

BUILD OUR "SELECTOSONIC THREE" AND CUT OUT THE NOISE!

Wireless Magazine

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Monthly

*The World's
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Magazine of
Wireless*



*Edited
by
Bernard
E.
Jones
April, 1926
Vol. 3, No. 15.*

**With
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Structograph
Coloured
Plate of
Our
"Selectosonic Three"**

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(This Set is Highly Selective in Tuning)*

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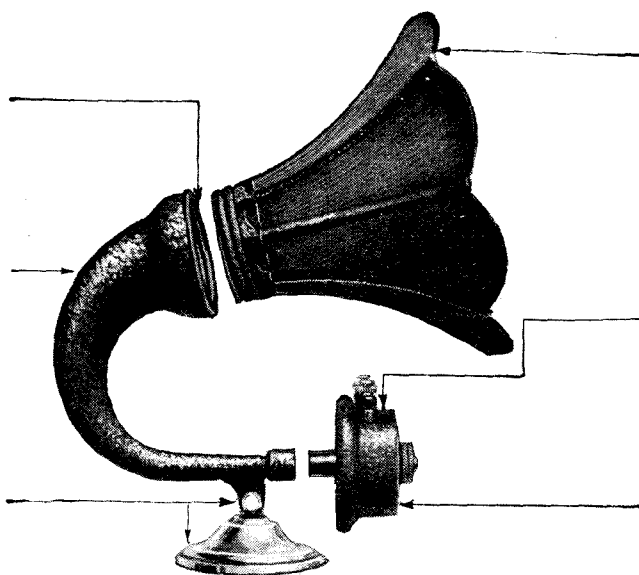
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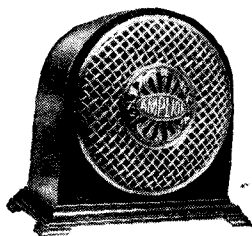
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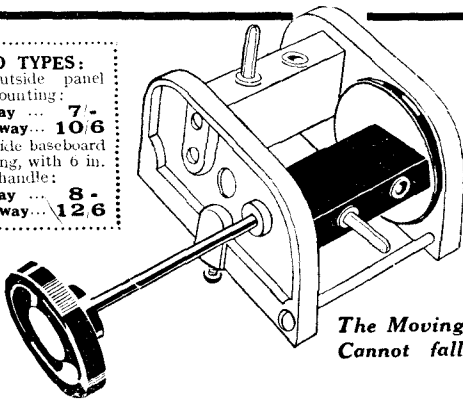
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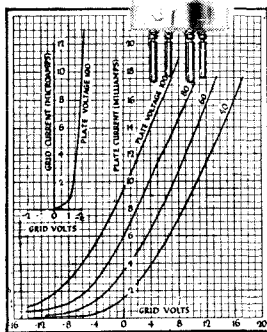
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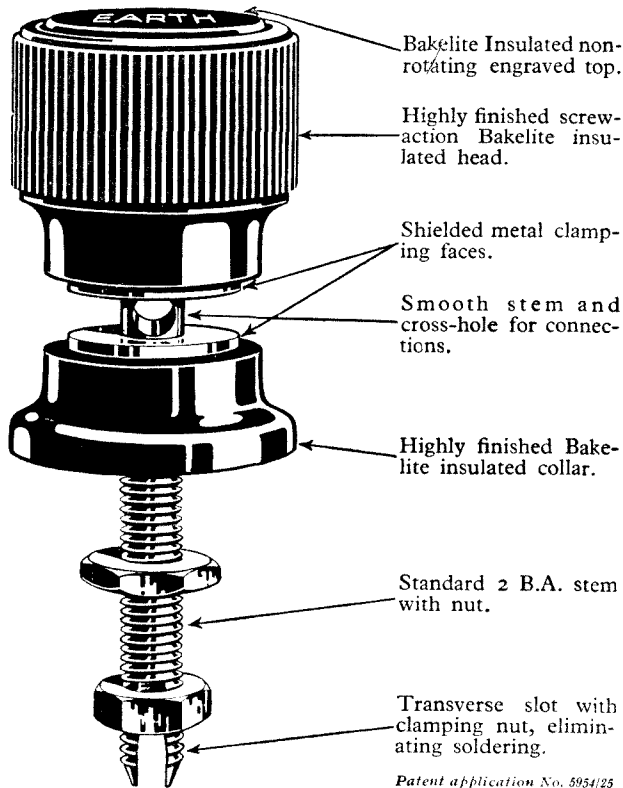
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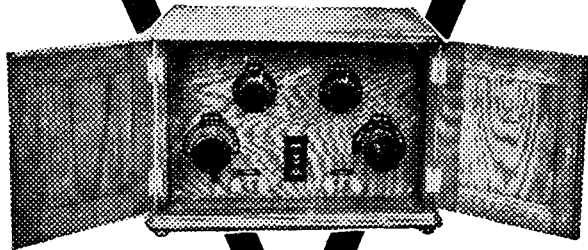
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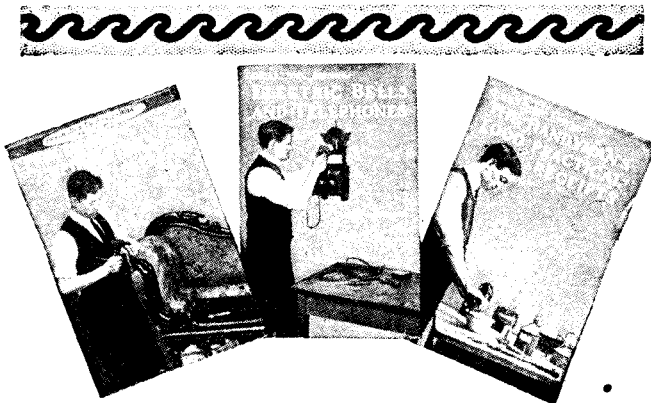
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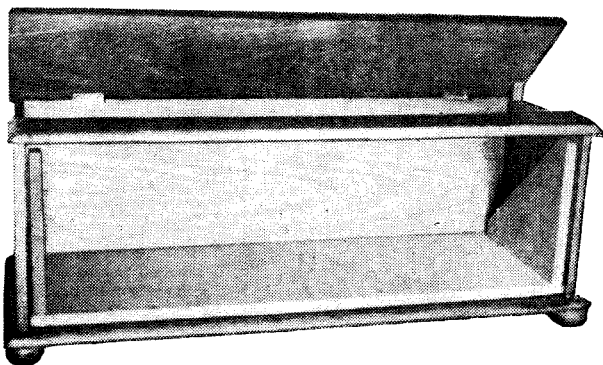
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Yours sincerely,
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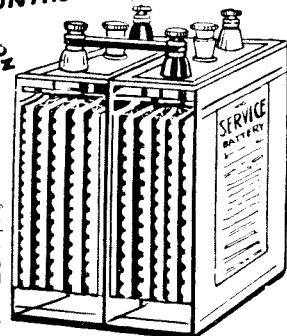
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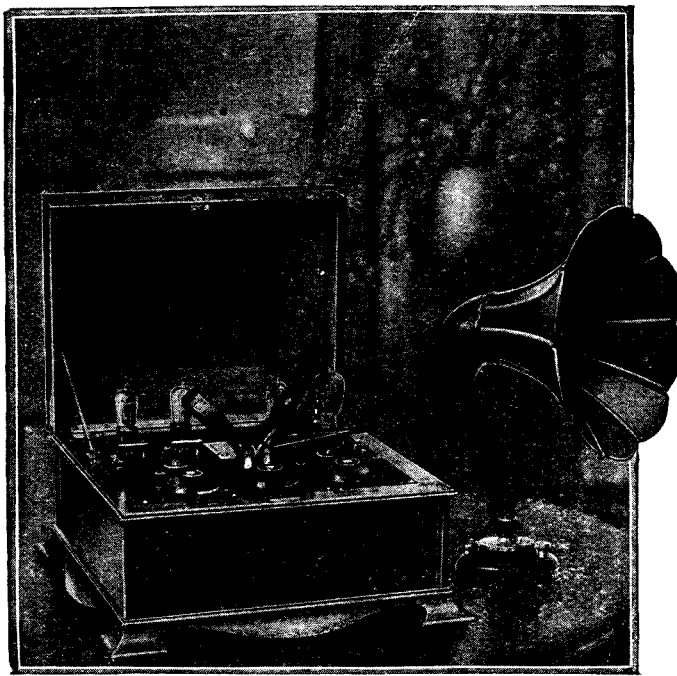
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4-volt	16-	20-	24-	30-
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The cabinets may be obtained in Mahogany or Oak, each a perfect piece, blending with its surroundings.

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A.J.S.

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Wireless Magazine

April, 1926

Vol. III

No. 15



Broadcasting brings a smile of real pleasure to the face of a young patient in hospital!

THE SELECTOSONIC THREE

Specially designed, built and tested by the WIRELESS MAGAZINE Technical Staff this three-valve set provides a new solution to an old problem—it enables the operator to cut out the local station without the need for a wavetrap or similar device that is difficult to tune without a great deal of practice. The circuit is quite straightforward, and there is nothing difficult about the construction of the set (a Structograph plate is given free with this issue), which is described in detail on page 216.

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Announcements.—The WIRELESS MAGAZINE, edited by Bernard E. Jones, is published about the 25th day of the month, and bears the date of the month following. Technical Adviser: Sydney Brydon, D.Sc., M.I.E.E. One Shilling Net. Subscription rates are 15s. 6d. a year, post free; Canada, 13s. 6d. a year, post free. Contributions, accompanied by stamped and addressed envelopes, are invited. All editorial communications should be addressed to The Editor, WIRELESS MAGAZINE, La Belle Sauvage, London, E.C.4. Subscriptions should be addressed to The Publisher, WIRELESS MAGAZINE.

Structograph Coloured Plate of This Set Free with This Issue

The Selectosonic Three

A SET THAT CAN BE MADE HIGHLY SELECTIVE AT WILL



*THIS THREE-VALVER
HAS BEEN
SPECIALLY
DESIGNED
BY THE
"W.M."
STAFF*

*In this photograph the operator is seen **adjusting the amount of selectivity** of the set.*

By turning the knob so that the right-hand coil is moved away from the centre coil the set is made as selective as possible—and that is very selective indeed.

Should great selectivity not be needed, however, it is necessary only to turn the knob and move the right-hand coil towards the centre coil.

Could anything as effective be more simple ?

**A NEW SOLUTION TO AN
OLD PROBLEM**

ALTHOUGH this country possesses the most efficient broadcasting system in the world there is one serious disadvantage in the fact that so many of our big towns have stations of their own.

Interference

In most cases the station is situated so centrally in the town that it causes a tremendous amount of interference to those listeners who have tired of their local station and are searching for other transmissions.

There are, moreover, so many stations transmitting on nearly the same wavelengths that the separation of one from another is becoming an increasingly serious problem.

The simple valve set, with a direct-coupled tuning coil and reaction is now almost useless for long-distance reception when the local station is "on the ether." The only solution to the problem lies in the use of a specially-designed receiver which, by a very small movement of the controls, is capable of cutting out the local station.

Selectivity can most easily be obtained by the use of loose-coupled tuning coils assisted by a single-high-frequency amplifying valve. If the internal capacity of the valve is neutralised by a small external capacity then the tuning is greatly simplified.

The circuit diagram shows that

in the Selectosonic Three a semi-aperiodic coil is inserted in the aerial circuit, coupled to which is a secondary or grid coil tuned by a variable condenser.

Neutralised Capacity

The oscillations received in this circuit are amplified at high-frequency by the first valve, the inter-electrode capacity of which is neutralised by the small variable condenser shown connected between the plate and grid of the valve.

It should be understood, however, that the use of this small condenser is not essential to the working of the set, and is by way of being a refinement, requiring a fair amount of

experiment for its correct adjustment.

If desired this small condenser, together with the H.F. choke coil connected between L.T. — and the H.F. grid coil, may be omitted.

In the plate circuit of the valve is connected a semi-aperiodic coil, coupled to which is the grid coil of the detector valve, tuned by a variable condenser. A reaction coil connected in the plate circuit of the detector valve is coupled to the tuned grid coil.

All three coils are of the plug-in type, held in a three-way coil holder, the tuned grid coil being placed in the centre socket with the aperiodic and reaction coils one on each side respectively.

The third valve is a low-frequency amplifier, transformer coupled to the detector valve.

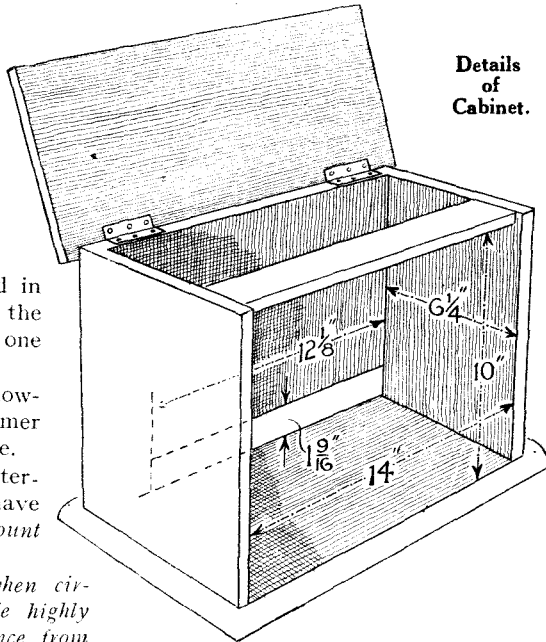
By virtue of the H.F. intervalve coupling system we have a method of varying the amount of selectivity of the circuit.

