

ANOTHER BIG GIFT TO READERS

Amateur Wireless

Every Thursday 3^d

And Electrics

Vol. XII. No. 295

Saturday, Feb. 4, 1928

BLUEPRINT
N^o. W. 74

BRITAIN'S FAVOURITE TWO

For full constructional details

FREE FULL SIZE BLUEPRINT

Full-size Layout, Drilling Guide & Wiring Diagram.

Use template for drilling

REACTION COIL

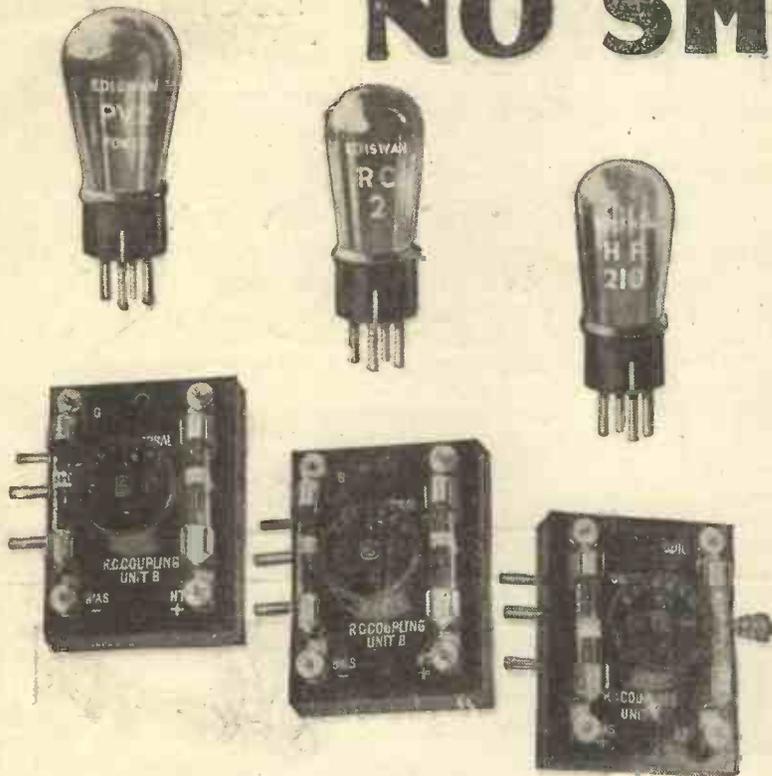
To coil tap

0003 MFD.

Ebonite

THERE IS NO SHORTAGE

OF THE NEW R.C. THREESOME COUPLING UNITS AND VALVES



Get the parts for this wonderfully simple 3-valve set on your way home. The New Threesome costs less than any other 3-valve receiver.

You will get several stations on the loudspeaker with a wonderful volume of crystal purity.

The New R.C. Threesome has only 5 wiring connections—requires no soldering, and can be made in an hour.

The remarkable results claimed for this set can only be guaranteed if you use Edison Swan Valves H.F.210, R.C.2 and P.V.2.



A.W. 4.2.28

To THE EDISON SWAN ELECTRIC Co. Ltd.
 (Publicity), 123/5, Queen Victoria Street,
 London, E.C.4.

Please send, post free, presentation
 copies of the New R.C. Threesome
 Instruction Book and Blue Print.

NAME.....

ADDRESS.....

.....

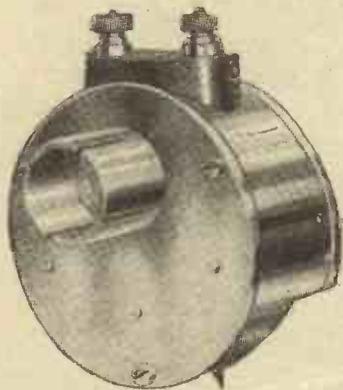
EDISWAN VALVES

CLEAREST-STRONGEST LAST THE LONGEST

A type for every purpose

V. 84

**Radio
links up with
the gramophone**



THE first time you hear the reproduction of a gramophone aided by radio you will find it difficult to believe your ears. Most probably you will look around for the singer or the player and not finding him, you will rub your eyes and ask the why and the wherefore of this mystifying realism. Then you will be shown a little instrument that is the cause of it all. You will be told that it is the **Brown Electrical Pick-up**, which, when fitted to the tone arm of a gramophone and connected to a wireless set and loud-speaker, completely transforms gramophone reproduction. Then, probably, you will be so impressed that you will want a **Brown Electrical Pick-up** yourself, so that your gramophone may give you purer tone, greater volume, controlled volume, and freedom from needle scratch. £4 is the price of this priceless boon.



S. G. Brown, Ltd.,
Western Avenue, North Acton
London, W.3

CA 1659

To Ensure Speedy Delivery, Mention "A.W." to Advertisers

Supreme examples
of Scientific Engineering.



CYLDON

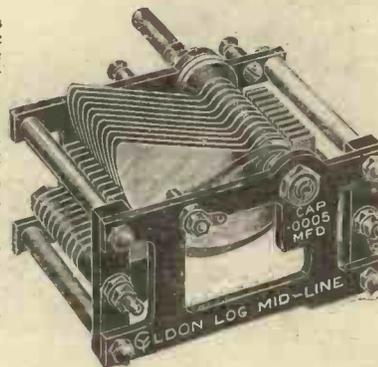
carries on the tradition

**THE "CYLDON" LOG
MID-LINE CONDENSER**

SPECIFIED FOR THE "BRITAIN'S" FAVOURITE-TWO

This Unique "Cyldon" is built on the Logarithmic principle, and the vanes are shaped approximately midway between the square law and the straight-line frequency types, the variation in capacity being intermediate. The effect is that the usual crowding of stations at either end of the scale in the S.L.F. and S.L. Condensers is eliminated, and in the case of multi-valve receivers will give identical readings over the whole tuning range.

The construction is identical with the high standard of all other "Cyldon" condensers.



	Prices:	With 4 in. knob dial	Prices:
.001 19/-	2/- extra. In the case	2 Gang .. £2 10s.
.0005 15/6	of gang condensers,	3 Gang .. £3 10s.
.003 14/6	Log Mid-Line are a	4 Gang .. £4 10s.
.00025 14/-	necessity, not a	
.002 13/6	luxury.	

Write for particulars of "Cyldon" Condensers
for the following circuits:

MULLARD "RALEIGH" RECEIVER. This popular circuit specifies three "Cyldon" Log Mid-Line (.0005), Price 15/6 each, and one S.L.F. (.00035), Price 15/-.

1928 "SOLODYNE." "Cyldon" 3 Condenser Assembly (Chassis mounted and thumb control.) Simpler Tuning. No extra Drum to buy. Easier Adjustment. Greater Selectivity. Complete with screens and drums, £4 10 0. Bebe Condenser (.0001), 7/6.

"ASTRAL FOUR." Specifies two "Cyldon" Log Mid-Line (.0005), Price 15/6 each.

"LONG RANGE HARTLEY 1." Specifies "Cyldon" Bebe Condenser (.0002), Price 8/6.

"SCREENED GRID H.F.1." Specifies "Cyldon" Log Mid-Line (.0005), Price 15/6, and Log Mid-Line (.0003), Price 14/6.

"BRITAIN'S FAVOURITE TWO." Specifies "Cyldon" Log Mid-Line (.0005), Price 15/6.

IMMEDIATE DELIVERIES AVAILABLE.

Write for complete illustrated catalogue if you are building any of these Receivers. Also for copy of FREE booklet "Concerning Variable Condensers."

SYDNEY S. BIRD & SONS, LTD.

Cyldon Works, Sarnesfield Road, Enfield Town, Middlesex.

Contractors to the B.B.C., H.M.R.A.F., H.M.O.W.,
and all the leading manufacturers of quality receivers.

Telephones: Enfield 2071 (2 lines).

Telegrams: "Capacity, Enfield."

Goodall Ad.

MR. ROWETT SAYS WE'RE TOO MODEST!

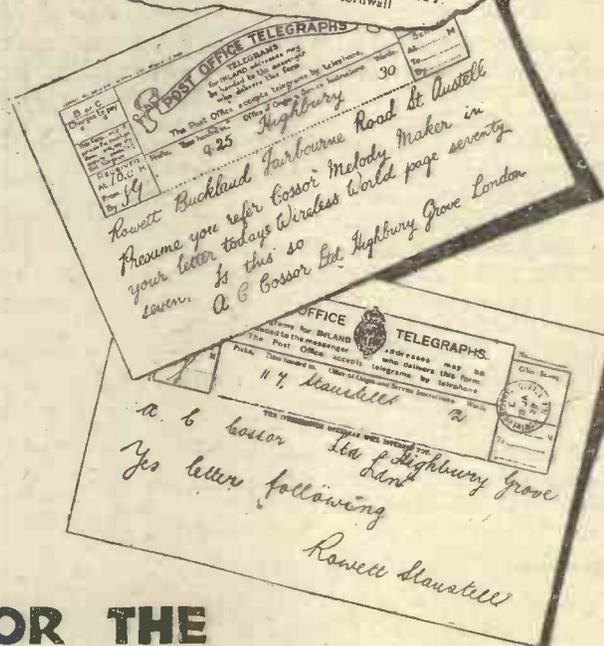
Read this extract from the "Wireless World"

Sir.—I note with great astonishment the letter published in your issue of the 28th inst. from Mr. S. G. Black on the question of the performance of three-valve receivers. Although an ardent believer in H.N., I made up a certain three-valve receiver now being extensively advertised by a firm of valve makers. The results obtained were, to me, astonishing. Thirty stations are obtainable on the speaker—headphones have not been employed—in fact, I should view the use of these with considerable trepidation owing to the great amplification. To state that the whole of Cornwall is outside the L.S. range of a three-valve set is nonsense, as several of my friends will testify. When the Savoy bands are S.B. Aberdeen is obtainable free from G.G.B. also 21.0 is free of Leipzig, and 5XX from Radio Paris; so selectivity is not lacking. While I do not wish to state that all these stations are obtainable 5XX from designers is always available, and it is my belief that the of programmes is not lacking. While I do not wish to be expected to do. It may interest Mr. Black to know that 5XX can be received at quiet L.S. strength in the morning on two valves—0.v.1. And, if he is interested, I will forward him particulars of circuit and components used. In any case, the are cheap, easy to build and run, and bring the boon of radio to many who might otherwise be deterred by the sight of many controls and valves.

W. A. F. ROWETT,
Buckland, Fairbourne Road, St. Austell, Cornwall
December 29th, 1927.

HE'S right. We are modest in our claims for the Cossor "Melody Maker." We do not believe in over-statement. We know that we can say, truthfully, that anyone who builds the Cossor "Melody Maker" according to instructions will, without difficulty, obtain broadcasting concerts from seven countries. That, in itself, is a remarkable statement. Yet Mr. Rowett, in a corner of England which is notoriously bad for Wireless reception, gets results which surpass all our claims. Nor is he alone. From Land's End to John O'Groats comes a daily stream of thanks from satisfied users. Each one tells of new stations heard—stations in all parts of the continent... even of American broadcasting. And every letter that comes is another link in the chain of evidence which proves the record-shattering efficiency of the wonderful Cossor "Melody Maker."

"Cheap, easy to build and run," says Mr. Rowett. Ask your Dealer for the free chart, "How to build the Cossor 'Melody Maker'", and see for yourself.



IN OUR CLAIMS FOR THE

COSSOR "Melody Maker"

Amateur Wireless

and Electrics

The Leading Radio Weekly for the Constructor, Listener
and Experimenter

Edited by BERNARD E. JONES

Vol. XII. No. 215

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

FEBRUARY 4, 1928

The "Favourite Two"—B.B.C.'s Efficiency—International Soccer Broadcast— Not Dodging Cost!—"Broadcast Three"—Another Conference!

"Favourite Two"

THE "Favourite Two," of which constructional details are given in this number, is the receiver which embodies the circuit voted second place in our recent competition. It will therefore, recommend itself to a very large number of our readers. The circuit consists of the well-tried arrangement of a detector valve with magnetic reaction followed by a transformer-coupled L.F. valve. This has been incorporated in the set in an eminently practicable form; plug-in coils are conveniently arranged for changing; and the grid-bias battery is contained in the receiver. Don't forget, too, that the blueprint can be used as a drilling template!

An Add-on Tetrode Unit

IN this week's issue full constructional particulars of a screened-grid valve H.F. unit are given. The unit is entirely self-contained and can be added to any receiver. It is neatly made and is not expensive. Those of our readers who have "just been wondering" about the screened-grid valve will welcome this opportunity to see for themselves its abilities.

B.B.C.'s Efficiency

HOWEVER the B.B.C. may be rated because of its programmes, its record for technical efficiency makes it difficult for criticism to be made on that account. During 3,562 hours worked during 1927 only 40 minutes were lost through breakdown—a percentage of .02. The record among B.B.C. stations for efficient working is held by Cardiff, whose percentage, in 1926 was .001!



At the recent Faversham and Sittingbourne election contest the rival candidates used loud-speakers to broadcast their speeches. Judging from the expressions on the faces of these two kiddies it would be doubtful if the candidate would be successful if they had a vote!

International Soccer Broadcast

THE sports talk from London and other stations on Saturday evening, February 11, will be on the Association Football match between teams representing the Armies of England and Belgium. It will be given by a speaker nominated by the Army Football Association.

Another Conference!

WASHINGTON is in the throes of yet another radio conference, owing to the Federal Radio Commission being

inundated with requests for ultra short wave permits. Naval and aircraft authorities are anxious to restrict short-wavers, within reason, but the "hams" demands are so insistent and urgent that a conference has been called!

Not Dodging Cost!

A "Victory Hour" programme recently broadcast in America by Dodge Brothers, a prominent firm of car manufacturers, is said to have cost 1,000 dollars a minute. The programme was relayed through 43 stations. The Dodge car rivals the Ford, so wait till Henry gives his ideal broadcast programme!

No Wireless Links!

BEFORE the end of this year, it is said, all the great cities of Europe will be exchanging programmes for wireless broadcasting. London is, of course, prominent in the scheme. Special telephone lines are now being laid. The difficulties are many—both technical and political—but they are steadily being surmounted.

The "Broadcast Three"

THE "Broadcast Three," the receiver which will be fully described in AMATEUR WIRELESS next week, has been specially designed for the listener who desires pure loud-speaker reception on at least two wave-bands without changing coils. The local station or either of the two Daventry's can be brought in by the flick of a switch. The receiver is well designed, handsome in appearance, and easy to handle. We are confident that a large number of our readers will find this receiver to fill their requirements ideally.

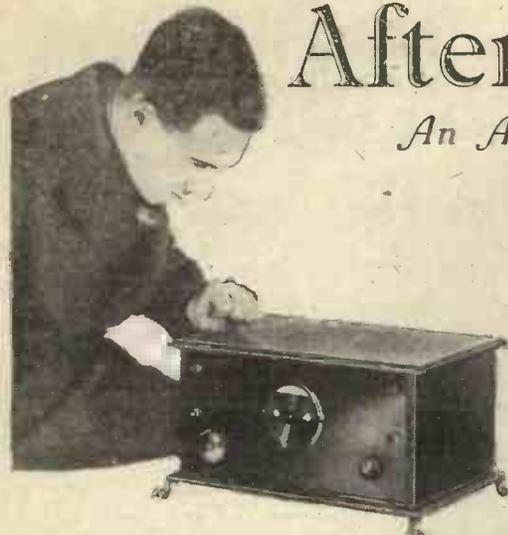
PRINCIPAL CONTENTS

Current Topics ..	171	Britain's "Favourite Two"	184
After the Set is Built! ..	172	"A.W." Tests of Apparatus	185
The "Screened-grid H.F. One"	173	Compressing the Carrier Wave	186
About the "Q" Coil ..	175	Without Fear or Favour	187
Practical Odds and Ends	176	Our Information Bureau	192
On Your Wavelength ..	181		
The Making of a Valve	183		

Next Week: TELEVISION IN NATURAL COLOURS, by T. Thorne Baker, F.Inst P.

After the Set is Built!

An Article that will Help in Overcoming Some of the Minor Difficulties You may Meet



BY the time these words appear in print, many hundreds of our readers will have built, or be in course of building, Britain's "Favourite Three," and before long almost as many will build the star set of this week, Britain's "Favourite Two." We know that the great majority of constructors who build these receivers will be delighted with the results they obtain, but we are quite aware that some few constructors will meet with minor difficulties in getting satisfactory results.

Little Snags

However great the care in construction and however explicit the instructions, there are always little snags which are unsuspected by the reader and difficult to foresee in a constructional article. Thus it is that, after a published description of a good receiver, our Query Dept. is called upon to clear up small difficulties, trifling in themselves, but quite sufficient to prevent good results from being obtained.

While we are at all times anxious to help readers out of their difficulties, we would much rather help them to avoid waste of time and additional expense. With this object in view, we now propose to summarise the main causes of difficulty in making our sets function in the satisfactory way we claim, and to offer suggestions for the prevention of such difficulties.

If the receiver is wired up in accordance with one of our blueprints, the constructor can be fairly certain that the wiring is correct. It is a rare thing for a mistake to creep into our specifications. The extraordinary care which is taken in checking the draughtsman's original drawing is responsible for the accuracy of all AMATEUR WIRELESS blueprints. It is only fair to say that in the majority of cases, the reader on his part faithfully follows our wiring plans.

And yet, as we have said, there are occasions when the results are not what they should be. It follows then, that the cause of the trouble must be due to faulty components or accessories. An analysis

of the queries confirms this diagnosis.

As regards the choice of components, we do our best to guide readers in the matter, by suggesting suitable alternatives in the lists of components specified. If our advice is followed, there remain only the accessories and aerial-earth system which can be wrong. It is here that the most fruitful crop of difficulties are encountered. A reader will write as follows, "I have built your So-and-So receiver and on the local station it works well. I am disappointed with the results on long-distance reception, as I am unable to get reaction."

Reaction Effects

This inability to "get reaction" is quite common and while it may be due to causes enumerated later, it is very probable that the aerial is the fault. In a simple receiver like Britain's "Favourite Two" it should be a simple matter to obtain reaction effects with a No. 50 or a No. 60 coil and if a much larger one has to be used it goes to show that the efficiency of the aerial is low. So before you criticise the performance of the receiver, satisfy yourself that the aerial is above suspicion. If the aerial has



A Grid-leak Connection Detail

been erected for more than six months, it is "suspect." That is assuming that you have an outdoor system, subject to atmospheric effects.

Aerial System

The insulators, lead-in tube, and the wire itself should be subjected to a periodical inspection. Although not very appreciable on local reception, the effects of a deteriorating aerial definitely limits the D.X. potentialities of the receiver. Always use the best quality stranded copper wire for the aerial and remember that "isolation" of the aerial wire is every bit as important as insulation.

The earth should be as efficient as possible. A good earth is usually more readily attainable than a good aerial, and where it is not possible to erect a good aerial it is all the more imperative that a good earth be arranged.

Keep the earth wire short, if possible, but do not shorten it at the expense of the earth itself. That is to say, if a longer lead is required to enable a better earth to be used

do not mind using the longer lead, providing it is a good thick one. If the wire can be taken to a large earth plate, not less than 2 feet square, buried three or four feet in the ground beneath the aerial so much the better; but fair results are given by a well-connected water-pipe.

Never connect to a gas-pipe. Apart from the danger of such a practice it is decidedly inefficient owing to the white-lead joints between the sections of gas piping.

Closely allied to the "poor aerial" cause of failure to obtain reaction is a less generally recognised one; we refer to the inadequate H.T. supply connected to the receiver. In the case of Britain's "Favourite Three" it is simply asking for poor results to use less than 120 volts H.T. supply. Owing to the resistance-capacity-coupling unit incorporated in this receiver the detector valve does not receive the full H.T. supply and if the initial H.T. is low the actual voltage applied may be insufficient to give reaction.

On the L.F. side, the quality of reproduction suffers if the H.T. is insufficient. The two-valve "favourite" set described in this issue relies for its excellence of operation on an adequate H.T. supply to the second valve, although the detector valve only requires about 60 volts.

The third cause of non-reaction effects has been found to be due to the use of inefficient or badly-designed H.F. chokes. In any system of Reinartz reaction, the ability to obtain smooth and consistent reaction is governed to some extent by the effectiveness of the H.F. choke in the anode circuit of the detector valve. Avoid unknown makes of chokes by using the type specified or the alternatives advised.

The contacts of coils are sometimes responsible for mysterious faults. Particularly is this the case when six-pin coils are involved. Take care to open out the pins and keep the sockets clean in all plug-in components and you will avoid many little set backs.

Valves

The choice of suitable valves in any of our receivers should receive careful consideration as these play a very important part in its successful working. Some confusion appears to exist with regard to the position of an "R.C." valve in such a receiver as Britain's "Favourite Three." The "R.C." valve always precedes the R.C. coupling and is never placed after it.

Grid leak and condenser connections also

(Continued on page 206)

"THE SCREENED-GRID H.F. ONE" (Continued from preceding page)

simple arrangement consisting of a tapped-coil tuned by means of a .0005-microfarad variable condenser. The thick black horizontal line in the circuit diagram represents the copper screen on the baseboard, to which is connected the earth, the lower end of the tuning coil, one side

(Cylton, Burndept, Formo, Ormond). Neutralising condenser (Peto-Scott, J.B., Igranic).

Two baseboard-mounting coil-holders (Lissen, L. & P.).

Two 2-microfarad condensers (Dubilier, Lissen, T.C.C.).

Eight terminals (Belling-Lee, Eastick).

7-ohm rheostat (G.E.C., Lissen, Igranic).

Screened-grid valve holder (Parex, Burndept).

In the design of the "Screened-grid H.F. One" there is an ebonite panel screwed at right angles to a wooden baseboard, both being completely lined with substantial copper sheet. A partition is arranged near the aerial end of the unit as shown in the photographs.

At the left-hand side of the panel is mounted the .0005-microfarad aerial-tuning condenser and behind this on the copper-lined baseboard are screwed the aerial coil mount and one side of the four-electrode valve holder. In the right-hand compartment are grouped the remaining components incorporated in the unit. The panel components of this compartment consist of a .0003-microfarad anode tuning condenser and filament rheostat.

The remaining baseboard components are the two 2-microfarad blocking condensers, anode-coil mount, variable coupling condenser and the other side of the four-electrode valve-holder, and the .0002-microfarad condenser across aerial and negative terminals.

Panel Layout

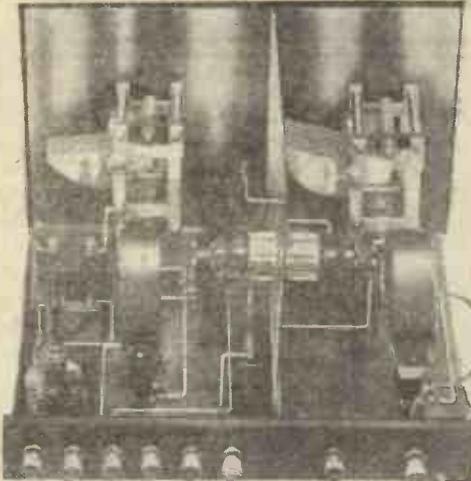
The panel layout is symmetrical and convenient from a control point of view, whilst the baseboard components are arranged to allow a certain amount of latitude in the assembly. The terminal strip fitted to the baseboard completes the assembly.

As with all units making use of copper-screening, the constructional work is a little more involved than it is with straight-forward receivers. Two lengths of copper-sheet are required. One measures 16 3/4 in. by 12 in. bent at right angles 7 5/8 in. from one end, which allows 3/8 in. overlap at the top of the panel and at the terminal strip edge of the baseboard. This length of sheet lines the panel and baseboard as shown in the detailed sketch. The second piece of copper-sheet, which is required for the valve partition measures 9 5/8 in. by 8 in., which allows a 1/16 in. lip at the top, bottom, and sides of the partition, the bottom of which is soldered to the bottom screen, and the side of which is soldered to the panel screen.

The screen is held in position on the panel

by the fixing of the rheostat, anode and aerial condensers and on the baseboard by means of the fixing screws of the components. A hole has to be cut in the screen in the vicinity of the anode tuning condenser, which must on no account be allowed to come into contact with the screen.

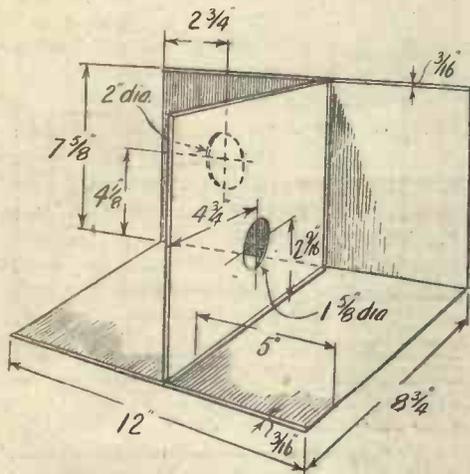
There is no need to take these precautions in the case of the aerial tuning condenser,



The Unit is Quite Compact

of the filament rheostat, L.T.— and the earthed sides of the two 2-microfarad blocking condensers. The filament rheostat is inserted in the negative L.T. lead as indicated.

Having thus briefly run over the detailed connections of the unit, we can now turn our attention to the constructional details.



Details of Panel, Baseboard and Shielding

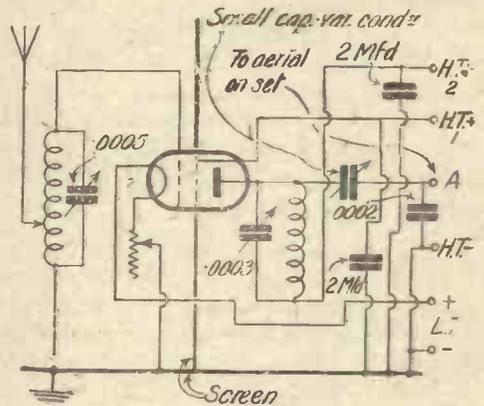
A full list of components required to build a unit similar to that shown in the photographic views and drawings is as follows:

Components

Ebonite or bakelite panel, 12 in. by 8 in. by 1/4 in. (Ebonart, Raymond, Becol, Per-tinax).

