased when the voltage is low. I am aware that the sensitivity is improved by lowering the voltage, but when there is only one low-frequency stage, as in most modern sets, distortion must be considered.

I prefer a high-tension of about 90 volts as a rule, and use more when possible. The signal strength that may be handled

by a detector without overloading, and therefore distorting, is dependent upon the anode voltage, and for safety it should be made as high as possible.

Night concerts are to be broadcast from the German stations between 12.30 and 1.30 a.m. on the following dates: Munich, September 10; Breslau, 12; Stuttgart, 16; Frankfurt, 20; Leipzig, 24; and Konigsberg, 28.

The Chinese Posts and Telegraphs will open in January, 1930, a short-wave wireless telegraphy service with the United States.

With the extension to Milan of the Transatlantic telephony service, on short waves, the American Telegraph and Telephone Company have enabled their subscribers to communicate with twenty-one different countries.

PURE LISSEN CURRENT FROM YOUR MAINS!

You cannot get purer current for radio than the pure D.C. current of a Lissen Battery—BUT IF YOU WANT TO USE AN ELIMINATOR USE A LISSEN ELIMINATOR.

Because no current from any eliminator is smoother or more silent than the current from a Lissen eliminator. No eliminator output is more constant, none is so free from hum.

Lissen have made eliminators safe—notice that the neat moulded cases of these Lissen Eliminators are made entirely of insulating material—see also the thickly insulated "cabtyre flex" that Lissen have used.

Lissen too have made it easy for you to choose the right eliminator—there are only four models and they satisfy the requirements of 90 per cent. of listeners. In producing these eliminators Lissen have compared their current with the purest form of current known, namely the Lissen Battery, and have got as near to that standard as it is humanly possible to do.

If you are buying an eliminator, be sure to see a Lissen Eliminator. Your dealer will be pleased to show you one that will suit you.



D.C.
Model A
27'6

TYPES AND PRICES.

D.C. Model "A."

Employs 3 H.T. + tapplings :
H.T. + 1 giving 80 volts
for S.G. valves; H.T. + 2
giving 60 volts at approx.
2 mA for detector valves ;
H.T. + 3 giving 120/150 volts
at 12 mA.

Price **27/6**

D.C. Model "B."

Employs 3 H.T. + tapplings : H.T.
+ 1 and H.T. + 2 are continuously
variable (by means of two control
knobs) and capable of giving any
desired voltage up to 120/150 volts at
approx. 2 mA.; H.T. + 3 giving
120/150 volts at 12 mA. for power
valves.

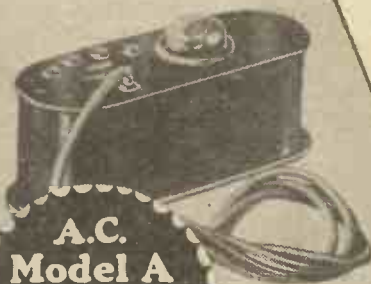
Price **39/6**

A.C. Model "A."

Tappings as in D.C. Model A.			
LN 576 for A.C. Mains voltage	200-210	PRICE	
" 577 " " "	220-230		
" 578 " " "	240-250		£3:0:0
" 639 " " "	100-110		

A.C. Model "B."

Tappings as in D.C. Model B			
LN 579 for A.C. Mains voltage	200-210	PRICE	
" 580 " " "	220-230		
" 581 " " "	240-250		£3:15:0
" 640 " " "	100-110		



A.C.
Model A
60'6

LISSEN

ELIMINATORS

LISSEN LTD, Worple Rd., Isleworth, Middlesex

Factories also at Richmond (Surrey) and Edmonton.

Managing Director : T. N. COLE.

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

"A.W." TESTS OF APPARATUS

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

Bulgin Remote Control

REMOTE control for wireless apparatus used to be considered a luxury beyond the means of the average wireless user. Times have changed, however, and now it is customary for a single set to operate a large number of speakers placed in different rooms in the house. It is by no means uncommon for a set to be installed in a room other than the main sitting-room and under such circumstances, switching on and off necessitates unnecessary labour. It is here that remote control proves invaluable for it can be operated from a number of different points in the house by simply withdrawing the loud-speaker from a wall jack.

The new Bulgin remote control apparatus is both inexpensive and practical. The relay with indicating light may be obtained with wall jacks for switching on and off the set and plugging in loud-speakers.

The remote control apparatus consists essentially of an electro-magnet with swinging armature. When the control switch is operated, a small current flows through the magnet winding and constrains the armature to close two contacts, thereby switching on the set. The normal filament-heating accumulator, whether it is 2, 4, or 6 volts, will operate the relay effectively. The current is passed through a flash lamp which automatically lights up and indicates when the set is on. The consumption from the accumulator to operate the relay varied from 50 to 96 milliamps, according to whether a 2-, 4-, or 6-volt accumulator was used; thus the additional load on the filament heating accumulator is less than that of a single valve. This device, which is mounted in a black oxidised-finished



Bulgin Remote Control

circular metal container, has a diameter of 4 in. and is approximately 1 3/4 in. high. It may be installed with any accumulator operating set without any internal alteration to the wiring.

On test, the contacts closed with unfailing reliability even when only a two-volt

accumulator was employed. This device should prove of practical use to readers.

Rosin-core Solder

OFTEN one of the greatest difficulties an amateur experiences when building his set, is the making of sound and neat soldered connections. The process of soldering correctly is an art only to be acquired after much practice; at least, it was an art, but new materials and methods of joining two metal surfaces together have greatly facilitated the work.

We have tested this week, a radio solder, known as Kester Rosin-core. This material is manufactured by the Chicago Solder Co., and marketed in this country by the Rothermel Radio Corp., of Maddox Street, Regent Street, London, W. It is sold in the form of a coil in small tins or, if desired, in considerably larger quantities. In the core of each coil, a quantity of rosin is placed, and is only liberated on the application of sufficient heat to melt the solder. Thus, in making a joint, one has merely to clean the surfaces, apply the iron and solder, when a



Handy Rosin-core Solder

perfect joint should result. Further, one is assured of utilising just the correct amount of flux.

We tested this solder with quite satisfactory results. A piece of thick wire was cut in half and the insulation stripped from either end. A hot iron was applied to the newly-bared wire and caused the solder to adhere freely to the two ends. Further tests were carried out, such as joining an old soldering tag to a lead, with quite satisfactory results.

There is no doubt from our experience with this solder, that it is both simple and practical to use and, provided sufficient heat is applied, makes an excellent joint

The Rotor-ohm

VARIABLE high resistances are in much demand at the present time, particularly for use as volume controls in conjunction with wireless and gramophone amplifiers.

The problem has always been with



Rotor-ohm Variable Resistances

variable high resistances to obtain reliability and silence in use without gradual deterioration of the resistance element, which must often stand the continual friction of a sliding contact. In the Rotor-ohm, marketed by Messrs. Rotor Electric Ltd., of 2-3 Upper Rathbone Place, W.1., the problem has been ingeniously tackled by allowing the rotating contact arm to bear on a circular coil of wire wound in the form of a variable filament resistance. Each turn of the coil is separately insulated and arranged to make contact with the resistance element. In consequence, each turn forms a tapping point of the resistance and may be selected by rotating the control knob. No damage whatsoever is caused to the resistance by the rotation of the arm.

On test, we found the resistance varied from a few ohms up to 700,000; by so proportioning the element it is arranged that the variation of resistance at values below 50,000 ohms is less for a given movement of the control. Either end of the resistance is connected to a terminal, whilst the central terminal is in contact with the rotating arm. The component makes an admirable volume control, especially when connected across the secondary of a low-frequency transformer.

The military section of the Eiffel Tower wireless station has placed at the disposal of the Paris police a service of picture transmission on the Belin system. This broadcast is carried out on short waves, and destined to the police organisations in London and Berlin. By international agreement it is proposed to transmit, when necessary, from either of the three capitals, finger prints of wanted criminals.

**OUR SECOND
GIFT OFFER
APPEARS ON
PAGE 580!**



that's all you need do
with this

EDISWAN

ALL-ELECTRIC, ALL-BRITISH 3-VALVE RECEIVER

This Ediswan All-Electric, All-British, 3-Valve Receiver works from the Electric Light Mains, requiring no H.T. batteries or accumulator.

Tuning is delightfully easy, volume and tone are excellent. It is a long range receiver, and is very selective, being designed to give the best possible

results with the Amazing Mazda Valves.

The Ediswan All-Electric 3-Valve Receiver looks, and is—splendid value.

The circuit employs a screened grid valve in the H.F. stage and a pentode in the output. Supplied for the following voltages:—100/110 v., 200/250 v., 40/100 cycles A.C., 200/250 volt D.C.

**NO H.T. BATTERIES: NO ACCUMULATORS: NO INTRICACIES:
COST ONLY A FEW SHILLINGS A YEAR FOR CURRENT: NO ATTENTION**

Hear it in operation at your local dealer, or at
THE EDISON SWAN ELECTRIC CO., LTD.,

*Incorporating the Wiring Supplies, Lighting
Engineering, Refrigeration and Radio Business of
The British Thomson-Houston Co., Ltd.*

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



Measuring LOUD-SPEAKER VOLUME

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

IN order to take the response curve of a loud-speaker, it is necessary to have some means of measuring the intensity of the sound radiated from the particular instrument. A rough check can, of course, be obtained by applying varying frequencies to the loud-speaker and noting the aural effect. This will, of course, enable any serious resonances, either in the amplifier or in the speaker, to be noted, and often a good indication of the performance of the speaker can be obtained in this manner. In order to obtain a definite measurement, however, more accurate methods are required than mere

allowance in the interpretation of the results afterwards.