Thus, the receiver can, when circumstances demand, be made highly selective, but when interference from the local or any other station is non-existent, the degree of selectivity can be reduced until the tuning is comparatively flat.

The advantages of such a system are obvious, especially when search-

ing for a distant station where high selectivity during the actual searching is a disadvantage. Once the station has been picked up the selectivity may or may not be increased, depending on the amount of interference experienced.

Due to the special coupling system



Details of Cabinet.

the radiation from the set when the latter is in a state of oscillation is very small.

In the next column is given a list of components suitable for constructing this set.

Ebonite panel, 10 in. by 14 in. by 1/4 in. thick (British Ebonite Co., Ltd., or American Hard Rubber, Trelleborg, Paragon, Siemens).

Ebonite terminal strip, 12 in. by 1 1/2 in. by 1/4 in. thick (see above).

.0003-microfarad variable condenser (Bowyer-Lowe Popular or Dubilier, Radio Instruments, Stirling, Ormond, Igranic).

.0005-microfarad variable condenser (Bowyer-Lowe Popular or Dubilier, Radio Instruments, Stirling, Ormond, Igranic).

L.F. transformer (Eureka 1st stage, or Brandes, G.E.C., M-L, Radio Instruments, Energo, Igranic, B.T.H., Lissen).

3 anti-microphonic valve holders (Burndept, Lotus, Stirling, Benjamin).

3 .5-microfarad fixed condensers (Dubilier or T.C.C.).

12 terminals (Belling-Lee).

3 carbon-type filament rheostats (Wates or Lissen, General Radio).

3-way coil holder (Lotus or Polar, Will Day, Economic Electric).

Neutrodyne condenser (Polar or Gambrell, Peto-Scott).

.0003-microfarad grid condenser and 2-megohm grid leak (Mullard or Dubilier).

.001-microfarad fixed condenser (Mullard or Dubilier, T.C.C.).

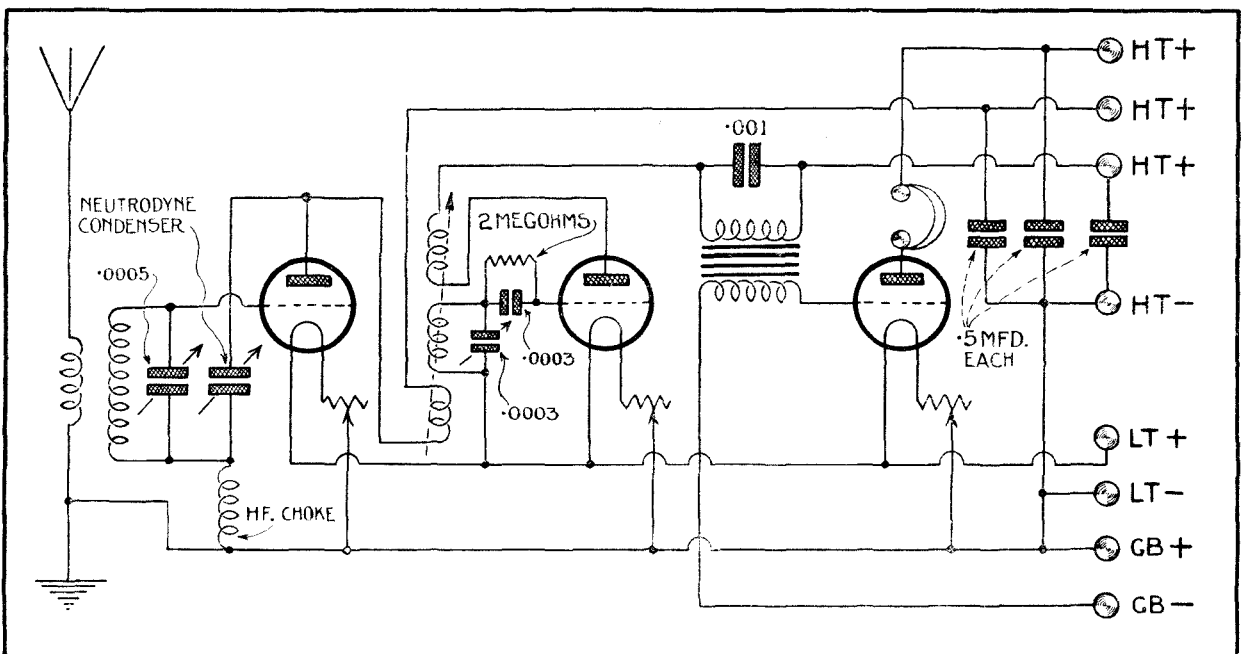
2 single-coil sockets (Economic Electric).

Cabinet of the dimensions shown (W. T. Lock).

Baseboard, 14 in. by 6 in. by 1/2 in. thick.

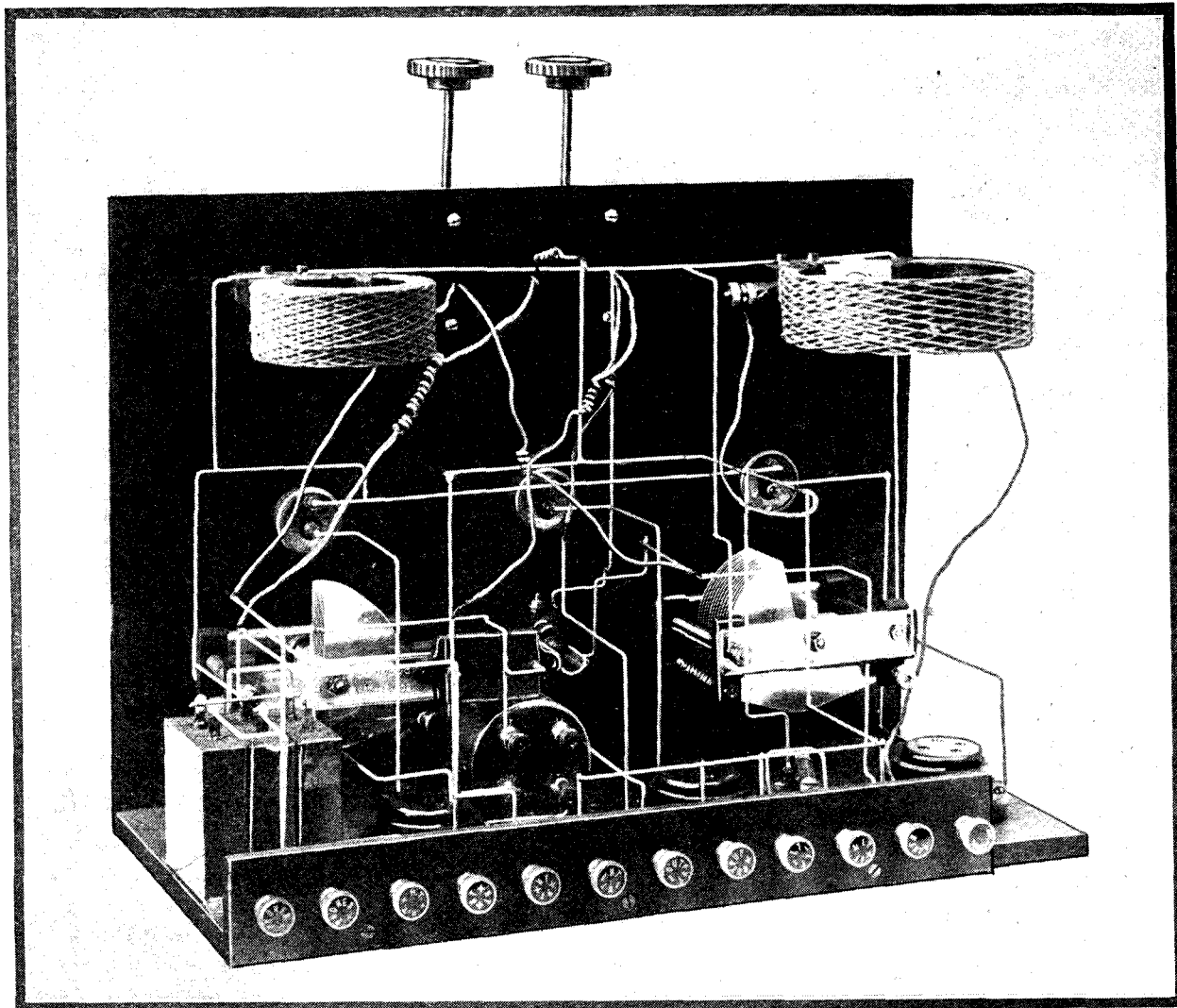
Note: The particular components shown in the photographs and allowed for in the Structograph are in each case mentioned first.

The panel may be obtained cut to size from the firm indicated in the list of components. A very high



Circuit Diagram of the Selectosonic Three.

The Selectosonic Three (Continued)



As can be seen from this photograph, there is nothing very complicated about the Selectosonic Three.

polish on the outside surface gives a pleasing appearance to the finished set, and has no ill effects on efficiency.

Free Structograph Plate

Given away free with this issue of the WIRELESS MAGAZINE is a Structograph (a combined coloured wiring diagram, layout and panel-drilling template) which should be used when drilling operations are started.

Lay the panel flat on a table or bench with the polished side facing up and place the Structograph over it in such a manner that the blue lines (on the Structograph) indicating the edges of the panel coincide with the actual edges.

The centres of all the holes to be

drilled are then marked through by means of a sharp steel point, after which the Structograph is removed and holes of the sizes indicated are drilled through at these marks.

Next comes the task of assembling the components on the panel. The three-way coil holder is mounted centrally at the top of the panel, with a filament rheostat directly underneath. On each side of the latter is mounted another filament rheostat.

Along the bottom of the panel are fixed the two variable condensers, mounted symmetrically one on each side of the neutralising condenser.

At the top of the panel, at each side of the coil holder, but at the back, is mounted a fixed coil holder,

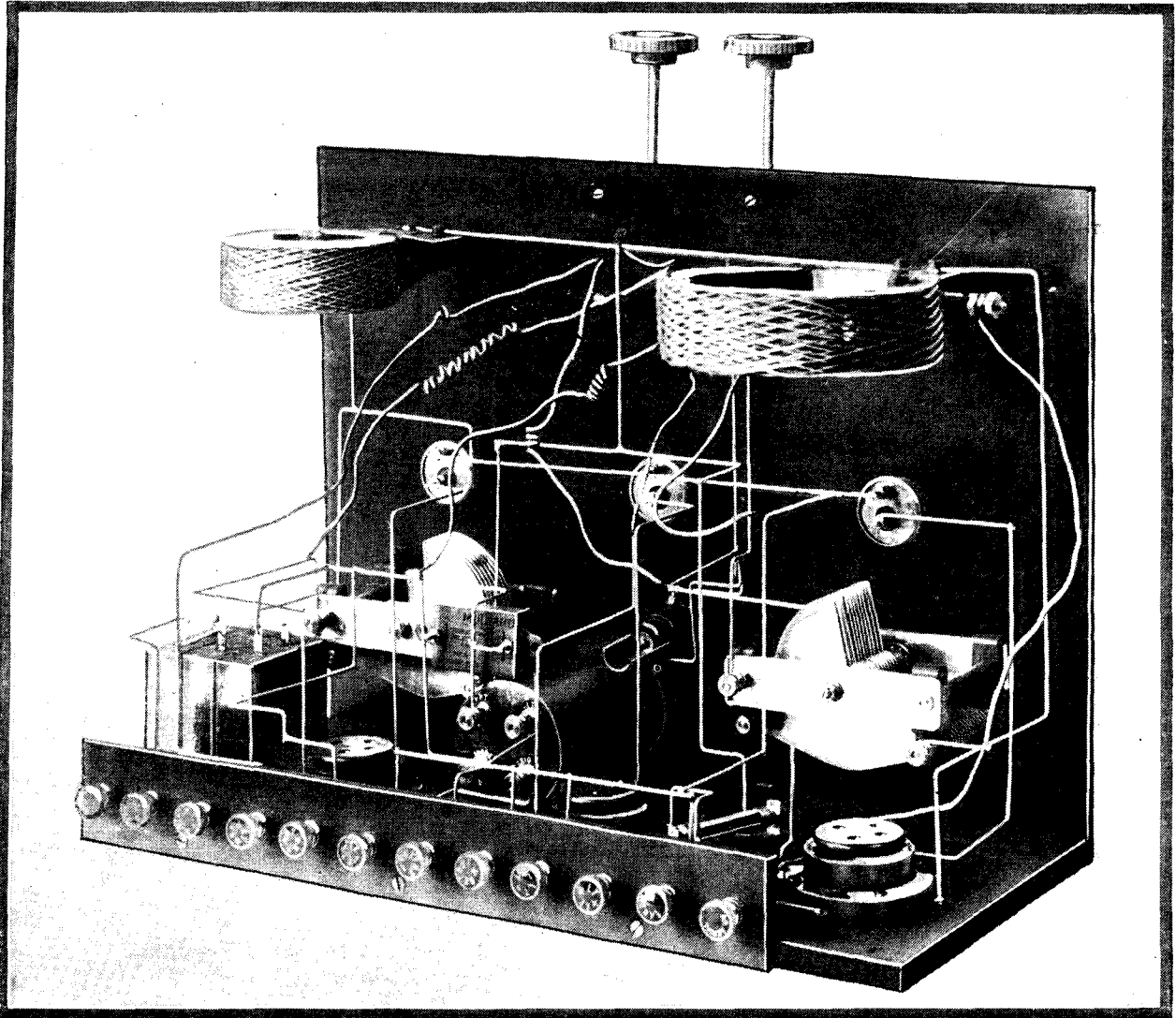
that on the left (looking from the front) being for the aperiodic aerial and secondary coils, and that on the right for the H.F. choke coil.