.0005-microfarad variable condenser (Cylton, Burndept, Formo, Ormond).

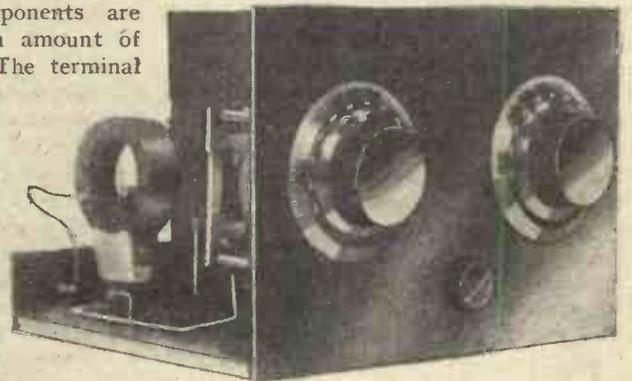
.0003-microfarad variable condenser



The Circuit Diagram

the moving vanes of which are connected to earth in any case.

When wiring up, the following points should be observed. The connection between the filament tag of the valve-holder and one side of the filament rheostat is taken through a small hole drilled in the screening partition, about half-way between the panel and the large circular valve hole. (2) The wiring is somewhat simplified by the fact that several of the connections, which in the ordinary way are earthed, are soldered to the adjacent



Front of Panel

copper screen. Thus, the earth side of the coil is earthed by means of a short length of Glazite, soldered to a small soldering tag which is screwed tightly down through the copper to the baseboard.

Similarly, the earth terminal and H.T.— and L.T.— terminals and one side of each reservoir condenser are earthed to the screen.

The rest of the connections are clearly indicated in the blueprint reproduction.

About The NEW "Q" COIL

Preliminary Details of an Entirely New Type of Coil by Our Technical Editor

TUNING coils or inductances are used in wireless practice in conjunction with a variable condenser to constitute an oscillatory circuit which can be adjusted to resonance with the signals to be received. When this condition of affairs is attained, the circuit is said to be tuned, and the currents flowing in the circuit build up to a value several times as great as they would do normally.

By this simple process of tuning therefore, we are able to make the circuit particularly responsive to certain frequencies, and in this manner we select the

capacity effect of the condenser, which makes the circuit respond to oscillating currents of a particular frequency. Thus, the most important factor which we have to consider in any tuning coil is the

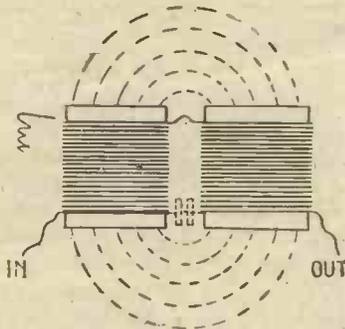
inevitably gives rise to extra loss in the circuit and makes for a greater inefficiency.

Magnification

Such matters were not appreciated in the early days of wireless for the losses in the coils themselves were so high that they swamped any minor inefficiencies due to

THE "Q" COIL

1. Tunes to long or short waves without dead ends.
2. Has a high magnification on both wavebands.
3. Is astatically wound.
4. Incorporates only a simple two-way switch since the same primary and reaction windings serve both wavebands.
5. Occupies the minimum of space.



Field of Binocular Coils

station required and tune it in so that the signals obtained are of a satisfactory strength. In order to achieve this, it is necessary that the coil shall have a certain inductance, this property being a measure of the magnetic effect produced by the coil.

Magnetic Field

It is well known that if a current is passed round a coil of wire a magnetic force is produced. This can be demonstrated simply by winding about a iron nail. If current from a battery is passed round the coil, the nail will become a magnet and will pick up other pieces of iron. Thus, there is a marked magnetic effect resulting from the passage of current round the coil. We make use of this magnetic effect in wireless work, for it has a peculiar retarding effect upon any currents in the circuit, and it is this, in conjunction with the

magnetic effect, or, as we call it, the inductance.

For a long time the inductance was considered to be the principal property of the coil and little attention was paid to the other properties associated with it. Clearly, however, any one coil will only tune over a certain limited range of frequency (or wavelength) with a given condenser, and consequently coils have usually been made interchangeable. Plug-and-socket or similar types of mounting have been devised whereby one coil can be interchanged for another one covering a different wavelength band. This question of interchangeability has always been the bugbear of the designer. The introduction of plugs and sockets



General Arrangement of the "Q" Coil

methods of mounting, etc., but it was not long before the importance of low resistance began to be appreciated.

It has already been pointed out that when a circuit is tuned to the frequency of the signal the voltage produced across the tuning condenser is considerably larger than the voltage originally induced in the circuit. We get a certain magnification or gain, which is definitely measurable. The gain of a coil is given by the expression

$$\text{Gain} = \frac{6.28fL}{R}$$

where L=inductance (henries),
R=resistance (ohms),
f=frequency,

and many engineers specify the gain of their coils and circuits in this manner, since it gives an immediate and definite indication as to how good the particular circuit is.

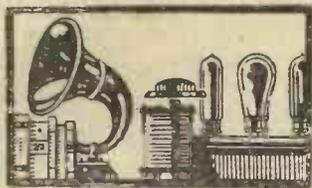
Examination of the simple formula just given shows that the lower we make the

(Continued on page 196)

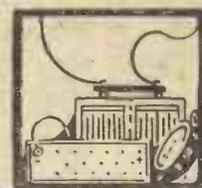


Mr. Reyner measuring the H.F. resistance of the New Coil

THE "BROADCAST THREE"—A SET WITH WIDE WAVELENGTH RANGE, NEXT WEEK



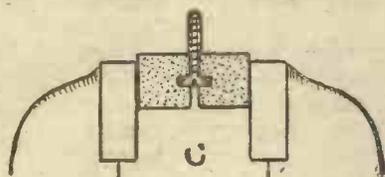
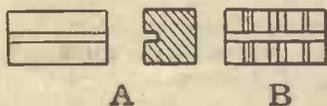
PRACTICAL ODDS & ENDS



Clamping Small Screws

IT is often necessary to grip the head of a small screw in the vice in order to file or re-thread the shank, and in the absence of a suitable clamping device the screw-head is liable to become damaged. For example, if the head of an ordinary-brass counter-sunk screw is placed directly in the jaws of the vice and gripped tight enough to prevent it from moving, two flats are formed on the sharp counter-sunk edge and the appearance of the screw is ruined.

A very serviceable clamp can be easily made from two small blocks of fibre or hardwood, each about $\frac{3}{4}$ in. in square section by $1\frac{1}{2}$ in. long. These should be grooved by means of a coarse wood-saw or file in the manner shown at A in the accompanying sketch, and then provided with two



Clamping Small Screws

or three different sizes of nicks, or "V" slots, as shown at B.

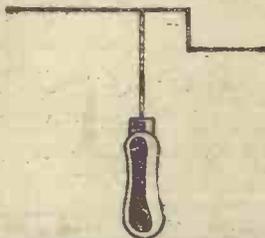
The lower sketch (diagram C) should make the idea quite clear. The two halves of the clamp are closed over the screw-head which rests in the longitudinal groove, and the screw is then moved along so that the shank engages two "V" slots of appropriate size. If the device is then tightly clamped in the vice the screw may be held securely without fear of damaging the head. The clamp shown in the sketch will take three different sizes of screws, but, of course, the lengths of the blocks and the number of different size "V" slots may be modified to take a larger range of screws. For sake of convenience the "V" slots are cut across the whole width of the blocks, as at B.

O. J. R.

A Soldering Accessory

WHEN a new wire is being fitted or an old one repaired, it often happens that the wire cannot be firmly held owing to lack of space for the fingers or a pair of pliers.

The tool illustrated in the drawing below will enable a firm hold to be obtained and make it possible to fit wires in extremely cramped positions. It consists of an 8-in. length of 16 s.w.g. square tinned wire fixed into a file handle. The wire to be fitted is bent to the required shape and soldered to



An Idea for Soldering in difficult places

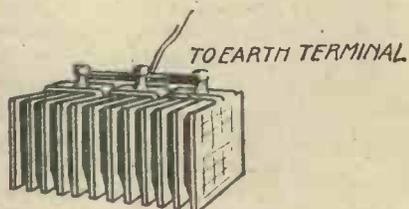
the tool. The points to which it is desired to solder the wire should be well tinned, so that the wire may be quickly sweated into position. Upon completion a similar touch will release the tool.

W. B.

A Good Earth

NOW that wireless is getting on in years, there are few of its devotees who have not an accumulator that has finished its work through the positive plates having "gone wrong."

The negative plates are invariably good, and instead of being thrown away or left lying useless, along with other "junk," can be used to form an excellent earth. The larger the accumulator, the better. When a 4- or 6-volt is used, the sets of plates can be joined as shown in the sketch. Buried a good depth in moist earth, it will be found this arrangement gives remark-



A Good Earth

ably good results. Most battery-charging shops have "dud" accumulators to dispose of cheaply.

D. H.

Making Washers

SUCH small items as washers are not always at hand. When such is the case they can easily be made from perforated metal strip, such as is supplied with Meccano parts, or, alternatively, perforated connecting wire, such as some constructors use for their sets.

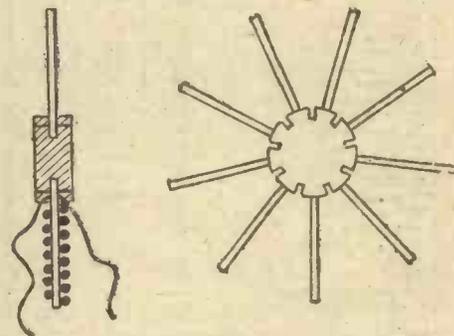
In order to make a number of suitable washers, it is only necessary to cut off sections. The pieces will be square or rectangular in shape, but this does not matter in the least, though if preferred they can easily be trimmed.

K. U.

Coil-winding Hint

IF the hub of a metal spider-coil former is slotted in the manner shown in the sketch the coil may be securely bound, at the usual cross-over points, before removing the spokes.

The advantage of such an arrangement should be obvious, for, it is invariably a difficult matter to "square up" a spider coil once the unsupported winding has been removed from the former. The slots should be cut by means of a hacksaw to a depth of about $\frac{1}{8}$ in., or nicks may be



A Coil-winding Hint

made with a three-cornered file. It will be found a simple matter to pass the twine through the slots, under the first turn of the winding, and then up over the outer edge of the coil, where it is neatly tied.

R. J.

Covering Coils with Shellac

THE practice of coating solenoid coils with shellac varnish, to prevent moisture in the air from increasing the distributed capacity, seems to be unpopular nowadays. Perhaps the reason for this is that the shellac coating tends slightly to increase the capacity of the coil.

It should be noted, though, that the specific inductive capacity of best-quality shellac varnish is 3.5, whereas the S.I.C. of water is 81. Hence any moisture in the air will be more harmful to the efficiency of a coil than is the thin shellac coating.

Varnish should be made from loose orange-shellac flakes dissolved in methylated spirit, this home-made mixture being better than many of the commercial products.

B. B.

THREE DIALS

IN STEP

AND ALL EUROPE COMES IN LIKE THE LOCAL



Analyse the test report on the Raleigh P.M. No use of reaction made during the whole evening. Stations printed in Black face were received with one L.F. Stage in circuit only.

STATION.	Aerial	1st H.F.	2nd H.F.
Unidentified	70.5	75	76
Radio Paris	71	68.5	65.5
Daventry	64	59	58
Berlin	44	44.5	44
Unidentified	34.5	35	36.5
Unidentified	31	32	33
Unidentified	28.5	29	28
Hilversum	25	24.75	25
Budapest	94.5	92	93
Munich	88	89	89
Vienna	85	86.25	86
Brussels	83.5	85	85
Daventry (5G8)	81	82	83
Langenberg	77	78.5	78.5
Oslo	75.5	77	77
Rome	73.25	75	75
Breslau	71.5	73.5	73.5
Frankfurt-on-Main	69	71.25	71
Cracow	68	70	70
Berne	65	66	67.5
Glasgow	63	67.5	67
Plymouth	62.5	66	66
Hamburg	62	65	65
Toulouse	60.75	64	64
Manchester	58.5	62.5	62.5
Stuttgart	58	62	62
London	56	59	57
Koenigsburg	45.5	50	50
Bournemouth	44.5	49	49
Paris	44	48	47
Dublin	43.5	47.5	46.5
Breslau	42	47	45.5
Newcastle	41	45	45
Belfast	38	44	42
Nuremberg	37	43.5	40.5
Liverpool and Hanover	36	41	41
Innsbruck	34.5	40	39
Edinburgh	34	37.5	38
Shffield and Cassel	31.5	33.5	32
Lille	23	31	29.5
Toulouse	27.5	28.5	27.5
Bremen	26	27.5	25
Gleiwitz	25	26	25
Muenster	23	23	20
Orebro	22.5	20.5	19
Halmstad	10	8	8

IT is extremely impressive to be able with no more mental or physical effort than maintaining three dials in step to produce a log of stations such as that on the left and receive each one as perfectly as the local. Few sets, if any, could boast of a performance equal to that!

Has not the vision of such a set filled your mind's eye from time to time? Would not radio be just your greatest joy if you owned a set such as this?

Contrary to usual experience the long wave tuning curve is dotted with stations to no less an efficient degree than the broadcast waveband.

On the 200 to 550 metre waveband performance of this receiver is remarkable. Stations such as Langenberg, Brussels, Frankfurt-on-Main, Nuremberg, 5 G.B., Bruenn, Stuttgart, Toulouse, Munich, Muenster, Berne, Hamburg, Rome and Madrid, simply break through like an immense volume from a suddenly-opened swell-box of a great cathedral organ.

This is an experience which occurs over the whole tuning range of the condensers. Mark you, it is not confined to those stations which are known to be working on very high power but is also extended to such transmissions as are not often heard, for reasons of their limited power.

If you want a radio set to provide your family with a variety of distant programmes at a volume as intensive as the local, build the Raleigh P.M. Fill in the coupon to-day.

**THE MULLARD
RALEIGH P.M.**
The PUBLISHERS, 63
Lincoln's Inn Fields,
London, W.C.2. Please
forward free, complete
instructions, blue print
and No. 4 RADIO FOR
THE MILLION, to build
this master receiver.

NAME.....
ADDRESS.....

Mullard MASTER RADIO

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

WIRELESS MAGAZINE

for February is now on sale, 1/-

The constructional articles include:

THE ASTRAL FOUR—a self-contained receiver, all batteries being enclosed. Specially adapted for long range without any changing of coils.

CONE LOUD - SPEAKER — a simple and extremely efficient instrument, which anyone can easily make at a very low cost.

In all there are over 50 Features,
all profusely illustrated, including:

Your Choice of the World's Programmes—Working Ranges of Broadcast Receivers, by Capt. H. J. Round, M.I.E.E.—The New "Q" Coil, by J. H. Reyner, B.Sc., A.M.I.E.E.—*The Long-range Hartley One*, for headphone reception of distant stations—*Two-programme Two*, covers upper and lower wavebands without changing coils—*Metropolitan Three*, for A.C. and D.C. Mains—*Everyday Three*, ideal for loud-speaker reception from almost anywhere in the British Isles—*A.C. Mains Adaptor*, for any "Simpler Wireless" Set.

BLUEPRINTS of above Units available at HALF-PRICE until February 29th.

WIRELESS MAGAZINE
is on sale at all Newsagents and Bookstalls
GET YOURS NOW



Your duty towards your neighbour!

ONE H.F. STAGE

There is a large Public who are content with reception from the local Station and Daventry, whose requirements can be met by the ordinary 3 Valve re-acted Detector Set of which there are so many varieties advertised with fanciful names. To get more than this inevitably means "oscillation" with consequent howling and annoyance to your neighbours. The B.B.C. definitely state that one H.F. stage is essential at the following ranges, if loud-speaker reproduction is to be anything but "indifferent":—

100-150 miles from Daventry.	5XX.	4 Valves.	1 H.F. stage.
50-100 " " "	5GB.	" "	1 H.F. stage.
Over 15 " " "	Main Station	" "	1 H.F. stage.

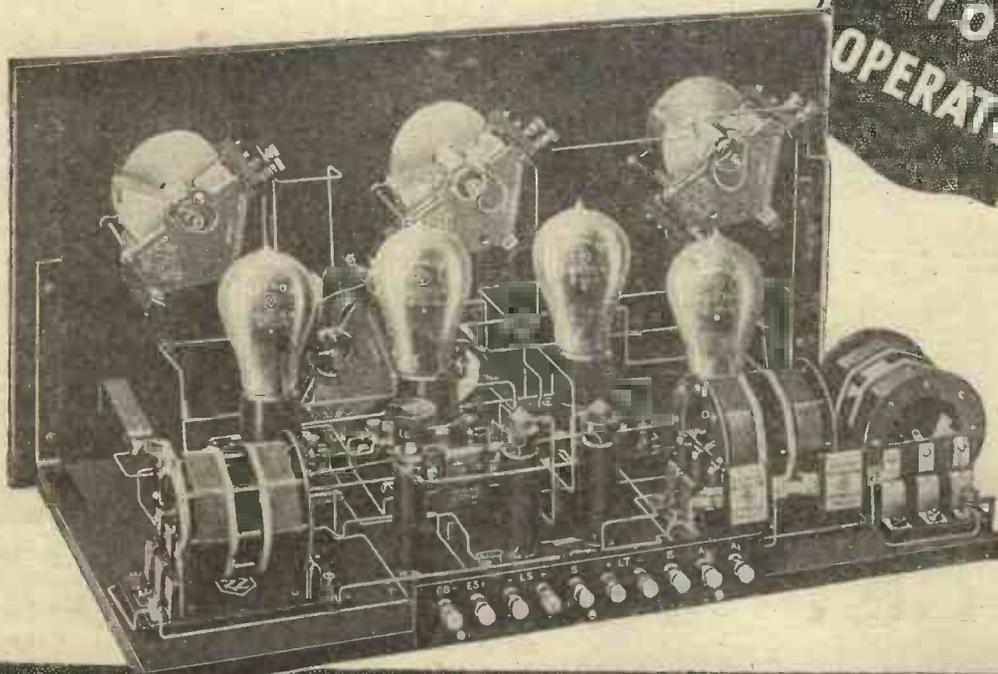
These figures obviously allow for that factor of safety which is so necessary if consistently pleasing reception is to be obtained under all conditions.

One neutrodyned stage of H.F. will give that additional sensitivity necessary for more distant reception, with radiation reduced to a minimum.

The Met-Vick 4 Valve A.N.P. Constructor's Set is the ideal solution. With the additional H.F. stage, there is no need to force the set. Using A.N.P. coils the set is stabilised, screening is unnecessary and high voltage factor Valves can be used. Additional selectivity is provided by a Tuned loose coupled aerial circuit, brought into action when required. Delightful to operate and cheap to build, the parts with two sets of coils costing only £9.

The Met-Vick A.N.P. 4 is pre-eminently the 4 Valve Set of the Day. If unable to obtain instruction book from your dealer, write for Publication No. 7117/5 or 7117/4 (the A.C. Valve Model) free on request.

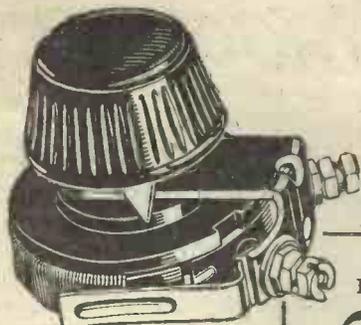
MET-VICK



R.P.
104

METRO VICK SUPPLIES LTD 155, CHARING CROSS RD. LONDON W.C.2.

Advertisers Appreciate Mention of "A.W." with Your Order



Actual Size

PRICE
2/-

The Lowest priced Quality Rheostat

The extraordinary value of the Igranic C.H. Filament Rheostat has created an unusual stir amongst constructors. The demands exceed all expectations, but, fortunately, our stocks are adequate to meet all orders.

Never before has such a really high-grade rheostat been offered at such a low price.

The Igranic C.H. Filament Rheostat

possesses every feature essential for perfect filament control. The well tried form of contact finger, with the added refinement of a domed sliding surface, provides a firm steady contact and allows for smooth turning without chatter or noise. One-hole fixing allows for easy mounting and the special anchor bites into the panel and prevents rotation of the frame. Terminals are conveniently placed and easily accessible from the top of the set. The resistance element, being held by a spring, cannot slip or wear out of true.

A special feature is its compactness. It is only 1 3/8 in. in diameter and projects only 3/8 in. behind the panel.

Made in three resistance values: 5, 15 and 30 ohms

Price 2/- each

Igranic components are always stocked by reputable dealers. All reports received by us of difficulty in obtaining them receive immediate attention.

Write to Dept. D76



149, QUEEN VICTORIA STREET, LONDON, E.C.4

Works: Bedford.

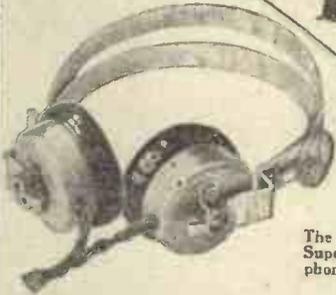
BRANCHES:

Birmingham, Bristol, Cardiff, Glasgow, Leeds, Manchester, Newcastle.



WERE  **NOW**

12/6



The famous Ericsson Super Sensitive Telephones are reduced to 12/6 a pair.

Adopted by the B.B.C. for use in their studios. Used by all the DX experimenters. Adopted as standard in 1909 by the Admiralty and in 1917 by the Air Board. Three resistances, 120, 2,000, and 4,000 ohms—our price, 12/6. Get your pair to-day!

Even if you have a multivalve set, now and again you'll need a good crystal set. Buy an Ericsson Crystal Set to-day. Sturdily and handsomely made and a really sensitive instrument. Tunes up to 5GB, and has a Loading Coil Plug for 5XX. A real snip at 15/-

At all our agents or direct from the Company.
ERICSSON TELEPHONES LTD., 67/73 Kingsway, London, W.C.2

Ericsson
SUPER SENSITIVE TELEPHONES.

Never Forget!  BY APPOINTMENT.

The Way to Ensure Better Reception, Greater Volume & Purer Tone

is by using

HART BATTERIES

FOR ALL WIRELESS CIRCUITS

There are sizes and types suitable for every kind of Valve Receiver.

Write Dept. "A.W." to-day for price list and FREE illustrated Booklet of interest to all wireless users.

HART ACCUMULATOR CO. LTD., STRATFORD, LONDON, E.15
BIRMINGHAM: 165 Edmund Street. BRISTOL: 37 Victoria Street.
CARDIFF: 50 Charles Street. GLASGOW: 107 Wellington Street.
MANCHESTER: 88 Chapel Street. WESTMINSTER: 36 Victoria Street, S.W.1. YORK: 6 Bridge Street.

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

On Your Wavelength!

Angels Unawares

NOT a few people lately have tuned in American broadcasting stations operating on the 250- to 500-metre wave-band quite accidentally, for conditions have been so phenomenally good for long-distance reception that some of these have been almost as easy to pick up as the more powerful home and Continental transmissions. The Savoy bands having whacked out their final chord, the condensers were given a turn in one direction or the other just to see if any of the Spaniards were still at work. Whilst this was being done, music was heard and a transmission of excellent quality, though with something rather "long distancy" about it, was soon brought up to good strength. A little later a voice announced that this was WGY or WJZ, or some other of the American big noises.

Only a Relay

In some cases, though, the boot was on the other leg. Genuine consumers of the midnight amp. deliberately searching for America, heard transmissions from that country with amazing strength and clarity. There appeared to be no doubt that they were American, for the call-sign of WGY was heard again and again. Not for some little while was the apple-cart upset by the sudden breaking in of the Stuttgart announcer's voice telling the Old World that his station was relaying from America. One has always to be on the lookout for this kind of thing, since German and other Continental stations not infrequently pick up WGY via 2XAF or 2XAD and relay the transmissions on a normal broadcast wavelength. Usually these relays take place without any previous warning. What makes it all the more deceiving in the case of Stuttgart is that the German station uses a wavelength of only 1.2 metres different from that of WGY. Both calibration chart and wavemeter may therefore lead you to think that you are listening to America, when actually you aren't—at least, not direct.

Another Surprise

There is yet another possible surprise for the broadcast-catcher who is searching round with the intention of picking up European stations, but with no thought of those on the far side of the Atlantic. Towards the end of the evening he tunes his set to 333.3 metres and hears a programme coming through. A glance at the wavelength tables shows him at once that this is either Naples or Reikjavik; prob-

ably the former, since the Icelandic station is seldom heard in this country—at all events, in the south. He may quite easily chalk up Naples in his log and pass on to something else. But stay a moment. Naples seldom continues much after 10 p.m. If music, accompanied by a certain amount of fading, is heard at a later hour upon that wavelength it is quite on the cards that what one is listening to is WBZ, the 15-kilowatt station at Springfield, which often comes across with considerable strength.

A Little Difference

On comparing American and European lists of stations, one might come to the conclusion that no American stations worked exactly upon wavelengths used on this side of the Atlantic. 5GB, for instance, operates on 491.8 metres, and WEAJ is shown as having a wavelength of 491.5 metres. Similarly, Naples has 333.3 and WBZ 333.1 metres, and KGO 384.4 as against 384.6 metres of our own 2ZY. Actually, though they look different, the wavelength of each of the pairs mentioned is the same. If you turn to a kilocycle table you will find that WEAJ and 5GB each have a frequency of 610, and so on.