From the oscillator we pass to the amplifier, if any, applying the voltage to the loud-speaker. For ordinary purposes the output from the oscillator is sufficient, but in some cases it is necessary to amplify still further and a correction must be allowed for this portion of the apparatus. The loud-speaker correction is, of course, what we are endeavouring to find, and we can only do this by knowing the theoretical voltage developed in every other part of the circuit. The deviation from the ideal is then due to the loud-speaker, and in this way we obtain our response curve.

Now, if we use the simplest method—that of the microphone—we have two further calibrations to make. First of all, the microphone itself is not uniformly responsive to various frequencies and, secondly, the amplifier following the microphone (for nearly every reasonably uniform microphone is relatively insensitive and must have an amplifier following it), must also be calibrated. For this reason it is sometimes preferable to get away from a microphone measurement at all and use an absolute measurement of the sound pressure, thereby reducing the number of corrections necessary.

For this purpose a Rayleigh disc may be employed. This apparatus, which is called after Lord Rayleigh, who first suggested its use, consists of a very thin disc suspended in the field of the sound vibrations. The suspension is by a single very fine hair or piece of unspun silk, as indicated in Fig. 1, and it will be found on switching on the loud-speaker that the disc rotates slightly on its axis as a result of the sound pressure.

It can be shown from the theory of the action that the deflection produced by a given sound wave is greatest if the disc is initially suspended at an angle of 45°

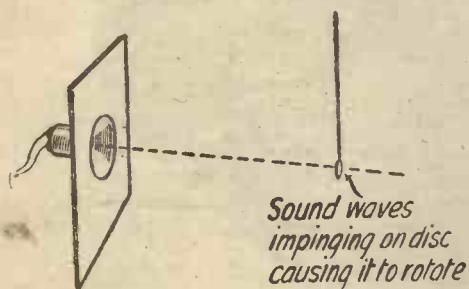


Fig. 1. Arrangement of the Rayleigh disc

aural observation. One method employed is to utilise a microphone situated at a suitable distance away from the loud-speaker. This will then respond to the sound waves and will give an indication of the radiation in terms of actual voltage.

It is, of course, necessary to calibrate the various parts of the system other than the speaker in order to correct it for any deviations from the ideal. For example, the oscillator itself must be calibrated as regards its output, for this will not necessarily be constant at all frequencies, and a correction must be applied or an adjustment made to allow for any discrepancy. The beat-frequency oscillator in use at the Furzehill Laboratories, for example, gives a constant output for all frequencies from 10 to 3,000 cycles per second. Beyond this point it begins to fall off slightly, the amplitude being reduced to approximately one-half at 8,000 cycles. If this fact is known it is possible to correct the falling-off either before the voltage is applied to the test apparatus or by making suitable

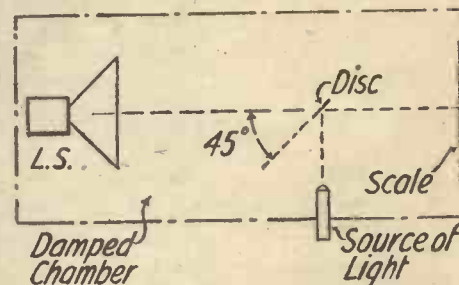


Fig. 2. Deflection is greatest if the disc is suspended at an angle of 45°

degrees with the direction of the sound as indicated in Fig. 2.

The disc must, of course, be very light and the suspension must have practically no stiffness, so that the very slightest breath of air is capable of causing the disc to rotate. The deflection of the disc is proportionate to the cube of the diameter, so that if we double the diameter of the disc we obtain eight times the deflection. On the other hand, the possibility of interference by draughts and other extraneous influences is increased, while it is difficult to make a disc light and perfectly plane if the diameter is increased beyond a certain amount. Generally a disc of between 1 in. and 2 in. in diameter is sufficient to give a good deflection on normal loud-speaker strength.

It must be remembered, of course that over those portions where one is particularly interested in a loud-speaker characteristic the sound pressure is likely to be small. Such points, for example, as the

(Continued on page 606)

HAVE YOU NOTICED

—how popular are the restaurant programmes broadcast during lunchtime?

—how Cologne, Nurnberg and Kaiserslautern penetrate even in daytime? Regular "shouters." Why?

—that the German stations conclude the sections of their programmes with "Auf wiederhoeren," which has a similar meaning to "Au revoir," but with the sense of "entendre" (to hear) rather than "voir" (to see)?

—how the gramophone records of dance bands over the ether have a much more marked and regular time than the actual dance band itself?

.. for those who prefer to build their own cabinets



TO many Radio Enthusiasts the price of the 'Lion' quality of reproduction is a difficulty, especially when it is purchased enclosed in an Amplion cabinet. Others, to whom the price does not present any obstacle, have their own ideas as to how they desire to mount it. Perhaps they desire to make a cabinet for themselves to their own design.

To all these we offer the 'Lion' chassis. These are 'Lion' Speakers, produced, tested and passed at our Slough works in the ordinary way. They are complete in every part, ready for attachment to your Radio Set. We sell a large number of these Chassis, mostly to the more technical type of wireless listener, who make, or assemble, their own sets.

For the general public we house the two sizes of 'Lion' chassis in handsome oak or mahogany Cabinets, and these are sold at prices ranging from £8 to £16.

GRAHAM AMPLION LTD. Works: SLOUGH
LONDON: 25/26, SAVILE ROW, W.1

£6
AND
£8

®

MODERN VALVES A USEFUL GUIDE

A list that will enable you to see at a glance suitable types for your set

TWO-VOLT, THREE-ELECTRODE											
Make	Type	Imped- ance	Amp. Factor	Make	Type	Imped- ance	Amp. Factor	Make	Type	Imped- ance	Amp. Factor
Dario ...	Resist.	60,000	30	Cossor ...	210HF	20,000	20	Osram ...	P215	5,000	7
Mazda ...	H210	59,000	47	Triotron ...	T10	20,000	9	Six-Sixty ...	220P	4,800	7.2
Lissen ...	H210	58,000	35	Triotron ...	HD2	20,000	16	Lissen ...	P220	4,700	7
Six-Sixty ...	210RC	55,500	39	Six-Sixty ...	210LF	12,500	10.6	Dario ...	SP	4,500	9
Mullard ...	PM1A	51,000	36	Cossor ...	210LF	12,000	10	Mullard ...	PM2	4,400	7.5
Cossor ...	210RC	50,000	36	Marconi ...	L210	12,000	11	Cossor ...	220P	4,000	8
Marconi ...	H210	50,000	35	Mullard ...	PM1LF	12,000	11	Triotron ...	UD2	3,750	6
Osram ...	H210	50,000	35	Osram ...	L210	12,000	11	Mazda ...	P220	3,700	12.5
Triotron ...	WD2	46,000	46	Triotron ...	TD2	11,400	8.5	Six-Sixty ...	230SP	2,750	5.5
Six-Sixty ...	210HF	25,000	19	Six-Sixty ...	225D	11,000	13.5	Dario ...	Hyper	2,700	5
Marconi ...	HL210	23,000	20	Mullard ...	PM2DX	10,700	13.5	Mullard ...	PM252	2,600	5.4
Osram ...	HL210	23,000	20	Dario ...	Univ.	10,000	9	Marconi ...	P240	2,500	4
Mullard ...	PM1HF	22,500	18	Lissen ...	L210	10,000	10	Osram ...	P240	2,500	4
Dario ...	Super HF	21,000	25	Mazda ...	L210	10,000	15.5	Cossor ...	230XP	2,000	4
Lissen ...	HL210	21,000	18	Triotron ...	SD2	6,250	5	Mazda ...	P240	1,900	7
Mazda ...	HL210	21,000	26	Marconi ...	P215	5,000	7				
TWO-VOLT, FOUR-ELECTRODE (SCREENED-GRID)											
Dario ...	SG	250,000	250	Six-Sixty ...	215SG	220,000	190	Osram ...	S215	200,000	170
Mullard ...	PM12	230,000	200	Cossor ...	220SG	200,000	200	Mazda ...	215SG	400,000	400
				Marconi ...	S215	200,000	170				
TWO-VOLT, FIVE-ELECTRODE (PENTODE)											
Lissen ...	PT225	64,000	90	Dario ...	Pent.	55,000	100	Osram ...	PT240	55,000	90
Six-Sixty ...	230PP	64,000	80	Marconi ...	PT240	55,000	90	Cossor ...	230PT	20,000	40
Mullard ...	PM22	62,500	82					Mazda ...	230Pen	—	—
FOUR-VOLT, THREE-ELECTRODE											
Cossor ...	410RC	60,000	40	Dario ...	Univ.	10,000	10	Six-Sixty ...	410P	4,200	7.7
Dario ...	Resist.	60,000	30	Triotron ...	RD4	9,000	9	Cossor ...	410P	4,000	8
Marconi ...	H410	60,000	40	Cossor ...	410LF	8,500	15	Triotron ...	UD4	3,750	6
Osram ...	H410	60,000	40	Marconi ...	L410	8,500	15	Dario ...	Hyper P	2,700	5
Six-Sixty ...	4075RC	58,000	37	Osram ...	L410	8,500	15	Triotron ...	SD4	2,500	4.5
Mullard ...	PM3A	55,000	38	Triotron ...	SD4	7,700	15.5	Marconi ...	P425	2,300	4.5
Triotron ...	WD4	46,000	46	Mullard ...	PM4DX	7,500	15	Osram ...	P425	2,300	4.5
Dario ...	Super HF	21,000	25	Six-Sixty ...	410D	7,250	14.5	Triotron ...	XD4	2,200	6
Cossor ...	410HF	20,000	20	Marconi ...	P410	5,000	7.5	Cossor ...	415XP	2,000	4
Mullard ...	PM3	13,000	14	Osram ...	P410	5,000	7.5	Mullard ...	PM254	2,000	4.2
Triotron ...	AD4	13,000	13	Dario ...	SP	4,500	9	Six-Sixty ...	420SP	2,000	4
Six-Sixty ...	4075HF	12,500	13.5	Mullard ...	PM4	4,450	8	Mazda ...	P425	1,950	3.5
FOUR-VOLT, FOUR-ELECTRODE (SCREENED-GRID)											
Dario ...	SG	250,000	250	Six-Sixty ...	4075HF	220,000	190	Osram ...	S410	200,000	180
Mullard ...	PM14	230,000	200	Cossor ...	410SG	200,000	200	Mazda ...	410SG	—	—
				Marconi ...	S410	200,000	180				
FOUR-VOLT, FIVE-ELECTRODE (PENTODE)											
Dario ...	Pent.	55,000	100	Osram ...	PT425	50,000	100	Six-Sixty ...	415PP	27,000	60
Mullard ...	PM24A	53,000	83	Mullard ...	PM24	28,000	62	Cossor ...	415PT	20,000	40
Marconi ...	PT425	50,000	100					Mazda ...	425Pen	—	—
SIX-VOLT, THREE-ELECTRODE											
Mazda ...	H607	90,000	40	Mullard ...	PM5B	33,000	40	Cossor ...	610HF	20,000	20
Cossor ...	610RC	60,000	50	Marconi ...	HL610	30,000	30	Mazda ...	HL607	20,000	20
Marconi ...	H610	60,000	40	Marconi ...	DE5B	30,000	20	Six-Sixty ...	6075HF	15,200	17
Osram ...	H610	60,000	40	Osram ...	HL610	30,000	30	Mullard ...	PM5X	14,700	17.5
Six-Sixty ...	6075RC	58,000	42	Marconi ...	LS5B	25,000	20	Six-Sixty ...	D610	9,250	18.5