Components on Baseboard

Having mounted these components, the panel may be put aside until the remainder of the apparatus has been screwed to the baseboard. The disposition of these instruments will be seen from the photographs and the Structograph, the last giving a plan view.

To the back edge of the baseboard the ebonite terminal strip is fixed by means of three countersunk $\frac{3}{4}$ -in. wood screws. All the terminals are bolted to this strip; they are arranged in the following manner

A Set That Can be Made Highly Selective at Will



Another photograph showing the simple construction of the Selectosonic Three.

(reading from left to right), phones -, phones +, H.T. +, H.T. +, H.T. +, H.T. -, grid bias -, grid bias +, L.T. -, L.T. +, earth and aerial.

Positions of Valves

The three valve holders are arranged in a line parallel to the surface of the panel along the outer edge of the baseboard, whilst the combined grid condenser and leak is screwed to the baseboard between the H.F. and detector valve holders.

Between the neutralising condenser and the .0003-microfarad variable condenser on the panel is mounted the low-frequency transformer, with a fixed condenser across the primary

terminals. The three fixed H.T. shunting condensers are mounted on the extreme left of the baseboard.

Wiring should be carefully carried out in conjunction with the Structograph. If the Structograph is studied it will be seen that every terminal (including those terminals mounted on the instruments) is marked with a small letter of the alphabet.

For instance, several terminals are marked *a*, some *b*, others *c*, and so on. This affords an indication of the order in which the instruments should be wired. All the terminals marked *a* should be wired up first with one wire or as few wires as

possible. Then all those marked *b* are wired up in a similar manner, and so on until the wiring is completed.

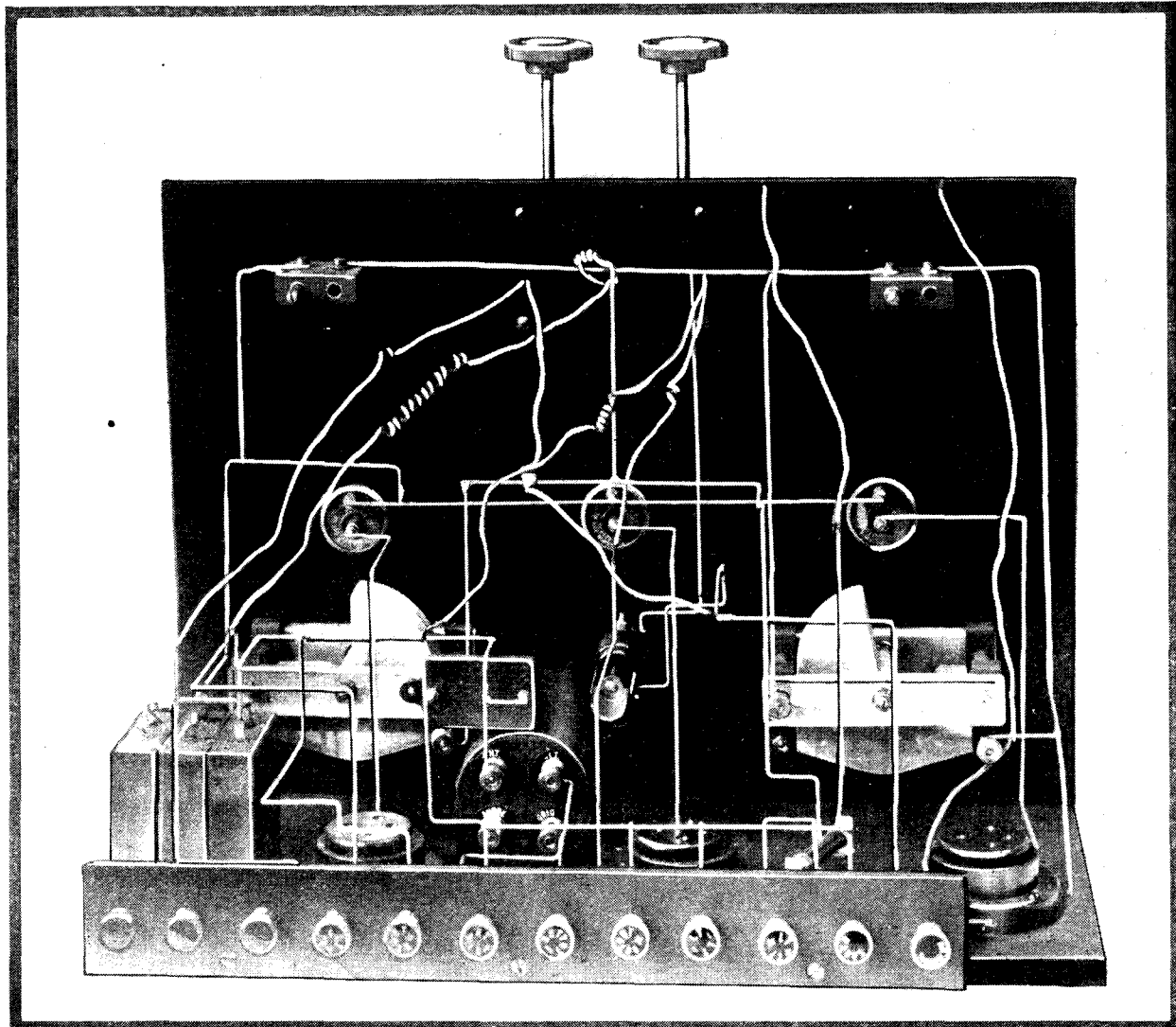
Transformer Condenser

The fixed condenser connected across the primary terminals of the low-frequency transformer is held in position by the wiring, and is not bolted or screwed to the panel.

The wire used for connecting up should be of such a gauge that this small component is held rigidly without any other method of fixing. No. 16-gauge round tinned-copper wire is very suitable.

The grid, filament-lighting and plate circuits are shown coloured in

The Selectosonic Three (Continued)



The components used in the construction of the Selectosonic Three are comparatively few in number.

black, red, and red-and-white respectively.

Connections to each of the sockets of the three-way coil holder should be made with short pieces of insulated flex. Similar connections should be provided for the aperiodic aerial coil, the terminals of which are mounted on the sides of the plug of the coil. Connections to the secondary are obtained from the fixed coil holder mounted on the panel.

Ready for Testing

The set is now ready for placing in its cabinet, a dimensioned sketch of which is given.

For really good results it is essential that the valves used should be care-

fully chosen. In this respect we recommend for 6-volt accumulators three Marconi DE8 type valves—one DE8 H.F. and two DE8 L.F.'s.

Other well-known makes may, of course, be substituted. Wherever possible, however, a special valve should be used for each stage—one for the H.F. stage, one for the detector and one for the amplifier.

Finally we come to the operation of the set. First of all connect aerial, earth, batteries and phones to their respective terminals. Into the fixed coil holder on the right-hand top corner of the panel (looking at the back) an Igranite Unitune Major coil is inserted, and the flexible connec-

tions attached to the aperiodic-coil terminals. Into the other socket on the left-hand top corner a No. 200 or 250 coil is inserted.

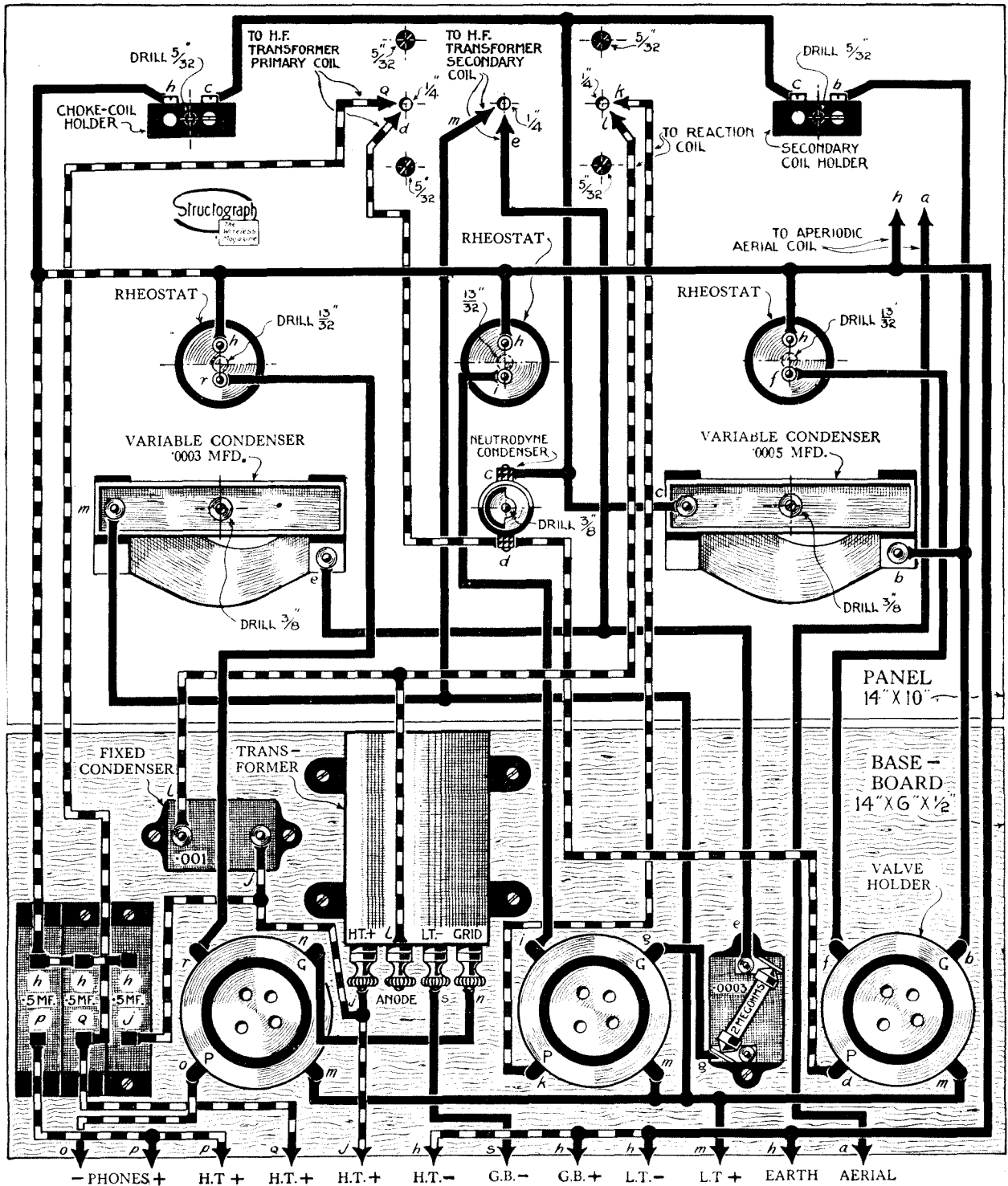
Sizes of Coils

Of the three coils inserted in the three-way coil holder mounted on the panel the centre coil should be a No. 60 or 75, the reaction coil (on the right looking at the front) a No. 60 coil, whilst the plate-coupling coil on the left should be as small as possible—a No. 25 will do, but can, with advantage, be smaller.

Turn the filament rheostats until the valve filaments reach a suitable brilliancy and, by means of the wander plugs on the H.T. and grid-

Reduced Reproduction of the Structograph Given Free with This Issue

A Combined Panel Layout, Drilling and Wiring Diagram.



bias batteries, apply about 45 volts to the anode of the H.F. valve, 50 to the detector and 120 to the amplifier, with about 3 negative volts on the grid of the last valve.

For the first test and in order to become accustomed to the "feel" of the set, the coupling between the plate coil of the first valve and the tuned secondary coil of the second valve should be as tight as possible. Keep the reaction coil well away from the centre coil.