Then, has some silly ass on one side of the Herring Pond or the other forgotten to carry one or something of the kind in his calculations? Not a bit of it. Under the Geneva scheme the convenient, but not absolutely correct, speed of light of 300,000,000 metres a second is taken, and the wavelength is found by dividing the frequency into this. For the United States Government wavelength allocation schemes the more correct figure of 299,800,000 is used. And there you are!

Remarkable Conditions

Not for a very long time have conditions for the reception of distant stations been so good as they are at the moment of writing. We have done pretty well right through the autumn and winter, for there have been few nights when foreign stations were not coming through at respectable strength; but it is some time since we had one of those periods of amazing ranges that do sometimes come along. Nobody seems to know really what causes them; all that we can do is to accept them and to be duly thankful.

—and the Result

In such phenomenal periods one's set seems to be a veritable magic-box. In normal times, however, I can hear such of

the home relays as are either temporarily or permanently without wavelength partners; in an abnormal period they come roaring through on the loud-speaker just as if they were fully fledged main stations. Edinburgh—the best part of 400 miles from me—nearly blows my head off if I happen to strike him when I am wearing phones. As for the Swedish relays down at the bottom of the broadcast band—well, they have to be heard for their strength to be believed—at least, nobody believes me when I talk about them until I drag them into my den and give a practical demonstration.

How Does it Happen?

I can understand the primary of a low frequency inter-valve transformer burning out or breaking down, for it does carry a appreciable amount of current. But the secondary is a very different pair of shoes. With a properly biased following valve (and though I say it as shouldn't, mine are properly biased) the current flowing through the secondary is just exactly nil when the set is working, though there is, of course, a very small flow for an instant at the moment of switching on, since the grid and filament form between them the plates of a very small condenser which charges up, and a back E.M.F. takes place in the secondary windings. But this should never be sufficient to damage even the finest wire used.

An Actual Case

I don't know how many transformers I have had in a long wireless career, but only once have I known a secondary to "go," and that was just the other night. That it has gone is quite certain, for there is now no path for current from IS to OS when the thing is tested out. I suddenly found signals horribly distorted and the set playing up in the queerest manner. The fault might have been a particularly puzzling one, for it is about the last thing that one would think of looking for. The ease with which it was tracked down provides yet another instance of the amazing usefulness of the milliammeter as a trouble-hunter.

The Radio Sleuth

Here is exactly how the defect was traced out in a minute or two. I always keep a milliammeter, shunted by a large fixed condenser, wired in series with the common negative lead of my high-tension battery. When anything goes wrong, the dial of this instrument is the first thing to

NEXT WEEK: Mr. Reyner's Test Reports of Britain's "Favourite Three" and Britain's "Favourite Two"

:: :: **On Your Wavelength! (continued)** :: ::

be consulted. In this instance the needle showed a current reading far above the normal. This is an almost infallible indication that something is wrong with one of the grid circuits. Switching off each valve in turn showed that the last was the culprit, its emission being more than double the proper figure. Another valve placed in the holder also gave an absurdly high reading. Clearly the negative potential from the biasing battery was not getting through to the grid. The appropriate wander-plug was pulled out of the grid battery. If the circuit had been completed this would have produced an immediate rise in plate current. As it was, nothing happened. The transformer secondary terminals were then short-circuited, and the emission immediately dropped to normal.

The Clue

Inspection showed that there was no wiring disconnection outside the transformer, and it was therefore concluded that the secondary of the instrument had given way. When the transformer was taken out and tested this was found to be the case. Had there not been a milliammeter it would have been a bit of a business, would it not, to arrive at the source of the trouble? One might in fact have gone on for hours, or even days, before tumbling to it. Your "Thermion" regards the milliammeter as an absolutely indispensable part of the kit of the valve-user who wishes to avoid trouble or to track it down quickly when it occurs.

Wire Up Your Sets to Music

This seems a little funny at first sight, but I have found that the presence of sweet music issuing from a conveniently placed loud-speaker often assists in the rapid completion of a particular set. Perhaps this is not always strictly the case, for sometimes one gets items sufficiently interesting to distract one's attention (*sic*), but particularly towards the end of the evening (when, incidentally, I seem to do most of my work), the dance music which is usually broadcast from one of the stations seems to supply a subsidiary interest and to keep one's brain keyed up and active.

Whether there is anything in this use of music as an aid to good work I do not know. Perhaps the time may come when loud-speakers will be used in factories in such processes as may be found suitable, such as packing and binding, or similar operations, where noisy machinery is not constantly in motion. The music, of course, would have to be carefully chosen; yet it is one of the peculiarities of jazz that one can listen to it without apparently affecting one's faculty for concentration.

I have often found that I can read a book, or even a fairly technical article, and follow it satisfactorily with jazz music being

broadcast in the same room, but that I am exceedingly disturbed if a talk or a news item, or even a variety programme, is transmitted. Yet, if I switch the set completely off there is a feeling of something lacking. Is this to be the ultimate end of jazz music—the providing of soothing balm for great and learned *savants* like myself?

What Use Does

There may be something of the nature of practice in the matter. It may be that one is used to the presence of music and, indeed, cannot work without some such influence in the background. A friend of mine was telling me the other day that when he was at Cambridge he, being a studious youth, used to endeavour to work, but was always interrupted by hosts of friends who used to raid the place and switch on his wireless set (this being in the days when wireless was not quite so popular as it is now). At first, he used merely to wait, with a resigned and patient air, until his friends had gone in the small hours of the morning, after which he would settle down to work; but after a time he tired of this uncongenial practice, and began to work while they were there, finding that he was able to disregard the music to some extent. Now, he tells me, if he wishes to do any serious thinking (of course, on rare occasions!) he has to switch on the loud-speaker in order to create the necessary atmosphere.

Identification Signals

The question of interval signals to be used by broadcasting stations is one which is of considerable interest to foreign listeners. This question appears to be raised periodically every year, and so far as I can see, although numberless suggestions have been put forward in many quarters, the authorities who are responsible for broadcasts in the various European countries do not appear to have found a practical solution to the problem. In many instances I admit that the signals transmitted between items where a short interval takes place considerably help towards the identification of the transmitter. We find metronomes galore—a system which has been adopted by so many stations that it now complicates the matter more than ever—or bells of different tones (a somewhat better device) or, again, automatic transmissions of letters in morse, which usually constitute the initials of the city in which the station is installed.

A Plain Statement

The fact that a studio opens its transmission by the aid of a bugle, chords on an organ, or by a prolonged whistle does not help, for it is seldom that the listener tunes in at that precise moment. If announcers would enunciate the name of

the station clearly between items, and not drop their voices after the initial *Achtung* or *Allo*, as is so frequently the case, no special mechanical device would be needed. Now, I submit that if you hear a sentence in a foreign language in which the *native* name of the city is incorporated, there are many chances that, unless you know it, you will not be a whit the wiser as to the locality from which the concert is being heard. We cannot expect foreigners to give out their call in English for our benefit; it would neither interest nor please the local listeners.

A Suggestion

What I do contend, however, is that there exists a very simple solution to the problem, and one to which I have not yet seen any reference in the many suggestions already published. If stations are willing to use a mechanical or electrical device to transmit an interval signal it would be an easy matter for each one to have its own *gramophone record* always at hand. Take, for example, the London station. If such a scheme were adopted, we might hear short, sharp whistle or a strong buzz, followed by "2LO London calling. *Ici le Poste de Londres. Hier London,*" and so on in, say, five or six languages. These calls could be repeated *ad libitum* on the record. In the intervals the electrical pick-up would be switched on and the call in the various languages would be automatically repeated.

The Matter of Tests

The greatest difficulty which those who are searching for the best possible reproduction of broadcast have, at the present time, is to get some sort of an idea of the response of their apparatus to all the useful musical frequencies. I understand that the N.P.L. is not, at present, in a position to test the frequency response of complete receivers and loud-speakers, and, in any case, the cost of a test made at Teddington would be rather more than the average listener would care to pay. A year or so ago the B.B.C. made an attempt to supply a rough-and-ready guide by substituting notes played on the piano for the tuning note; but somehow the idea wasn't popular, and the piano scale was dropped, to the regret of many experimenters who found it remarkably useful.

I have just heard, on the very best authority, that the B.B.C. is now experimenting with a series of tuning forks, and that when it has its apparatus ready, a complete series of notes of standard musical frequency will be sent out at definite intervals for the benefit of those who are experimenting in getting the very best possible results.

THERMION.

THE MAKING OF A VALVE

ALTHOUGH it is only during the last five or six years that thermionic valves have been produced in any quantity, the method of manufacture and the characteristics of the valves themselves have been entirely changed several times

The Glass Bulb

The glass from which Osram valve bulbs are made is manufactured at the G.E.C. Glass Works at Lemington-on-Tyne, and is carefully made so as to be uniform in thickness and free from air-bubbles. There are very few who realise the importance of glass in valve manufacture, but the use of the right kind of glass, treated in the correct manner, is of equal importance to the choice, say, of the metal used in the construction of the anode.

The bulbs are automatically made by the most ingenious machines known to commercial science—the Westlake automatic glass-blowing machine. A blob of molten glass is picked out of the furnace by two great iron arms which transfer it to other waiting iron tentacles

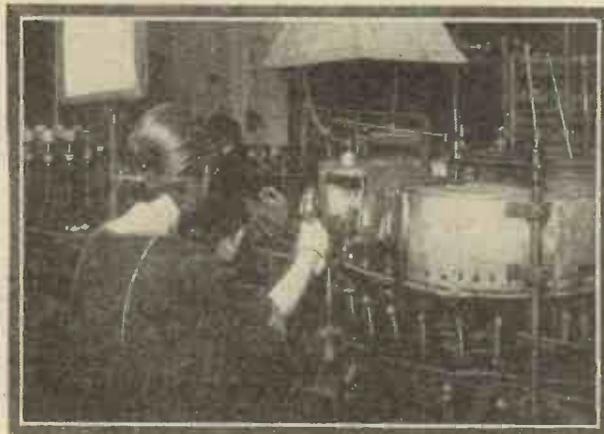
and these in turn gradually mould and blow the blob of glass into a perfectly shaped glass bulb.

After inspection the bulbs are taken to that portion of the factory where the sealing-in process takes place, and here we must leave them for a time until we have sufficiently progressed with the manufacture of a valve to have it sealed in its bulb.

The Electrodes

The anode is stamped out of nickel sheet and pressed to shape in a jig. In order to give strength and rigidity, the

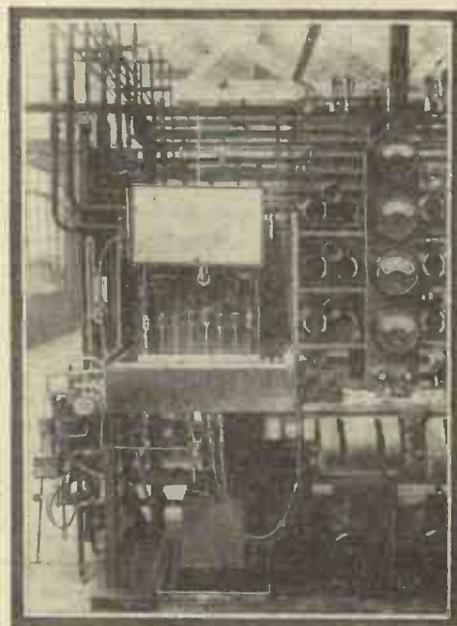
anode is ribbed and provided with a deep fin to which the supports are welded. This method of anode construction in Osram valves has proved particularly successful and has been adopted as standard for all the types of valves now



Rotary Pumping Machine

during this short period and it is therefore particularly interesting to note the latest and most modern methods of production.

A day spent at the Osram Works at Hammersmith is a day well spent. One sees the most absorbingly interesting processes, and the birth of a valve may be followed right through from the crude glass and ore state up to the finished and tested valve. Many millions of valves have been turned out from these works and the organisation that has been designed to cope with this large output represents the last word in efficiency.

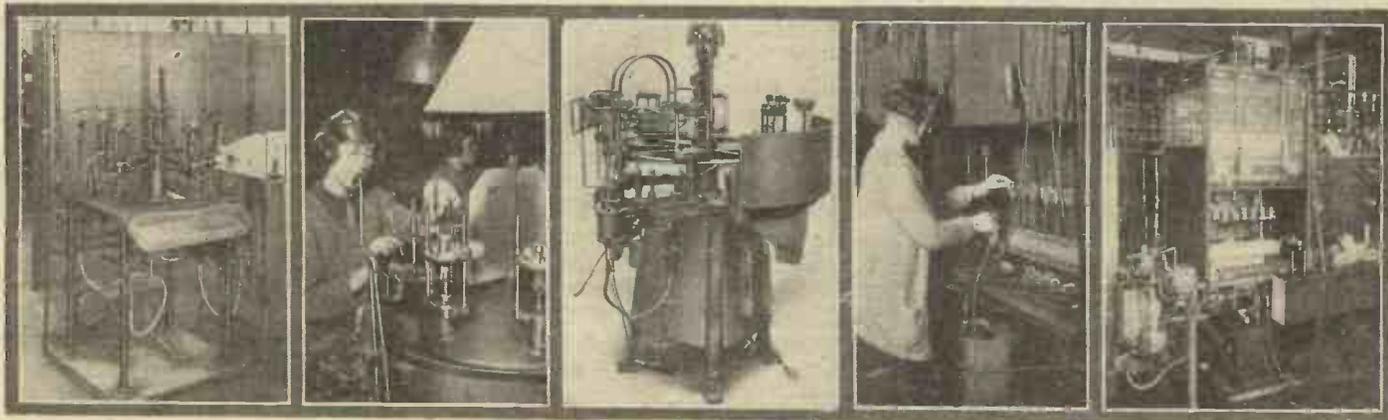


Bench Pumping Machine

being produced at the Hammersmith works.

The next step is the construction of the grid which differs, of course, for each type of valve. The construction of the grid is one of the most delicate processes in valve manufacture; the slightest variation in thickness of the wire used for the grid or

(Continued on page 203)



FREE SUPPLEMENT TO "AMATEUR WIRELESS" No 295 FEB. 4. 1928.

BLUEPRINT
No A.W. 74

BRITAIN'S FAVORITE TWO

PANEL 14" X 7"



Full-size Layout, Drilling Guide & Wiring Diagram

For full constructional details see "Amateur Wireless" No 295 Feb. 4.

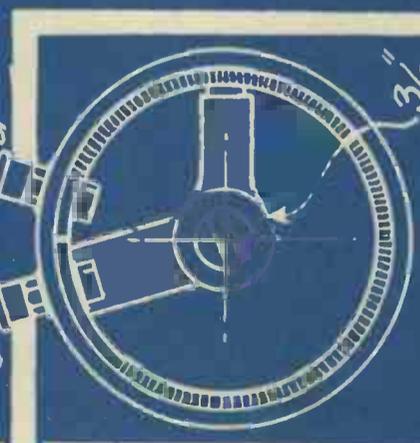
Price 1/-



.0005 Mfd.

To moving plates

Use template for drilling



Level of baseboard



1/8"

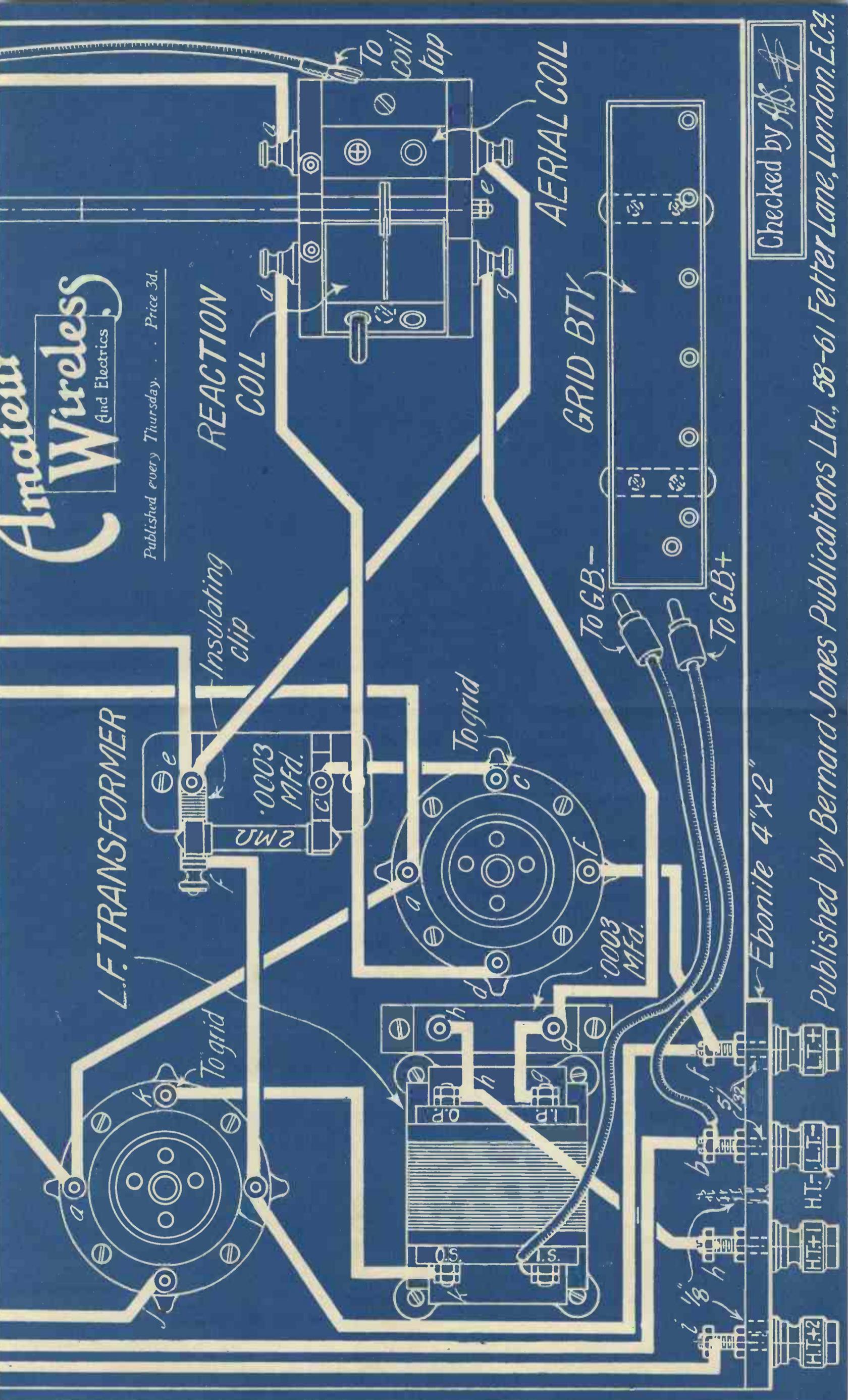
1/8"

BASEBOARD
14" X 9" X 3/8"

Amateur Wireless

And Electrics

Published every Thursday. Price 3d.



L.F. TRANSFORMER

REACTION COIL

AERIAL COIL

GRID B.T.Y.

Insulating clip

2MΩ
.0003 MFD.

To G.B.-
To G.B.+

To grid

.0003 MFD.

Ebonite 4" x 2"

Published by Bernard Jones Publications Ltd, 58-61 Fetter Lane, London.E.C.4.

Checked by A.B.

BRITAIN'S "FAVOURITE THREE"

Completing the Assembling : Wiring : Testing and Operation.

(Continued from Last Week's Issue)

IN assembling Britain's "Favourite Three," the constructor can please himself as to the order of procedure, although we personally recommend him to drill the panel and terminal strip first and to mount the baseboard and terminal strip parts as already indicated. A rather novel wiring system has been adopted for the connection of the two variable condensers and filament rheostat. A single length of 18 gauge tinned copper wire goes from the earth terminal under the reaction-condenser, tuning-condenser and filament-rheostat bushes. So before the condensers and rheostat are mounted on the panel, this length of wire should be clamped under each fixing bush, as each component is "one-hole fixed" to the panel. A small diagram shows how to "flatten out" this length of wire where it passes under the bushes, in order to offer a larger contact surface to the components concerned. This wire is, of course, the earth wire, common to both sets of moving vanes of the condensers and one side of the rheostat. The rest of the assembly is merely a matter of fixing the baseboard components, in the positions indicated, with small wood screws. When the panel components and terminals are mounted on the panel and terminal strip respectively, these are also screwed to the baseboard as shown.

The Wiring

The wiring of Britain's "Favourite Three" constitutes an innovation as far as AMATEUR WIRELESS receivers are concerned. There is not a single soldered connection in the whole receiver. As every component incorporated has either substantial terminals or adequate clamping screws for connection purposes, this procedure has contributed to the ease with which the receiver can be wired up, without involving the somewhat tedious process of soldering.

We have counted the number of "straight runs" of wire necessary in this receiver and readers will be surprised to know that there are but 18—surely a record in simplicity! Bare, tinned-copper wire, No. 18 gauge, has been used throughout, and since there are but few wires which cross or run in very close proximity to one another there is no particular advantage in using covered wire. The connections to the grid-bias battery consist of suitable lengths of rubber-covered flex, terminating in "Lisenin" plugs, two black ones for the negatives and one red for the positive. This positive flex lead, by the way, is clamped under a terminal on the rheostat and the two negative leads come from the grid-bias connections on the R.C. coupler and L.F. transformer. The L.F. trans-

former is provided with six terminals, to enable the experimenter to try out various coupling arrangements. We have used the simplest possible arrangement, such, as is obtainable with the conventional "four-terminal" L.F. transformer, and hence terminals marked 1 and 2 are bridged with a "shorting" strap provided by the makers.

Note that the grid condenser has an insulated clip to allow for the series connection of the grid leak between the grid and L.T. +.

Check the Connections

Before attempting to try out the receiver in practice, it is a good plan to check the connections actually made in your receiver with those shown in the blueprint. When you feel confident that you have duplicated our connections, insert suitable coils and valves in the coil-mounts and valve-holders. Suitable valve combinations are given in the specially prepared valve table which was given last week, and any of them can be recommended with the utmost confidence. If a centre-tapped tuning coil is used this should be a No. 60, such as Lissen, Atlas, Lewcos, or Gambrell. If a double-tapped coil is used for the purpose of obtaining greater selectivity than is afforded by a centre-tapped coil a No. 60 coil of this type should also be used. The sizes given for each type cover the entire B.B.C. wavelength band of 200 to 500 meters. The reaction coil size is not critical and a No. 40 or 60 ordinary plug-in coil will serve admirably. For the reception of long-wave stations, such as Daventry 5XX, etc., the tuning coil should be a No. 150 centre-tapped coil and the reaction coil a No. 75 or 100 coil.

Testing and Operating

The simplicity of operation of Britain's "Favourite Three" is, of course, one of its most appealing characteristics, but for the benefit of inexperienced listeners, the following remarks may be of service. With 120 volts connected to the H.T. terminals a suitable accumulator connected to the L.T. terminals, a nine-volt G.B. battery clipped into the G.B. clips, insert the G.B. positive plug into the positive end of the G.B. battery, the G.B. negative from the R.C. coupler at about 2 volts negative G.B.

and the G.B. negative plug from the transformer into the full 9 volts negative tapping. The operator can then proceed to tune in his local station, provided he has inserted the correct coils and valves, as already indicated. The small knob on the left should be turned so that the reaction condenser is at zero, and the small knob on the right rotated until it is at its fullest extent to the left, after which the main control, that is the variable condenser dial,



Britain's "Favourite Three"

can be rotated until something is heard of the local station, the signal strength of which can then be materially increased by slowly rotating the reaction condenser knob. Slight additional adjustments may have to be made to the grid-bias tapping and filament control, but as these are more or less fool-proof operations they can be safely left to the discretion of the operator.

CHIEF EVENTS OF THE WEEK

LONDON AND DAVENTRY (5XX)	
Feb. 5	Orchestral concert.
" 6	Vaudeville programme.
" 7	<i>The Burden of Women</i> , a play by E. Temple Thurston.
" 8	Recital by Elizabeth Schumann and Suggia.
" 9	Concert by the Gloucester Orpheus Society.
" 10	Symphony concert, relayed from the Queen's Hall.
" 11	Operatic programme.
DAVENTRY (5GB)	
Feb. 6	An Edward German programme.
" 7	From the musical comedies.
" 8	Vaudeville programme.
" 10	Speeches from Civil Service dinner.
CARDIFF	
Feb. 5	<i>The Light of Life</i> , oratorio by Sir Edward Elgar
" 6	A Saint-Saens programme.
" 7	Lecture-recital by Fred E. Weatherly.
MANCHESTER	
Feb. 6	<i>Carry Me Out</i> , a farce by A. E. Bryan.
" 8	<i>Leap Year</i> , a new revue.
NEWCASTLE	
Feb. 6	<i>A Neat w? Geordie</i> .
" 7	Dickens birthday anniversary programme.
GLASGOW	
Feb. 11	An Arabian night.
ABERDEEN	
Feb. 7	A Scottish instrumental and vocal programme.
BELFAST	
Feb. 6	Vaudeville programme.
" 9	Hungarian programme.
" 10	Belfast Philharmonic Society's Concert, relayed from the Ulster Hall.

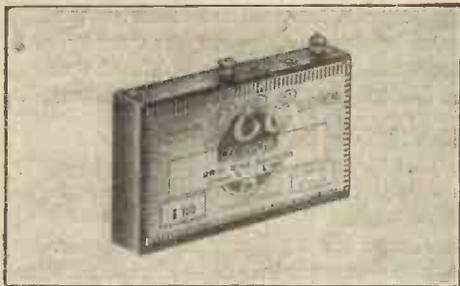
"A.W." TESTS OF APPARATUS

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

G.E.C. Grid-bias Battery

GRID-BIAS batteries have become more or less standardised both in capacity and the number of tapping points, and the 9-volt unit is perhaps the most popular since it meets the average needs and is sufficient for most purposes.