(Continued on page 596)



WE ARE EXHIBITING
AT THE MANCHESTER
RADIO EXHIBITION
STAND No. 75



WITH MELODY OUT OF THE MEDLEY

Musical tone depends for its quality upon the proportion in which the harmonics are combined with the fundamental note. A Telsan Transformer will give true reproduction of every tone.

Try one now. They are entirely British.
"Radiogrand" Model "Ace" Model

12/6

Ratios 5—1 and 3—1

8/6

Ratios 5—1 and 3—1

TRANSFORMERS

TELSEN ELECTRIC CO., LTD.,

MILLER STREET, BIRMINGHAM.

SIX-VOLT, THREE-ELECTRODE (Continued)

Make	Type	Imped- ance	Amp. Factor	Make	Type	Imped- ance	Amp. Factor	Make	Type	Imped- ance	Amp. Factor
Mullard ...	PM6D	9,000	18	Mullard ...	PM6	3,550	8	Cossor ...	610 XP	2,000	5
Cossor ...	610LF	7,500	15	Cossor ...	610P	3,500	8	Mullard ...	PM256	1,850	6
Marconi ...	L610	7,500	15	Marconi ...	P610	3,500	8	Six-Sixty ...	625SP	1,780	5.8
Osram ...	L610	7,500	15	Osram ...	DEP610	3,500	8	Mazda ...	P650	1,750	3.5
Marconi ...	DE5	7,000	7	Marconi ...	LS5A	2,750	2.5	Marconi ...	P625A	1,600	3.7
Marconi ...	LS5	6,000	5	Mazda ...	P625B	2,500	7	Mazda ...	P625A	1,600	4
Osram ...	LS5	6,000	5	Marconi ...	P625	2,400	6	Osram ...	P625A	1,600	3.7
Six-Sixty ...	610P	6,000	7.2	Osram ...	P625	2,400	6	Marconi ...	LS6A	1,300	3
Marconi ...	DE5A	4,000	3.5					Osram ...	LS6A	1,300	3

SIX-VOLT, FOUR-ELECTRODE (SCREENED-GRID)

Cossor ...	610SG	200,000	200	Marconi ...	S610	200,000	210	Marconi ...	S625	175,000	110
Mullard ...	PM16	200,000	200	Osram ...	S610	200,000	210	Osram ...	S625	175,000	110

SIX-VOLT, FIVE-ELECTRODE (PENTODE)

	Mullard ...	PM26	25,000	50							
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MAINS VALVES, 8 VOLT (DIRECTLY HEATED)

Marconi ...	S.8	200,000	160	Osram ...	H.8	55,000	40	Osram ...	HL.8	17,000	17
Osram ...	S.8	200,000	160	Marconi ...	D.8	21,000	14	Marconi ...	P.8	6,000	6
Marconi ...	H.8	55,000	40	Osram ...	D.8	21,000	14	Osram ...	P.8	6,000	6
				Marconi ...	HL.8	17,000	17				

MAINS VALVES, 4 VOLT, 1 AMPERE (INDIRECTLY HEATED)

Mullard ...	S4V	1,330,000	1,000	Mullard ...	354V	14,000	35	Cossor ...	M41P	5,000	10
Mazda ...	AC/SG	600,000	1,200	Mazda ...	AC/HL	13,500	35	Six-Sixty ...	SS4P	3,000	10
Cossor ...	MSG41	200,000	400	Cossor ...	M41LF	7,900	15	Mullard ...	104V	2,850	10
Cossor ...	M41RC	20,000	35	Six-Sixty ...	SS4Det	7,000	16	Mazda ...	AC/P	2,650	10
Six-Sixty ...	SS4GP	14,500	35	Mullard ...	164V	6,650	16	Cossor ...	M41 XP	2,000	4
Cossor ...	M41HF	14,000	25					Mazda ...	AC/P1	2,000	5

ALL POSITION NON-SPILLABLE

Weight for weight and size for size the C.A.V. Jelly Acid Battery has a better capacity and higher efficiency than other non-spillable types. The special construction of the container, and the use of Jelly Acid allows it to be placed and used in any position, without the risk of spilt acid. It is both the safest and best for your portable. Recommended in the constructional articles of the Wireless Press, and standardised in many popular portable sets, the C.A.V. Jelly Acid Battery provides the most reliable and the safest non-spillable battery obtainable.

The New C.A.V. H.T. Accumulator
Have you had details of our new range of high tension accumulators? Supplied in 10 volt units or 30 volt groups of 2,500, 5,000 and 10,000 milli-amp hour capacity, this entirely new and original H.T. is suitable for every class of receiver.

C.A.V. Vandervell & Co. Ltd.
ACTON, LONDON, W. 3.

The New C.A.V. H.T. Accumulator
To those seeking a perfect source of H.T. current we recommend the new C.A.V. H.T. Accumulator. Absolutely silent in operation, handsome and compact, inexpensive in first cost and cheaply maintained. A C.A.V. non-spillable battery is specified for the "Music Leader" transportable set described in this issue.

*The Original
Jelly Acid
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*The Perfect
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all Portables*

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Better reception — easier assembling if you use Lotus Components!

The strength of the receiver you build is like the strength of a chain—as strong only as the weakest link.

That is why it matters so much to you what components you build into your set.

Built with Lotus components, a set gives better reception and takes less time and trouble to build for every Lotus unit is accurately made, strongly made and slips into place quickly.

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Lotus H.F. Choke
5/6

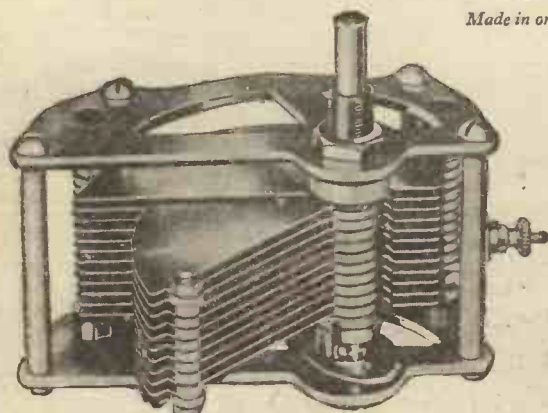


Lotus L.F. Intervalve
Transformer, 12/6

Lotus L.F. Power
Choke, 15/-

LOTUS COMPONENTS

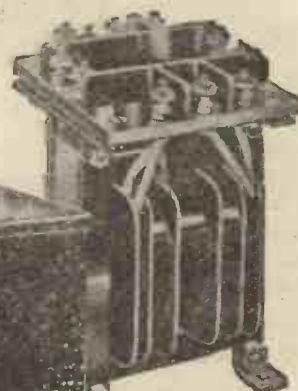
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Lotus Logarithmic Condensers in
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OUR INFORMATION BUREAU



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

Chattering Cone Loud-speaker

Q.—I have constructed the "Best-Yet" cone loud-speaker, and find that when dealing with heavy passages of music the speaker is inclined to chatter.—T. L. (Stratford).

A.—The quality of the material for the cone diaphragm has much to do with the reproduction from the speaker, and it is quite possible that the material you have used is the cause of your trouble. You do not say whether you have used the unit we specify, but if you have used any other, the chattering may be caused by the reed inside the unit. The material with which the diaphragm is suspended has also a decided effect on reproduction.—C. B.