Now search round for signals by slowly rotating the two variable-condenser dials. If self-oscillation is evident in the H.F. valve, the neutralising condenser should be adjusted, the operator first making

sure that the reaction coupling is not too tight.

Having tuned-in the local station the battery voltages should be re-adjusted until the best results are obtained.

It will be noticed that as the aperiodic plate coil is gradually separated from the detector-valve grid coil signals become more sharply tuned. *Thus the amount of selectivity required may be governed by a simple movement of the aperiodic plate coil.*

If it is desired to receive another station on a wavelength approximately that of the local station, and if, normally, the latter causes much interference, then it is only necessary

to loosen the coupling already mentioned and the result will be greatly increased selectivity, enabling the local station to be separated from others working on neighbouring wavelengths.

Tested on an aerial in Ealing, London, the results obtained were very satisfactory as regards both sensitivity and selectivity. At that distance from 2 L O the transmission could be completely cut out and Bournemouth on 368 metres tuned-in with no interference from London. Hamburg could also be easily received without interference. The volume obtained with the last station was remarkable. Altogether, twenty-five stations were logged in one evening.

CUTTING HIM OUT!

IT is bad enough being in the electrical business (I've a job in a power station), but when your friends get to know that, in addition, you've had a wireless set on the quiet for donkey's years—why then, you might as well pack up and leave the town.

It's no earthly good explaining matters. Your friends have no logic and no pity. *You are a wireless man*, and your explanations are interpreted as:—

- (a) Modesty, or
- (b) Cussedness.

Tom is one of those who *will* persist in taking no notice of my disclaimers. He spotted me the other day and rushed through the traffic to buttonhole me. I was in for it!

"Hullo, Tom," I said feebly.

"Hullo, yourself," answered Tom. "About my crystal set—here, come back! You remember the set I rigged up with an aerial in the yard, don't you?"

(I did—by Jove, I did. Hadn't he nearly worried me to death with his technical troubles, and dragged me over to his house three times?)

"Well," he went on, "there's a chap in the flat overhead who's sticking an aerial about fifteen feet above mine. D'you think it'll be all right?"

I didn't see why it shouldn't, and anyway he couldn't stop his upstairs neighbour picking up wireless waves.

A few days later I boarded a

tramcar, and had just settled down to a newspaper when Tom's voice came over my shoulder. (Oh, drat the fellow!)

"Say, old man—you remember my crystal set, don't you, and about that chap overhead? Well, I'm jiggered if he hasn't got a valve set and when he gets going I seem to hear shrieks, and then I can get hardly anything."

I said it might be due to interference, and he had better have a diplomatic pow-wow with his neighbour. I went on to point out the demerits of interference in general, but the sarcasm was wasted.

Some time afterwards I met Tom at lunch, and in spite of all my verbal struggles the conversation veered to wireless. I soon found why. Tom had managed to cut out his interfering neighbour.

"Yes," he informed me, "I cut him out—and quite simply. I tied a piece of wire to the water-pipe, and when it's dark and I want to listen-in I hook the wire on to his aerial with our clothes-prop. That cuts him out right enough."

"That's a bit hard on him, isn't it?" I asked.

"Bless you, *he* doesn't mind," said Tom. "He likes to play about with his valves, and when I take the earth off his aerial he just thinks it's his own cleverness that's brought the signals back."

"Yes, but," I pointed out finally, "what'll you do when the light even-

ings come round again, and he might spot you cutting him out?"

"You mean next spring? Oh, I've thought of that. I won't need to cut him out then. You see, *he's got a motor bike.*"

* * *

Some time afterwards I was at a festive gathering, and after we'd been treated to B.B.C. stuff of course there was some wireless talk. One fellow, whose face seemed vaguely familiar, joined in.

"There's a funny chap lives below us," he said. "I used to have an outside aerial, and this chap, I think, must have got it into his head that my aerial was messing him up. One dark night we heard a queer noise—it was the lead-in shaking. When we looked out we could just spot the underneath chap hooking a wire on to our aerial and earthing it."

"Well, I felt like going down and scragging him. However, my wife dissuaded me—I was changing over to a frame aerial, so it didn't very much matter. And all this winter that chap has solemnly gone on earthing our aerial night after night—rain, hail or snow! Whenever we hear our disused lead-in rattle, we never fail to respond! And the best part of the joke is this: If only the silly ass connected his wire to the set instead of earth he'd get jolly fine signals—far better than what he gets on his own tuppence ha'penny aerial!" STAN DARD.

BROADCASTING A PLAY FROM THE STUDIO

This article by J. Godchaux Abrahams is illustrated by photographs from a special film of the "Radio Radianc Revue," which was taken by Harry B. Parkinson and released in January.

AS I pushed through the swing doors of the B.B.C. headquarters, my eyes alighted on a notice board which read:—

LONDON REPERTORY RADIO PLAYERS

"LOYALTY" Rehearsal,
11 a.m., Studio 5.

THE NEW REVUE, Studio 2.

"Here," said I to myself, "is something of interest to WIRELESS MAGAZINE readers." Wending my way through what appeared to be an interminable maze of corridors, and past innumerable offices, I was on the point of giving myself up as lost, when by good luck I met a member of the play-production staff. The words "WIRELESS MAGAZINE" proved to be an "open sesame," and a few minutes later I was seated in Mr. R. E. Jeffrey's office.

In reply to a question of mine, the B.B.C.'s dramatic producer said to me: "A new play and a revue are being rehearsed this morning; you can see them in the making." He consulted a memorandum on his desk. "Studios numbers 1, 2 and 5. Come along."

Descending by the lift, we entered studio number 2, although the red light gave out a warning signal. As I passed through the doors, I heard a voice say—"No, no, no! Please put some pep into it, let it go with a swing. Once again, ladies, if you please." The London Radio Dance Band struck up a lively lilt and I could hear the pit-a-pat of the dancers' feet on the lino-leum-covered stage.

Here was a surprise; before me, on a slightly raised platform, at the end of the studio, danced the eight "Radio Radianc" girls.

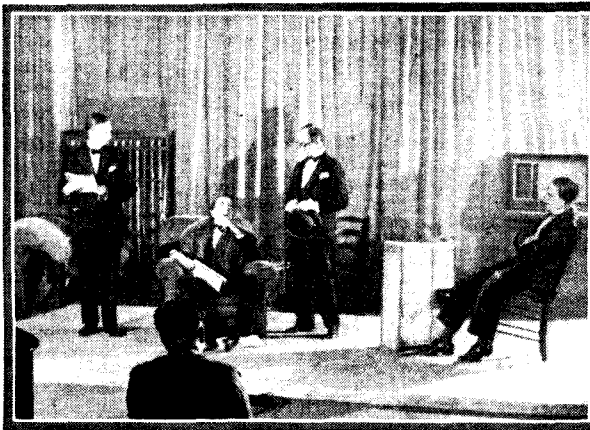
Several times whilst I was in the studio the steps were gone through until the stage manager declared himself satisfied with the result.

"Is this being broadcast? I see the red light is on."



The "Radio Radianc" girls have a rehearsal.

"No, not to the outside public, but to certain points of the building. The transmission can be heard in other studios at present accommodating the performers in the revue, if necessary.



Rehearsing a play in the studio.

"Come along to the control box with me."

He led me to a magnified telephone cabin at the end of the studio. Along one side, facing the performers,

ran a switchboard, furnished with a number of small levers; above these a series of signs, reading: *come nearer, louder, softer, slower*, and so on. In the box itself there were two or three pairs of headphones of the type usually associated with the ordinary wireless receiver.

From this glass-encased and sound-proof cabin, I could hear, by means of the headphones, all that was taking place in the studio, in the same manner as it would, when broadcast, be received by the outside public. As the singing ceased in number 5, so the engineers in the amplification room switched us over to studio 2, where a sketch was being rehearsed. I listened for a few minutes, then—

"Tell me, Mr. Jeffrey," I enquired, "some of your revues are presented in one studio, but in other wireless productions you have given to the public, as for example, *The White Château*, or *The Military Tattoo*, you have apparently used several studios at one and the same time. How is this done?"

Conversation during the rehearsal of a chorus proving a difficult matter we repaired to the artistes' waiting-room.

"If at any time we have achieved any success, and if our efforts have been deserving of praise," replied the producer, "it is solely due to the close co-operation which exists between artistes, orchestra, chorus, and the engineering staff.

It is merely a question of working to an elaborate

time schedule arranged beforehand.

"We have, on occasions, used five studios, as well as other rooms furnished with microphones, at one and the same time in the course of

Broadcasting a Play from the Studio (Continued)

two hours. Each control box is in the hands of a stage manager, supplied with the list of items we intend to broadcast; each in turn works to schedule, and the engineers in the main control and amplification room, fade out and connect up all studios, according to plan."

"And it works?"

"Perfectly. For instance, say studio number 2 is giving a sketch, the announcer stands by, signals to the amplification room whose engineers are also listening. Studio 2 is warned by the flickering of the red light, and stands by. The stage manager in number 1 gives the signal as the sketch in number 2 comes to an end; the band strikes up, and the engineers fade out number 2 and switch in number 1."

"And the wireless-scenic effects and noises?"

"May be produced at some other point. In some instances the sounds would be received by the microphone in the studio, that is, the one in which the sketch is being produced; in other cases these effects are carried out before a separate instrument, and the resulting sounds superimposed on the first transmission."

"Is that equally effective?"

"Yes, because such a method may allow us to use real sounds, instead of imitating them by mechanical means. In a mystery play dealing with a crime which we produced some time ago, the first scene represented a street. At one of the rehearsals we placed a microphone at an open window, but the noise made by motor vehicles in the Strand came through as a confused roar, a mere jumble of sounds.

"An improvement was made by using a window overlooking a quiet street through which we sent two of our own cars. In this manner we successfully captured the noises of the motors and also the hooting of the horns."

"Have you not actually brought the sound of the sea to listeners' ears?"

"Yes, from Plymouth, but we can only do this during spells of rough weather in the Channel, the reason being that when superimposing the breaking of the waves on the original transmission we can control the sound to any degree, and also bring

it into the actual text of the play or sketch as required. On calm days we could not rely on the waves splashing at the right moment, and should the necessity arise for such a sound, we would be compelled, for

TEN FAMOUS RADIO FANS

*TEN famous radio fans
Tuning very fine,
One got a heterodyne,
Then there were nine.*

*Nine tired radio fans,
Listening very late,
One got R.I.P.,
Then there were eight.*

*Eight eager radio fans
Tried to tune-in Heaven,
"Old Nick" jammed one,
Then there were seven.*

*Seven young radio fans
Trying wireless tricks,
One began to oscillate,
Then there were six.*

*Six lucky radio fans,
Very much alive,
One heard his call sign,
Then there were five.*

*Five skilled radio fans
Fishing round for more,
Found a short-circuit,
Then there were four.*

*Four bold radio fans
Pushing up H.T.,
One pushed six thousand volts,
Then there were three.*

*Three grim radio fans
Wondered what to do,
Ones tunes a harp now,
Leaves only two.*

*Two lonely radio fans
Tried to get some fun,
Tuned-in a thunderstorm,
Then there was one.*

*One odd radio fan
Pushed a fountain pen,
Sent this to the Editor,
Good-bye, Amen.*

B. W. O. DAVIES.

the purposes of the play, to fall back on a studio sea effect."

Mr. Jeffrey rose from his seat, and I followed him to another floor of the building.

In studio 1 a short drama was being rehearsed, and I listened with considerable interest to the development of its plot. What struck me

most, perhaps, was the care with which each line of the dialogue was delivered; it was a short play, with quick action and every word told. The actual production was due within a few days and the actors in the cast were word-perfect.

Actual positions of the artists in respect to the microphone were carefully planned in order to secure a perfect balance of voices. All exits and entrances were as conscientiously carried out as if the play itself had been booked for stage production, and as the artists played from memory, they were free to use gesture and facial expression, thus considerably adding to the successful impersonation of their rôles.

This was no "amateur theatricals" or show got up on the spur of the moment, but the finished production of a dramatic play. No help could be given by scenery or other stage contrivances to create the necessary atmosphere; perfect acting was essential and great pains were taken by all concerned to secure a faithful interpretation of the various character parts. Although such a play, for obvious reasons, could be performed for a few nights only, as much care was devoted to its preparation as if it had been booked for a long West end run.

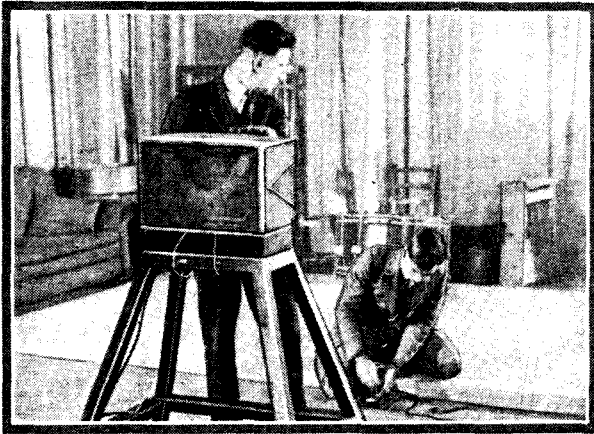
But there was more to be learnt, so quietly slipping out of the studio, I went in search of my victim. I ran him to earth outside studio number 4. Afraid of losing him again, I clutched at his arm.