A Gecophone grid-bias battery has been sent in for test by the General Electric Company of Magnet House, Kingsway, W.C.2. The dimensions are similar to the standard 9-volt type, but the makers have considered the inclusion of tappings at every $1\frac{1}{2}$ volts unnecessary. The battery is tapped at $4\frac{1}{2}$ volts and at every additional $1\frac{1}{2}$ volts up to 9; since it is seldom that a grid-bias voltage below $4\frac{1}{2}$ volts is required, the battery should be suitable for general use.



G.E.C. Grid-bias Battery

Two terminal wander plugs are provided, which assist the user in making a rapid connection, whilst should the leads from the set be fitted with wander plugs, these may be inserted directly into the sockets.

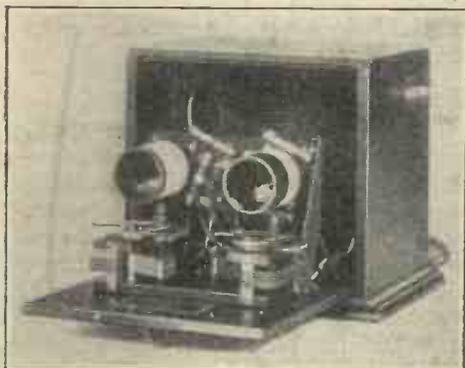
The voltages proved to be equal to the stated values.

Ediswan One-der Receiver

WE are so liable to associate good quality reproduction with power-valves and somewhat heavy anode current that it comes as a surprise to hear a set giving pure loud-speaker reproduction from a single valve with a total anode current hardly exceeding 1 milliamp. The Edison-Swan Electrical Co., Ltd., of 123-5 Queen Victoria Street, E.C.4, have recently placed on the market such a receiver. This incorporates a novel type of valve which, although having a single filament, will rectify and amplify simultaneously.

Briefly the valve consists of two sets of electrodes with a common filament so arranged that part of the emission flows to an inner plate via an inner grid whilst the remainder flows to an outer plate via a second grid. The two three-electrode valves thus formed have their respective duties as rectifier and amplifier. The

remainder of the circuit follows more or less conventional lines, excepting that the anode circuit is tuned in order to give a



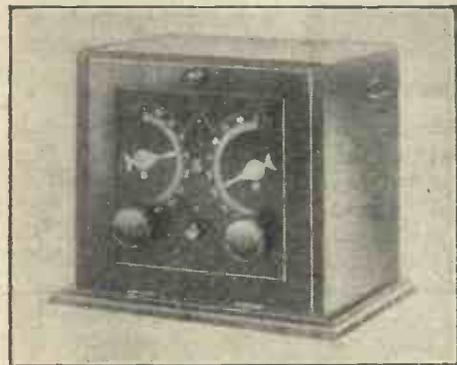
The One-der Receiver with the front open

reactive effect. Good selectivity is obtained by tapping the aerial to a suitable point on the grid inductance.

The complete receiver, including two slow-motion variable condensers, is mounted in a small but neat cabinet having the following approximate dimensions; 9 in. by 7 in. by 8 in. The tuning controls, including an on-off switch, are mounted on the outer wooden panel, whilst for inspection purposes the panel hinges forward and discloses the complete array of components including the valve which can be readily removed.

A set of battery leads is provided in addition to aerial, earth and loud-speaker terminals. The makers recommend the use of 120 volts H.T. but owing to the low current consumption, a small capacity battery is sufficient. A two-volt accumulator and 6-volt tapped grid-bias battery form the remainder of the requirements apart from the loud-speaker.

We tested the receiver in our laboratories with several loud-speakers, including



The complete One-der Receiver

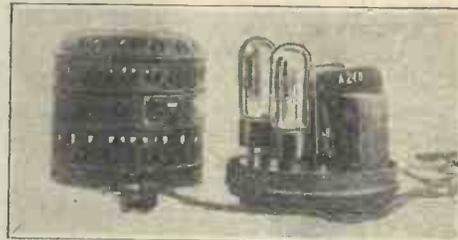
the Ediswan One-der speaker and obtained satisfactory strength to fill a medium-sized room, whilst the quality was good, due

partly to the fact that resistance-capacity coupling is used for the amplifier stage. It is stated that loud-speaker reproduction should be received at distances up to 15 miles from the local station, 80 miles from 5XX, 50 miles from 5GB, and 3 miles from a relay station; our tests indicated that the makers have not exaggerated the receiver's abilities.

As regards consumption, the filament requires a current of .2 of an amp. at 2 volts, whilst the anode current is approximately 1.2 milliamps; economy is therefore one of the most outstanding features of the receiver.

Mullard L.T. Battery Charger

CHARGING one's wireless accumulator from electric light mains is now rapidly gaining favour and there are a number of appliances on the market whereby this can be effected.



Mullard L.T. Charger

The Mullard L.T. battery charger is an excellent example of this class of instrument. It is intended for use with alternating-current mains and consists essentially of a step-down transformer to reduce the voltage and a baretter or resistance lamp to maintain the value of the charging current at approximately $1\frac{1}{2}$ amperes irrespective of the load.

Thus, whether 2-, 4-, or 6-volt accumulators are employed, no alteration to the connections is necessary, the current automatically adjusting itself in each case.

This baretter not only keeps the current within limit, but preserves the instrument from damage, for we found that by short circuiting the leads or even by connecting a battery the wrong way round, the current was not excessive, the baretter coming into operation in a satisfactory manner and avoiding any damage to the gas-discharge tube.

A particular feature about the unit was the complete absence of hum from the transformer laminations. The Mullard Wireless Service, Co., Ltd., of Mullard House, Denmark Street, W.C.2, are the makers of the unit.

COMPRESSING THE CARRIER WAVE

Interesting Particulars of a New System of Modulation

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

BEFORE the thermionic valve had been developed to its present-day pitch of perfection, the generation of very large high-frequency currents for transmitting purposes presented some difficulty. The old spark systems with their very small radiating efficiency and their very broad tuning were gradually giving place to continuous wave systems in which the high-frequency oscillations in the aerial were continuous while the transmission was in progress.

The Arc System

The difficulty was the production of such continuously oscillating currents in large quantities capable of giving an effective radiation of many tens of kilowatts. One of the first systems to accomplish the result satisfactorily was the Poulsen arc, and for some years this was a big competitor with other

coil and the aerial and continuous oscillations can be produced.

The Spacing Wave

The difficulty with the arc is that it cannot be stopped and started instantaneously. It is necessary to strike the arc by allowing the two electrodes to touch momentarily and then drawing them apart when an arc is formed. It is then necessary to adjust the length of the arc rather carefully in order to obtain the best efficiency from the transmitter; in general, the starting of an arc transmitter is an operation taking anything from 5 to 15 minutes. In order to transmit morse signals however, it is

It was soon found that this system possessed one very valuable property, namely that the current would change from one frequency to the other very rapidly and without any disturbance. Attention was called to the matter when the question of high-speed transmission first became of interest. With the ordinary type of transmitter, where the current is definitely started and stopped every time the key is depressed, a certain time lag elapses before the current builds up to its full value and similarly when the key is raised again the current does not stop instantaneously. The time lag is so heavy as to interpose a definite limit on the maximum speed of working of a transmitter. With the spacing wave system where the frequency was changed leaving the amplitude the same, no difficulty of this sort was experienced.

Modulation Difficulties

This problem has now arrived in the broadcasting world. Here we are not concerned with high speed morse involving starting and stopping of the currents, but we are concerned with very much higher speed fluctuations in strength. Under normal broadcasting conditions, the amplitude of the carrier is modulated in accordance with the speech or music. With a soprano singing top C, the strength of the carrier wave has to vary between a maximum and a minimum over 1,000 times in a second, and variations up to 6,000 times a second may be required.

If trouble arises with high-speed morse where the current is merely started and stopped 10 to 20 times a second, how much greater will the difficulties be when we try and modulate the current 6,000 times a second? The received current would simply refuse to follow the modulation of the carrier wave and a hopeless jumble would result. This effect becomes more serious as we reduce the resistance of the circuit and consequently in order to obviate any jumbling like this, we have to employ somewhat broadly tuned transmitters and receivers. Thus each broadcasting service requires a certain band of frequency on each side of its official carrier wave and if any other station works within that band, interference will result. This indeed is exactly what happens when we hear those unpleasant heterodyne whistles and

(Continued on page 192)



Testing apparatus at the Furze Hill Laboratories. The first photograph shows tests being made of the inductance of L.F. transformers and the second the calibration of a short-wave wavemeter from a Crystal check

systems for high-power stations.

In the high-frequency arc an ordinary carbon arc such as is used for street lighting, cinema projectors, etc., is employed with certain modifications. A tuned circuit consisting of a coil and a condenser is connected across the arc so that the oscillating circuit definitely includes the arc itself. It is found that under the suitable conditions just referred to, the arc behaves as if it had a negative resistance and thus it counteracts the actual resistance of the

necessary to interrupt the current in some way and the method which was ultimately adopted in most cases was that of the spacing wave. The frequency of the system was changed by short-circuiting a portion of the inductance coil or by some similar method, so that when the key was down the transmitter would radiate one wavelength, and when the key was up it would radiate another wavelength, somewhere near the first, but sufficiently different to render distinction possible.

NEXT WEEK: DR. ALFRED GRADENWITZ ON A NEW MAGNETIC DISCOVERY

WITHOUT FEAR OR FAVOUR



A Weekly Programme Criticism by Sydney A. Moseley

PITY the Talks Department! It has to provide subjects and speakers of varied interests and professions. In the series—"Ourselves as Others See Us"—it hit upon an excellent scheme. Whether the polite foreigner actually tells us how he *does* see us is another matter. I should think that up to the present Leon Feuchtwanger has been the most candid of them all.

We have also had Madame Anne Kallas, Herr Emil Ludwig, and Mr. Theodore Komisarjevsky. It is about the last two I wish to comment.

Both are as eminent as the others who preceded them, but both were just as difficult to understand easily. What I said about Feuchtwanger applies to Ludwig. Each is a brilliant scholar with a very fine knowledge of the English tongue; and yet both are more or less bad broadcasters. Wherein lies the problem I have raised before. Should these fellows with big names be made to say a few informal words of introduction while their papers were read for them? I think in the end it will come to that. Komisarjevsky however, was amusing and clever, even if he did not pass with full marks in English.

I paid a tribute to the "Foundations of Music" series and I see that the B.B.C., trying to improve the occasion, has made an alteration. Instead of the pianoforte solos we have been given songs, by Beethoven, Brahms, and no doubt we shall go through the whole gamut of eminent composers. The first series were sung very well by George Parker. Nevertheless, I think listeners will have preferred the pianoforte transmissions.

A member of the Hammersmith and Kensington Social and Literary Society tries to embroil me in a debate the society has just had on the respective merits of syncopated music and classical music. It seems that the votaries of Haydn walloped the advocates of Hylton! As a matter of fact, the proposer, who maintained that the merits of the two classes of music were equal was attempting an impossible proposition. It is all a question of taste. Some gentlemen prefer blondes!

The Haydn Wood programme was an example of tasteful music of the middle school and the announcer was justified in saying that few modern composers could

produce so many popular songs and pieces. The overture—"A May Day"—is bright and not without originality, while the songs (sung nicely by Miss Megan Thomas) "A Brown Bird Singing," "Bird of Love Divine," are known everywhere. Rex Palmer, who excels in ballads of this kind, gave "Shipmates o' Mine," "The Sea Road" and other songs perhaps not quite so widely known. Neither critic of the jazz music nor the devotee of classical music could object to this hour of bright melody.

But at ten minutes to nine a little poetry was thrown in. I did not catch the name of the perpetrator but I do not think it mattered very much after all.

There was recently a skit on programme broadcasting which is always good fun, offering as it does immense scope for leg-pulling. A particularly funny Children's answer was "If Gladys will look up the chimney—she will find plenty of soot!" and the other one—"If darling Gwendoline will look in the waste paper basket, she will find the final Income Tax demand."

Yet a little more working up of these broadcasting skits would certainly bring the studio down.

A reader asks me why I have not men-

tioned the advent of Harry Lauder. The answer is because I gave a good deal of space to him on his first appearance. He certainly is "some guy!"—a show man *par excellence*. Whether he is worth the fortune we have to pay him depends on whether you have Scotch blood in your veins or not. I was sorry, however, that after the transmission reference was made to the coincidence of the sad anniversary of his son's death.

Before rushing off to St. Moritz (where I am writing this) I heard Cecil Lewis' play *Pursuit*. Since it was announced as "a new thing in wireless transmission" I listened with keen interest. I suspended judgment pending a second hearing; and even then I have let my views mature until now. Harking back, it seems to me that Lewis spent more time on the technical rather than the literary side. The pursuit of a stolen heroine, after all, belongs to the "penny-blood" school.

But I am prepared to leave this side and agree that the author *did* achieve something "new" in wireless transmissions. We must reserve full judgment on the new method however, until we have heard a play which is as original in theme as in technicality.



LOUD-SPEAKERS AT AN ELECTION

Loud-speakers were used by opposing candidates to broadcast their election speeches at Faversham and Sittingbourne. The picture shows a Conservative supporter addressing the villagers.

VOTED
THE
MOST
POPULAR
2-VALVE
CIRCUIT

THAT the straight-forward two-valve circuit is still the second-best arrangement favoured by the majority of our readers was conclusively proved by the result of our recent competition. As announced last week, the AMATEUR WIRELESS Technical Staff have embodied this two-valve circuit in a simple and efficient two-valve receiver, which is to be known as Britain's "Favourite Two"

—a title which will, we think, have amply justified itself in a few weeks' time, when a considerable number of "Favourite Two's" will be in use.

There is a lot that could be written about two-valvers generally, but it will be sufficient in this article to outline the chief con-

BRITAIN'S "FAVOURITE TWO"

The two-valver in almost any of its numerous forms is capable of giving results which satisfy both the constructor and listener. From the listener's point of view especially, the two-valver represents the simplest solution to the problem of obtaining good loud-speaker reception from the local station with the minimum of expense and complication.

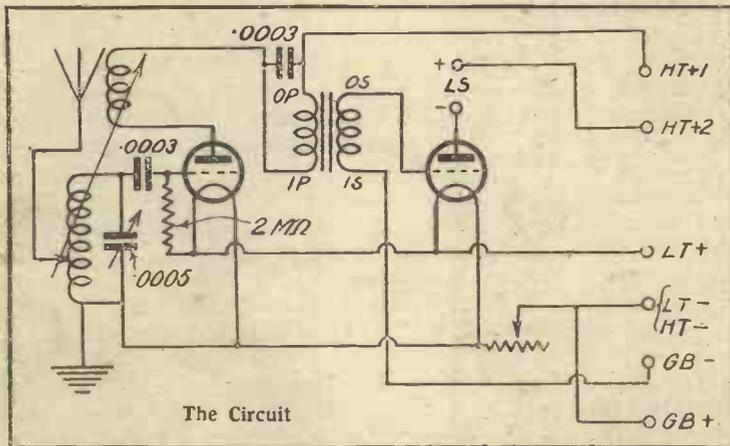
It is not the greater cost of the three-valver compared with the two-valver that usually decides many listeners in favour of the former, but the fact that the running costs and renewal costs are considerably lower. For example, as regards the high-tension supply, the small-capacity H.T. battery is thoroughly capable of delivering sufficient current for two valves, whereas three valves would exert a considerable drain upon the same battery.

For most listeners, loud-speaker reproduction from the local station is all that is desired, although, admittedly, the receiver has an added attraction if it is capable of picking up distant transmissions. It is not surprising therefore, that the two-valver with reaction, which is capable of meeting these requirements maintains such a popularity.

The Chosen Circuit

When the number of valves is limited to two, our choice of really effective circuit combinations is fairly limited. The arrangement adopted must be capable of enabling the valves to work at their maximum efficiency. Thus, the detector valve will have to work on the leaky-grid-condenser principle, and an efficient system of reaction must be embodied in the detector circuit.

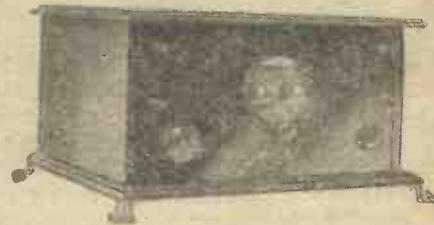
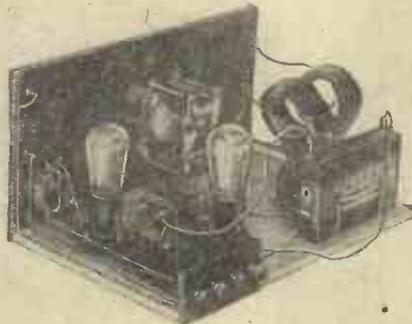
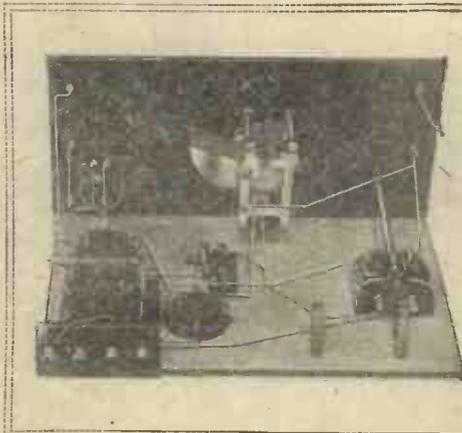
The coupling between the detector and amplifying valves can be transformer, resistance capacity or choke according to the volume or purity of reproduction desired. We decided to use a good L.F. transformer, because we do not think that the increase in purity of reproduction gained by substituting resistance-capacity- or choke-capacity-coupling for a transformer is justified in the case of a two-valver owing to the inevitable loss in volume which would be experienced. Moreover, a good transformer in a circuit arrangement where there is only one stage of L.F. amplification gives very pleasurable results which could only be complained of by an extremely fastidious musician. We say this, of course, with the proviso that adequate high-tension



The Circuit

siderations which account for the undoubtedly wide popularity of the "straight two."

In the first place, the arrangement permits of an extremely simple and compact practical interpretation. Secondly, the initial cost and running costs of such an arrangement must always prove a great attraction to those of moderate means.



FEATURES OF BRITAIN'S "FAVOURITE TWO"

Simple Construction : Low Cost

"FAVOURITE TWO"

supply is available and that a tolerably good loud-speaker is used.

Conforming with our usual practice we will, for the benefit of new readers, analyse the complete circuit arrangement as depicted by the theoretical circuit diagram. Let us

consider first the aerial-tuning circuit. This consists of a tapped coil, which may be

either a centre-tapped or "X" coil, according to the selectivity desired,

tuned by means of a .0005-microfarad variable condenser. With a No. 60 centre-tapped or "X" coil this condenser enables stations on the 200-500-metre broadcasting band to be tuned in. The aerial lead is not connected to the grid end of the tuning coil but to the tapping some way down, this is either at the centre or a few turns from the earth end of the coil.

The grid leak and condenser, having values of 2 megohms and .0003 microfarad respectively, are connected as shown in order to obtain leaky-grid-condenser rectification. In this system it will be seen that the grid leak is connected between the grid of the detector valve and L.T. plus.

Reaction

The reaction arrangement adopted is the

well-known magnetically-coupled system which is familiar to most of our readers. By this system we are able to obtain the required increase in volume in the simplest possible way and with the fewest possible components. Improvements in the design of moving-coil holders have tended to bring this system of reaction into favour again. Provided the two-way coil-holder has a delicate slow-motion movement the principal disadvantage of magnetic reaction—clumsy application—is considerably minimised.

Between the detector and L.F. valves is the L.F. transformer, the standard connections of which must be familiar even to our new readers. But it is important to note that a .0003-microfarad fixed condenser is shunted across the primary winding of the L.F. transformer. The function of this

by-pass condenser, as its name implies, is to offer an easy path to the high-frequency oscillations which tend to cause distortion; moreover the impedance of the primary winding would prevent reaction effects from being obtained with ease.

Because delicate reaction control is only possible by the careful adjustment of the high-tension supply to the anode of the

detector valve, we have provided a separate H.T. plus terminal for the detector valve. A lower H.T. value, such as is usually required for efficient detection, can be applied without diminishing the volume obtainable by supplying 100 volts or more to the anode of the second valve.

As we remarked last week, a certain amount of controversy exists regarding the use of filament controls in the form of resistors or rheostats, and, as in the case of the Britain's "Favourite Three" receiver, we consider the best compromise is a single rheostat, simultaneously controlling the filament current of both valves. This rheostat is shown connected in the L.T.

—AND
THE
SECOND
MOST
POPULAR
RECEIVER

LIST OF COMPONENTS

Ebonite or bakelite panel, 14 in. by 7 in. by $\frac{1}{4}$ in. (Radion, Raymond, Pertinax, Becol).

.0005-microfarad variable condenser (Cylton, J.B., Burton, Formo, Ormond).

Panel-mounting rheostat, 6 ohms (Lissenin, Igranic, Lissen).

Two-way coil-holder (Lissen, Lotus long spindle).

Two anti-microphonic valve-holders (Lotus, Lissen, Benjamin).

.0003-microfarad fixed condenser and series clip (Dubilier, Lissen, T.C.C., C.D.M.).

2-megohm grid leak (Dubilier, Lissen).

L.F. transformer, 4-1 (B.T.H., R.I. & Varley, Lissen).

.0005-microfarad fixed condenser (Dubilier, Lissen, T.C.C.).

Ebonite strip, 4 in. by 2 in. by $\frac{1}{4}$ in.

Eight terminals, marked: Aerial, Earth, L.S.+, L.S.—, L.T.+, L.T.—, H.T.1, H.T.2 (Belling-Lee, Eastick).

Grid-battery clips (Bulgin).

Two wander plugs (Lissenin, Clix).

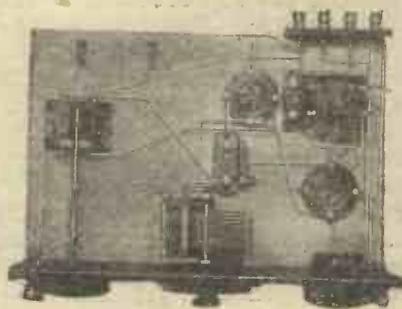
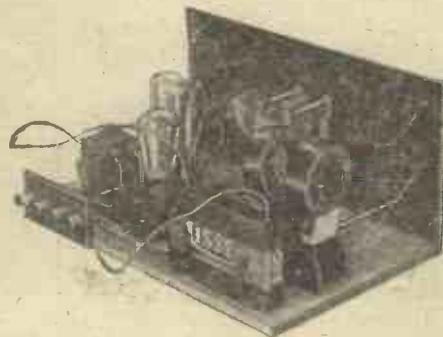
Connecting wire, 16 S.W.G. bare tinned (Lewcos, Junit).

Slow-motion dial (Harlie).

negative lead.

The other battery terminals not yet mentioned are H.T.—, which is connected to L.T.— and two flexible leads, G.B.+, which is connected to L.T.—, and G.B.—, which comes from the I.S. terminal of the L.F. transformer.

From the foregoing considerations the reader should now have a clear idea of the



"FAVOURITE TWO" IN PICTURE

: Neat Appearance : Efficient

BRITAIN'S "FAVOURITE TWO" (Continued from preceding page.)

"why and wherefore" of the circuit embodied in Britain's "Favourite Two" and attention can now be turned to more practical matters.

The several photographic views and detail drawings of Britain's "Favourite Two" should indicate to the reader who proposes to construct this receiver the disposition and general arrangement of the components. Broadly speaking, the layout follows conventional lines, in that the

either side of this control are the remaining two knobs, the left-hand one being the knob of the two-way coil-holder and the right-hand one the filament resistance control.

As far as the baseboard layout is concerned this was determined to a large extent by the panel position occupied by the two-way coil-holder knob. It will be appreciated that the moving portion of the two-way coil holder takes up a good deal of the baseboard space, and this accounts for the apparent crowding of the components at one end of the baseboard.

Immediately behind the two-way coil-holder are the grid-bias battery clips which accommodate a 9-volt grid-bias battery. The valve-holders and L.F. transformer are placed in convenient wiring positions as indicated in the blueprint, as is the by-pass condenser across the primary of the L.F. transformer and the grid-leak and grid condenser.

It should be specially noted that the grid-condenser has an insulated clip for the series grid-leak connections between the grid of the valve and L.T. positive, thus saving the expense of a separate grid-leak holder. If an alternative grid condenser is used, this point should be

board components and terminal strip can be fitted as already outlined.

Wiring

The wiring up of Britain's "Favourite Two" as in the case of Britain's "Favourite Three" has been simplified by the exclusion of all soldered joints. Simple, straight runs of wire are taken between the clamping nuts and terminals on the various components, and, providing care is taken in securing the ends of the bare-wire connections under the clamping nuts as tightly as possible, results will be in every way equal to those obtained with the average soldered joint.

Owing to the simplicity of the wiring we have not thought it necessary to use insulated wire, although this is a matter which is left entirely to the constructor's discretion. The grid-bias-battery leads consist of suitable lengths of rubber-covered flex. The negative G.B. lead from the I.S. connection of the L.F. transformer, and the positive G.B. lead from the L.T. minus terminal terminate in black and red wander plugs respectively. The embodiment of the grid-bias battery in the receiver itself has contributed to the simplicity of the terminal-strip arrangement.