Screen-grid Valve Set

Q.—I have constructed a screen-grid valve receiver to fit into a special cabinet, and now I find that it is almost impossible to prevent the set from oscillating. Are there any special features that must be given more consideration than is normally required when designing a screen-grid valve set?—F. U. (Brighton).

A.—There are certain very important points that must be given special consideration in the design of a set such as yours, and the screening

of the H.F. stages is not the most important. If there are any two wires parallel that belong

When Asking Technical Queries

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 for the usual query fee. Any drawings submitted should be sent on a separate sheet of paper. Wiring plans and layouts cannot be supplied.

to different H.F. circuits, then these will cause sufficient interaction to make the receiver oscillate. We suggest you go over the wiring

of your set with the above points in mind and, above all, see that your screening is sound between the various circuits. An incomplete screen may account for considerable trouble. Do not allow the aerial lead-in wire to run anywhere near the H.F. circuits or tuning coils.—A. L.

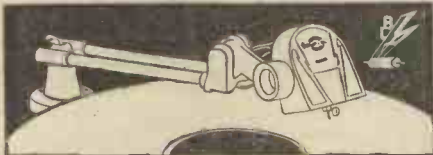
Screened Wavetraps

Q.—I have been in the habit of using a wavetraps to cut out interfering signals, but having read of a screened wavetraps, I am wondering whether such an instrument would be an improvement.—F.O. (Rye).

A.—There is little point in using a screened wavetraps unless it is needed to obviate interference due to "shock-effect" reception from some powerful near-by station. When shock-effect reception is experienced, it is usually necessary to screen the whole receiver, so that a screened wavetraps holds no advantages over the ordinary unscreened type unless the receiver itself is also screened. If you reside within a mile or so of your local station and you wish to get other stations farther afield, then, provided your receiving set is screened, a screened wavetraps will be useful.—A. D.

HEARING IS BELIEVING!

THE NEW Bower-Lowe pick-up astounded even its designers when first it was produced. From 25 to well over 6000 cycles it gives a smooth rich reproduction which must be heard to be believed. Yet its price is extremely low—lower than you'd expect to pay for so beautiful an instrument. Hear the Bower-Lowe before you buy any pick-up. Only ... 19/6



GRAMOPHONE PICK-UP

TRACK-ARM.—Specially designed for use with the Bower-Lowe pick-up ... 10/-

UNIVERSAL LOG CONDENSER

For panel mounting with dial control, or for drum control. Very easily ganged. Single hole fixing.

List No. 366. '0003 without dial, 5/9

List No. 367. '0005 without dial, 6/-



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TO THE FORE!

The first serviceable dry cell was made by Helleesen over forty years ago, in 1887. Since then Helleesens have made dry cells exclusively, nothing else at all.

As a natural result, the Helleesens Dry Battery is the best the world produces.

Expert and amateur alike agree that it is real economy to pay the slightly higher initial cost of a Helleesen, because it lasts so much longer. They will also tell you that it pays handsomely to buy a double- or treble-capacity Helleesen, since the increased capacity is much greater, in proportion, than the increased price.

(E.g. Standard capacity 60-volt WIRIN cost 10/6; the 60-volt KOLIN, giving three times the capacity, costs only 19/-, a saving of 12/6.)

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ELECTRICAL MEASURING INSTRUMENTS,
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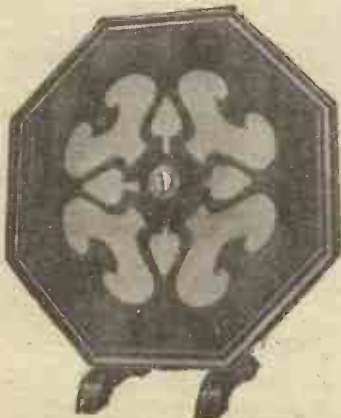


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"ONE OF THE BEST SPEAKERS AT ITS PRICE
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VIDE "WIRELESS TRADER"
TEST REPORT OCT. 5, 1929

DO you agree?
Here is your opportunity
to test for yourself. Any
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will let you have either the
Popular Cabinet 45/-, or
Popular Plaque 25/- for
Seven Days' Free Trial in
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*Hearing that is
Almost Seeing*

**FILL IN THIS COUPON AND TAKE
IT TO YOUR DEALER TO-DAY!**

Please supply me with one { M.P.A. Popular Cabinet 45/- } Cross out line
on SEVEN DAYS' FREE TRIAL, on the understanding that { M.P.A. Popular Plaque 25/- } not required.
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Address

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

HAVE YOU BUILT YOUR NEW SET?

NOW IS THE TIME TO BEGIN

The long evenings are here—You have time on your hands—USE IT PROFITABLY

Why not make a Wireless Set or bring your present Receiver up to date.

GET PERFECT REPRODUCTION OF THE WORLD'S MUSIC We will advise you of a Receiver which best suits your conditions and requirements.



POSSESS THE BEST WIRELESS CAN OFFER IMMEDIATELY! BY SMALL MONTHLY PAYMENTS.

COSSOR 1930 KIT. CASH, £8 15s. 0d.

Send only 16/-, balance by monthly payments of 16/-

NEW OSRAM MUSIC MAGNET. CASH, £9 0s. 0d.

Send only 16/-, balance by 11 monthly payments of 16/-

MULLARD ORGOLA KIT, including Oak Cabinet.

Send only 14/3, balance by 11 monthly payments of 14/3

EKCO MODEL 3F22 (A). CASH, £3 19s. 6d.

Send only 7/3, balance by 11 monthly payments of 7/3

CELESTION C 12 (Oak). CASH, £5 12s. 6d.

Send only 10/4, balance by 11 monthly payments of 10/4

KITS FOR THE MUSIC LEADER, CLARION THREE, KNIFE-EDGE THREE, ETC.

Loudspeakers, H.T. Units, Accumulators, Moving Coil

Speakers, Portables, etc.

EVERYTHING WIRELESS

ANY RECEIVER BUILT FOR 10/-

A nominal charge of 10/- ONLY is made for building and

testing any receiver (Marconi Royalties extra).

QUICKEST DELIVERY IN LONDON—CARRIAGE FREE.

Call or send a list of your requirements—

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The P. D. P. COMPANY LTD. (Dept. 'A')

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—Cut out the rest

The Tunewell Cut-Out is a wonderfully efficient Station Selector with three Aerial Tappings, Sockets and Plugs to vary the tuning and degrees of selectivity. Incorporates most efficient astatically wound coils and .0005 variable condenser. Enclosed in Superior Bakelite Case. The most efficient Cut-Out yet.

B.B.C. WAVE BAND HIGH WAVE
10/6 12/6

TUNEWELL CUT-OUT

TURNER & CO.,
54 STATION ROAD,
NEW SOUTHGATE - LONDON, N.11

BROADCAST TELEPHONY

Broadcasting stations classified by country and in order of wavelengths. For the purpose of better comparison, the power indicated is aerial energy.

Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)	Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)	Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)
GREAT BRITAIN											
25.53	11,751	Chelmsford (5SW) 15.0		*294	1,020	Limoges (PTT) 0.5		*320.3	908	Naples (Napoli) 1.5	
				304	986	Bordeaux (PTT) 1.0		*385	779	Genoa (IGE) ... 1.0	
*200	1,500	Leeds (2LS) ... 0.13		305.6	981.7	Agen ... 0.25		*441	680	Rome (Roma) 3.0	
*242	1,238	Belfast (2BE) ... 1.0		309	970	Radio Vitus ... 1.0		453	662	Bolzano (IBZ) ... 0.3	
*261	1,148	Newcastle (5NO) 1.0		*316	950	Marseilles (PTT) 0.5		*501	599	Milan (Milano) 7.0	
288.5	1,040	Swansea (SSX) 0.13		326.5	918.9	Grenoble (PTT) 0.5		YUGOSLAVIA			
288.5	1,040	Stoke-on-Trent (6ST) 0.13		331.4	905	Petit Parisien ... 0.5		*321.4	977.3	Zagreb (Agram) 0.7	
288.5	1,040	Sheffield (6LF) 0.13		345	809	Strasbourg ... 0.1		*429	694	Belgrade ... 2.5	
288.5	1,040	Plymouth (6PY) 0.13		364	824	Algiers ... 2.0		575	521.7	Ljubljana ... 2.5	
288.5	1,040	Liverpool (6LV) 0.13		368	815	Radio LL (Paris) 0.5		LATVIA			
288.5	1,040	Hull (6KH) ... 0.13		*381	788	Radio Toulouse ... 8.0		*525	572	Riga ... 3.0	
288.5	1,040	Edinburgh (2EH) 0.35		411	729	Radio Maroc (Rabat) 2.0		LITHUANIA			
288.5	1,040	Dundee (2DE) 0.13		436	687	Radio Flandre (Lille) 0.1		*1,935	155	Kovno ... 7.0	
288.5	1,040	Bournemouth (6BM) 1.0		447	671	Paris (Ecole Sup. PTT) 1.5		NORWAY			
288.5	1,040	Bradford (2LS) 0.13		468	640	Lyons (PTT) ... 5.0		*540	1,250	Rjukan ... 0.18	
*301	995	Aberdeen (2BD) 1.0		1,350	222	Tunis (Kasbah) 0.6		*283	1,038	Notodden ... 0.6	
*310	968	Cardiff (5WA) ... 1.0		1,444	207.5	Eiffel Tower ... 12.0		*395	820	Bergen ... 1.0	
*356	842	London (2LO) 2.0		*1,725	174	Radio Paris ... 12.0		*394	761	Frederikstad 0.7	
356	842	Brookman's Park 20.0		GERMANY							
*377	797	Manchester (2ZY) 1.0		*218	1,373	Flensburg ... 0.5		*313	959	Cracow ... 0.5	
*393	753	Glasgow (5SC) 1.0		*227	1,319	Cologne ... 4.0		*335	866	Posen ... 1.2	
*479	626	Daventry (5GB) 25.0		*234	1,283	Muenster ... 3.0		385	779	Wino ... 0.5	
1,554	797	Daventry (5XX) 25.0		*239	1,256	Nurnberg ... 2.0		*408	734	Kattowitz ... 10.0	
AUSTRIA											
*246	1,220	Linz ... 0.5		*246	1,220	Cassel ... 0.25		*1,411	212.5	Warsaw ... 8.0	
*283	1,058	Innsbruck ... 0.5		*253	1,184	Gleitwitz ... 2.0		ROMANIA			
*352	851	Graz ... 7.0		*259	1,157	Leipzig ... 1.5		*391	761	Bucharest ... 0.12	
*453	666	Klagenfurt ... 0.5		*270	1,112	Kaiserslautern ... 0.25		RUSSIA			
*617	581	Vienna ... 15.0		*276	1,083	Koenigsberg ... 2.5		*351	855.5	Leningrad ... 1.0	
BELGIUM											
216	1,391	Charleroi (LL) 0.25		*283	1,048	Magdeburg ... 0.5		*427	702.5	Khar'kov (NKO) 4.0	
250	1,202	Schaerbeek-Brussels 0.25		*283	1,048	Berlin (E.) ... 0.5		*483	621.5	Hemel ... 1.2	
250	1,200	Ghent ... 0.5		*283	1,048	Stettin ... 0.5		*825	364	Moscow (PTT) 20.0	
280	1,071	Liège ... 0.1		*319	941	Dresden ... 0.25		1,080	283	Tiflis ... 10.0	
312	961.4	Arlon ... 0.25		*325	923	Breslau ... 1.5		1,000	308	Leningrad ... 20.0	
339	887	Louvain ... 8.0		*339	887	Bremen ... 0.35		1,103	272.7	Moscow Popoff 40.0	
*609	590	Brussels ... 1.0		*360	833	Stuttgart ... 1.5		*1,301	230	Khar'kov ... 4.0	
CZECHO-SLOVAKIA											
*263	1,139	Morava-Ostrava 10.0		*372	806	Hamburg ... 1.5		SPAIN			
*279	1,076	Bratislava ... 12.5		*390	770	Frankfurt ... 1.5		251	1,193	Almeria (EAJ18) 1.0	
*293	1,022	Kosice ... 2.0		*418	720	Berlin ... 0.25		298	1,121	Barcelona (EAJ13) 10.0	
*342	878	Brno (Brno) 2.4		*453	662	Danzig ... 0.35		314	916	Oviedo (EAJ19) 0.5	
*487	617	Prague (Praba) 5.0		*453	662	Aachen ... 1.0		*349	860	Barcelona (EAJ1) 8.0	
DENMARK											
*281	1,067	Copenhagen (Kjobenhavn) 0.75		*473	635	Langenberg ... 1.5		*368	815	Seville (EAJ15) 1.5	
1,153	260	Kalundborg ... 7.5		*532	536	Augsburg ... 0.25		403	743	San Sebastian (EAJ8) 0.5	
ESTHONIA											
*297	1,010	Reval (Tallinn) 0.7		*560	536	Hanover ... 0.35		*424	767	Madrid (EAJ7) 2.0	
FINLAND											
*221	1,355	Helsingfors ... 0.9		*570	527	Freiburg ... 0.35		453	669	Salamanca (EAJ22) 1.0	
*1,790	167	Lahti ... 40.0		*1,635	183.5	Zeesen ... 30.0		SWEDEN			
FRANCE											
211.3	1,420	Béziers ... 0.1		2,100	142	Norddeich ... 10.0		231	1,301	Malmö ... 0.6	
221	1,364	Fecamp (Radio Normandie) 0.5		2,290	131			*257	1,160	Hoerby ... 10.0	
228	1,260	Bordeaux (Radio Sud-Ouest) 1.0		GRAND DUCHY				*270	1,112	Trollhattan ... 0.45	
480	1,216	Radio Nîmes ... 0.25		223	1,316	Luxembourg ... 3.0		*322	932	Goeteborg ... 10.0	
*255	1,175	Toulouse (PTT) 1.5		HOLLAND				322	932	Falun ... 0.5	
*265	1,134	Lille (PTT) ... 0.7		31.4	9,554	Eindhoven (PCJ) 25.0		*436	689	Stockholm ... 1.5	
268	1,121	Casablanca ... 0.5		*293	1,004	Hilversum (mttl) 5.40 p.m. G.M.T.) 6.5		*542	554	Sundsvall ... 0.6	
*272	1,103	Rennes (PTT) 0.5		*1,071	280	Hilversum ... 6.5		*770	389	Ostersund ... 0.6	
277	1,083	Pic du Midi de Bigorre (weather forecasts 9 p.m.) Montpelier (PTT) 0.2		*1,070	280	Scheveningen-Haven 5.0		1,200	250	Boden ... 0.6	
*280		Mont de Marsan (1.3) Radio Lyons ... 0.5		(from 10.30 a.m. to 5.40 p.m. B.S.T.)				*1,348	222.5	Motala ... 30.0	
ITALY											
238.5	1,040	Mont de Marsan (1.3)		*1,875	260	Huizen (after 5.40 p.m. G.M.T.) 6.5		SWITZERLAND			
262	1,028	Radio Lyons ... 0.5		550	545	Budapest ... 20.0		*403	743	Berne ... 1.0	
IRISH FREE STATE											
*225	1,337	Cork (IFS) ... 1.0		ICELAND				*459	653	Zurich ... 0.63	
*413	725	Dublin (2RN) 1.0		*1,200	250	Reykjavik ... 1.0		466	644	Zurich (during afternoon) 0.63	
ITALY											
248	1,209	Trieste (testing) 1.0		680	442	Lausanne ... 0.6		760	395	Geneva ... 0.25	
*274	1,094	Turin (Torino) 7.0		1,010	297	Basle ... 0.25		TURKEY			

All wavelengths marked with an asterisk have been allotted according to the Plan de Prague.

All wavelengths marked with an asterisk have been allotted according to the Plan de Prague.

CHIEF EVENTS OF THE WEEK

LONDON AND DAVENTRY
Oct. 21 "Points of View" (4), by Mr. H. G. Wells.
" 22 A vaudeville programme.
" 25 An orchestral concert from the Queen's Hall.
" 26 An old-time vaudeville programme.

DAVENTRY EXPERIMENTAL (5GB)
Oct. 22 The Monkey's Paw, a story by W. W. Jacobs dramatised by Louis N. Parker.
" 24 An Edward German programme.
" 25 A vaudeville programme.

NEWCASTLE
Oct. 22 A local revue.

GLASGOW

Oct. 24 A programme of musical comedy and light opera.
" 26 Running commentary on Wales v. Scotland International Association Football Match.

BELFAST

Oct. 24 The Faithful Sentinel, an opera: music by Franz Schubert.

Address Wanted.—Will the Rev. M. McDonnell, of St. Mary's Cathedral, send his full address to the Regent Radio Supply Co., to whom he sent an order with cheque.

MIRILIUM

THE WIRELESS SENSATION OF THE YEAR

A CLEARTRON DISCOVERY

A WONDERFUL new filament coating discovered by research chemists in the Cleartron Laboratories makes it possible FOR THE FIRST TIME to offer a complete range of coated filament valves at half usual prices. The new series of eighteen CLEARTRON MIRILIUM-COATED VALVES has been independently tested by nationally known experts—and shows characteristics unsurpassed by any other valve at any price. In many instances the Cleartron Valve is definitely superior to its more expensive rivals of the same type.

In construction, range, and low current consumption the new Cleartron Valves will completely satisfy the most critical user. Two-, four- and six-volt types are made for every purpose in wireless.

Ask your dealer for MIRILIUM-COATED CLEARTRONS. Test them against any other make you know.

Send us a card for illustrated brochure containing characteristic graphs.

The New
CLEARTRON
 5 1/2- *Mirilium Coated* **6"6**
VALVES **POWER**
 (S.G. tube 12'6)

GENERAL PURPOSE
CLEARTRON (1927) LTD., 21 CUMBERLAND ST., BIRMINGHAM
 London: 310 HIGH HOLBORN, W.C.2 Telephone: Holborn 8378

Please Mention "A.W." When Corresponding with Advertisers

"THE MUSIC LEADER" (Continued from page 586)

free. As usual, however, a small reproduction of the print is given on page 586, and this will be a further aid to construction.

Components

A list on page 585 shows the parts needed for making up the receiving section of the "Music Leader." As usual, after each component, a number of alternative makes are mentioned. The first mentioned make is that actually used in the original receiver, and illustrated by the accompanying photograph. Following, are a number of alternatives which can be used if the constructor prefers, and only minor alteration will be necessary, but it is most unwise to deviate from the list of alternatives given.

The blueprint is most useful in that it is full size, and thus can be used as a template for panel drilling and the mounting of the components. It shows each wire in its correct position (though not in every case is it possible to give each wire in its correct length), and can be used as a helpful final check when all the wiring is done and it remains only to see that each wire is

correctly put in place. Here is the blueprint free for your benefit, so make the most use of it in the construction of the "Music Leader."

Follow closely the list of components in conjunction with the components' list and blueprint, so that everything will be ready for the simple constructional details which will be given next week.