"A few minutes more," I begged. "Your observations on scenic effects and sounds have whetted my appetite. Now how are these sounds produced?"

"Must we give away all our secrets?" asked Mr. Jeffrey, with a smile.

He took me into a room at the back of one of the large studios. Its appearance would have shamed a marine store dealer! Ranged against the walls, lying all around on the floor, was a medley of weird contraptions such as I could not have conceived in my wildest flight of a vivid imagination. Drums, sieves, cylinders large and small, sheets of iron, mallets, several species of door knockers, quaint wooden implements, bells, gongs; in fact, oddments and

An Exclusive Article Explaining How it is Done



Testing the microphone connections.

sounds are put, we must carefully choose our implements, or the entire illusion may be dispelled.

"The slamming of a door, for instance, can only be effectively imitated by the comparative soft closing of a small cupboard latch. Such a sound in the studio itself might pass unnoticed, but brought to the outside hearer by headphones or loud-speaker, it truly reproduces the noisy slam of a street door.

used for stage productions are not suited to the microphone."

I did not press for further explanations, nor did I ask to be shown more of the various implements used, as I realised that such knowledge would only bring disappointment when listening to a broadcast production of a play in my own home. To visualise the heroine, alone, on the deck of a battered steamer, in the midst of a raging gale, could send a shiver down my spine; to think of her, standing in front of the microphone in a comfortably warmed studio, while some of her colleagues were manufacturing the storm, howling wind and great combers in the adjoining room, would only cause disillusion and disappointment.

scrap material of every kind and description.

"Here," he exclaimed, "you will find storms, thunder, lightning, rain, hail, the howling of the wind, the song of birds, the sea shore, the railway station, the tube lift, the ship's syren, the motor klaxon, the aeroplane, big and little guns, everything which may be needed in the production of every possible style of sketch or play, from a simple kiss to the sacrificial dance of the warlike Wai-kikuyus of Central Africa." He turned a handle. "Rain and wind," he said.

"I hear it not," I replied. "To me it does not sound like either."

"Perhaps not, and it is precisely the peculiar characteristic of the microphone which we have been compelled to study."

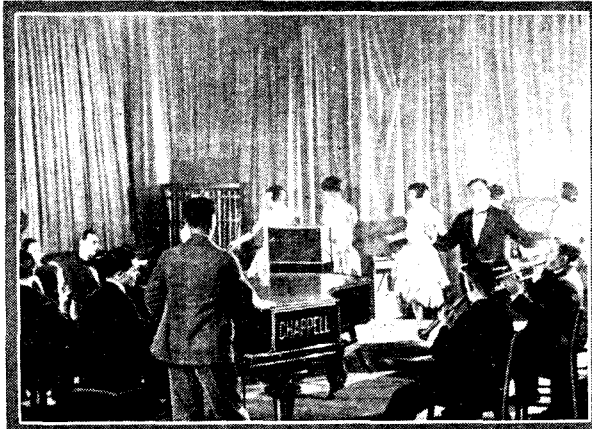
"Surely," I retorted, "the real sound must—"

"Not at all! If you wished your hearers to visualise a tea-party, how would you obtain the sound of china cups rattling on their respective saucers?"

I smiled; the problem was an easy one. "By rattling a cup against a saucer," I retorted.

"Wrong again! Through the microphone this would give you the sound of two sheets of iron in violent contact with one another. The crunching of stiff paper would be just as bad. To secure these effects in the listener's own home, in view of the amplification to which the

outside hearer by headphones or loud-speaker, it truly reproduces the noisy slam of a street door.



Another photograph of the "Radio Radiance" girls.

"Here again," continued the producer, "you see a species of sieve containing dried peas. By tilting this gadget, they run from one side to the other. At a fair distance from the microphone this will give you the effect of the swishing of waves."

"I take it that you are compelled to effect a great number of tests before you are satisfied with the results achieved?"

"Yes, we are always trying out new effects, as those habitually

If you wish to enjoy a wireless play do not think of the ways and means by which it is produced. Let your imagination run riot; try to visualise the scenes which the producer mechanically or otherwise conveys from the studio to your ears.

I looked at the clock; the little hand pointed to one. "Talking of sounds," I began, "it is lunch time. I may not possess your experience, but I feel sure I could give you a tolerable imitation of a swallow."

"Let's put that to the test," replied Mr. Jeffrey.

So together we passed out through the glass doors of the B.B.C. building into Savoy Hill.



Trying out a new song!

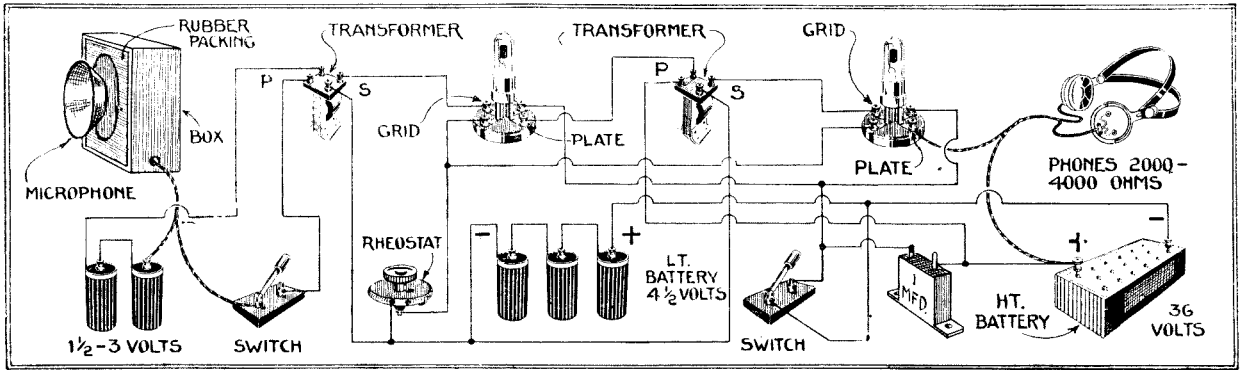


Fig. 2.—Wiring Diagram of Trial "Hook-up" with Two Stages of Amplification.

How Valves Can Help the Deaf

AN ARTICLE BY J. HARTLEY REYNOLDS

THE number of people in this country suffering from a severe form of deafness is a very large one indeed. I believe that I am right in saying that the figures run to well over a million, which means that roughly one person in every fifty is robbed of a very great deal of the pleasures of life by inability to hear properly such sounds as those of speech and music and the songs of the birds.

There are many cases in which the wireless valve may be usefully employed as an aid to the deaf; but before constructing any kind of sound-amplifying device for a sufferer it is most important that medical advice should first be taken.

Deafness may arise from a large variety of causes; in some instances the use of an amplifier may be beneficial, whilst there are others in which its employment may do no small harm. If, therefore, you think of constructing the little appliance to be described for any of your friends, *make sure first of all that he has previously ascertained from his doctor that its use can have no ill effects.*

The idea of using wireless valves

came to me two or three years ago when a friend of mine who is to all intents and purposes stone deaf heard music for the first time for twenty years with the help of my receiving set.

When I detached the loud-speaker from a five-valve set and replaced it with a pair of good telephones he was able to hear music fairly well,

signed for him a compact little device incorporating a microphone and two note magnifiers, which he made up and had in use for some little time. The great objection to it was that it could not be taken about readily from place to place. Those were the days of bright-emitter valves when a cumbersome accumulator was required for filament-heating purposes.

Since then he has constructed another instrument in which two "o6" valves heated by dry cells are used. This weighs but a few pounds, and as he has fitted the whole thing, batteries included, into a small fibre attaché case he can take it with him wherever he goes with the greatest of ease.

When it is in use he hears perfectly if one speaks in quite a low voice at some distance from the microphone. He can enjoy music from the piano, the violin or any solo instrument, whilst as regards wireless he now finds himself on equality with the rest of his family. He places the case containing the device upon the table which supports the loud-speaker and is able to follow the programmes easily.

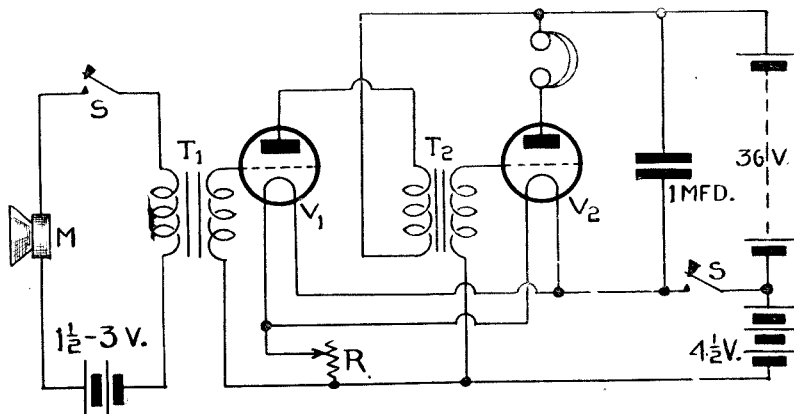


Fig. 1.—Circuit Diagram of Two-valve L.F. Amplifier for Use of Deaf Person.

though he could not catch all of the announcer's words between items. By tuning-in the transmission to rather greater strength I was able to let him hear both speech and music.

His case is one that is quite beyond all ordinary treatment and his medical adviser stated that no harm could be done by a sound-amplifying device.

I therefore worked out and de-

The circuit diagram of the device is seen in Fig. 1. The microphone may be an ex-Army one, such as is obtainable very cheaply from many wireless dealers, or a Skinderviken button may be used. The battery supplying current to the microphone will in most cases require to have a potential of 1½ or 3 volts, though with some instruments 4½ volts will be found to give better results.

A suitable size of battery is that composed of large flashlamp refill cells such as those used in the Ever-ready No. 15 battery. A switch must be provided in this circuit so that current from the battery may be cut off when the microphone is not in use.

The transformer T1 may be an ordinary low-frequency transformer, though it is advisable that the step-up ratio should be fairly high. As there is no need here to have a large primary impedance one can use satisfactorily the little transformers taken from Army field-telephone sets which are obtainable from many dealers in surplus goods at about two shillings apiece.

Both V1 and V2 should be "o6" dull-emitters. As all extraneous noises must be carefully avoided it is advisable to fit them with valve holders designed to minimise microphonic effects. T2 is a low-frequency transformer whose step-up ratio should not be too high.

The telephones must be of good pattern capable of dealing without being overloaded with a large volume of sound.

I have used quite successfully both high-and low-resistance patterns in these amplifiers.

The plate battery is one of quite small size with a maximum voltage of 36. Across it is placed a 1-microfarad condenser whose purpose is simply to smooth out any fluctuations that may occur in its output current.

The filament battery is an Ever-ready No. 15 flashlamp refill. This has admittedly not a long life if the device is brought into use for long periods on end, but in the portable instrument, which is intended primarily to be switched on only at intervals and for short periods, it answers very well indeed since it takes up hardly any room and is extremely light. The rheostat should have a maximum resistance of about 30 ohms in order to control the filaments properly.

Fig. 2 shows how a trial "hook-up" of the apparatus may be put together upon a board so that it may

phone switch S is open. Any noises due to a bad high-tension battery or to interaction between transformers will be most distressing to the user of the device since they will be amplified to practically the same extent as the sounds that he wishes to hear.

In this connection it may be said that the mounting of the microphone itself may present a little difficulty. Unless it is provided with a resilient bed to act as a shock absorber it will pick up and pass on to the telephones in an enormously amplified form all kinds of unwanted sounds. The arrangement shown in the diagram Fig. 2 answers very well indeed.

Here the microphone is seen mounted in a small wooden box with a packing of rubber sponge. This serves to eliminate the majority of extraneous noises due to jarring, but it is as well to place the box upon a pad made from a thick cloth folded several times.