Checking

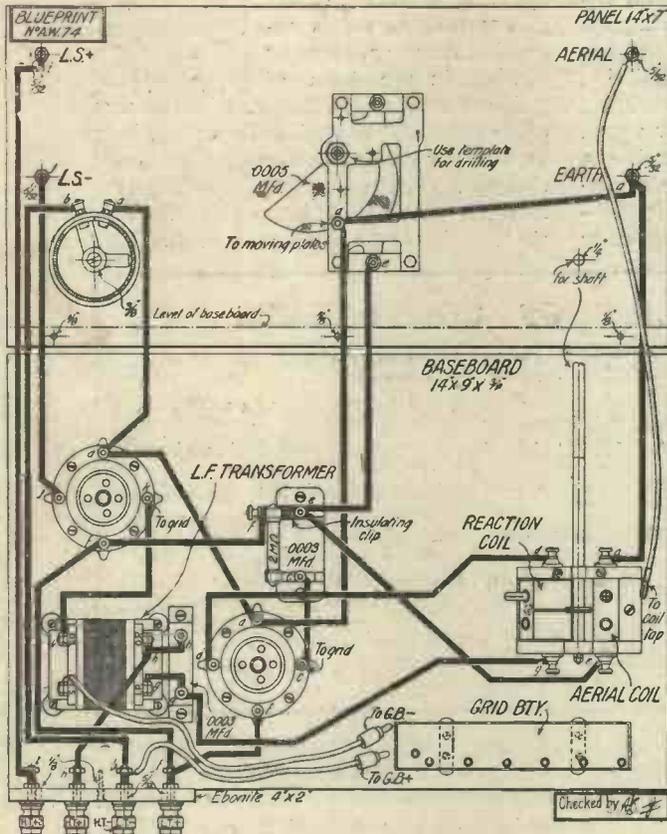
When the constructor has wired up the receiver and has carefully checked the connections actually made in his own receiver with those shown on our free blueprint, preliminary tests can be undertaken. For valves the reader is referred to the specially-prepared valve table accompanying this article. As regards the sizes of plug-in coils a No. 60 "X" coil has already been advocated and this will give excellent results used in conjunction with a No. 50 or 60 plug-in coil in the reaction coil-holder.

For reception of stations on the long waves, such as Daventry 5XX, Radio Paris, etc., a No. 200 centre-tapped or "X"

(Continued on page 200)

2-VOLT VALVES FOR BRITAIN'S "FAVOURITE TWO"

Make	Detector	L.F.
B.T.H.	B210C	B215P
CLEARTRON	CT15	CT15X
COSMOS	SP16 G	SP18 RR
COSSOR	210HF	220P
EDISWAN	DR2	PV2
MARCONI	DEL210	DEP 215 240
MULLARD	PM1LF	PM252
OSRAM	DEL210	DEP 215 240
SIX-SIXTY	SS210LF	SS215P



The Wiring Diagram. Blueprint available, price 1/-

variable tuning condenser, filament rheostat and moving coil-holder knob are accommodated on the panel, which is screwed at right angles to the baseboard on which are fitted the two valve-holders, L.F. transformer, by-pass condenser, grid-leak and condenser, two-way coil-holder, and grid-bias battery clips.

Looking from the back of the receiver, as in the blueprint, a small terminal strip carrying the H.T. and L.T. terminals is screwed at right angles to the back of the baseboard at the extreme left-hand end.

To go into details a little, it will be seen that, looking from the front of the panel, the aerial and earth terminals are mounted on the left-hand side of the panel and the loud-speaker terminals on the right-hand side.

The main control, which is, of course, the slow-motion dial of the variable condenser, occupies the central position on the panel. Then, arranged symmetrically on

watched, as it is essential for most efficient working that the grid-leak be connected as advised and not straight across the grid condenser.

The constructional processes involved in the assembly of Britain's "Favourite Two" are extremely simple, especially if the constructor makes use of our full-size blueprint which is given free with this issue.

The particular variable condenser specified, requires four holes to be drilled in the panel, but as an accurate template is supplied by the makers this should cause no trouble. The holes for the two-way-coil spindle and the "one-hole-fixed" rheostat are standard. Accuracy is needed, however in the drilling of the hole for the two-way coil spindle, otherwise the movement of this will be stiff and erratic.

When the panel drilling is completed and the panel components mounted thereon, this should be fitted to the baseboard by means of three wood screws, then the base-



**Lasts
for ages**

That is what users say about the Lissen Battery and the remarkable oxygen content which makes this long-life noticeable is due to the unique chemical combination and process which is known only to Lissen. This fine battery will stand up to the longest programme without being affected, and it brings to the loud-speaker a new power smoothness and freshness of tone which lasts from the beginning to the end, no matter how long the programme may be. This is the battery to use for power valves, and also whenever it is desired to hear an opera or any other fine piece of music right through with clarity, volume, and perfect tone purity.

10,000 DEALERS SELL IT THROUGHOUT THE COUNTRY.

Next time you want a good battery ask for LISSEN New Process in a way which shows you will take no other.

60 volts (reads 66) 7/1 1

100 volts (reads 108) - 12/11

9 volts (grid bias) - 1/6

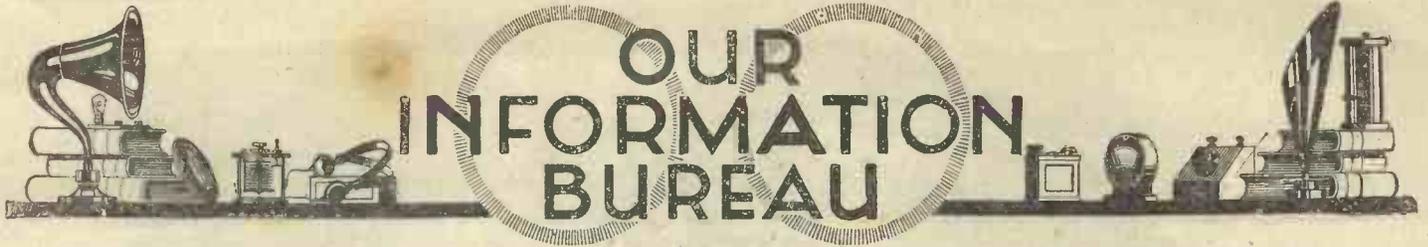
LISSEN LIMITED, 16-20 Friars Lane, Richmond, Surrey

Managing Director : THOMAS N. COLE

LISSEN NEW PROCESS BATTERY

7/11

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



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.

Earthing the Aerial.

Q.—*Is it essential to earth the receiving aerial when the receiver is not in use?*—K. H. (Devon).

A.—It is certainly advisable to earth the aerial when the receiver is not in use. The aerial is, of course, earthed through the receiver when connected up to the set, but should a charge of electricity reach the aerial, then this charge must pass through the tuning circuits and tuning components of the set before reaching earth. This is liable to cause considerable damage to the set. If the aerial is merely left disconnected from the set, then a charge of static electricity may accumulate on it and any person touching the aerial with the body is likely to experience a nasty shock.—L. C.

Night Charging.

Q.—*I have been in the habit of charging my accumulator at home during the night, but I have been told that this is bad practice. Is there really any danger attendant upon the charging of accumulators during the night?*—R. W. (Chelsea).

A.—Apart from the fact that the house is usually closed during the night, and therefore any fumes given off by the accumulator, when charging, have no chance of leaking away into the outer atmosphere, there is the possi-

bility of fire. It is not an unknown thing for a battery to catch fire while it is being charged, although, in our experience, this has only happened in the case of a battery with celluloid

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, but it will be necessary to charge a special fee (which will be quoted upon request) for detail layouts and designs.

container. There is the possibility, however, of the battery frothing over and causing a short-circuit between the terminals of the battery, and this is likely to blow the main fuses, or

even fuse the mains of the house. We would prefer to advise you to do all of your charging during the daytime, so that occasional attention may be given to the battery. Such attention will quite appreciably prolong the life of the battery.—C. A.

L.F. Transformers.

Q.—*Why is it that some manufacturers specify a high-ratio L.F. transformer to follow the detector valve and a low-ratio transformer for the second stage of amplification, whilst other manufacturers specify exactly the reverse of these?*—J. G. (Oldham).

A.—The whole question of the position of the L.F. transformers is governed by the impedance of the primary windings of the transformers. Some manufacturers make a high-ratio high-impedance transformer for the first stage of L.F., with a low-ratio low-impedance transformer for the second stage of L.F. Other manufacturers prefer the design of a high-impedance low-ratio instrument for the first stage with a low-impedance high-ratio for the second stage of L.F. It is a matter of opinion which is the better system of design, but you should be governed only by the primary impedance of the transformers when considering their positions in your set.—L. C.

“COMPRESSING THE CARRIER WAVE”

(Continued from page 186)

distortion on distant stations due to the fact that there are too many stations at work in Europe at the present day.

A Solution

Now comes the suggestion that the method which proved successful in the case of high-speed telegraphy might prove a solution to the problems of broadcast telephony. In the telegraphy case, it was found better to vary the frequency of the currents, keeping the strength the same. It was then found that the currents would change from one frequency to another with the utmost smoothness, not offering any objection at all, as it were. Could we not apply some similar system to broadcasting?

Several radio engineers in different countries have set themselves this problem and it appears by report that some considerable measure of success has been achieved. The system is known as frequency-modulation as opposed to power modulation, and in this the transmitter merely radiates a carrier wave of constant amplitude. The frequency, however, is continually changing between limits of 500 cycles on each side of the mean value. The period elapsing between successive

impulses is varied in accordance with the frequency of the speech or music. Thus, if we have a low-frequency, the successive waves occur at relatively long intervals, whereas with a high-frequency they occur with much greater rapidity.

Advantages Claimed

Modulation is thus achieved by a successive compression and expansion of the impulses which constitute the carrier wave. Various advantages are claimed for the system. The band occupied by the transmission is much less, so that the number of stations which can work in a given wave band, say 300 to 500 metres, is greatly increased. There is considerable saving of power at the transmitting end, and it is said that the signals carry better to a distance.

Against this, however, we have to place the fact that it would mean the scrapping of the present system of broadcasting and probably no small alteration would have to be made to receiving equipment as well. If the system proves of sufficient advantage, no doubt a change would gradually come about, but the benefits obtained from the new system would have to be very large indeed before any such wholesale alteration to the existing system could be contemplated.

French wireless fans report reception of an Italian broadcasting station working on 297 metres, a wavelength common to Liverpool, Agen, Hanover, and Innsbruck; it is also stated that on some nights Naples has been heard testing on about 398 metres.



A Slow-motion Dial

THE SOURCE OF POWER



60 VOLTS 7/11
 100 VOLTS 12/11
 9 VOLTS 1/6

The miller no longer grinds his grain by the power of a wind-mill. He has found something better.

Radio users, too, have found something better than they had before as the source of power for their radio. This is the new energy provided by a LISSEN New Process Battery, which keeps every note of music and every word of speech clear and distinct throughout the longest programme and for months and months of use. Loud-speaker reproduction now has a natural truth about it which makes everybody using it for the first time wish they had known about the LISSEN New Process Battery before.

For the LISSEN Battery yields power without a ripple, without a sign of hum, without a trace of noise, and it is absolutely safe for children and all at home. Its energy is chemically generated by a new chemical combination and a process embodied in the battery which is known only to LISSEN. The great oxygen content of the cells resulting, yields a power output so remarkable that the last notes of a long opera or the longest concert come through as loud and clear as the opening bars hours before.

Ask for the LISSEN Battery in a way which shows you will take no other. It is obtainable at practically every Radio Dealer's throughout the country.

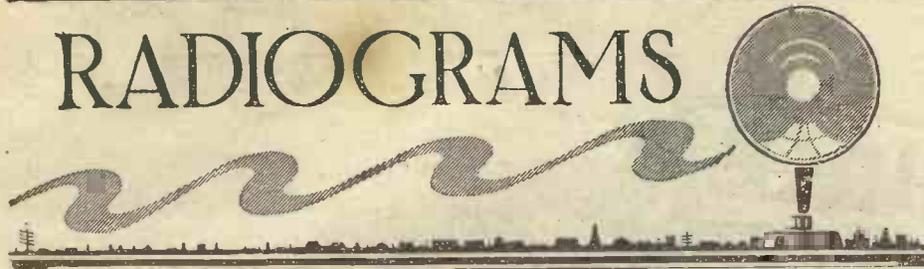
60 volts (reads 66) 7/11 100 volts (reads 108) 12/11 9 volts (grid bias) 1/6

**LISSEN LIMITED,
 FRIARS LANE,
 RICHMOND, SURREY.**

Managing Director: Thomas N. Cole.

Advertisers Appreciate Mention of "A.W." with Your Order

RADIOGRAMS



SUKIE'S SCARF, a humorous sketch to be broadcast on February 3 from 2LO and 5XX will give listeners another opportunity of hearing Wish Wynne in her clever impersonations of a girl of the people.

On February 11, those inimitable comedians, Clapham and Dwyer will give a concert party at the 2LO studio.

L'Enfance du Christ (The Childhood of Christ), Berlioz's only oratorio, first performed at Paris in 1854, will be broadcast for the first time in this country through 5GB on February 12. It is to be rendered by the Birmingham Studio Orchestra and chorus and well-known vocalists, under the leadership of Joseph Lewis.

For February 13, Belfast has arranged an all-Irish programme which will include a performance of W. B. Yeats' play *The Land of Heart's Desire*. A variety entertainment to follow will feature Seamus Clandillon, the Director of the Dublin broadcasting station.

Pouishnoff, the well-known pianist, will take part in the sixth concert to be given by the Birmingham Symphony Orchestra, conducted by Mr. Adrian C. Boult on February 9; this transmission will be relayed to 5GB.

Further feature programmes are being arranged by the Birmingham studio; on February 14, a Wagner programme will include the singing of Wotan's Farewell

(*The Valkyries*) and Sach's monologue (*The Mastersingers*) by Topliss Green; for February 16, a Tennyson programme has been arranged, to which will contribute the British Vocal Quartet and Gladys Ward, the latter in the ex-laureate's popular poems. A programme to consist of works by Gloucestershire composers has been fixed for February 17.

The successful reception of short-wave transmissions from 5SW, the B.B.C. Chelmsford experimental station is reported from Perak, Sumatra, Singapore, Lima, Penang, and North Borneo. Although the midday concerts broadcast from Chelmsford have been well received in Australia it is stated that, on most occasions, re-broadcasting has not been found possible.

The "Q" Coil

FURTHER DETAILS NEXT WEEK

Legend Land is the title of an entertainment to be produced at the Cardiff station, on February 16; in the course of the evening Arthur Cranmer will sing items from *The Immortal Hour*. There will also be a play based on the Arthurian legends of the era.

A symphonic poem entitled *The White Rider* which was the test piece at the Crystal Palace contest will be broadcast by the Newcastle Station on February 11;

it is to be performed by the Harton Colliery Band conducted by Ernest Thorpe.

An exceptional combination of female talent will be found in the evening programme to be broadcast through 2LO, 5XX and other stations on February 8. It includes Elisabeth Schumann, the well-known singer, and the equally world-famous 'cellist, Suggia.

Since 5GB took over the Birmingham Radio Circles, its numbers have considerably increased and the membership now exceeds 12,000. The Radio Circle Fund, to which many children contribute, since its inception has equipped numerous hospitals with wireless receivers. Of £1,000 required to endow a Radio Circle Cot in the Children's Hospital some £600 have already been realised of which £45 was represented by the sale of silver paper collected by the youngsters and sent into the local station.

"Mrs. Buggins," alias Mabel Constanduros, is going North again on February 3 to give a party in the Aberdeen studio. This may be one of the last of Miss Constanduros' broadcasts for some time, as she is shortly to appear in a play at a West End Theatre.

The hard lot of the Cornish miner in the eighteenth century, during which the working conditions were staggeringly frightful when judged by modern standards, will form the topic of Mr. A. J. Hamilton Jenkins' next talk in the series on Cornish Mining, which he is to give on Monday, February 13.

An opportunity to hear the recently re-constructed organ at Wallasey Town Hall will be afforded to those who listen to the Liverpool and Manchester Stations between 8.30 and 9 p.m. on Saturday, February 25, during a recital by Mr. Reginald Goss-Custard, the famous London organist. The programme will include an improvisation of an organ arrangement of the Overture *William Tell*, by Rossini.

A CROWD of interested sightseers were letting their buses slip by at the bus stop in Orchard Street, London, the other evening as they gazed into one of the large display windows of Selfridges. I had expected something of the sort, writes our Special Correspondent, because I know that an immense amount of interest has been aroused by the result of the AMATEUR WIRELESS competition. Of course, the object of the crowd's interest was Britain's "Favourite Three," of which actually there were three models on view, each liberally embellished with the free-gift blueprints.

An impressive card "told the world" that Frankfurt, Langenberg, etc., had been picked up on the receiver in Kensington; and this, I happen to know, is a very conservative estimate

The "Favourites" at Selfridges

of the receiver's capabilities. I was surprised at the extraordinarily low cost of the complete kit of parts required to build the "Favourite Three"; the cash price is only four pounds eleven shillings.

During the past week visitors to Selfridges have had an opportunity to see, and even closely examine, these "Favourite Threes" for themselves, and during this coming week (February 2 to 9) numerous models of the "Favourite Two" can also be seen. In addition to the window display in Orchard Street, models of the "Favour-

ites" are on show in the Selfridge wireless department, on the first floor, both at the display counter and in the demonstration salon. In the Selfridges radio annexe these receivers are also given a prominent show.

I saw quite a number of wireless enthusiasts consulting the experts in charge of the wireless section regarding the "Favourites," and it seems to me that here is a unique opportunity for the constructor who resides in or near London to see the receiver he proposes to build "in the flesh." Such an inspection will greatly enhance the value of the constructional details given in AMATEUR WIRELESS. There is no doubt that the "Favourites" have caught on, and the reason for it is simply this: They are just what the reader wants.

NONE SO GOOD



The Valve
with the
**NICKEL
FILAMENT**

For high emission, low filament temperature, economical operation, ability to stand high anode voltages and for all-round excellence of results, there are no 2-volt valves so good as the new B.T.H. Nickel Filament Valves. Buy some to-day—they will last you for years.

B 210 H <i>R.C. and H.F.</i>	B 210 L <i>General Purpose.</i>	B 215 P <i>Power Amplifying.</i>
Fil. Volts 2	Fil. Volts 2	Fil. Volts 2
Fil. Amps. 0.10	Fil. Amps. 0.10	Fil. Amps. 0.15
Max. H.T. Volts 150	Max. H.T. Volts 120	Max. H.T. Volts 120
10s. 6d.	10s. 6d.	12s. 6d.

The above prices are applicable in Gt. Britain and N. Ireland only



VALVES

NICKEL FILAMENT

Made at Rugby in the Mazda Lamp Works.

The British Thomson Houston Co. Ltd.

"ABOUT THE 'Q' COIL" (Continued from page 175)

resistance, the greater is the gain, and it is necessary therefore to design the coil with a low high-frequency resistance. A limit is reached in time where the resonance curve becomes so sharp that the circuit cannot follow the rapid variations in amplitude which the carrier wave of a telephony transmission has to undergo. This limit, however, is fairly high and usually leaves us ample scope for improvement.

The next step, therefore, was the production of coils having a much lower resistance and consequently a much higher gain, and this immediately brought trouble in its wake. Due to the relatively greater efficiency of the coils, circuits which had hitherto been fairly easily controlled, became altogether unmanageable. Tendency to oscillate, due to inherent feedback in the valves, could be overcome by neutralising, although the simple methods which had hitherto proved successful have to be ruthlessly scrapped and much greater care has to be taken.

Interaction

The greatest trouble, however, arose from the interaction between the coils themselves. Owing to the low resistance, large currents were set up in these coils, as a result of which comparatively large electrostatic and magnetic fields were set up around the coil which influenced neighbouring circuits. It is easy to appreciate that numerous unwanted reaction effects can be produced in such circumstances. We may, perhaps, nullify such effects between adjacent circuits, but we then find that we get coupling between one circuit and another a little farther away, and, in general, the problem of the satisfactory layout of components in a wireless receiver became somewhat complex.

Magnetic and Electrical Effects

Engineers, therefore, immediately set about solving the problem, and it became clear that there were two ways of attempting this. First of all, we can permit the coil to exercise its magnetic and electrical effects in this manner and then try some means of eliminating these effects. This is the principle adopted in screening. We can surround the coil with a metal shield, in which eddy currents are set up by the fields from the coil. These eddy currents in turn produce counter fields outside the screen which nullify the original fields produced by the coil.

To be really successful, screening must be complete and each circuit should be enclosed entirely in a metal screen, but as a partial remedy, I introduced, two years ago, the screened coil. This consisted of a metal box with a removable cover, the coil being mounted inside on a six-pin base to allow of interchangeability. This, although only a partial remedy, proved of considerable value and many successful receivers have been built utilising these coils.

Astatic Windings

The other method is to wind the coil in such a manner that its external field is negligible. Various types of astatic coil have been devised. We have the "bucking" coil, having two sections wound on the same former in opposite directions. We have the toroid, which is made in the form of a long single layer solenoid bent round into a circle, and we have the binocular coil. I shall speak more of the relative merits of these various types in a further article, but they all are so arranged that the magnetic field produced by the coil is more or less self-contained.

Fieldless?

These coils are often called fieldless, but this is ridiculous, because a coil must have some magnetic field or it would have no inductance, and as we have seen, inductance is essential to the working of the normal wireless circuit. The term "astatic" is better, this indicating that the field a short distance away is negligible, the magnetic effect being confined within the limits of the coil itself.

NEXT WEEK:
MR. REYNER'S
Test Reports of
Britain's "Favourite" Receivers

All these coils, screened or astatic, suffer from one serious disadvantage in that their wavelength range is limited. There are many listeners who cannot enjoy a programme on the normal broadcast band of 300 to 500 metres owing to the excessive Morse interference, and they have to turn for their pleasure to the longer waves in between 1,000 and 2,000 metres. This means that any good receiver must be capable of receiving both the wavebands, and the coils or transformers must therefore be interchangeable. This has proved a serious handicap to the designer in the past, quite apart from the inconvenience to the user of having to change numerous coils from time to time.

Extended Wavelength Range

Bearing these several points in mind, experiments were instituted at the Furze-hill Laboratories with the idea of overcoming this defect. Detailed tests were carried out on various forms of astatic coil in order to determine not only the magnetic field from such coils, but also the capacity effect. The average astatic coil is only fieldless as far as the magnetic field is concerned, and in many cases there is quite a strong capacity coupling remaining. Numerous forms of new and original coil were developed and tested out, as a result of which a particular form of coil showed considerable

promise. This coil was made up with two windings, normally in parallel, and during the testing of this coil it became clear that, by utilising the windings in series, the long waves could be tuned in without any difficulty.

The importance of this property was rapidly appreciated and experiments were conducted to ascertain whether the astatic properties of the parallel arrangement could be combined with a system giving good tuning of the long waves if the connections of the coil were changed over. After weeks of research, this was found to be possible and a practical form of coil was devised.

At this stage of the proceedings, therefore, we had a coil which was astatic and efficient on the short waves and which, by a simple change of the connections, could be made to tune efficiently on the long wavelengths. The whole of the coil was in use all the time, so that there was no possibility of dead-end losses or other effects of this nature. The next point to be considered was the application of this coil to existing types of circuit, and here additional primary, reaction, and similar windings were necessary, and the design of suitable windings became somewhat difficult. The number of turns which would be suitable for the short-wave windings would naturally, with an ordinary coil, be completely inadequate for the long waves, and at first sight it appeared as if tappings would have to be used, thereby losing the delightful simplicity which was the principal feature of the coil in its original state. Further investigations, however, indicated that by suitable positioning of the winding, the same winding could be made to serve for both purposes.

A Remarkable Result

If this can be achieved, then we have a coil possessed of most remarkable properties. The same coil will tune to any wavelength between 250 and 2,000 metres (excepting a small gap between 600 and 700 metres), while the same primary, coupling, or reaction winding serves throughout the whole of the range. Thus no plug-in arrangement of any sort is required. The coil can be mounted once and for all in the receiver and a simple switch incorporated in the coil serves to change over the connections on the secondary from the short to the long waves or *vice versa*.

Such an ideal would appear to be difficult of attainment, and in practice it was found to require careful experiment, but in the end a satisfactory solution was forthcoming, and the "Q" coil, which possesses all these advantages, will shortly be available to readers. The name "Q" has been given to the coil in view of the equi-potential properties which result from its astatic winding. Further details of the coil and its development will be given next week.



CLEARTRON Valves are specified for use in the "FAVOURITE CIRCUIT"

Thousands of Radio enthusiasts are now using these famous valves, and every user is delighted with the splendid results obtained and the amazing saving effected on every CLEARTRON Valve purchased.

BRITISH MADE
AND
FULLY GUARANTEED

Provincial Retailers are invited to write at once for liberal trade terms

Valve.	Filament Volts	Filament Amps.	Impedance Ohms.	Amplification Factors.
CT10	3.8	0.1	15,000	7.5
CT10*	3.8	0.1	8,000	3.8
CT15	1.8-2.0	0.15	18,000	7.5
CT15*	2.0	0.3	5,000	3.5
CT215H† ..	2.0	0.15	100,000	45
CT25	5.0	0.25	10,000	9
CT25B† .. .	5.0	0.25	20,000	20
CT25*	5.0	0.5	4,000	5

Power Valves are Marked *. Valves marked † are Special Valves for resistance capacity amplification.

GENERAL PURPOSE VALVES

4! ■ EACH

BRITISH POWER AND R. C. C. AMPLIFICATION VALVES

6! ■ EACH

POSTAGE 3d. EXTRA.

Can be obtained from your Local Dealer or direct from:

Sales Dept., CLEARTRON (1927) LTD., 21 Cumberland Street, Birmingham

Sole Distributors for London Area, SELFRIDGE & CO., LTD.

The Favourite Valve for the Favourite Circuit is the CLEARTRON

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

LETTERS TO THE EDITOR



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

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

"Sitting Up for America"

SIR,—I was pleased to see the article in No. 292, by Mr. Hallows on "Sitting up for America." Short-wave work being the vogue now, little attention is paid to the medium-wave American transmitters.

For the last fortnight I have been receiving WGY, WBZ and KDKA (medium-wave) stations at excellent strength on the "Ether Searcher."