Details will be given for making up the receiver section only, and when this is complete, it can be tried out as a unit when the frame aerial is wound, and before the linen-diaphragm loud-speaker is finished, if desired. The construction of the complete receiver "chassis" and cabinet will be given in easy stages.

On View in London

In the meantime, it should be noted that the "Music Leader" is being shown in the Somerset Street windows of Messrs. Selfridge & Co., Ltd., wherein each week a current AMATEUR WIRELESS receiver is displayed. All London readers should take advantage of the opportunity to see the "Music Leader," for the appearance of the complete self-contained set, ready to work,

is more convincing than many photographs or pages of written matter.

And make sure of next week's issue, for further constructional details.

The free blueprint gives full particulars and dimensions of each part of the "Music Leader." On the extreme left will be seen the linen-diaphragm loud-speaker, the two frames and back batten being clearly shown. Next the screening box shown in detail, every dimension being given and the box shown in perspective so that no difficulty whatsoever should be experienced in making it. The frame aerial is wound on a rectangular frame, particulars of which are given in a small drawing at the top right-hand side of the print. Inside the frame are two fillets upon which the receiver itself is supported. To the extreme right is shown the cabinet of the "Music Leader." All dimensions are given so that no difficulty will be experienced in making it up. Below, in the main portion of the print, is shown the receiver section, full size. Dotted lines show the connections to the frame aerial. Receiver, cabinet, frame aerial, and loud-speaker all on one free blueprint.

ONLY 15/6

THE BULGIN MULTI-COIL
(Patent Pending)

YOU will find no trouble with Brookmans Park if you incorporate this wonderful new all wave tuner. It covers the whole range of 220 to 600 and 1000 to 2500 metres the wavechange being effected by a special switch incorporated. It is scientifically designed in accordance with modern valve theory and is centre tapped on both wave lengths for the utmost selectivity.

AND WORTH IT

Send for our new 56-page Catalogue

A.F. BULGIN & CO.
RADIO PRODUCTS
9-10-11 CURSITOR STREET
CHANCERY LANE, LONDON, E.C.4



We started easy payments in Radio!

and we continue to provide sets, components, and accessories on generous deferred payments.

For example:—

Cossor 1930 3-Valve Kit ...	12 monthly Installments of	16/-
Cossor 1930 3-Valve All Mains Kit ...		27/6
Cossor 1930 2-Valve All Mains Set ...		19/3
Mullard "Orgola" 3-Valve Kit including Oak Cabinet. Valves extra.		14/6
New Osram Music Magnet Kit including Valves and Cabinet ..		16/6

DELIVERED on PAYMENT of FIRST INSTALLMENT

Write now for List No. 18 containing prices and terms of EVERYTHING RADIO.

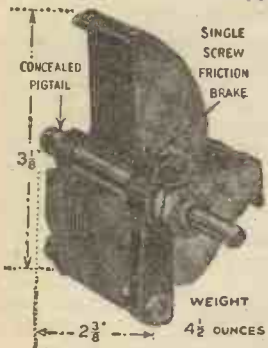
NEW Times SALES CO.,
56 Ludgate Hill, London, E.C.4

OAK CABINET 22/-

Ready to assemble. All joints cut. Send P.C. for free illustrated Catalogue of 70 "R.T.A." Pieces of Furniture.

HANDICRAFTS LTD.,
18 WEEDINGTON RD., N.W.5





"1930" LOG (MID-LINE) CONDENSER

As specified for the MUSIC
LEADER described in this issue.

In four Capacities

.0005
.00035
.00025
.00015

4/6 Each

* Double spacing of vanes for Ultra
Short-wave work.

The Finest VERNIER DIAL

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FULL arrangements have already been made by the B.B.C. for the broadcast of the Cenotaph Service on Armistice Day (November 11), the transmission being almost exactly the same as last year. The broadcast will be carried out by all B.B.C. stations, including 5SW. Although no general authority can be given for its re-diffusion, it is not felt that objection should or would be raised if the service is rebroadcast in a church. The responsibility for any questions of copyright, however, must be left to the person or persons undertaking the re-diffusion of the broadcast.

A special revue of a humorous character dealing with the North-east Coast Exhibition will be broadcast from the Newcastle station on October 22. Councillor Arthur Lambert, the Lord Mayor of Newcastle, is taking part in the performance, in which he will sing a song, "Northumberland," specially composed by the Lady Mayoress.

On November 7 listeners to 2LO and

5XX will be given the thrills of the speedway, as the B.B.C. will convey them on that evening to a contest at the Wembley Stadium.

Michael, a Russian play in three scenes, by Miles Malleson, and based on one of Leo Tolstoy's tales, will be presented through 5GB on October 29.

Airy Nothings, a burlesque from the pen of Gordon McConnel, has been brought up to date in a second edition. Amongst other "hits" at the B.B.C. programmes, it makes fun of the Schneider Trophy commentary and the weekly "surprise items." It will be heard from 2LO and 5XX on October 21.

On October 18 the Freedom of the City of London is to be presented to Lieut.-General Lord Baden-Powell. The proceedings will be relayed from the Guildhall to 2LO and 5XX.

London and Daventry, and all stations taking the London programme, on Novem-

ber 14 will broadcast the speeches made at the Peace Commemoration Dinner organised by the League of Nations Union. The speakers will be Lord Cecil, Mr. Philip Snowden, M.P., and Mr. J. C. Smuts. In the course of the broadcast the manuscript of *Journey's End* will be auctioned by Sir Herbert Morgan.

On November 14 the B.B.C. will celebrate the anniversary of its seventh birthday by the usual staff concert. It will be broadcast at the end of the evening's transmission, namely, towards 10 p.m. Listeners will be compelled to guess the names of the authors and of those assisting in the performance, for they are being kept a closely-guarded secret.

On October 6 another change-over in wavelengths took place between the Dutch transmitters; Hilversum, until 5.40 p.m. G.M.T. now broadcasts on 298 metres, and from that hour until closing time on 1,075 metres. Huizen, on the other hand, works on 1,875 metres throughout the day. Scheveningen-Haven, the commercial telephony transmitter, broadcasts from early morning until 5.40 p.m. on 1,071 metres.

With the coming of winter-time, listeners should bear in mind that France, Belgium, and Spain have simultaneously returned to G.M.T. Holland, however, is still twenty minutes in advance of Great Britain, and countries working on Central

(Continued on next page).

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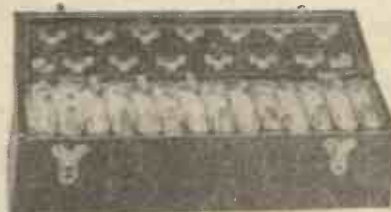
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"RADIOGRAMS" (Continued)

European Time—e.g., Scandinavia, Germany, Austria, Italy, and so on—one full hour.

On October 31, until the opening of the Moorside Edge (Huddersfield) North Regional transmitter, Newcastle will be compelled to broadcast on the national common wavelength of 288.5 metres, and during that period will not be able to transmit its own programmes. Later, however, when the new regional station takes over the north of England service, a wavelength will be allotted to the Newcastle transmitter when local entertainments can again be given.

The Rome broadcasting station now regularly transmits photographs on the Fulton system on Fridays, Saturdays, and Sundays between 10 and 10.18 p.m. G.M.T., and again on Fridays at 6.30 p.m. G.M.T.

Tests emanating from Radio Luxemburg (Grand Duchy) on 223 metres are best heard between 9 and 10 p.m. G.M.T.

French wireless papers report that Brockmans Park announces itself as "London Bridge calling!" They do not say whether other bridges have protested, but we are inclined to believe that this favouritism might make Charing Cross!

The Canadian National Railways has adopted broadcasting as one of its chief aids in attracting settlers to the 240,000,000 acres of good farming land yet to be cultivated. The Canadian Northern Railway has established thirteen broadcasting stations to offset the lack of entertainment on isolated Canadian farms.

One of the features of the recent New York radio show was the release of a large silver balloon flown from the roof of the building. A radio valve and a letter was attached, and a cheque of one hundred dollars will be sent to whoever picks it up when the balloon finally completes its flight.

It is understood that the stay of the Post Office detection van in Glasgow and district may extend to six months or longer. Glasgow alone has a population estimated at round 1¼ millions, while there are very populous areas outside the city, yet the district only boasts some 60,000 receiving licences. One in every four houses is believed to be equipped for wireless reception, and the officials accompanying the van are armed with lists of suspected houses. Much interest is being taken by the populace in the results of this "big push" against pirates.

With the disbanding of the Glasgow station orchestra, the B.B.C. has entered into contracts with the Scottish Orchestra and the Reid Orchestra. Seven concerts by the former will be broadcast from St. Andrew's Hall, Glasgow, and five by the latter from the Usher Hall, Edinburgh. Of these, 60 per cent. will include works by Scottish composers.

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McMICHAEL SCREENED GRID THREE. Complete kit of components, including Cabinet, Valves, etc. Send only 16/3; balance in 11 monthly instalments of 16/3.

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76 OLDHALL STREET,
LIVERPOOL : ENGLAND

"MEASURING LOUD-SPEAKER VOLUME"

(Continued from page 592)

bass and treble registers where a cut-off is beginning to occur are points which require investigation, and the Rayleigh disc must therefore be sufficiently sensitive to respond to these frequencies. This means that during the middle registers the deflection may be quite large.