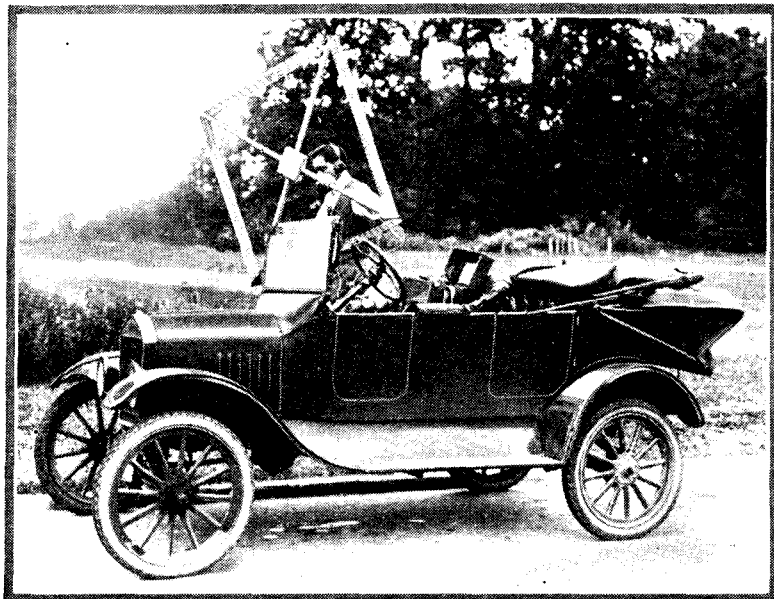
If after tests with the "hook-up" it is found that the deaf person is likely to profit from the use of the amplifier—assuming that medical consent to its employment has previously been obtained—the apparatus can be made up in an attaché

case, the batteries being placed in wooden compartments at either end and a small ebonite panel being used for mounting the rheostat and the switches.

The valve holders may conveniently be fixed to a thin strip of wood secured by screws to the inside of the attaché case below the handle.

They are thus in a horizontal position when the case is laid on the table, and vertical when it is carried. Mounted in this way they take up very little room, and quite a thin case may be used. The volume of sound obtained from the telephones can be regulated very nicely by means of the rheostat.

TRACKING DOWN INTERFERENCE!

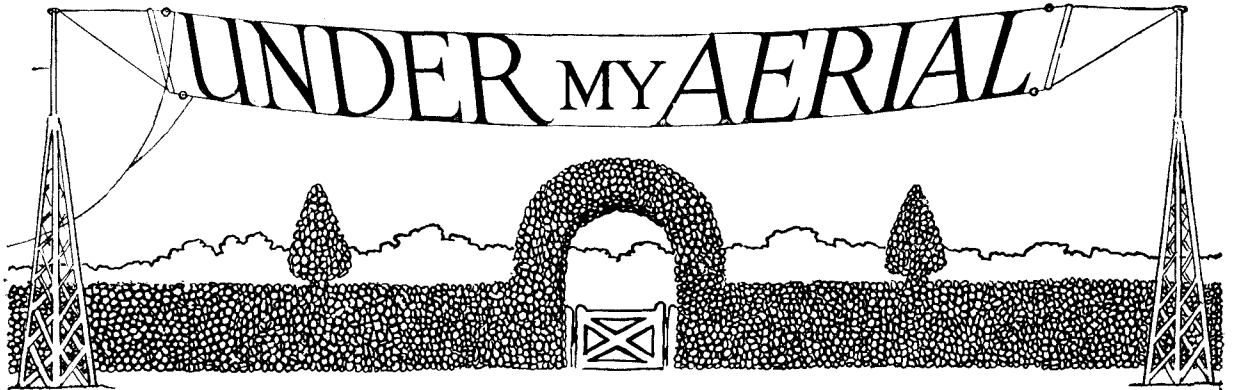


A car equipped with apparatus for detecting interference caused by underground electric cables.

be tested out by the deaf person for whom it is intended.

In many cases a single stage of amplification will suffice, but sometimes more than two are necessary. In the latter case I would recommend that the couplings between the valves should be made not with transformers but by the choke-capacity method. Suitable chokes are obtainable at quite reasonable prices and for multi-stage amplification they are quieter than transformers.

It must be remembered that it is of the utmost importance that the device should not be noisy. When the filaments are lit and the plate battery connected up there should be no noise at all when the micro-



The Second Million

There is something very fascinating to me about the wireless licence figures which are published from time to time. At the present moment the total number of licences issued is not far short of 1,700,000.

New wireless licences are being issued at the rate of 40,000 or 50,000 a month. If the higher of these two



You would be a millionaire.

monthly rates is maintained, the second millionth licence should be issued during the month of October. I wonder who will get it.

The higher monthly rate, 50,000 a month, is scarcely likely to be maintained during the summer months, if previous years are anything to go by. Even if the rate is only on the average 40,000 a month for the rest of the year the second millionth licence will be issued before the year is out.

Next year, then, there will be two million wireless licences issued and paid for. If all these ten-shilling licence fees were to find their way into my pocket (or shall I be generous and say your pocket?) you would be a millionaire before the year 1927 gave way to 1928.

And then what kind of a set would you build?



The Reason Why

I wonder if the Editor would consider the idea of a voting competition on the reason why the Transatlantic broadcasting tests were so pronounced a failure this year. (No, a thousand times NO!—Ed.)

Anyhow, here is a jolly little list

of those troublesome influences to which the failure of these tests has been ascribed, wholly or in part:

- (i) The Aurora Borealis, (ii) sun-spots, (iii) unsuitable weather conditions, (iv) full moon, (v) shooting stars, (vi) mischievous pranks played by the Heaviside layer (if any), (vii) insufficient power of the American transmitting stations taking part in the tests, (viii) ether pockets over the Atlantic, (ix) atmospherics, (x) morse interference, and (xi) a secondary approaching Iceland.

Pretty good "Test" team, isn't it? If you want a twelfth man, here you are: (xii) oscillating receivers on the European side.

My meteorological friend is most indignant over the suggestions that the Aurora Borealis, unsuitable weather conditions, or a secondary even when approaching Iceland, could have any effect on the tests.

My astronomical friend says only a lunatic would suggest that the full moon had anything to do with the failure, and as to shooting stars, he says you might just as well blame shooting corns for a bad earth.

Even if we give way to the objections of my meteorological and astronomical friends, bless them, we have still got a pretty nice list.

Seriously, though, I attribute my own failure over the Transatlantic tests this year to the fact that I—



I prefer a warm bed.

er—prefer a warm bed to a cold sitting-room in the early hours of the morning.

Perhaps next year, if the weather is a little bit warmer, I shall do better.

Undesirable Development

It has been stated before the Government Committee on broadcasting that the abolition of the low-power relay stations and the setting up of a number of high-power transmitting stations at carefully selected points in these islands would lead to the following desirable features in our wireless development:



An undesirable development.

- (i) The appearance of cheap valve receivers on the market.
- (ii) The disappearance of the crystal set; and
- (iii) wireless in every home.

Much as we should undoubtedly like to see (i) and (iii) brought about, I scarcely think that any of us would like to see the last of the humble crystal.

Some of us will never forget those early days of crystal reception when valves were an impossibility, and I think many of us will agree that the wireless enthusiast has not tasted to the full the joys of wireless until he has experimented with a simple crystal receiver.

The inevitable result of a great increase in the number of valve sets would be an increase in the amount of interference from oscillating receivers. I am sure that the single-valve set with reaction is one of the greatest offenders in this respect, and, in spite of what has been said in certain quarters lately, I do not believe that there is any appreciable, one might almost say audible, interference from crystal sets.

In my own case, I have derived more pleasure on the whole from designing and making crystal sets

than I have from designing and making valve sets.

"Here's to the good old crystal," say I. What do you say?



Wheep! Wheep!

I wonder what your locality is like as regards interference caused by nearby oscillating receivers. We are particularly fortunate in this respect in our own little home town (touch wood, or better, perhaps, touch ebonite).

The other evening I went the round of the broadcasting stations in order to see how much interference there was on the different wavelengths. Manchester was easily the most interfered with station. When listening to 2 Z Y, I received a succession of those peculiar noises which are as familiar to you, I dare say, as they are to me.

You know the kind of noises I mean. *Wheep! Wheep! Wheep!* I expect you know just as well as I do how they are caused.

It so happened that Manchester had a most attractive programme that particular evening. I suppose interference of this kind is generally the worst with that broadcasting station which is transmitting an exceptionally good programme.

Such undue amount of interference is no doubt caused by wireless enthusiasts allowing their receiving sets to get too near the oscillating point when "reaching out" for the



Interference!

distant station with the good programme.

A point which interests me with regard to interference from oscillating receivers is that such interference seems to be less noticeable on the higher wavelengths than on the lower wavelengths. I wonder if this is generally the case. If so, it would be a great argument in favour of the higher wavelengths for broadcasting.

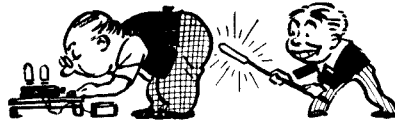


Fear of Lightning

Are you at all afraid of thunderstorms? Do uncomfortable shivers of apprehension run down your spine when you hear those sharp, angry

atmospherics in your telephones or loud-speaker?

I am afraid I must confess to a certain amount of dread of thunder and lightning even here in England



A foolish thing to do.

where our thunderstorms are very tame affairs when compared with the fierce electric storms I have had some experience of in Eastern Canada.

Some people look upon a properly

Tell Us What You Know

about H.T. batteries. For the best hint or hints (not exceeding 100 words in length and written on one side of the paper only) on H.T. batteries sent in by any reader we shall award a prize of **one guinea's worth of components** chosen from the catalogues of advertisers in this issue.

For all other hints used we shall give a small adjustable spanner suitable for constructional work.

All hints must be received by April 24.

earthed aerial as a protection when thunderstorms are about. Others, however, look upon an aerial as a source of danger during a local thunderstorm.

I have two wireless friends who belong to the latter class, and during a bad thunderstorm last year they did what I thought were extremely dangerous and foolish things to do.

The first of my two thunderfearsome friends went out during the storm, let down his aerial and buried the free end in the soil of a flower bed.

My second friend, during the same storm, unscrewed the end of his aerial down-lead from the aerial lead-in, carried the end of the down-lead across an asphalt footpath in the front of his house and tied the end of the down-lead to a low branch of a tree.

Neither of my two friends could have done a more foolish thing, for they both exposed themselves to danger by working for a time near an isolated, high tree which was far and away the likeliest thing for lightning to strike in the immediate neighbourhood.

Interference on Daventry's Wavelength

Do you ever experience any trouble with your reception of the high-power station's transmissions? Possibly you look upon Daventry, as I do, as one of the most reliable of our broadcasting stations. If the least thing goes wrong with 5 X X when you are listening to one of its transmissions I expect you simply cannot help noticing it any more than I can.

The other evening I was listening to a talk from 5 X X, a most interesting talk as it happened, when suddenly there was a little plop and the volume of speech from my loud-speaker was reduced to about a third of what it had been.

Simultaneously with the reduction in volume from the loud-speaker there appeared as a background noise a rattle very similar to that caused by a powerful station transmitting automatic morse.

It must have been three or four minutes before there was a return to normal signal strength from 5 X X. I actually sat still all that time and looked at my three-valve set with anxious eyes. The temptation to get up and see if the set were at fault was almost irresistible, but I did not give way to it.

As the background noises continued to be audible during the subsequent silent periods in the programme, I attached a pair of phones to the set and listened-in on the phones for a while.



Something wrong with 5 X X.

With the phones I could distinctly hear morse signals, and I have been wondering ever since what station it was which interfered so suddenly and unusually with my quiet reception of Daventry.



George and Daventry

I told George about my experience of interference when listening-in to Daventry.

"Not a bit surprised," said George.

"Why, don't you look upon 5 X X as your most reliable station, George?" I asked.

"Dear me, no. 5 X X is my most *unreliable* station."

"Do you mean to tell me that you have ever been troubled with interference when listening-in to Daventry?"

"Certainly. Only this morning I had bags of it when listening-in to Daventry at 11 a.m."



Bags!

"What do you mean by bags of it?"

"Exactly what I said—bags of it."

"Do explain yourself."

"When I was listening-in to my most unreliable station I distinctly heard a conversation between two men. The first speaker asked the second speaker to take a hundred bags, and the second speaker replied that he would only take fifty bags. Isn't that what I said—interference, bags of it?"

"Seems to me as if that is what you ought to get when listening-in at a time when the rest of us are working," I replied, but George only gave one of his "I've-got-the-better-of-you" snorts and left me.

But I would like to know if you have ever heard any land-line telephony when listening-in to Daventry during the usual hours of business.



Christening Wireless Sets

If you were fortunate enough to hit upon a new wireless circuit, or a new type of efficient wireless receiver, or a new component part, what name would you give it? Would you give it your own name, or would you invent a name for it?

Nowadays the tendency seems to be towards inventing appropriate scientific names for new wireless sets and parts. Most of these names



Christening wireless sets.

are carefully thought out, but occasionally one runs across a made-up name which is meaningless or even contradictory when considered from the point of view of its derivation.

Possibly the word *dyne*, derived from the Greek word *dynamis*,

meaning force, is the most frequently used word in the business world of wireless. Thus we have *sedodyne*, *monodyne* and *unidyne*, all signifying single force, *duodyne* signifying two force, and *multidyne* signifying many forces. We have also *autodyne*, meaning self-force, and *heterodyne*, meaning other force.

The now familiar word *neutrodyne* is another *dyne* word, its meaning being, of course, neutralising force.

American wireless designers seem to have this fondness for inventing names for their wireless sets. Some of the latest made-up names for wireless sets on the other side of the Atlantic are *autoregenerator*, *orthophase*, *regenaformer* and *isofarad*.