On one occasion signals being so loud, I changed over to an old ST45 with good effect, volume being about R5.

WEAF has also been logged at fair phone strength. Congratulations for a good set in the "Ether Searcher."

L. (Fleetwood).

A 5XX Peculiarity?

SIR,—I have noticed for some little time now a peculiarity in regard to reception from 5XX.

When a particularly good soprano is coming out exceedingly well and one is listening with rapt attention to every note

and anticipating the climax of the excellent top notes, when they arrive one is badly let down. Instead of coming out in proportion to the lower notes, they have a choked or held-back effect. I should like to know the reason of this and if any other readers have noticed it; my opinion is that the control room is responsible.

D. (Hythe).

The H.T. Battery Problem

SIR,—I was much interested in Thermion's notes in recent issues of AMATEUR WIRELESS, as to the public preferring to buy the small-capacity high-tension dry batteries in preference to the five-times-the-capacity type at double the price. The trouble is that the dry battery buyer is to a certain extent buying a pig in a bag and so he prefers to buy a small doubtful battery in preference to a large and equally doubtful one. Either may have been in stock longer than the makers guarantee them to be kept and until some guarantee in the shape of the date of manufacture of

the battery they are about to purchase is given, the public will buy the small type. In fact, unless some such procedure is soon taken all who are able will dispense with the dry battery altogether to the detriment of the battery trade. I once bought a battery which later on was examined and found to be four months old from the date of manufacture. I was also told by a trader that he could keep a certain make of battery in stock for twelve months and that they were quite all right at the end of that time. What of the purchaser who pays the full price for the aged battery?
M. (Tiverton).

Coils for the "Ether Searcher Three"

SIR,—With reference to the query of S. F. H. (Middlesex) concerning coils to use and difficulty of obtaining reaction with "The Ether Searcher," perhaps the following experience of mine will assist.

I have omitted the wire leading from the aerial terminal A1 and instead taken a flexible wire to the centre tap at a No. 60 coil (aerial) and then by using a 75 reaction coil have found reaction to be very stable between 60 and 70 degrees. On the long waves I am using a 200 centre-tapped aerial coil similarly with 150 reaction.

C. (East Dulwich).

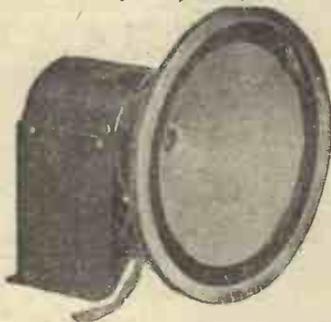
The Japanese Broadcasting Association is planning a rapid development of radio. Its programme calls for the construction of six new radio stations.

MAGNAVOX

ELECTRO-DYNAMIC POWER SPEAKER UNIT.

Manufactured under Magnavox British Patent No. 197,836 of May 24th, 1923.

"R.4"
UNIT
£9.10



"R.4"
UNIT
£9.10

The World's finest speakers by the oldest speaker manufacturers. A revelation in reproduction with results equal to moving coil speakers selling at five times the price.

The field of the Magnavox Type R4 Unit is operated from a 6-volt accumulator or any standard trickle charger. Consumes 1/2 ampere. Resistance 12 ohms. This field current is easily available from the L.T. battery of your receiving set. The unit is supplied complete with attachment cords and built-in input transformer.

Permanent Magnet Type No. M.7, 60/-. Write for full list. Our new 1928 Catalogue and circuit supplement is now ready. Send 9d. in stamps to cover cost of postage. It's the most instructive and interesting list available.

THE ROTHERMEL CORPORATION LTD.

24-26, MADDOX ST., LONDON, W.1.

Telephone: Mayfair 0578-0579

Transformer troubles banished by BROWNIE WIRELESS

Brownie Transformers are guaranteed 100% British. Made from the very finest materials, the characteristics and performance are equal to those of transformers costing twice the price. Ensure perfect tone and quality by building a Brownie Popular Transformer into your set. Examine this wonderful transformer for yourself at your nearest Radio Dealer.



THE BROWNIE POPULAR TRANSFORMER.—The magnetic field is composed of special laminations of the softest iron procurable, and the accuracy of the windings on their moulded bobbin guarantee distortionless reproduction, free from resonance. Totally enclosed in a moulded case ... **9/6**

Write for our new Free Booklet: "Wireless Without Worry," to—

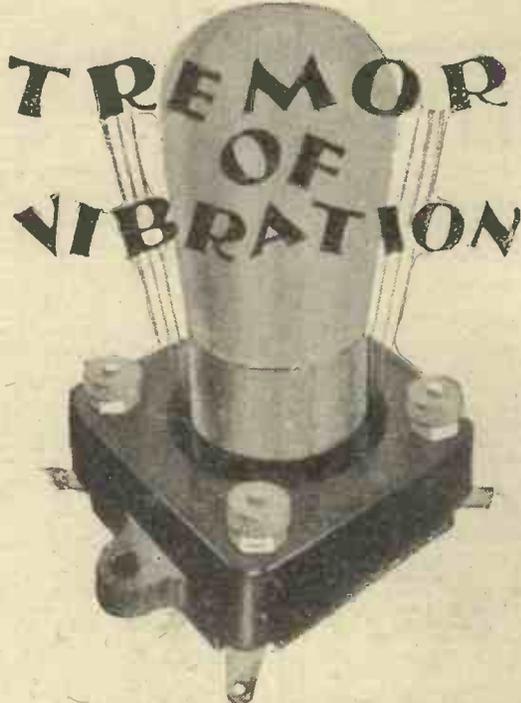
THE BROWNIE WIRELESS COMPANY (G.B.) LTD. (Dept 26), NELSON STREET WORKS, LONDON, N.W.1

BLUEPRINTS

Full-size Blueprints, each one being a photographic contact print, from the draughtsman's original design, and produced on stout paper, are now available of the following sets. Price, Post free.

No.	Price.	Post free.
ONE-VALVE SETS		
All-in-all One-valver ...	A.W. 13	1 0
Hartley DX One-valver ...	A.W. 27	1 0
Alpha One* ...	W.M. 26	2 3
Reinartz Plug-in One-valver ...	A.W. 46	1 0
The Dynaflex (One-valver) ...	A.W. 69	1 0
Constant-coupled One ...	A.W. 65	1 0
Long Range Hartley One ...	W.M. 54	1 0
Economy One ...	A.W. 71	1 0
Screened-grid H.F. One ...	A.W. 75	1 0
TWO-VALVE SETS		
Wide World Short-wave Two... ..	A.W. 11	1 0
All-wave Two-valver ...	A.W. 15	1 0
Reinartz Two ...	A.W. 21	1 0
Empire Short-wave Two ...	A.W. 28	1 0
"Next-step" Receiver... ..	A.W. 34	1 0
Girdle Two* ...	W.M. 30	1 3
Centre-tap Two ...	A.W. 42	1 0
Mains-fed Two ...	W.M. 37	1 0
The Rover Two ...	A.W. 53	1 0
British Broadcast Two ...	W.M. 44	1 0
General Purpose Two ...	A.W. 55	1 0
All-wave Two ...	A.W. 57	1 0
The "Yule" Two ...	A.W. 59	1 0
The 30/- Two-valver ...	A.W. 61	1 0
Economical Two ...	A.W. 66	1 0
Two-programme Two ...	W.M. 56	1 0
THREE-VALVE SETS		
Continental Three ...	W.M. 7	1 0
Victory Three ...	A.W. 9	1 0
M.C. 3 Star ...	A.W. 16	1 0
Split-primary Three ...	A.W. 24	1 0
Purity Three-valver ...	A.W. 33	1 0
A Modern Tuned-anode Three ...	A.W. 35	1 0
Tetrode Three for Shielded Valves ...	A.W. 36	1 0
Alternative-programme Three ...	A.W. 38	1 0
A "Mains" Three-valver ...	W.M. 31	1 0
Screened-grid Three ...	W.M. 21	1 0
"Simpler Wireless" Special Three-valver ...	A.W. 41	1 0
"Home Station" Three ...	A.W. 45	1 0
The "Economy" Three ...	A.W. 48	1 0
Five-guinea Three ...	W.M. 29	1 0
Dominions Short-wave Three ...	W.M. 39	1 0
Short-wave Three ...	A.W. 50	1 0
The Ether Searcher Three ...	A.W. 52	1 0
Three Continent Three ...	A.W. 54	1 0
Tuned-anode Three for the Mains (D.C.) ...	W.M. 43	1 0
The Standard Three ...	A.W. 56	1 0
Straight-line Three ...	A.W. 60	1 0
Screened-grid Short-waver ...	W.M. 51	1 0
Hartley DX Three ...	A.W. 63	1 0
Metropolitan Three ...	W.M. 48	1 0
Everyday Three ...	W.M. 52	1 0
Britains Favourite Three and copy of "A.W." ...	A.W. 72	0 4
THREE-FOUR-VALVE SETS		
A Tuned-anode Three-four ...	A.W. 40	1 6
Concord Three-four ...	W.M. 45	1 6
FOUR-VALVE SETS		
M.C. Four ...	A.W. 8	1 6
Household Four ...	A.W. 17	1 6
Revelation Four ...	W.M. 24	1 6
"A.W." Gramo Radio... ..	A.W. 40	1 6
All-purpose Four ...	A.W. 43	1 6
All-wave Roberts Four and copy of "A.W." ...	A.W. 47	0 7
C.T. Four ...	A.W. 58	1 6
Simplicity Four... ..	W.M. 49	1 6
Astral Four ...	W.M. 53	1 6
"Simpler Wireless" Four ...	A.W. 70	1 6
FIVE-VALVE SETS		
1927 Five ...	W.M. 6	1 6
Two-volter's Five ...	W.M. 11	1 6
Individual Five ...	A.W. 25	1 6
Exhibition Five ...	W.M. 35	1 6
Phoenix Five ...	W.M. 43	1 6
1928 Five ...	W.M. 46	1 6
SIX-VALVE SETS		
Nomad Six ...	W.M. 31	1 6
Short-wave Super-six ...	A.W. 67	1 6
SEVEN-VALVE SETS		
Simpladyne Seven (Super-het.) ...	W.M. 22	1 6
AMPLIFIERS		
Two-valve D.C. Mains Amplifier ...	W.M. 16	1 0
Range Extender (H.F. Amplifying Unit) ...	W.M. 38	1 0
True-tone Amplifier ...	W.M. 47	1 0
Utility Two valve Amplifier ...	A.W. 68	1 0
PORTABLE SETS		
Springtime Portable (Two-valver) ...	W.M. 12	1 0
Countryside Four ...	W.M. 17	1 6
Motorists' Portable Four-valver ...	A.W. 14	1 6
M.C. Three Portable ...	A.W. 22	1 0
Handy Three ...	W.M. 27	1 0
Holiday Portable (three-valver) ...	A.W. 32	1 0
Club Portable (three-valver) ...	A.W. 30	1 0
CRYSTAL SETS		
Crystal Set for the R.C. Enthusiast ...	W.M. 13	0 6
Two-programme Crystal Set ...	W.M. 25	0 6
Half-Hour Crystal Set ...	W.M. 28	0 6
Centre-tap Crystal Set ...	W.M. 20	0 6
Super Crystal Receiver ...	A.W. 64	0 6
MISCELLANEOUS		
Made-to-measure Wave-trap ...	A.W. 19	0 6
New Current Supply Idea ...	A.W. 26	1 0
DX One-valve Unit ...	A.W. 37	1 0
Volume Control Unit ...	W.M. 40	0 6
Battery Eliminator for A.C. Mains ...	W.M. 41	1 0
"Simpler Wireless" Rectifying Unit ...	A.W. 62	1 0
A.C. Mains Adapt or (for any "Simpler Wireless" Set ...	W.M. 57	1 0
H.T. Supply from A.C. Mains ...	A.W. 73	1 0
Cone Loud-speaker ...	W.M. 55	1 0
* With a copy of "Wireless Magazine" complete.		

THE BENJAMIN VALVEHOLDER ABSORBS EVERY



DO YOUR VALVEHOLDERS DO THIS?

BECAUSE in the Benjamin Valveholder—the valve socket is sprung on four extremely sensitive one-piece springs, the valves are free to float in every direction, the valve legs cannot possibly foul the baseboard.

And then, in addition—the valve sockets and springs are made in one piece with no joints or rivets to work loose.

Soldering Tags and terminals are provided.

Fit Benjamin Valveholders in every receiver.

All radio dealers sell them, 2/- each.

THE BENJAMIN ELECTRIC LTD.
Barntwood Works, Tottenham, - London, N.17.

Send a Postal Order to-day to BLUEPRINT SERVICE AMATEUR WIRELESS 58-61 Fetter Lane London, E.C.4

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



Free Gift!

A Beautiful Two-Colour

Harlie

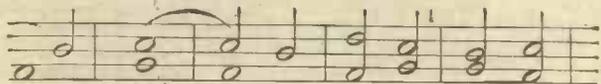
POCKET LOG CHART

If your dealer cannot supply you write for this useful present now, before it is too late!

HARLIE BROS.

BALHAM ROAD, LOWER EDMONTON, N.9

Telephone: Tottenham 2446



Crisp, clear notes without burred edges



Notes come from the "GEM" crisp and clear—not as though a laundry had been fraying the edges. When you listen to a "GEM," songs by performers whose voices sounded "throaty" before, come through in a really enjoyable fashion

Orphean "GEM"

The "GEM" is not a "baby" Speaker, but a full-sized instrument with a full-sized voice. Its price is the only small thing about it. Send for List.

LONDON RADIO MFG. CO. LTD.

Head Office and Works:—

Station Rd., MERTON ABBEY, London, S.W.19

Telephone: WIMBLEDON 4658

FULL SIZE 30/- ONLY
Every user says "MARVELLOUS!"

50 10-3

MAKE YOUR OWN CONE SPEAKER

The New Wonder "Nightingale"

CONE UNIT

Exactly as fitted to our Cabinet Cone Speaker.

Guaranteed to give results equal to the most expensive Loud-speakers yet made.

Full constructional details with each Unit.

GRAMOPHONE ATTACHMENT

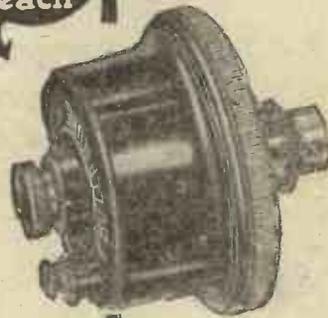
Reduced from 32/6 to 15/- solely as an advertisement for the famous Bullphone Nightingale Loud-speakers. Cobalt Magnet guaranteed for all time.

With 4-inch Diaphragm. Instantly converts your own Gramophone into a full power Loud-speaker, giving a wealth of pure undistorted volume which must be heard to be believed.



15/- each

SATISFACTION GUARANTEED or money refunded!



15 FITTED TO OUR 25 POST HORN

BUY ON EASY TERMS

10/- Secures this Speaker

5/- Secures this Speaker

The Nightingale "DE LUXE"

57/6 cash, or 5/- deposit and 12 monthly payments of 5/-.

21 in. high with 14 in. Bell. Mahogany finished, with plated arm & stand.



BAKELITE SOUND CONDUIT & TONE ARM

26" HIGH Bell Mouth 14" FINISHED IN MAHOGANY

NIGHTINGALE CONCERT SUPREME SUPER

Guaranteed free from metallic resonance.

63/- cash, or **EASY TERMS**, 10/- deposit and 12 monthly payments of 5/-.

Send Deposit NOW!

Obtainable from your Local Dealer or direct from:—

BULLPHONE LIMITED

38, HOLYWELL LANE, LONDON E.C.2.

NIGHTINGALE SPEAKERS

WEARITE COMPONENTS
WRIGHT & WEAIRE, Ltd.
 740, HIGH ROAD, TOTTENHAM, N.17

NOTICE!

Having established a reputation as makers of all types of highest-grade Inductance Coils, and in particular, those used in published circuits, we have extended our plant and can give prompt deliveries. We would specially draw attention to our make of coils suitable for such circuits as the

- "Melody Maker" - 8/6 each
- "Mullard Master" - B.B.C. 5/6
- " " " - 5XX 8/6
- "Every Man Four" - 37/6 pair

EVERY COIL CARRIES OUR GUARANTEE OF EFFICIENCY

ATTRACTIVE RADIO!
 OBTAINED BY USING A
TROLITE
PANEL

YOU can make your radio set as attractive as the most expensive shop set—at no extra cost! Trolite panels have a mirror-like surface, yet there is no surface leakage. They are beautifully finished in five different designs. Black polished. Mahogany polished. Walnut polished. Wavy design. Cube design. So you can choose the design that harmonises best with your cabinet. All the same, efficiency is not sacrificed to effect. Insulation resistance is exceptionally high. Drilling, sawing, and machining is easy. Joints can be made with acetone. Use a Trolite panel for your radio set!

PRICES, per square inch:
 Polished Black Mahogany, Walnut, Cube, Wavy
 1/2 in. ... 1/4d. 1/4 in. ... 1/4d.
 1/4 in. ... 1/4d. 1/4 in. ... 1/4d.

Ask your radio dealer also for Trolite Dials, Coil Formers, Coil Mounts and other radio mouldings. In case of difficulty write direct to:

F. A. HUGHES & Co., Limited
 204-206 Great Portland Street, W.1

Telephone: Museum 8630 (3 lines) Telegrams: "Distancing, Wesdo, London"
 Manchester Office: 185 Princess Street Telephone: City 332

EFFICIENCY WITH EFFECT

Advertisers Appreciate Mention of "A.W." with Your Order

And Now

Britain's 'Favourite Two'
 RECEIVER ON
SELFRIDGE'S
 'NO DEPOSIT'
 SYSTEM

The second choice of the readers of "Amateur Wireless" as to the most popular type of set was Britain's "Favourite Two"—a receiver that has been tested by Selfridge's Wireless Experts and found to give loud-speaker reproduction SECOND TO NONE.

It is a very powerful two-valve receiver, extremely selective, and on test at Bermondsey, Frankfurt, Langenberg, and Dortmund were received while 2LO was operating at full loud-speaker strength and without any interference from the local station. Specification below.

SPECIFICATION

	£	s.	d.		£	s.	d.
Baseboard, 13 by 8 in:	0	1	6	L.F. Transformer (4-1), (B.T.H.)	0	15	0
Ebonite or Bakelite Panel, 14 by 7 by 1/2 in. (Radion)	0	6	3	.0005 Fixed Condenser (Dubilier)	0	2	6
.0005 Variable Condenser (Cylton)	0	15	6	Ebonite Strip, 4 by 2 by 1/2 in.	0	0	6
Panel-mounting Rheostat, 6 ohms (G.E.C.)	0	2	6	8 Terminals (Belling-Lee)	0	3	0
Two-way Coil-holder (Lissen)	0	5	6	Grid Battery Clips (Bulgin)	0	0	6
2 Anti-microphonic Valve-holders (Lottus)	0	1	6	Connecting Wire (16 S.W.G. bare-tinned) (Lewcos, Junit)	0	1	0
.0003 Fixed Condenser and Series Clip (Dubilier)	0	3	0	Slow-motion Dial (Selfridge)	0	2	6
2-megohm Grid Leak (Dubilier)	0	2	6	1 Coil, No. 40 ordinary (Lissen)	0	3	3
				1 Coil, No. 60X (Lissen)	0	6	4

CASH PRICE £3 : 12 : 10

or on 'NO DEPOSIT' TERMS

—6 payments of 12/9 per month, or with one Cleartron 2-volt General Purpose and one Cleartron 2-volt Power Valve, 6 payments of 14/-

THE FAMOUS

"CLEARTRON" VALVES
 ARE AGAIN SPECIFIED

for use with this remarkable receiver, Britain's "Favourite Two." Specification below.

Valve	Filament Volts	Filament Amps	Impedance Ohms	Amplification Factors
CT08	3.0	0.08	18,000	7.5
CT08*	3.0	0.15	5,000	4
CT10	3.8	0.1	15,000	7.5
CT10*	3.8	0.1	8,000	3.8
CT15	1.8-2.0	0.15	18,000	7.5
CT15*	2.0	0.3	5,000	3.5
CT25	5.0	0.25	10,000	.9
CT25Bx	5.0	0.25	20,000	20
CT25*	5.0	0.5	4,000	5

GENERAL PURPOSE VALVES PRICE, each **4/-** **POWER AND R.C.C. VALVES** PRICE, each **6/-**

OBTAINABLE FROM

Radio Dept. (First Floor); Radio Annexe, 101 Wigmore Street, W.1; Selfridge's Bargain Basement, Aisle 10; and from the following Selfridge Stores: Bon Marché, Brixton, S.W.9; H. Holdron, Ltd., Peckham, S.E.15; John Barnes & Co., 191 Finchley Road, N.W.; Jones Bros. (Holloway), Ltd., N.7.

With this very selective set a slow-motion dial is desirable. Special Offer of Dial, with 4 1/2-in. bakelite dial, takes 3/8-in. to 1/2-in. spindle, has hair line indicator, and no backlash whatsoever. PRICE, each, 2/6 Postage and packing, 3d. extra.

Selfridge & Co. Ltd., Oxford Street, London.

Phone—Mayfair 1234

"THE MAKING OF A VALVE"

(Continued from page 183)

in the spacing of the turns gives variation in characteristics and inconsistent performance.

The grids are made by automatic machinery which for each type of valve makes long strips of grid which are subsequently and automatically cut off to the exact lengths.

Most interesting of all, however, is the manufacture of the new filament. Some of the processes involved are naturally kept a closely-guarded secret, but nevertheless the actual processes are open to inspection.

The core of the new filament used in the latest ranges of Osram 2-, 4-, and 6-volt valves is of pure tungsten which is made and drawn into fine wire at the works. The core is purified, prepared and transferred to the section of the factory dealing with the coating of the core. In this section it is given a preliminary coating with a substance designed to hold rigidly and permanently the final coating which is applied at a later stage.

Pinch Making

The making of the pinch involves a considerable amount of work, most of which is carried out by automatic machinery. Glass tubes of the correct diameter and thickness are fed vertically into a machine (shown in the first lower illustration) which cuts them into fixed lengths and provides them with a glass flange at one end. These are then taken off to the pinch-making machine (shown in the second and third illustrations from the left) where the electrode support wires and the exhausting tube are placed in the correct position. The glass flange is heated by revolving gas flames, and when at the right temperature is pinched together by automatic pinchers. This clamps the electrode support wires and the copper lead-in wires in position.

The pinch is then placed in a jig, which ensures that the filament supports, etc., are correctly adjusted. At this point the filament, grid, and anode are assembled, the jig in which the pinch is placed enabling the right length of filament to be spot-welded to its supports.

On the completion of assembling the electrodes, the inside of the anode is painted with barium azide and a small piece of magnesium is spot-welded to the outer surface of the anode.

The glass bulb is then placed over the pinch and assembled electrodes and is sealed round the bottom of the pinch, leaving the glass exhausting tube projecting.

Exhausting

The next stage is that of pumping all the air out of the glass bulb, and for this purpose the sealed-in valves are taken to

(Continued on page 204)

BRITAIN'S "FAVOURITE 3"

No. 1 LIST OF COMPONENTS

Ormond .0005 and .00025 Log Mid-line Condensers, 12/- and 13/- each. 7-ohm Panel Rheostats, 2/-. 3 B.R. Valve-holders at 1/9. 2 Single Coil-stands. .0003 Fixed and Series Clip and Dubilier 2-meg. Leak, 5/-. H.F. Choke 5/-. R.C. Dubilier Unit, 7/-. R.I. Transformer, 25/-. 7 Terminals at 9d. (5/3). 2 Strips 4 by 2.

Total **81/6**. Sent post free for **74/6** nett.

PLEASE NOTE. Price in issue Jan. 28th was an error. Above is correct. I regret any inconvenience caused.

16 by 8 PANELS, BEST GRADE "A," 5/-
16 by 8 AMERICAN CABINETS (OAK), HINGED LID AND BASEBOARD. SPECIAL PRICE WITH ABOVE KIT OF PARTS ONLY, 12/6 NETT. Post extra.

2nd SELECTION FOR ABOVE

2 Log Mid-line Condensers, with S.M. Dials (Raymond). Panel Rheostat, 7-ohm. 3 Anti-microphonic Valve-holders. 2 Single Coil Stands. 1 Lissen .0003, with Grid Leak and Series Clip. 1 H.F. Choke. Lissen R.C. Unit. L.F. Transformer (R.I. & Varley). 2 Strips 4 by 2. 7 Terminals, with Name Tabs.

POST FREE **59/6**

IT IS IMPOSSIBLE TO ADVERTISE ALL THE WIRELESS PARTS NOW ON SALE BUT IF YOU WANT THEM TRY RAYMOND'S FIRST!
BE SURE YOU VISIT THE Bargain Window.

New 100-page Catalogue. Profusely illustrated Price 1/- Post FREE, allowed off first 10/- order



CABINETS

Large stocks of really useful cabinets kept or made to order. Solid oak, glass finish. American type, hinged lid, baseboard.

- 10 x 8 x 8 ... 8/11
- 12 x 8 x 9 ... 11/6
- 14 x 7 x 9 ... 13/11
- 16 x 8 x 9 ... 16/11
- 18 x 8 x 9 ... 19/11
- 20 x 8 x 9 ... 22/6
- 21 x 7 x 9 ... 25/-
- 24 x 7 x 9 ... 27/6

Carr. & Packing 2/6 extra

SET OF THE SEASON COSSOR MELODY MAKER COMPONENTS FOR SAME

POST **KIT £4 : 10 : 0** EXTRA
2 Ormond .0005. 2 Do. S.M. Dials. 6 T.C.C. Condensers, .001, .002, two .0003, .0001, 2 mfd. 2 Grid Leak Clips, B.B. 1 Var. B.B. Rheostat, 3 Grid Leaks, .25, 3, 4 meg. 3 Lotus V.H. 1 Ferranti A.F.3. 2 Panel Switches. 1 Cossor Melody Wound Coil. Terminals. Name Tabs. Glazite. 9-v. Grid Bias (all as specified).