It is certainly an interesting experiment to try fitting up a disc in one's home where it is not necessary to take the elaborate precautions for measuring the deflections and for ensuring absolute accuracy. A disc 1 in. diameter placed 2 ft. away from a loud-speaker giving normal strength will rotate 10 or 15 degrees. It is necessary to enclose the apparatus to some extent in order to shield the apparatus from draughts, and, of course, care must be taken to avoid reflections from the side if an accurate measurement is being taken. For a rough test as a home experiment this is not necessary. Thin mica or white card is quite satisfactory.

Where an actual measurement has to be taken it is necessary to devise means of measuring the actual deflection. One method of doing this is to stick very small mirrors on the centre of the disc and to reflect light from a suitable source on to a scale. A spot of light appears at a certain part of the scale when the apparatus is at rest, and this moves along the scale a certain distance when the sound is applied from the loud-speaker. In some cases it is possible to dispense with the use of mirrors by using a highly polished mica disc which has sufficient reflective power to act as a mirror in itself.

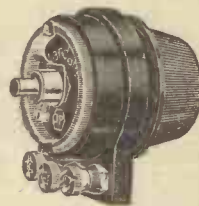
If, of course, one places the disc closer to the loud-speaker than 2 ft., then quite large deflections can be obtained. The disadvantage of placing the disc so close is that it accentuates the unevenness of the radiation from an average loud-speaker.

This was brought out by a recent experiment which I conducted by the method just described. The radiation of the loud-speaker was measured on the axis, and it was tolerably uniform up to about 3,000 cycles, when a very sharp cut-off occurred. At first sight, therefore, one would say that the loud-speaker was very poor, whereas actually it was known to radiate quite efficiently at frequencies over 8,000 cycles per second. The reason for the apparent difference was, of course, that the higher frequencies were not radiated axially, but were shot out at an angle, and therefore, listening some distance away, it was possible to hear all the frequencies more or less rendered together. Any measurement, therefore, made on a loud-speaker must take into account this discrepancy between the radiations at different angles, and it is indeed largely due to this source of error that loud-speaker curves are not more frequently published than at present.

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"THE TRUTH ABOUT THE SCIENCE MUSEUM SET"

(Continued from page 579)

from the roof. This is 27 ft. long, is made of lead-covered sheet iron, coated over for a thickness of $\frac{1}{4}$ in. with pitch. This is attached to a Western Electric drive of the type used for "talkies." I heard this instrument working with the set properly controlled, and my own frank opinion is that it is as good as anything I have ever heard; but if the volume is too great, then it is certainly not perfect. Worked properly, the reproduction is entirely natural, although a frequency curve shows that some of the bass is missing. I do not think that the Museum authorities will be able to improve on this loud-speaker's reproduction, at least for another five years.

The other loud-speaker is the original McLachlan moving-coil instrument. Frankly, I do not think it is so good as the horn speaker. On the one hand, it is the original model, and is therefore fairly old, and has earned museum status; on the other hand, it is every bit as good as many other moving coils I have heard. A third loud-speaker demonstrated is the Amplion Lion. This is shown because it is the type of speaker an average man can have, as distinct from the 27-ft. horn and the original McLachlan. A simple change-over switch brings each loud-speaker into circuit in turn.

The hall in which the loud-speakers are installed is far from ideal. It is comparatively bare and full of echo. But a triple-thickness of canvas put up as a screen at one end of the hall, and facing the orifice of the horn speaker, has done much to alleviate the echo.

A few weeks ago the horn speaker started to "buzz" very badly, and it did not at first seem obvious how this could happen. Then they took the giant horn down from its hangings, separated the unit, and located the culprit—a fly! This must have crawled up the horn when the set was not working, and must have been killed at once by the vibration when the set was switched on.

The set is in operation on most afternoons, including Sundays, and the opportunity to hear it makes an interesting experience for Londoners. It is not an "everyman" set, but it is a wonderful demonstration set, and it has never broken down. That is more than most of us can claim!

In connection with the new Leningrad high power broadcasting station, the Soviet Authorities in that city have installed a Dramatic Studio, capable of seating some 2,000 spectators. Built to serve as a theatre, it will be used for the relay of musical and other plays. Arrangements are also being made for the demonstration of television transmissions.

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1 Differential reaction condenser, type 926 (.0003-mfd.) (Pye)	5	0	0
1 Trimmer condenser, type 929 (.00005-mfd.) (Pye)	4	0	0
1 H.F. Choke (Climax)	7	6	0
1 Set of terminals, A, E, L.S., L.S.—, Pick-up, Pick-up (Belling-Lee)	3	0	0
1 Seven-way battery cord fitted with engraved wander plugs and spade tags (Belling-Lee)	5	9	0
1 Safety Anode Connector (Belling-Lee)	6	0	0
1 Pair of panel brackets	2	6	0
1 Set of Junit switches (1 with blue and 2 with black knobs) (Junit) 1s. 6d. each	4	6	0
3 Junit indicating washers, 1d. each	3	0	0
3 Terminal Mounts (Junit) 8d. each	2	0	0
(Say) 8 oz. 18-gauge copper wire (approx.)	1	3	0
Length of sleeving, screws	6	0	0
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1 P.M. H.T. Supply Unit (Mullard) or	5	5	0
3 H.T. dry batteries, 50-v. type 1035 (Siemens) each, or	1	5	0
1 H.T. dry battery, 100-v. type 1203 (Siemens)	1	2	6
1 Grid Bias Battery, 16-v. type G.3 (Siemens)	3	6	0
1 Accumulator, say 30 amp. hr. capacity	11	6	0
1 Cabinet and baseboard	1	7	6

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LETTERS TO THE EDITOR

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

H.T. Battery Wastage

SIR,—I am interested in the letters *re* this bugbear. One correspondent says he has not had 42 days' service. I have had six batteries between May 1 and September 20. The last two batteries ran out in about 8 hours' service. By this I mean 1½ hours on Sunday, 3 hours on Monday, 3 hours on Tuesday, and a dead stop on Wednesday. These were 108-volt batteries. The valves were 2-volt, three HL210's, DEH210, DEP215. The set has been returned to the makers twice for overhaul on their suggestion. As I paid carriage both ways, the cost for carriage has been about 30s., and the cost for new batteries, 108-volt at 15s. 6d. each, about £3 17s. 6d. When I mention six batteries used up, I am including the original one in the set when purchased complete. I have paid for five new batteries in less than five months. In an effort to save wastage, I have taken out the plugs from H.T., L.T., and grid-bias battery when not in use, even for a quarter of an hour. If any reader can beat this or can suggest what is wrong I will bless him. B. (Birkdale).

Faulty Components

SIR,—I am an old reader of your paper, having taken it in since No. 1. I feel I would like to comment upon the article by "Thermion" in a recent issue *re* faulty components and the general willingness of the trade to rectify same. The following are my recent experiences. About a month ago I made up "Britain's Favourite Three" of nearly all new components, and although I got this set to work, all I could get was 5XX, and I could not get the slightest reaction.

My slight knowledge as to the reason soon being exhausted, I took this set to where I purchased the parts (one of the largest dealers in Birmingham), who assured me they would soon be able to put it right; anything faulty they would replace. A few days later I called for the set, and was assured that it was working perfectly.

You can imagine my surprise, upon reaching home, to find the set whistled frightfully and no reaction. I complained to this firm, who said it was all right at their shop. Not being able to improve matters, I wrote to AMATEUR WIRELESS "Information Bureau," explaining matters, and was advised to try a new H.F. choke. This I purchased locally, expecting to cure matters, but upon fitting same I could not get a sound. Testing this with phones and battery, I found it was no good; so I took it back, but they would not change it (Continued on page 611)

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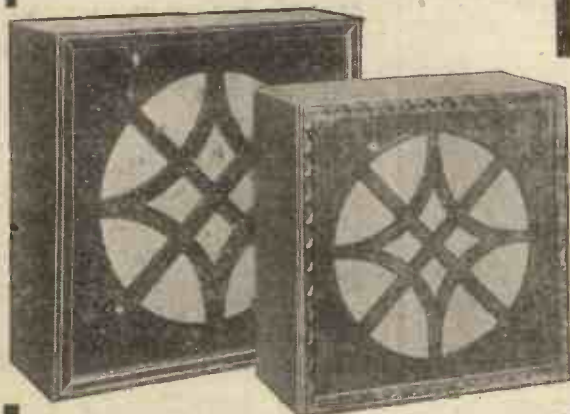
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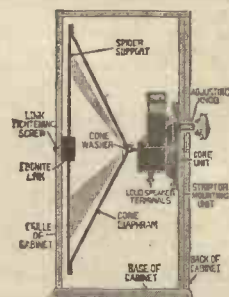
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"Modern Gramophones and Electrical Reproducers," by A. Wilson, M.A., and G. W. Webb (Cassell & Co., Ltd., London, ros. 6d. net). To the best of our knowledge, this is the only book published up to the present which deals with gramophone technique in a scientific manner. This is not surprising when it is remembered that until a couple of years ago the gramophone was developed entirely by trial and error and that it is only since the advent of electrical recording and the application of electrical impedance methods to acoustical problems that it has been possible to put it on a scientific basis. The book covers the whole range of modern gramophone technique in a manner that is easily understandable by the average reader. It will be invaluable to the designer, and the ordinary gramophone enthusiast will find in it much practical advice to enable him to get the best out of his instrument and remedy any defects. The latter part deals very fully with pick-ups, loud-speakers, and amplifiers, and includes a section of miscellaneous hints on mechanical and gramo-radio upkeep.

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58/61 FETTER LANE, LONDON, E.C.4

PATENTS.—Trade Marks, Advice Handbook free.—B. T. King, Regd. Patent Agent, 140 Queen Victoria St., London.