Your dictionary, along with your knowledge of wireless, will enable you to get at the meanings of these invented words of American origin.



Less Wind

As soon as ever March is out you may look at your aerial mast and breathe a deep sigh of relief, for if the mast has withstood the hard



"Striking" figures.

buffeting of the winter gales, it will stand you in good stead during the summer months.

The great difference with regard to gales between the six months October to March and the six months April to September is as interesting to wireless enthusiasts as it is to any other branch of the community.

Could you have any more striking figures in this respect than these? In the Scilly Islands during the months of October to March, inclusive, the average number of hours during which the wind blows with gale force is 168, whereas during the other six months of the year, April to September, the corresponding number is but sixteen.

Putting it another way it amounts to this. In the Scilly Islands during the half of the year October to March you get, on the average, a total of seven whole days of gale. From April to September you only get two-thirds of a day of gale.

The difference between these two periods of six months is, of course, not so marked in less exposed places.

Loud-speakers

Have you ever tried turning a gramophone into a loud-speaker by means of a properly-constructed loud-speaking unit fitted to the tone-arm of the gramophone? It seems to me as if this particular



A sadly neglected type.

branch of loud-speaker reproduction is rather sadly neglected.

I can well remember that, when a wireless neighbour of mine bought a loud-speaking attachment for his gramophone some two years ago, I pooh-poohed the idea, and would not even trouble to go and listen to his gramophone loud-speaker.

The other day I happened to call in a wireless shop when the morning transmission from Daventry was being received. I was rather taken with the excellent reproduction of speech and music. There were several loud-speakers on view, and I asked the man behind the counter which one he was using.

"None of them," he replied. "I am using this very cheap home-made loud-speaker constructed from an old gramophone and a loud-speaking unit."

Really, when I examined the home-made loud-speaker I was amazed at the purity and volume it was giving. The gramophone sound-box was a very old one and the loud-speaking attachment was an inexpensive one which has been advertised in the WIRELESS MAGAZINE recently.



Gaining Experience

My friend the architect would make a four-valve set at his first attempt.



Gaining experience.

I told him what the result would be. Just imagine starting constructional work with a four-valve set, one high-frequency valve, detector valve and two low-frequency valves.

The set was designed to fit a corner cupboard. It was a neat design

and looked as attractive as any set I have ever seen. I asked my architect friend the other day what success he had had.

"Not much, perhaps," he replied. "The set works best without an earth, and it is not very selective."

"Didn't I tell you it would not be selective?" I asked.

"I admit you did," he replied, "but the set really fits the corner cupboard as nicely as one could wish. In fact, the corner cupboard is the best part of the set."

Yesterday I met my architect again, and once more I asked about the set.

"I've taken it all to pieces and re-wired it again according to a different circuit. I get plenty of volume but no selectivity."

"What are you going to do next?" I asked.

"Get you to design me one of your own extra special four-valve sets."

"That's what I wanted to do at first, and I can't see why you did not let me."

"I'm jolly glad I didn't," he replied. "If I had done I should have lost all the experience I have had making up the other two sets."

Rather nicely put, wasn't it?



The New Recruit

The lady who comes to my house twice a week in order to carry all the furniture out from the various rooms and put it back again is going to take up wireless.

I am rather surprised that she has not succumbed before, for this is a house in which one would expect a susceptible person to be bitten pretty badly with the wireless fever.

There are valve and crystal sets in the chief room in the house, the wireless room, and there are indoor aerials here, there and everywhere. There are frame aerials lurking in the corners and loud-speaker wires running from room to room.

The good lady I refer to knows a little about wireless. She has been taught how to take a valve set and its attendant batteries "from together" prior to carrying it out of the room to be cleaned. She also knows how to blow the dust from off the top of a set, and she is fully conversant with the punishment which may be hers if she is ever caught dusting a set with a duster.

"I am going to start wireless," she said to me yesterday.

"Splendid," I remarked. "Where are you having your set from?"

"My landlady's daughter's husband's wireless friend is going to make me a set."

"Indeed, and what kind of a set is it going to be?"



It's going to be a chrysalis set.

"It's going to be one of these chrysalis sets," was the reply.

My great hope in the matter is that the so-called set will hatch out into a valve set in the early summer.



Broadcast Architecture

I have been wondering if the B.B.C. engineers look forward to the time when they can design all their broadcast station buildings

You Are Interested in Super-hets?

Of course you are! Then turn to p. 269. On that page and the pages immediately following you will find some particulars of super-hets, well illustrated with photographs.

from the ground up to the top of the masts.

If our future broadcasting stations could be designed simply and solely as broadcasting stations no doubt we should very soon see the development of a new type of architecture which would be known as broadcast, or wireless, architecture.

I have been trying to form a mental picture of the ideal broad-



A far-seeing architect.

casting station. In the building of such a station I should imagine the chief thing to do would be to incorporate the steel aerial masts in the stone or brick building itself. These lattice-work steel masts would be so riveted and bolted to the

framework of the building that the exposed portions of the masts would withstand the pressure of the strongest winds.

The studios, offices and transmitting plant rooms would all be in the broadcast building directly under one of the aerial masts. Probably the part of the building between the masts and the part under the second mast would form a large concert hall with organ. A far-seeing architect might possibly reserve a part of the broadcast building for television apparatus.

If ever I had to plan out a broadcast building the point I should watch most carefully would be the provision of a jolly good earth underneath the building.



Wireless in the Sick-room

A small boy in a house in which I was staying recently caught a chill, and it was necessary to keep the little fellow in bed the greater part of a week. Life in bed was rather tedious for the young invalid; he was unable to read much, so I offered him wireless to pass away the time.

My set was in the sitting-room beneath the boy's bedroom, and it was a simple matter to run a double-flex lead from the set to the bedroom above. I tried two loud-speakers in the sick room, a large modern one and an old small one which I have had for three years. In order to get the most agreeable effect I tried the loud-speakers separately in various parts of the room and also in the corridor just outside the room. The boy preferred to have the loud-speaker just outside the room—a very sensible choice.

I tried both the loud-speakers in this position and then asked the little fellow which he liked best. He replied: "I like the big one for music, and the little one when somebody is speaking."

I then connected the two loud-speakers in parallel, but the effect was not good. I then connected them in series, and the result was excellent, and pleased the boy immensely. I left him with the two loud-speakers working in this manner. Not only did he enjoy the whole of the afternoon concert, but he insisted on listening to the Children's Hour, a most unusual thing for a grown-up schoolboy of twelve to insist on, as far as my experience of schoolboys goes.

HALYARD.

Broadcasting Committee's Report

WHAT effect will the Broadcasting Committee's report have on our wireless entertainment? That is the question every listener is asking, but it is a question to which time only can give the answer. At the moment of going to press it is not even known whether the report will be accepted by the Government.

The Broadcasting Committee was brought together by the Postmaster-General to advise as to the proper scope of the broadcasting service and as to its management, control and finance after the expiry of the B.B.C.'s licence on December 31, 1926.

Its ten members were as follow:—

Rt. Hon. the Earl of CRAWFORD and BALCARRES, K.T. (*Chairman*).

Rt. Hon. Lord BLANESBURGH, G.B.E.

Capt. IAN FRASER, C.B.E., M.P.

Rt. Hon. WILLIAM GRAHAM, M.P.
RUDYARD KIPLING, ESQ.

Sir WILLIAM HENRY HADOW, C.B.E.

Rt. Hon. IAN MACPHERSON, K.C., M.P.

Rt. Hon. Lord RAYLEIGH, F.R.S.
Sir THOMAS ROYDEN, Bart., C.H.
Dame MERIEL TALBOT, D.B.E.

The Committee held sixteen meetings and heard evidence from twenty-two individuals or groups; it also considered various memoranda dealing with the subject.

It was agreed that the United States system of free and uncontrolled transmission and reception is unsuited to this country, and that broadcasting must accordingly remain a monopoly—in other words, that the whole organisation must be controlled by a single authority.

Four methods seemed available, namely:—

(a) That the State as such should be responsible;

(b) That the B.B.C.'s licence should be renewed;

(c) That a new company should be formed on the analogy of the B.B.C.;

(d) Or else that a public corporation should be set up to act as a trustee for the national interest in broadcasting.

As is well known, the Committee decided on the fourth method, that is, of appointing a British Broad-

casting Commission to control the broadcasting service.

Briefly, the recommendations of the Committee are that:—

(1) When the B.B.C.'s licence expires on December 31 of this year, the whole of the company's activities and personnel should be taken over by the Commission, which must be formed before that date so that there should be no dislocation of the service.

(2) The Commission must be self-supporting and can expect no grant from public funds (it is suggested that the licence fee should remain 10s. a year).

(3) The Commissioners should be persons of judgment and independence, free of commitments, and that they would inspire confidence by having no other interests to promote than those of public service (it is proposed that one of the Commissioners should be a member of the present board of the B.B.C. in order to ensure continuity of action), and that they should not be persons representing various interests, such as music, science, drama, education, finance, manufacturing, etc.

It is further proposed that the Commission should consist of not more than seven or less than five persons appointed by the Crown.

Other recommendations of the Committee are:—

(a) That the Commissioners should appoint, in consultation with appropriate societies and organisations, as many advisory committees as are necessary to ensure due consideration of all phases of broadcasting.

(b) That the entire property and undertaking of the British Broadcasting Company as a going concern should be vested in the Commission on January 1, 1927; that all existing contracts and staff of the British Broadcasting Company should be taken over by the new Commission.

(c) That the Postmaster-General should remain the licensing authority and be responsible for collecting the licence fees.

(d) That the provision for experiment and research should be generous.

(e) That the Commission should be empowered to raise capital.

(f) That the fee of ten shillings for a receiving licence should be

maintained; that the first charge on the revenue from licence fees should be the expenditure incurred by the Postmaster-General in connection with the broadcasting service; that after paying the Commissioners an income thoroughly adequate to enable them to ensure the full and efficient maintenance and development of the service, any surplus should be retained by the State.

(g) That the Commission's accounts should be reviewed by the Comptroller and Auditor General.

(h) That so soon as the licence expires or is withdrawn the Commission, on due provision being made for the discharge of all debts and liabilities, should be bound to transfer or dispose of its whole undertaking in such manner as the Postmaster-General may direct.

(i) That the Commissioners should be entitled to all the ordinary rights as regards the use of copyright material—whether in news or otherwise—and that it is unnecessary to invest them with any special privilege or preference.

(j) That the claims of those listeners who desire a larger proportion of educational matter, though relatively few in number, should, if possible, be met.

(k) That every effort should be made to raise the standard of style and performance in every phase of broadcasting and particularly in music.

(l) That a moderate amount of controversial matter should be broadcast, provided the material is of high quality and distributed with scrupulous fairness, and that the discretion of the Commissioners in this connection should be upheld.

(m) That licences should be granted to blind persons free of charge.

(n) That the prestige and status of the Commission should be freely acknowledged and their sense of responsibility emphasised; that, although Parliament must retain the right of ultimate control and the Postmaster-General must be the Parliamentary spokesman on broad questions of policy, the Commissioners should be invested with the maximum of freedom which Parliament is prepared to concede.

(o) That the Commissioners should present an annual report to Parliament.

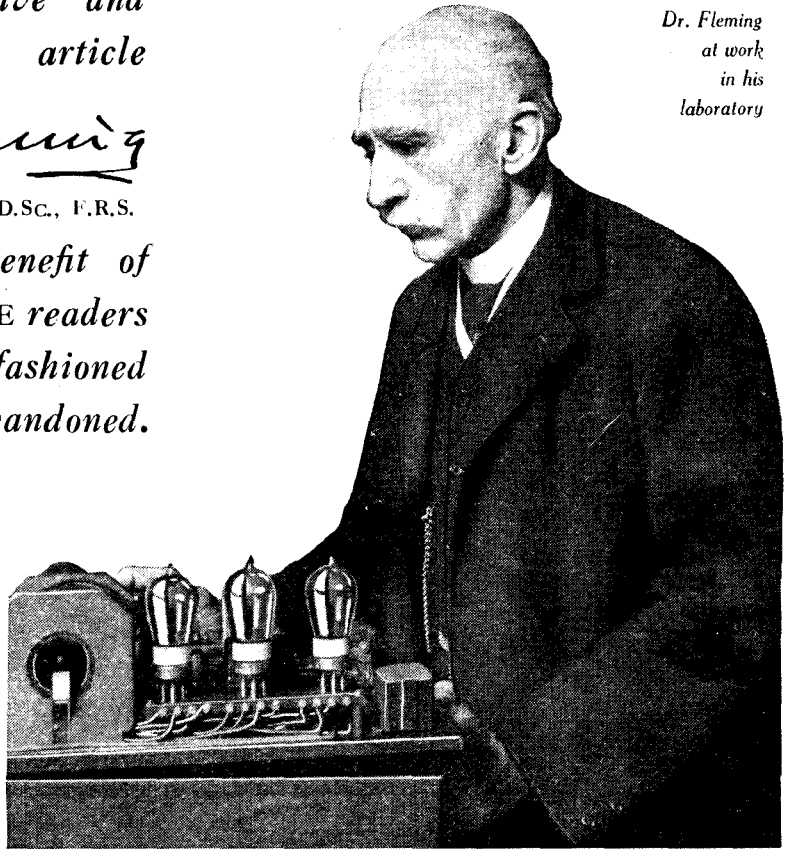
THE NEED FOR A NEW "ETHER"

In this authoritative and specially written article

J. A. Fleming
D.Sc., F.R.S.

explains for the benefit of WIRELESS MAGAZINE readers why certain old-fashioned theories must be abandoned.