NOTE Drilled High-grade 21 by 7 Polished Panel, with Radion Strip, FREE with above kit.

NOTE COSSOR MELODY CABINET, American type hinged lid and baseboard for 18/11 with above kit of parts. Carriage 2/6. Cossor Valves 10/6, and Power 12/6

MARCONI, EDISWAN, OSRAM, B.T.H., COSMOS VALVES AT USUAL PRICES.

UNITS and PICK-UPS, all makes. AMPLION, CLIMAX, BENJAMIN, WEARITE, COLVERN, DETEX, DUBILIER, PENTON, EDISWAN, ORMOND, FERRANTI, HARLIE, IGRANIC, LOTUS, LISSEN, FORMO, MARCONI, MULLARD, OLDHAM, WATMEL, POLAR, EXIDE, W. & B. DUBILIER, McMICHAEL, UTILITY, HELLESEN, B.T.H., SIEMENS, BURNDIPT, EVER-READY, LEWCOS, BELLING-LEE, and all proprietary lines stocked.

BRITAIN'S "FAVOURITE 2"

Don't worry about paying exorbitant Prices on the weekly system—**TRY OUR CASH PRICE!**

Ebonite Panel 14x8, .0005 Ormond S.L.F. and S.M. Dial, Igranic 6 ohms, Lissen 2-way, 2 Lotus Valve Holders, .0003 and series clip, 2 meg. Leak, B.T.H. or R.I. and Varley L.F. Transformer, .0005 Fixed, Strip 4x2, 8 marked Terminals, G.B. Clips, 2 Wander Plugs, Square Wire.

THE ABOVE LOT net cash post free - 45/-
With Lissen L.F. - 37/6
Mansome Cabinet with above Kit only, Mahogany polished, all Components enclosed for 7/11. If cabinet ordered, 2/- extra for carriage.

PERSONAL SHOPPERS

ALL DAY SATURDAY
ALL DAY THURSDAY
TWO SHOPS ALL DAY EVERY DAY
if one is closed Hours 9 a.m. to 6 p.m.
the other is open. Sat. 9 a.m. to 9 p.m.
Sunday morning 11-1

"MULLARD MASTER THREE"

No Solder—Only 20 Wires to Connect
SET OF COMPONENTS

2 Strips. 1 Base. 2 J.B. Condensers. Climax Choke. 3 Valve-holders. Pair Brackets. Spade Terminals. Master 3 Coils. Bulgin Switch. R.C.C. Unit Type "A," R.I. L.F. Transformer. Mullard .0003. 2 Meg. Leak. 8 Wander Plugs. Flex and Bush. 4 Named Terminals, and 3 Mullard Valves.

ABOVE KIT £6 : 17 : 6

FREE. High-grade Aluminium Panel (drilled), G.B. Battery, and 100-volt H.T. GIVEN FREE with above. All carriage and packing extra. Or Panel free and the 25/- Oak Cabinet for 15/- with above kit free, instead of 2 free Batteries.

DARIO VALVES

(Genuine Radio Micro)

Best in the World.

- SIVOLT 2-v. 05. 7/8;
- Loud Speaker Valve 10 9;
- R.C. .05 1.8, 7/6; 3.5
- .05, 7/6; Loud Speaker
- Valve, 10/9; 3.5 R.C. .07,
- 7/6. Post ed. each.

DR. NESPER Adjustable PHONES ... **10/6**

LOUD SPEAKER UNIT ... **10/6**

DE LUXE PHONES ... **7/11**

MARCONI, EDISWAN, OSRAM, B.T.H., COSMOS VALVES AT USUAL PRICES.

UNITS and PICK-UPS, all makes. AMPLION, CLIMAX, BENJAMIN, WEARITE, COLVERN, DETEX, DUBILIER, PENTON, EDISWAN, ORMOND, FERRANTI, HARLIE, IGRANIC, LOTUS, LISSEN, FORMO, MARCONI, MULLARD, OLDHAM, WATMEL, POLAR, EXIDE, W. & B. DUBILIER, McMICHAEL, UTILITY, HELLESEN, B.T.H., SIEMENS, BURNDIPT, EVER-READY, LEWCOS, BELLING-LEE, and all proprietary lines stocked.

THE NEW NO. 3 ORMOND S.L.F. CONDENSER

.00025, 5/6; .00035, 5/9; .0005, 6/-. With 4-in. Dial. With Friction 55-1 4-in. Dial, 6/- each extra.
ORMOND, Square Law Low-Loss. .0005, 9/6; .0005, 8/6 (1/6 each less no. vernier); Friction Geared, .0005, 15/-; .00035, 14/6; .00025, 13/6. Straight Line. Frequency Friction Geared. .0005, 20/-; .00035, 19/6. S.L.F. .0005, 12/-; .00035, 11/-.
FILAMENT RHEOSTATS, Dual, 2/6; 6 ohms or 30 ohms, 2/-; Potentiometer, 400 ohms, 2/6. .0007 Reactives, 4/-; Air Dielectric, 2/-; Neutralising, 4/-; Neutrodyne, 2/-; Twin Gang, .0005, 32/-; Triple, 40/-; H.F. Choke, 7/6. Geared Dial, 5/-.



LOW LOSS SQUARE LAW.
.0003 this variable
.0005 4/11 Condenser is
each simply marvellous value.
By Post It cannot be equalled in price or quality with VERNIER 1/- extra.



LOG-MID-LINE

Try our NEW VARIABLE CONDENSERS, made on the Log-Mid-Line principle. .0005 or .0003, with a 4-in. Triolite Dial, the best you can try, for the moderate price of **5/11** each post free

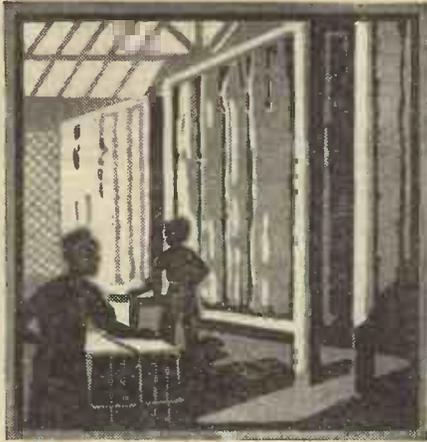
LISSEN J.B. CONDENSERS

Valve-Holders, 1/-; Fixed Con., 1/-, 1/6; Leaks, 1/-; Switches, 1/6, 2/6; Latest 2-way Cam Vernier, 4/6; Rheostats, 2/6; B.B., 1/6; Lissenola, 13/6; L.F. Transformers, 8/6; 100 v. H.T., 12/11; 60 v. H.T., 7/11; Coils, 60 X, 6/4; 250 X, 9/9.

T.T. Friction Ver. .0005, 16/6 .00035, 15/9
.00015, 16/-
S.L.F.
.0005, 11/6 .00035, 10/6
.00025, 10/- .00015, 10/-
Sq. Law
.001 .. 9/6 .0005 .. 8/-
.0003 .. 7/-
Neutralising ... 3/6

CALLERS—If you bring your list of parts in we will give you a very special quotation over 30/-.

K. RAYMOND LEICESTER SQ. TUBE
(Important) Ask for back of Daly's Theatre This address is opposite.
27 & 28a, LISLE St., LONDON, W.C.2.
Phone: Gerrard 4637.



Plantations and Panels.

4. The long, thin rubber sheets are now dried

WHEN the powerful roller machines have expressed all impurity from the rubber, the long thin sheets are hung up to dry, where they are left for some time preparatory to shipment.

If a sheet of this rubber contains the slightest flaw or impediment it is never shipped for the manufacture of Resiston Panels. That is why, if you examine the Resiston Panel which your Wireless Dealer will show you, you will find no blemish to mar its beautiful surface. That is why you will marvel at its great strength. Why you will appraise its rich colouring—as fresh after months of use as when you buy it. That, too, is why Resiston's insulation is so perfect, and why its dielectric constant is so low. That, in short, is why Resiston is the perfect panel. Ask your Dealer—he knows.

Q Resiston Panels come in 13 stock sizes in Black and Mahogany-grained. From 6 in. x 9 in. in Black, 3/5, to 8 in. x 30 in. Mahogany-grained 19/-.

RESISTON
PANELS

"24 hours Cut Panel Service"

Adv. American Hard Rubber Co., Ltd., 13a, Fore St. E.C.
1697

"THE MAKING OF A VALVE"

(Continued from page 203)

a round slowly-rotating table (shown in the first illustration) while their exhausting tubes are automatically connected to various pumps in succession, each successive pump creating a higher vacuum in the valve than the previous pump. At the end of the pumping process the highest possible vacuum which can be obtained by mechanical means has been created in each valve.

In the meantime the valves slowly pass through small ovens which heats the glass and drives off any gases that may be occluded, these gases being removed during the exhausting process.

At the final stage on the rotating table a small coil coupled to a high-frequency oscillating circuit (having a frequency equal to a wavelength of about 600 metres) is lowered over each valve in turn. Eddy currents are set up in the anode sufficient to raise the latter to a temperature which flashes the small piece of magnesium. The magnesium volatilises and pins down any remaining gas in the valve to the walls of the bulb, giving the latter the well-known silver appearance.

A small blow-pipe flame plays on the exhausting tube sealing it at the required length. The valve is then seized by grippers, placed in a shoot which carries it to the next section where it is capped. Bakelite caps made by the G.E.C. are used and these are cemented to the glass bulbs with a special cement.

Final Coating of Filament

The most remarkable state in which the valve finds itself at the moment is this. Although to all appearances the valve is exhausted, sealed-in and capped, the filament has not yet received its final coating. In fact, the coating of the filament has yet to be accomplished.

Each valve is subjected to a much stronger high-frequency oscillating current again setting up eddy-currents in the anode and flashing the barium azide which deposits itself in the form of pure barium on the prepared surface of the filament.

It is this coating of barium that gives such highly emissive properties to the filament of the new Osram valve.

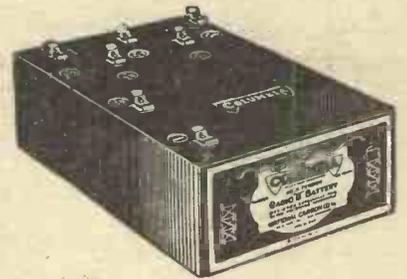
The valve is then "aged" under working conditions on the testing racks in order to stabilise its performance.

Every individual Osram valve is tested—not one of a batch, but every single valve that leaves the works has to comply with a certain rigid specification.

These tests include those of (1) filament continuity; (2) filament current; (3) minimum emission; (4) conformity to published characteristics; (5) insulation across pins; (6) disposition of electrodes; (7) general appearance.

Such is the story of the birth of a valve, one of the most wonderful inventions of science.

Used the world over



Columbia

No. 4780, 60 volts type: 22/6

This statement is literally true, and the reason is that Columbia High Capacity Batteries are the cheapest and most efficient in the world. They save you money! The 60 volts type weighs 13 lbs., as compared with 5 lbs. in other batteries of the same voltage. This means that you are getting more than three batteries for the cost of two. Ask your dealer for Columbia—the battery that lasts.

Price of 60 volts type: 22/6.

Don't hesitate to write to us if you are unable to obtain Columbia Batteries from your dealer.

Columbia High Capacity Batteries are manufactured by The National Carbon Co., the world's largest battery manufacturers and are sold under the full guarantee of this Company.

J. R. MORRIS

15, Kingsway, London, W.C.2.
Scotland: J. T. Carlwright, 3 Cadogan Street, Glasgow

Mullard
The Master Three

Patent.

The designers of the famous Mullard Receiver, The "Master Three," in their choice of the best possible components, specified Belling-Lee terminals. Your own choice must be Belling-Lee.

Prices:

Type "B." Standard large insulated model.
Polished black bakelite - - 9d. each
Type "M." As type "B" but smaller, and with only the engraved top insulated.
Rest nickel-plated brass - - 6d. each

BOTH TYPES GUARANTEED
Made with 30 different engravings.

BELLING-LEE
TERMINALS

Belling & Lee, Ltd., Queensway Works, Ponders End, Middlesex.



FORMO-DENSER

A sound variable condenser which fills a long-felt want. Specially designed to take the place of the hitherto generally used Fixed Condenser. For use as:

- Neutralising Condenser
- Aerial Condenser
- Grid Condenser
- Reaction Condenser
- Phasing Condenser
- Tone Control Condenser

5 Capacity ranges, and each in Baseboard and Panel models.

22 CRICKLEWOOD LANE, N.W. 2

Phone: Hampstead 1787

SAXON GUIDE TO WIRELESS

1928 EDITION ENTIRELY REVISED

192 PAGES

This valuable book costs only 1/3, but it is worth many pounds, as it enables any beginner to build splendid up-to-date wireless sets of unrivalled EFFICIENCY at a great saving of money. FULL INSTRUCTIONS, with clear wiring diagrams, are given for making CRYSTAL AND SINGLE-VALVE SETS, ONE- AND TWO-VALVE AMPLIFIERS, the FAMOUS SAXON FOUR-VALVE TUNED-ANODE SET; also an EXTREMELY EFFICIENT FIVE-VALVE RECEIVER.

Particular attention is drawn to our latest 1928 TWO- AND THREE-VALVE LOUD-SPEAKER SETS, which eliminate coils entirely and cover all wavelengths from 200 to 2,000 metres by merely turning a knob. Any beginner can make these sets in two or three hours.

1/3 POST FREE

NO SOLDERING--NO DRILLING
NO KNOWLEDGE REQUIRED
Money refunded if book is returned in 7 days.

SAXON RADIO CO. (Dept. 12), SOUTH SHORE, BLACKPOOL

VALVE HEATING

from
Air depolarising "AD" PRIMARY CELLS

Operating EMF 1 volt or higher per cell, perfect simplicity; charged at home with sal-ammoniac. Most economical cell yet produced as the following examples will show.

No.	Output Not to Exceed	Life per Zinc when used 3 hours daily	Price per complete cell, with salt
222	1 amp. 3-5 hrs. daily.	350 days with 5 valves (each 100 m.a.)	30/-
229	300 m.a. 3-5 hrs. daily.	330 days with 3 valves (each 100 m.a.)	15/-
240	120 m.a. 3-5 hrs. daily.	330 days with 1 valve (100 m.a.)	5/6

Pro rata life for other types of valves 1 volt per cell, 2 volts 2 cells in series, etc.

PERFECT IN ALL RESPECTS for Country Sets or anywhere where attention to battery recharging is troublesome.

Ask your dealer to give fullest particulars or apply to

LE CARBONE

Coventry House, South Place, London, E.C.2.

Works: PORTSLADE, SUSSEX.

WALK UP! WALK UP! WALK UP!

NOW SHOWING (IN OUR WINDOWS!)

THE NEW 1928 SOLODYNE 5, undoubtedly one of the greatest achievements in wireless. Foreign stations received as loud and clear as 2L.O. NOW PREPARING. All parts for this wonderful circuit.

ALSO all parts now in stock for the MOVING COIL LOUD-SPEAKER. DO NOT FAIL to hear a demonstration of this wonderful adjunct to wireless. SECURE AT ONCE THE NEW LIST OF PARTS FOR THE MOVING COIL LOUD-SPEAKER, and special reference work on same by C. P. ALLINSON, A.M.I.R.E., the well-known technical expert. 2s. 6d.

Every make of Pick-up for use with the Gramophone in stock from 1s. upwards.

ALL PARTS FOR MULLARD "MASTER THREE" NOW IN STOCK. FREE to all purchasers of a complete set of parts for the MULLARD "MASTER THREE" circuit, including Royalty, we OFFER TO WIRE THEIR SETS ENTIRELY FREE OF CHARGE.

OUR INTERNATIONAL RADIO CATALOGUE (3rd edition) will be sent to all enthusiasts sending 6d. to cover cost of postage and packing

(The Best in the West) **WILL DAY, LTD.** (Dept. A.W.)

19, LISLE STREET, LEICESTER SQUARE, LONDON, W.C.2

Telephone (2 lines): Regent 0921 and 0922. Telegrams: Titles, Westrand, London.

Better Transformers

It can be safely claimed that the STANDARD Model Transformer has positively no equal at the price. Recently designed, its amplification and tone have benefited to the extent of 25 per cent. Weight, 12 oz. Height, 3 1/2 in. Width, 2 1/2 in. Depth, 1 1/2 in.

The matchless ORCHESTRAL Model Transformer (centre illustration) stands foremost amongst any other makes on the market. It reproduces without the slightest suspicion of distortion. Each instrument comprising the orchestra is most clearly defined. Weight, 42 oz. Height, 2 1/2 in. Width, 3 1/2 in. Depth, 2 1/2 in.

STANDARD 10/6
ORCHESTRAL 22/6
MANCHESTER 12/6

would be hard to find

The popular MANCHESTER Model embodies all the features of the Standard type, but is larger and of heavier design. Its amplification is exceptionally good whilst clearness of speech and tone is remarkable.

Weight, 14 oz. Height, 3 1/2 in. Width, 2 1/2 in. Depth, 2 1/2 in.

The Orchestral Model Transformer is incorporated in the Hartley D.X. Three, described in the December 31 issue of this paper.

The POWER EQUIPMENT Co. Ltd.
Kingsbury Works, The Hyde, HENDON, N.W.9

POWQUIP

TRANSFORMERS and L.F. CHOKES

THE LATEST

in the Wireless line are the famous'

LOEWE HIGH VACUUM RESISTANCES AND BLOCK CONDENSERS.

As an expert you should know them. Please ask for free literature by mailing the coupon below.

LOEWE Radio Co., Ltd., 4 Fountayne Road, Tottenham, London, N.15. Telephone: Tottenham 2076

POST TO-DAY

LOEWE RADIO

To the LOEWE Radio Company Ltd., 4 Fountayne Road, Tottenham, N.15.

Please send me your literature concerning Loewe High Vacuum Resistances and Loewe High Vacuum Block Condensers.

NAME _____

ADDRESS _____

A.W. 4/2



RELIABLE CABINETS

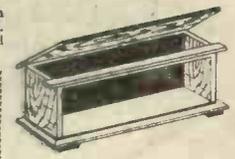
MAKE your radio set as attractive as any sold in the shops by installing it in a Camco cabinet. Illustrated list of complete range sent FREE. Fill up and post coupon below.

GARRINGTON MANUFACTURING CO. LTD., Camco Works, Banderstead Road, South Oroydon

Telephone: Croydon 0623 (2 lines)

Name _____

Address _____



Advertisers Appreciate Mention of "A.W." with Your Order



OUT-OF-DATE H-T BATTERIES are the source of continual expense and disappointment

HOW often have you experienced poor reception due to run-down batteries? Think of what a permanent H.T. supply at small cost would mean to you. This battery supplies a steady current ensuring pure, undistorted tone of consistently good strength. A current that can always be kept up to scratch and effect an enormous saving in cost.

Get this Free Book

Take the first step by sending for FREE Booklet describing every detail for installing and maintaining this super-efficient and money-saving battery.

For 2-Valve Sets: A.4. 90 volts... 25/1	For 3-5 Valve Sets: D.6. 108 volts... 37/3	Super Sets: F.6. 120 volts... 69/6
--	---	---------------------------------------

DEFERRED TERMS. NO DEPOSIT. ORDERS OF 10/- OR OVER CARRIAGE PAID. Single Units of 1½ volts from 41d. each. Dept. (C) WET H.T. BATTERY CO. 12 Brownlow Street, London, W.C.1. STOCKED BY HALFORD'S CYCLE STORES

Avoid all troubles & expense of H.T. supply by installing the STANDARD PERMANENT H.T. SUPPLY

The Vital Power in Radio! M.B. 41

BUILD STRICTLY TO THE AUTHORS SPECIFICATION AND USE A COLVERN ALUMINIUM PANEL

For The Master Three

14 gauge; sprayed instrument black; drilled for condensers and switch— 7/6 From your dealer.

Colvern Ltd., Mowney's Road, Romford.

"AFTER THE SET IS BUILT"

(Continued from page 172)

trouble some constructors. In a good many of our receivers we use a Dubilier grid condenser, provided with an insulated clip for the "series" grid leak connection in order to avoid the use of a separate grid leak holder. Some constructors ignore this insulated clip and connect the grid-leak straight across the grid condenser.

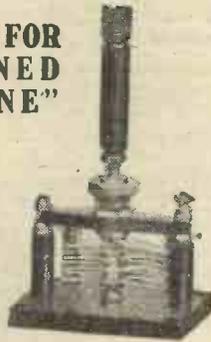
When it is realised that one side of the coil is already connected to L.T. negative it will be clear, from an examination of a blueprint, that the connection of the grid-leak to the coil side of the grid condenser results in the short-circuiting of the accumulator through the coil. Readers sometimes want to know what it is that is making their coil get hot! We hope this explains the position and will prevent other readers falling into the trap.

The foregoing notes should be read in conjunction with the constructional articles in which the reader is particularly interested and if there is any other point still not clear you are invited to write to us.

RECOMMENDED FOR THE "SCREENED GRID H.F. ONE"

Keystone Neutralising Condenser

Ideal for the many positions where a small capacity condenser is required. An aluminium shield prevents hand-capacity effects, and a special taper bearing gives a beautifully smooth movement. Capacity '0001 mfd. Price 5/6



Keystone Midget Condenser

Suitable for neutralising the electrode capacities for all types of valves. Very low minimum capacity. The wide spacing of the vanes renders accidental "shorting" impossible.

Board mounting 5/-

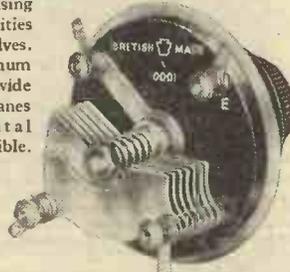
Panel mounting 6/3

Send for comprehensive illustrated Catalogue "AW" of Components.

PETO-SCOTT Co., Ltd.

77, City Road, London, E.C.1.

Branches:—62, High Holborn, London, W.C.1
4, Manchester St., Liverpool.



"TROMBA" THE WET H.T.

Small Capacity Large Capacity
SACS 1/4 ZINCS 8d. doz. SACS 2/2 ZINCS 10d. doz.
JARS for either size 1/2 doz. Postage extra.
90 v. for 2 valves 18/4. 123 v. for 5 valves 38/7.
Any voltage to order. NO EXTRAS. CARRIAGE PAID,
1/4d. brings booklet, 6d. a cell 1/- full range of samples.
TROMBA ELECTRICAL CO. (Dept. D).
13 H'gh Road, Kilburn, N.W.8. Phone: Maida Vale 1669

LOSE NO TIME! BUILD THE MELODY MAKER

AND JOIN THE TENS OF THOUSANDS WHO ARE NOW REALISING FOR THE FIRST TIME WHAT WIRELESS REALLY IS—AND THE JOY OF BUILDING YOUR OWN SET. YOU CAN BUILD THE MELODY MAKER ON YOUR KITCHEN TABLE, IN 3 TO 4 HOURS, USING THE COMPONENTS SPECIFIED, WITH THE AID OF ORDINARY HOUSEHOLD TOOLS AND WITHOUT SOLDERING, THE BUGBEAR OF THE NOVICE.

LISENIN

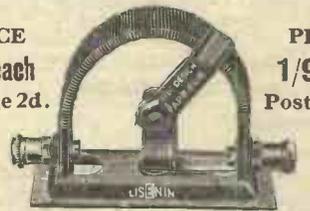
PRE-SET RESISTOR

(REGISTERED DESIGN)

SPECIFIED BY THE DESIGNER, IS MADE IN RESISTANCES TO SUIT ALL VALVES. FIVE OHMS (MAXIMUM) IS SUITABLE FOR ALL

COSSOR VALVES

PRICE 1/9 each Postage 2d.



PRICE 1/9 each Postage 2d.

COSSOR MELODY MAKER

Coils wound to specification 6/- each
Formers only ... 2- ..
Postage 4d. extra.

POSITIVE GRIP TERMINALS ARE ABSOLUTELY IDEAL



The ends of the leads are so gripped that they cannot possibly come adrift. Pressure is so distributed that a break is practically impossible. (See illustration.) Further, the ragged ends of the flex covering are covered up, and one's leads look and behave as they ought to behave when fitted with Lisenin Positive Grip Terminals, as used in

"RADIO for the MILLION"

"Amateur Wireless" and "Wireless World" Sets. Follow the lead of experts.

Plugs and sockets, with two nuts and indication disc... 4½d.
Spade Ends ... 4d.
Wander Plugs ... 2d.

Obtainable of your dealer. If he cannot supply give us his name, but refuse substitutes

THE LISEININ WIRELESS CO.

1, EDGWARE RD., LONDON, W.2
Phone: PADDINGTON 2734.

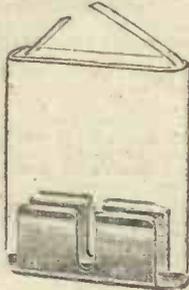
Pat. No. 245586

BULGIN

RADIO PRODUCTS

GRID BIAS BATTERY CLIPS
There are some imitations but make sure you get the original 'Deckorem' in the Orange and Black Cartons.

- No. 1. for 9 or 15-volt Batteries. 6d. per pair.
- No. 2. for 4½-volt, (as illustrated) 4½d.
- No. 3. Universal Spring Type, 2d. each.



Reg. Design No. 721332

Obtainable from all Dealers. Send for our 5 free catalogues.

A. F. BULGIN & CO.

RADIO MANUFACTURERS,
9, 10, 11, CURSITOR ST., CHANCERY LANE, E.C.4.
Phone: HOLBORN 2073.

THE "Lindley"

FIVE-VALVE PORTABLE

Range—400 miles on Daventry 5 XX.
300 " " " 5 GB.
100 " " " Local Stations.