DECORATE YOUR LOUD-SPEAKER YOURSELF. Transfers giving painted effects on Fabric, Wood, Metal, etc. Sample and catalogue 1/- A.W., Axon Ltd., Jersey, England.

EARN MONEY AT HOME by becoming a proficient Showcard Writer. We train you by post and sell your work through our specialized Sales Department. Show Card Service, Ltd., Hitchin.

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YOUTHS REQUIRED FOR WIRING AND ASSEMBLING. Previous experience preferred, but not essential. Apply Eastern Wireless Co. Ltd., Collingwood Road, Sutton, Surrey.

SINQUERS

SAVE YOUR
ACCUMULATORS
SET A SINKER
SENTRY!
HE'LL NEVER LET
YOU DOWN.

Double the life of your cells! Avoid being let down by a run-out accumulator. Sinquers tell you the exact state of your battery and warn you when it needs recharging. Just drop them in and leave them to it.

1/- per carton from most dealers or 1/3 post free from actual makers.

FIDDIAN BAWTREE & CO.,

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Sole trade distributors, Eric J. Lever

(Trix) Ltd., 33 Clerkenwell Green, E.C.1



Improve your Set
with
FoToS Valves!

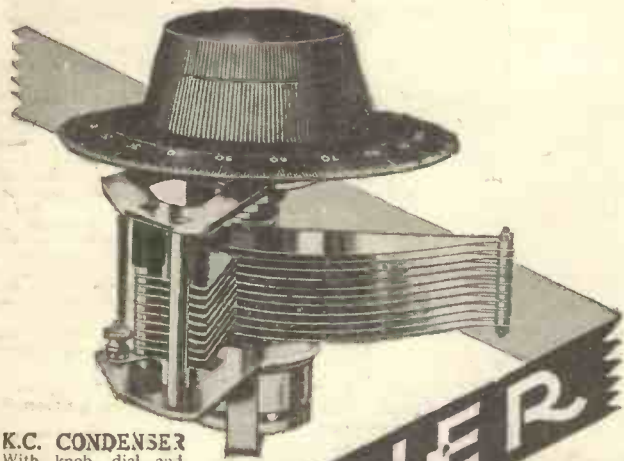
See Advertisement on page 603

Amateur Wireless

COUPON

Available until Saturday,

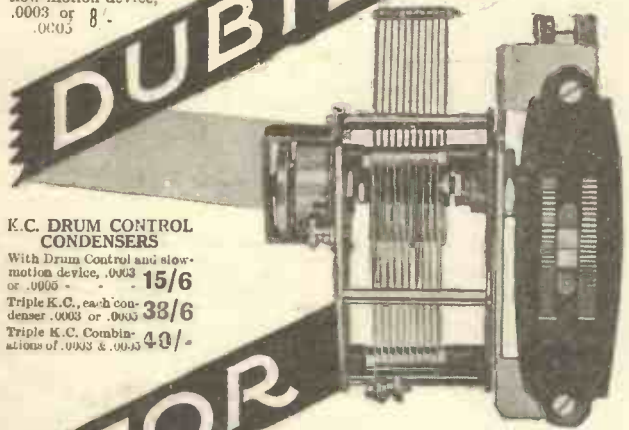
OCTOBER 26, 1929

**K.C. CONDENSER**

With knob, dial and slow-motion device, .0003 or .0005 12/-

Without knob, dial or slow-motion device, .0003 or 8/-

.0005

**K.C. DRUM CONTROL CONDENSERS**

With Drum Control and slow-motion device, .0003 or .0005 15/6

Triple K.C. each condenser .0003 or .0005 38/6

Triple K.C. Combination of .0003 & .0005 49/-

**MIDGET CONDENSER**

A small variable condenser for panel mounting .00005, .0001 or .0002 5/6



If unobtainable from your dealer, write direct to us giving his name and address.

DUBILIER

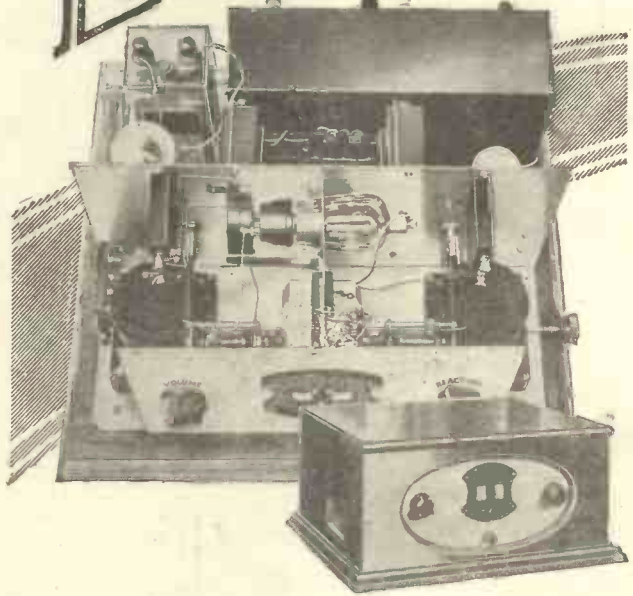
VARIABLE CONDENSERS

Ask your dealer for the Dubilier Booklet—"A Bit about a Battery"—it's free.



Dubilier Condenser Co. (1925), Ltd., Ducon Works, Victoria Road, N. Acton, London, W.3 BC249/V

Start Building this LOTUS set To-day!



Set builders—build and own the very latest radio development, the new 3-valve Lotus S.G.P. set. You can buy the kit for it complete, assemble it in a few hours and demonstrate to your friends the greatest range, power and selectivity of any set this season.

Start building the new Lotus S.G.P. to-day. The kit contains every unit you need except valves, cabinet and batteries and can be bought at your nearest retailer's for the modest sum of £7 12s. 6d. . . . Diagrams and instructions enclosed.

LOTUS

3-valve S.G.P. Set

Supplied with main components mounted and ready for immediate assembling. Prepared by the makers of Lotus components
GARNETT, WHITELEY & CO., LTD.,
Lotus Works, Liverpool.

Send this coupon now!

To Garnett, Whiteley & Co., Ltd.,
Lotus Works, Liverpool

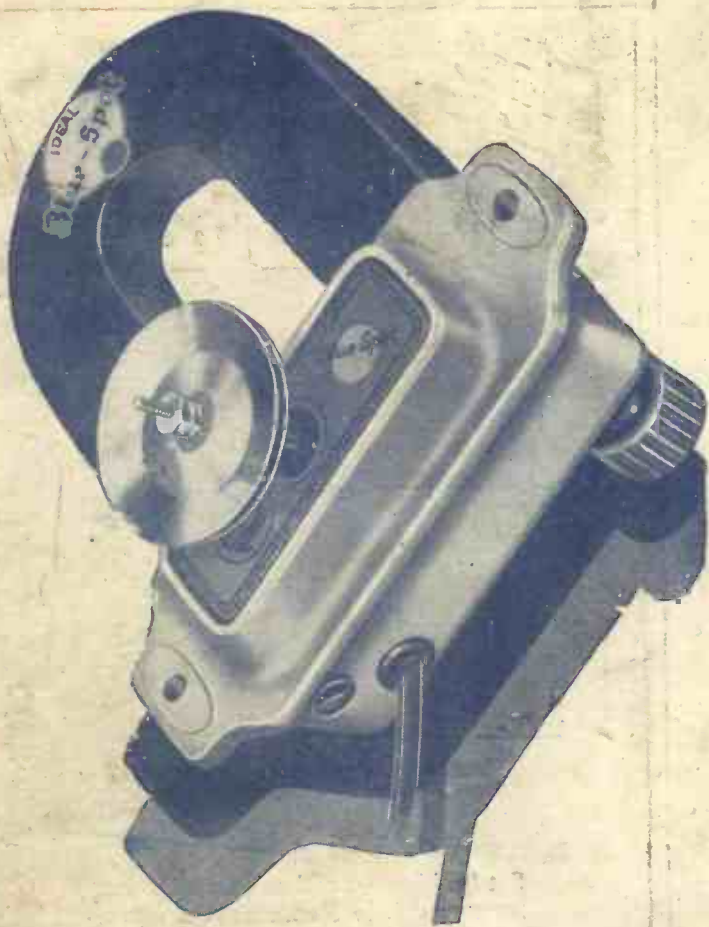
Please send me Free copies of the latest Lotus Booklets and instructions for building the Lotus S.G.P. Set.

Name

Address

AW 19/10/29

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



There are three reasons for the Blue Spot 66K speaker unit's popularity.

1. The Blue Spot unit, the pioneer of balanced armature units, still remains the best loud-speaker unit on the market to-day it lives up to the claims made for it.

2. It will withstand any amount of volume and always gives pure undistorted reproduction.

3. The Blue Spot 66K unit is sold under guarantee. Look for the special carton with the price 25/- clearly marked.

Hear it demonstrated at your dealer's.

AND THE CHASSIS!

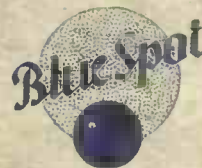
To hear the Blue Spot 66K at its best, you must hear it working with a Blue Spot Chassis. Designed for the unit, it is simply a matter of bolting the all-metal chassis to it, the cone is already in position. And there you have a fine speaker.

There are two chassis, the Minor—complete with 9½" cone Price 12/6

The Major with 13" cone Price 15/-

Your dealer stocks them!

66K THE UNIT THAT BLUE SPOT BUILT



Visit the Blue Spot Stand 30,
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