Also receives several Continental Stations.

Purity of reception is most marked.

Volume is excellent and splendidly reproduced on the self-contained speaker.

All components are British and the set is easily tuned for desired stations.

All-in PRICE **£30** Royalties paid

Canvas slip-over cover supplied free.

FROM ALL DEALERS OR

LINDLEY & CO.

Telephone: Holborn 3052

14 Great Queen Street, Kingsway, LONDON, W.C.2

The accepted Rolls Royce of Radio is that great success

DIX-ONEMETER

It is a Precision Instrument of universal use, with an ingenious system of multipliers which enable full-scale readings of any value to be made over a wide range. One millivolt to 2,000 v., or 50 ohms to 50 megohms. Mirror double scale, jewelled, knife edge. A £10 De Luxe model for 55/-. Multipliers 6/6 each New A.C. Model now ready. ANODE METERS, panel type for showing H.T. output to Receivers, 7/-. 

FIVE GUINEA CABINET LOUD-SPEAKERS for 25/- The famous Violina can be heard all day at Electradix **VIOLA REED CONE UNITS, 15/6.** WESTERN

ELECTRIC balance arm, 10/- **BROWN'S "A" I3/6** Pick-up Parts, Magnet and Bobbins; 1/2, ditto in case, 1/6. Special Sk. Adjustable Unit, 8/-. Marvels of the Microphone 6d.

Our new **72-PAGE CATALOGUE** is now ready. Over a thousand bargains are listed and hundreds illustrated. Send 4d. in stamps to

ELECTRADIX RADIOS,
218 UPPER THAMES STREET, LONDON, E.C.4

DIGBY'S CABINETS

Write for New 16-page Catalogue

Please note new address:

F. DIGBY, 9 THE OVAL, MACKNEY ROAD, LONDON, E.2.

"An Excellent Earth Tube"

MR. KILLINGWORTH HEDGES, 10 Cranley Place, South Kensington, London, S.W., points out to us that the earth tube described and illustrated on page 87 of the January 21 issue of **AMATEUR WIRELESS**, resembles his patented tubular earth, which has been in use for some years. The "Hedges" Tubular Earth consists of a 3 ft. pointed tube, to which is connected 7/22 bare copper wire which is electrically jointed by lead yarn tamped into the socket. The wire passes down to the bottom of the tube. Surrounding the copper wire inside the tube is a filling of carbon and at the top of the tube, just below ground level, is a hole which provides for self-watering. The price varies from 4s. to 8s. 6d. each and the tubular earth is obtainable from Messrs. R. C. Cutting & Co., Vulcan House, 56, Ludgate Hill, London, E.C.4.

Sure-a-lite High-tension Batteries

In the advertisement of these batteries, which appeared in our issue of January 28, the price of the new Royal 100-volt battery was given as 14s. 9d. The correct price is 14s. 3d. In addition, the makers have decided to name the battery "Supra."

"Amateur Wireless and Electric." Price Threepence. Published on Thursdays and bearing the date of Saturday immediately following. Post free to any part of the world: 3 months, 4s. 6d.; 6 months, 8s. 9d.; 12 months, 17s. 6d. Postal Orders, Post Office Orders, or Cheques should be made payable to "Bernard Jones Publications, Ltd."

General Correspondence is to be brief and written on one side of the paper only. All sketches and drawings to be on separate sheets. **Contributions** are always welcome, will be promptly considered, and if used will be paid for. Queries should be addressed to the Editor, and the conditions printed at the head of "Our Information Bureau" should be closely observed. **Communications** should be addressed, according to their nature, to The Editor, The Advertisement Manager, or the Publisher, "Amateur Wireless," 33-61 Fetter Lane, London, E.C.4.



No more prickly kisses!

Does your morning salute scratch your wife's face? Then use

ECLIPSE

SAFETY RAZOR
BLADES

and have no more complaints!

THE "ECLIPSE" GUARANTEE

Buy a packet of 5 "Eclipse" Blades from your usual supplier (or if unable to obtain, send 1/8 to makers). If, after using 2, you are not entirely satisfied, return the 5 blades direct to us and your 1/8 will be refunded.

5 for 1/8 Obtainable from 10 for 3/4 usual suppliers

Made by **JAMES NEILL & CO. (SHEFFIELD), LTD.**
STEEL MANUFACTURERS.
(Dept. R3) NAPIER STREET, SHEFFIELD

The BEST Magazine of Wireless— "WIRELESS MAGAZINE"

STARTLING REDUCTION IN WIRELESS VALVES

BEST BRITISH FOR 3/6 OLD PRICE 8 6

L.F., H.F., R.C., AND DETECTOR IN 2 and 4 VOLTS

P.R. SUPER DULL EMITTER VALVES challenge comparison with any other valve on the market. Don't imagine for one moment that they are "tripe"—such as bankrupt stocks or rubbishy foreign valves. On the contrary, they are the latest product of one of the finest equipped factories in Great Britain.

Type	Fil. Vts.	Fil. Amp.	Imp. Ohms.	Amp. Fac.	M/C	
PR 1	2	.06	35,000	15	.4	H.F.
PR 2	2	.06	25,000	12	.43	Det.
PR 3	2	.06	18,000	8	.44	L.F.
PR 4	2	.06	120,000	40	.33	R.C.
PR 5	2	.15	40,000	20	.5	H.F.
PR 6	2	.15	30,000	15	.5	Det.
PR 7	2	.15	12,000	6	.5	L.F.
PR 8	4	.06	23,000	15	.65	H.F.
PR 9	4	.06	19,000	9.5	.5	Det.
PR10	4	.06	11,000	6	.55	L.F.
PR11	4	.06	120,000	40	.33	R.C.

Power Valves 2V .20 6,000 5 .82 P. 7/6 Each. Post & Packing 4d.
4V .15 4,000 4 1.0 P.

P.R. VALVES 6 St. Paul's Buildings 29 PATERNOSTER ROW LONDON E.C.4



Phone your order: City 3112. Pay the Postman C.Q.D.

Sets of Valves made up to any requirements.

NOW ONLY 3/6

Post and Packing 4d:

- 2 Valves for 6/2 Post & Packing 6d.
- 3 Valves for 10/- Post & Packing 6d.
- 4 Valves for 13/- Post & Packing 9d.

All valves despatched under guarantee of money back in full if not satisfied. All valves are carefully packed and leakages replaced.

500,000 LISTENERS
USE AND RECOMMEND LIBERTY DETECTOR

WHY?
TRY ONE AND GET THE ANSWER

Louder permanently than a cat-whisker sometimes.

From all Dealers at post free.



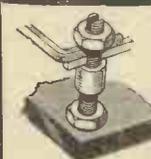
Don't experiment — use a LIBERTY, the Original. Still the best, but be sure it's a LIBERTY!

Every one tested on broadcasting. Fully guaranteed.

RADI-ARC CO. BENNETT ST. LONDON, W.A

NOW **2/6**

BELLING - LEE SUB-CONNECTORS



This handy little gadget eliminates soldering and gives a low resistance and low self-capacity joint. Supplied to screw on to 2, 4 and 6 B.A. threads, and also "T" or Floating connections for joining wires, 1d. each with nut, or in assorted packets of 30, 2/6.

Made by the makers of the famous Belling-Lee Terminals. Queensway Works, Ponders End, Middlesex

GAMBRELL CENTRE-TAPPED COILS



These coils are recommended for use in all circuits which are designed for extreme selectivity. Besides being excellent for this purpose, these coils can be used with advantage in ANY circuit Standard fitting to all coil sockets. Occupy minimum baseboard space.

SIZE	PRICE	Approx. No. Turns
A2	4/10	15
A	4/10	25
B	5/-	30
A1	5/2	40
C	5/3	50
D	5/9	75
E	6/3	100
E1	6/9	150
F	7/9	200
F	8/6	300
G	10/-	600

Prices quoted are Standard Coils—Centre-Tapped, 6d. extra.

A Gambrell Coil Holder specially designed for use with these coils, and which does away entirely with flex leads. Price 1/9 each.

GAMBRELL BROS. LTD.
76 Victoria Street, London, S.W.1

RADIO PANELS

7x6	1/3	9x6	1/7
8x6	1/4	11x8	2/3
10x8	2/1	12x8	2/6
10x9	2/4	12x9	2/10
12x10	3/-	14x10	3/5
14x12	4/-	16x9	3/6
14x7	2/7	21x7	3/7
16x8	3/2	24x7	4/-
18x7	3/2		

3/4 in. thick, Post Free.



TRADE MARK

Money-back guarantee that each and all Panels are free from surface leakage. Megger test Infinity.

CROXSONIA CO., 10 South St., Moorgate, E.C.2
Phone: Clerkenwell 7853

Agents: John Henry Smith, 139 Anlaby Road, Hull.
L. H. Helyar, 82 Chamberlin Road, Norwich.
A. Siredwick & Co., 27 The Market, Chatham.
Boynton & Co., Ltd., 34 Bradford Street, Birmingham.

Mullard The Master Three

ALUMINIUM PANELS

For this set Frosted Finish, Drilled for Condensers and Switch, 6/- per panel (post 6d.)

FREE: Two Terminal Blocks Drilled, given away to every purchaser.

S. MARKS & SON
15 Park Street, Camden Town, LONDON, N.W.1

NO VALVES!

The "NEW MAGNO" Micro-amplifier is GUARANTEED to amplify 3 to 10 times when connected to any crystal (or valve) set. For 2/6 we supply the micro parts—i.e., ample length of sensitive electrode, read, and screws—to make this amplifier, complete, with full clear diagrams, drawings and instructions. This enables anyone to CHEAPLY make an efficient amplifier without H.T., Buttons, or Accumulators. Worked by 1 1/2-v. dry cell only. Agent: L. Cook, 182, Cranston Road, S.E.25.

Early American Reception

WITH the aid of the "Short-wave Super-six" a member of the AMATEUR WIRELESS Technical Staff picked up the American short-wave broadcasting station 2XAD at the unusually early hour of 6.30 p.m. on the evening of Monday, January 23. The wavelength was 21.97 metres and the strength was sufficiently great to enable a large moving-coil loud-speaker to be worked. Users of this remarkably sensitive short-waver should note that the two tuning-condenser readings were 29.5 and 32 degrees, and the reaction reading was 42 degrees. We should be interested to hear of any reader who has picked up long-distance short-wave broadcasting with a "Short-wave Super-six."

SIEMEN'S BROTHERS request us to point out that in the latest edition of the "Cossor Melody Maker" chart the old prices of the Siemen's batteries are given. The new prices are as follows: 60-volt battery, 8s. 6d.; "Power," 60-volt, 15s.

The new super-receiving station recently opened at Belfast, Main, U.S.A., has three aerials, nine miles long and six miles apart.

During the water-front dispute between the ship-owners and men which occurred a short time ago in Australia, the shipowners in both Australia and England had a "board" meeting, the wireless beam system being the "medium."

THE PERFECT WET H.T.

ASSURED WITH OUR NEW INSULATING LINER

Jars, 1/3 doz. plain, 1/6 doz. waxed; special zincs, 1/- doz.; big capacity zincs, 1/6 doz.; perforated liners, 4d. doz. Post free on 3 doz. complete units and over including special divided carbon suitable as a container. Send 6d. for sample complete unit, particulars and instructions. We stock seamless moulded cone parts.

TELEPHONES AND LOUD-SPEAKERS RE-WOUND
SPENCER'S STORES, LTD.
4-5 Mason's Avenue, Coleman Street, London, E.C.2
Phone: London Wall 2292 (Nr. Bank)

EASY TERMS

Send Particulars of your Requirement to THE WOOLDRIDGE RADIO CO. LTD. RADIO COMPONENTS DEPT. 17 & 22 LISLE ST. W.C. 2

REPAIRS—THREE MONTHS' GUARANTEE accompanies all our repairs. Any make of L.F. Transformer, Loud-speaker or Headphones, Repaired and despatched within 48 hours. 4/- Post Free. Terms to Trade.

SERVICE 214 HIGH ST., COLLIER'S WOOD, LONDON, S.W. 19.

H.T. ELIMINATORS

All voltage D.C. model, four positive tapings, 25/- post 1/- Fully guaranteed. We also repair or rewind anything from a choke to a 10 valve set. Trade enquiries welcomed. **KNIGHT & CO., 6 Chapel Street, London, E.C.2.** Phone: Clerkenwell 4715.

The WIRELESS MAGAZINE

The Big British Wireless Monthly

1/-

CABINETS "MELODY MAKER" "MASTER THREE"

Complete parts for either, in Oak specially selected for the purpose, cut to exact size and planed smooth.

Nothing but the screws required to put together a Cabinet that you will be proud of.

8/- (Postage 1/-)

KENT CABINETS, WESTGATE, KENT.

PREPAID ADVERTISEMENTS.

Advertisements under this head are charged **THREEPENCE PER WORD**, minimum charge **THREE SHILLINGS.**

DEPOSIT SYSTEM

As the Publishers cannot accept responsibility for the bonafides of advertisers in this publication, they have introduced a system of deposit which it is recommended should be adopted by readers when dealing with persons with whom they are unacquainted. It is here explained.

Intending purchasers should forward to the Publishers the amount of the purchase money of the article advertised. This will be acknowledged to both the Depositor and the Vendor, whose names and addresses must necessarily be given. The Deposit is retained until advice is received of the completion of the purchase, or of the article having been returned to and accepted by the Vendor. In addition to the amount of the Deposit, a Fee of 6d. for sums of £1 and under, and 1s. for amounts in excess of £1, to cover postage, etc., must be remitted at the same time. In cases of persons not resident within the United Kingdom, double fees are charged.

The amount of the Deposit and Fee must be remitted by Postal Order or Registered Letter (Cheques cannot be accepted), addressed to

"AMATEUR WIRELESS" ADVERTISEMENT DEPARTMENT, 58/61, FETTER LANE, LONDON, E.C.4

WOOD HORNS FOR ALL SPEAKER BASES AND GRAMOPHONE UNITS.—See AMATEUR WIRELESS, Dec. 24th for illustration of cheapest wood horn on the market. List: H. Maddison, 2a, Ronald's Road, N.5. Manufacturer of the "Allwoodhorn."

HOME BATTERY CHARGERS for alternating or direct current. Charges both high and low tension Accumulators. Prices from 30/-. Send for illustrated list. Rumbaken Magneto Works, Ardwick, Manchester, or 240 Deansgate; London, 39 Victoria Street, S.W.1.

PATENTS.—Trade Marks. Advice Handbook free—B. T. King. Regd. Patent Agent, 146, Queen Victoria Street, London.

WIRELESS MORSE INKERS. complete with someter and relay, £3. 2-in. Spark Coils, no vibrators, windings, and 4M Condenser, perfect, 6/-; carriage, 1/6. Microphones, 1/6. Microphone Transformers, 4/6. Microphone buttons, 1/- Large Single Earphones, 1/6 —Below

LARGE FAN MOTORS. no fans, 110 v. and 220 v., all D.C., 10/-, 110-v. D.C. Motor Blower, 1 hp., 30/-; Starter, 10/- Large new Car Magnetes, no breakers, make good H.T. generators, 10/-; carriage, 1 1/6. P.O. Relays, A type, 17/6. 2 M.F. Condensers, 2/-; 025, 6d. Dewar. Switches, 9d. L.F. Transformers, 6/- Buzzer, 1/- 1,000-ohm Chokes, 1/-—Below

Guarantee all above goods to satisfaction. Cash with order. Three days' approval from date of delivery. All replies answered.—Galpin, Binfield Heath, near Henley-on-Thames.

WET H.T. BATTERIES

Solve all H.T. Troubles

SELF-CHARGING, SILENT, ECONOMICAL

JARS (waxed) 2 1/2 x 1 1/2 sq. 1/3 doz. ZINCS New type, 1 1/2 doz. BACS 1/2 doz. Sample doz. (18 volts) complete with band and electrolyte 4/3, post 9d. Sample unit 6d. 16 page booklet free. Bargain list free. AMPLIFIERS: 1 VALVE 19/-. 2 VALVE 30/-. 2 VALVE ALL-STATION SET, 44.

A. TAYLOR, 57 Studley Road, Stockwell, London

D-XELLENT!

DX PLUG-IN COILS

From 1/- DX COILS, LTD., London, E.8

THE LITTLE CELLS THAT SATISFY

Eton Primary H.T. Battery, P1 Porous Pot Cells, S1 and S2 Sac Cells. All complete for assembly.

1-cell.	6-cell.	12-cell.	30-cell.
P1 6d.	3/3	5/9	14/-
S1 6d.	3/-	5/3	12/-
S2 4d.	2/6	3/10	9/5

Send 1 1/2d. stamp for booklet giving full particulars to—**THE ETON GLASS BATTERY CO.** 46 ST. MARY'S ROAD - LEYTON - E.10

USE THE ELECTRIC MAINS

FOR EVERY RADIO PURPOSE

Send fourpence in stamps for the "Kaynite" handbook and guide. Well illustrated, circuits, etc.

A. W. KNIGHT & CO., LTD.
180 Tower Bridge Road - London, S.E.1

Amateur Wireless

COUPON
Available until Saturday, FEB. 18th, 1928

An Announcement concerning the

COSSER MELODY MAKER | **MULLARD MASTER THREE**

AND THE

TOREADOR P.M. RECEIVERS

A LARGE number of people wishing to construct these popular receivers are anxious to use Bowyer-Lowe components. They feel that by using products of proved performance and quality they can be sure of the best possible results. In deference to these wishes we have satisfied ourselves that, by wiring up according to the published instructions, the following components give complete satisfaction. We are therefore now in a position to give immediate deliveries of the parts listed below.

The COSSOR MELODY MAKER

	Price each
	£ s. d.
"Popular" Condensers with Two-Speed Dial and Station Recorder, .0005, No. 219b	15 6
"Whiteline" Valve-holders, No. 282	2 3
Low-frequency Transformer, 3-1 ratio, "Popular" Model, No. 297	1 0 0
Panel Switch, No. 298	1 6
Variable Resistor, 5 ohms, No. 289	3 0
Ebonite Front Panel, 21 x 7, drilled and polished, No. 299	16 0
Ebonite Terminal Panel, 21 x 1 1/2 in., No. 300	4 0

The MULLARD MASTER THREE and TOREADOR P.M. RECEIVERS

	£ s. d.
"Popular" Condenser with Two-Speed Dial and Station Recorder, .0003, No. 218b	15 6
Do. Do. .0005, No. 219b	15 6
"Whiteline" Valve-holders, No. 282	2 3
Low-frequency Transformer, 3-1 ratio, "Popular" Model, No. 297	1 0 0
Panel Switch, No. 298	1 6
Broadcast Coil, No. 304	7 6
Long-Wave Coil, No. 305	8 6
Universal H.F. Choke, No. 288	9 0
Aluminium Front Panel, 18 x 7, drilled—Black enamelled, No. 301	6 0
Frosted and lacquered, No. 302	7 0
Coil Base, No. 291	3 6
Ebonite Terminal Panels, 2 1/2 x 2 x 1/4, No. 303	7 1/2

IMMEDIATE DELIVERIES

YOU CAN OBTAIN BOWYER-LOWE COMPONENTS THROUGH EVERY GOOD WIRELESS DEALER

Write for the Bowyer-Lowe catalogues of Components and Receivers



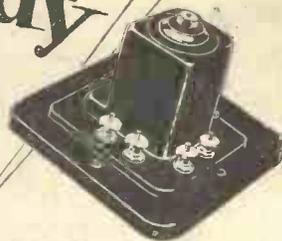
Quality Components

BOWYER-LOWE CO. LTD., Radio Works, Station Way, LETCHWORTH

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

Now ready

A REMOTE CONTROL FOR ANY SET



BECAUSE Lotus Remote Control has proved itself such a great convenience to thousands of users of the ordinary H.T. and L.T. wireless set, we are now making it to suit any type of receiving set.

No matter what sort of set you are using, you can have simultaneous reception and control. No more going from one room to another to switch on and off—no more crowding into one room to hear the wireless. Never mind where the set is; listen-in in every room by installing a Lotus Remote Control.

FREE Blueprints and instructions showing how you can fit it up easily and quickly will be sent by return on request.

PRICES:

Complete outfit for two rooms for a set using L.T. Accumulator and H.T. Battery: 30/-	Complete outfit for two rooms for a set using L.T. Accumulator and H.T. Eliminator: 45/-	Complete outfit for two rooms, including 3-volt dry Cell and twin conductor for an "All from the Mains" set: 47/6
--	---	--

LOTUS REMOTE CONTROLS

Made by the Makers of the Lotus Buoyancy Valve Holder, Lotus Vernier Coil Holder, Lotus Jacks, Switches & Plugs.

Garnett, Whiteley & Co. Ltd.
Broadgreen Rd., Liverpool.

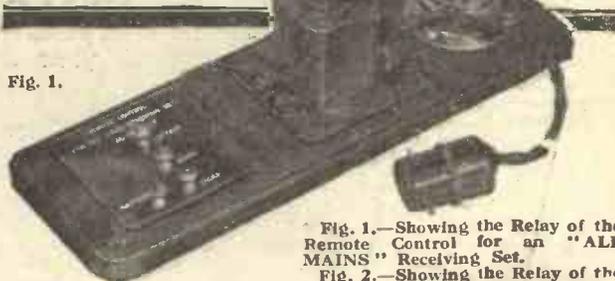


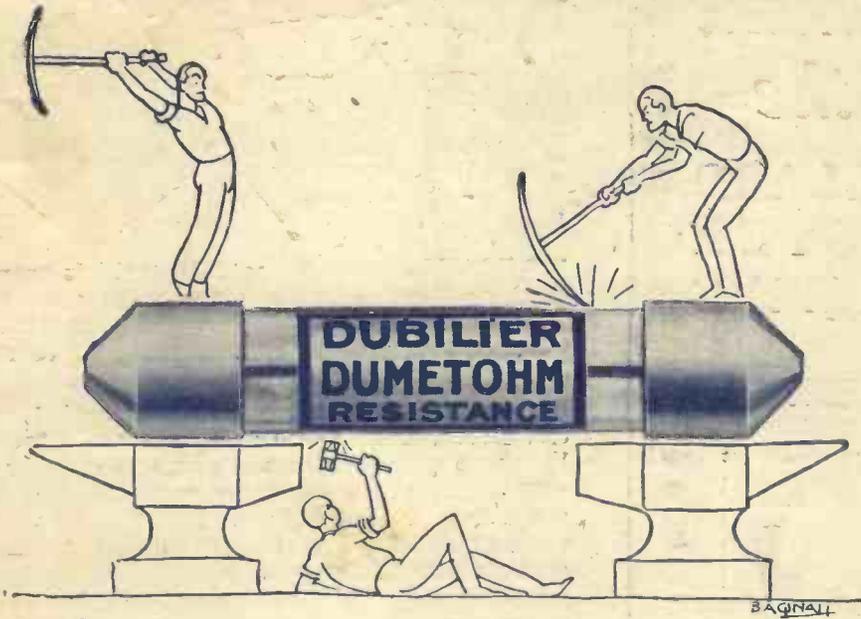
Fig. 1.

Fig. 1.—Showing the Relay of the Remote Control for an "ALL MAINS" Receiving Set.



Fig. 2.

Fig. 2.—Showing the Relay of the Remote Control for set using L.T. Accumulator and H.T. Eliminator.



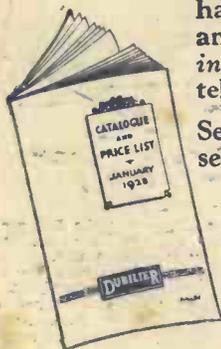
What would Happen?

THIS is not an invitation for you to have a Dumetohm broken up to find out what would happen "if the air gets in" or to see what's inside.

In the first place the air is there already—it was never taken out. And if you do break the glass you won't find any form of carbon resistance inside—that type went out when arks were popular.

All you will see is a straight golden rod which has been metallised by a very special process to give just that smooth, unvarying resistance so essential to clear Radio reproduction. Neither temperature nor voltage affects it appreciably, it has no self inductance, no self capacity and is "easily the most popular resistance in the country" as your dealer will tell you.

See that the Dumetohm figures in every set you build.



All Dubilier Products are fully described in the catalogue shown here. In addition there is a lot of information which you may find interesting. If your dealer has run out of copies we will forward you one free.



Dubilier Dumetohm Resistances.
 .25, .5, 1.5, 2, 3, 4, 5 and 10 megohms.
 Price 2/6 each.
 Dumetohm Holders.
 Price 1/- each.

Advt. of The Dubilier Condenser Co. (1925) Ltd., Ducon Works, North Acton, London, W.3.

T.C.111

DUBILIER DICTA



No. 6.

Have you Electric Light? If so why put up with an outside aerial which implies ladders, masts and much precarious scrambling on the roof?

The Ducon is simplicity itself to use. Plugged into a lamp holder and connected to the receiving set it forms a highly efficient and selective aerial, consumes no current, is perfectly safe, eliminates risks from lightning and reduces Morse and atmospheric interference.



"much precarious scrambling."

To meet all the variety of wiring systems and reception conditions with which we are blessed in this country it is only natural that provision should be made for connecting the Ducon in many different ways. Try them through according to the full instructions supplied with each Ducon.

For instance, your Ducon may give best results when the switch controlling its lamp holder is turned off. It may be found that reception is improved by connecting the Ducon to the Earth terminal as an auxiliary to the existing earth (It is tested at 2,500 volts!)

In short, there are numerous ways in which the Ducon will prove an invaluable thing to have by you if only as a "stand-by" in case your aerial carries away. Send us a P.O. for 5/3 to-day (or order C.O.D.) mentioning this paper. We guarantee you satisfaction—or your money back—and you will find it the best investment in wireless you have ever made.

Incidentally, if you only have one lighting pot in the wireless room, your electrician can supply you with a two-way holder enabling you to use both Ducon and light.