Dr. Fleming at work in his laboratory



Broadcast listeners owe a great deal to Dr. J. A. Fleming, who, by his invention of the two-electrode valve, helped so much towards the rapid development of wireless.

Dr. Fleming, now in his 76th year, has had, as all the world knows, a most distinguished electrical career.

IN spite of all that has been written on the subject of the ether, or the supposed means by which radiation is transmitted through space, our actual knowledge of it is small—and rather negative than positive in character.

Things We Do Know

It will be of advantage to mention first the principal things that we do know about the effect called radiation, and then turn our attention to those which we do not know.

In the first place, we know that hot substances make themselves felt at a distance by sending out heat and perhaps also light, even when we are not in contact with them, even when there is no material substance, gas, or air, in the interspace.

In Switzerland, in the high Alps in winter, when exposed to the sun, which is a hot body, one's face may become scorched and sunburnt even though the air is at a temperature below freezing point.

When the temperature of the hot substance rises beyond about 400° C. it affects the retina of our eyes and produces the sensation of light.

Radiation is called luminous if it affects the eye and thermal if it affects only the skin or a thermometer.

Experiments on luminous radiation or light have shown that it takes time to pass through space, and that its velocity is 299.9 million metres, or nearly 1,000 million feet per second.

Furthermore, we know from numerous facts that this radiation is a wave motion in the sense that it is periodic in space and in time. This means that if we imagine ourselves to stand still at a certain point and let the radiation go past us, the same physical operations would be repeated periodically at that point.

On the other hand, if we consider the radiation to stand still and ourselves to move along the line of prop-

agation, we should find the same physical state periodically repeated along that line at successive points.

The space interval in which one complete cycle of operations would be found is called a wavelength, and the time interval in which they happen at any point is called the periodic time, and its reciprocal the frequency.

Constituent Rays

If we have radiation in which the constituent rays have different and regularly increasing wavelengths, then that range lying between two wavelengths one of which is double or else half the other is called an octave of radiation.

The whole of the visible radiation is comprised within one octave, and the rays of various wavelengths affect our eyes with different sensations of colour, for example, the rainbow or spectrum series. The average wavelength of visible radiation is about $\frac{1}{25000}$ of an inch.

The Need for a New "Ether" (Continued)

It is convenient to reckon these small lengths either in *microns*, 1 micron (denoted by 1μ) being $\frac{1}{1000}$ millimetre, or else in Angstrom units (A.U.), 1 A.U. being one hundred millionth of a centimetre. On this scale the wavelength of yellow light is about 0.5μ or 5,000 A.U.

Beyond the octave of visible radiation we have invisible radiation, both of longer wavelength, called dark heat, and shorter wavelength, called ultra-violet radiation, which latter has great photographic power.

Dark heat of considerable wavelength can be obtained from various sources, such as a Welsbach gas mantel, by a method, due to Rubens and Nichols, of repeated reflection from certain substances such as the mineral sylvite.

It is a general law of radiation that a substance reflects most strongly rays of the same wavelength it absorbs. Thus a sheet of glass absorbs nearly all the dark heat-rays from a coal fire, but allows the luminous rays to pass through it. Hence it reflects dark heat-rays more completely than light-rays.

There are substances which possess absorption for a certain limited range of long-wave radiation, and these are said to have an absorption band in the ultra-red region. By repeated reflection from several surfaces of such substances long heat-rays can be separated out, called *reststrahlen* in German, or residual rays of great wavelength.

In this manner (about 1911) dark heat-rays up to about 300μ in wavelength, or one-seventy-fifth of an inch, had been isolated and their wavelength measured. These lie nearly 10 octaves beyond the visible radiation wavelengths.

At the other end of the spectrum the range of known ultra-violet wavelengths was gradually explored by Schumann and Lyman as far down as wavelengths of 130 A.U. or 0.0125μ .

Waves of these short wavelengths

are powerfully absorbed even by a few centimetres thickness of air. Hence they can only be studied by spectroscopes which are in a vacuum.

The so-called X-rays, or Röntgen rays, are radiations of still shorter wavelength, and of these about 14 octaves are known, extending down

PROF. EINSTEIN—



—whose theories of relativity are closely connected with our conception of the ether.

to waves as short as 0.06 A.U. in wavelength. Then there are even shorter waves, called gamma waves, given out by radium.

Quite recently Dr. R. A. Millikan, in the United States, has announced his discovery of a new type of radiation, having wavelengths vastly shorter even than X-rays; the shortest wavelength of this type is about 0.0004 A.U., or nearly $\frac{1}{2500}$ of the mean diameter of an atom of matter, and only a ten-millionth part of the wavelength of visible light.

These rays are so penetrating that they can pass through a thickness of 6 ft. of lead or 68 ft. of water.

Passing back, then, to the dark heat-rays, we all know that the wireless waves and the Hertzian waves produced by electric oscillations are radiations of the same character as visible radiation or light, only of vastly greater wavelength. Up to a few years ago the shortest Hertzian electro-magnetic waves which had been produced by electric oscillations had a wavelength of about 7 or 8 millimetres or, say, $\frac{1}{4}$ inch.

But in 1923 Dr. E. F. Nichols and Dr. J. D. Tear, in the United States, succeeded by special methods in generating electrically Hertzian waves having a wavelength of only $\frac{1}{100}$ inch or $\frac{1}{4}$ millimetre or 250μ . These waves were shorter than the longest heat-waves filtered out by the reflection method from sources of heat.

Hence there is now no gap between the longest known dark heat-rays and the shortest Hertzian waves. The length of the longest electro-magnetic waves used in high-power wireless stations for world-wide radio is about 20,000 metres.

Accordingly, if we take into account this new radiation recently discovered by Dr. Millikan with a wavelength of $\frac{1}{2500}$ Angstrom unit we can say that we are acquainted with 70 to 80 octaves of electro-magnetic radiation, all of which we believe is of the same essential nature and travels through space with the same velocity.

We have next to ask ourselves what is the nature of this effect which can in this way be propagated through space with a definite and constant velocity.

The study of Hertzian waves has shown that it is an electro-magnetic wave in which there is a propagation of two periodically varying physical effects, namely, an electric displacement or force and a magnetic flux or force. These two forces take place in directions at right angles each to

An Exclusive Article by Dr. J. A. Fleming, F.R.S.

the other, and to the direction of propagation of the wave. Thus, if one considers an electro-magnetic wave travelling straight towards oneself, say in a north to south direction, then the electric force in it will be in a direction say upwards, and the magnetic force in a direction either to right or left of the line of propagation.

These two effects are called the wave-vectors, and they travel together, keeping step with each other and both periodically fluctuating or changing, so that the electric and magnetic forces, though at right angles to each other, come to their maximum or zero values at the same place and at the same time on the line of propagation.

The meaning of this may be made clearer by considering other and more familiar types of wave. Consider first surface waves on the sea. In this case the particles of water at the surface are alternately above and below the mean level; hence one wave-vector is a change in surface level. The particles of water are also alternately in motion or at rest; therefore velocity is the other vector.

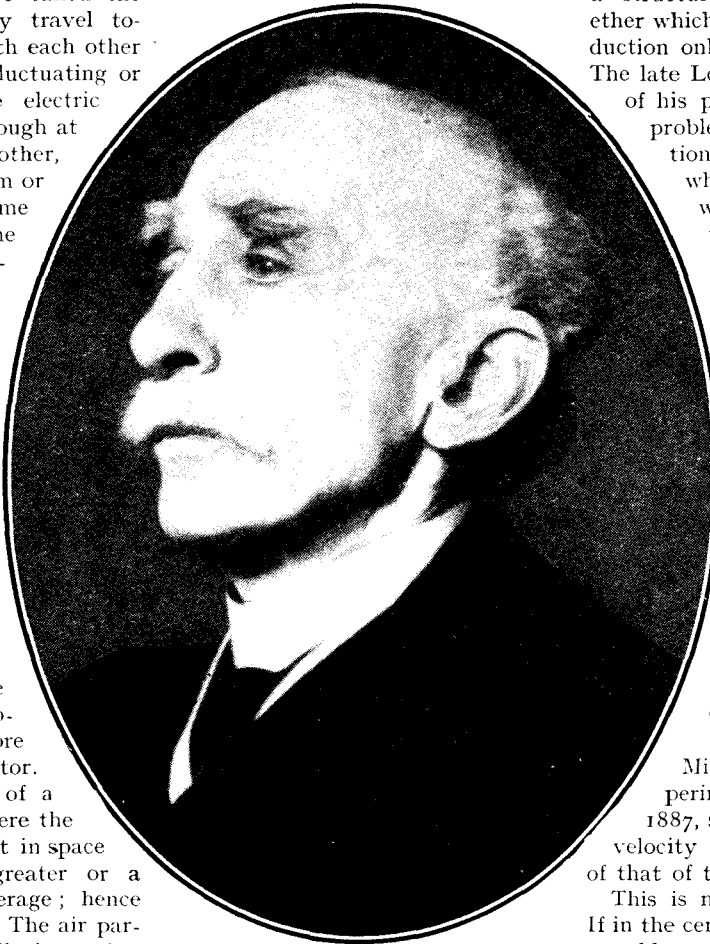
Take next the case of a sound wave in air. Here the air pressure at any point in space is alternately a little greater or a little less than the average; hence pressure is one vector. The air particles are also periodically in motion along the line of propagation of the wave; accordingly motion or velocity is the other vector.

In the case of a wireless or electric wave the thing that changes from point to point in space or instant to instant in time is not a mechanical quantity, like air pressure or water level, but something called electric or magnetic force. We cannot visualise this or explain it to ourselves in terms of any more familiar motion, displacement, or pressure.

The old-fashioned mode of dealing with this subject of radiation was to assume that all space, even the per-

fectly vacuous space between the stars, was full of an intangible weightless material or medium called the ether, and then to proceed to imagine or hypothecate some structure for this ether which should render it possible to have distortional waves propagated in it.

Dr. J. A. FLEMING, F.R.S.



A new portrait taken specially for the WIRELESS MAGAZINE.

There are many phenomena which show that the waves which constitute radiation are analogous to distortional waves in an elastic solid and not to compressional waves such as those in air. A gas like air only admits of having waves of compression produced in it, because the only elasticity the air possesses is resistance to change of bulk or volume.

But in the case of a solid there is resistance also to change of shape or form or distortion.

Accordingly, in an elastic material like indiarubber or steel, or even in the solid earth, we can propagate two kinds of wave, viz., waves of compression and waves of distortion. These two kinds make their appearance in earthquake waves.

Since there are no compressional waves in the case of radiation it was necessary to try to invent or imagine a structure for the hypothecated ether which should admit of the production only of waves of distortion. The late Lord Kelvin devoted much of his profound thought to the problem of devising in imagination a structure for the ether which would admit only of waves of distortion being propagated through it.

All these so-called elastic solid or gyrostatic theories of the ether have had to be abandoned.

The fact that in wireless waves the wave-vectors are electric and magnetic in nature proves that this is the case in all radiation, and nothing is gained by assuming that these forces are the result of some mechanical structure of an ether possessing inertia and some kind of elasticity.

Moreover, the celebrated Michelson and Morley experiment, first performed in 1887, seemed to prove that the velocity of light is independent of that of the source of light.

This is not the case with sound. If in the centre of a very long airship a sudden noise was made, observers at the bow and stern would hear it simultaneously if the ship was at rest in still air. If the ship was in motion the observer at the stern would hear the sound first, because he is, so to speak, moving forwards to meet the sound wave.

The earth may be regarded as a sort of ship moving through space with a velocity of about twenty miles a second. If, however, a flash of light is made at any point on it, observers at equal distances see it simultaneously, no matter what the direction of the line joining them to the source of light has with

The Need for a New "Ether" (Continued)

respect to the line of the earth's motion.

This, at least, is what seemed to be proved by the Michelson-Morley experiment. The inference made from it was that it is impossible to detect the motion of the earth with reference to a supposed stagnant ether through which it is moving.

Foundation of the Modern Theory

The whole of the modern theory of relativity, associated chiefly with the name of Einstein, is built up on the assumption that the result of the Michelson-Morley experiment was to show that there is absolutely no difference in the velocity of light in different directions.

It is very seldom that a physical experiment can prove the absolute absence of a particular effect. All it can do is to prove that it is less than a certain amount. In this case the Michelson-Morley experiment in fact proved that if there is a relative motion of the earth with regard to the ether near it, it is less than 7.5 kilometres per second.

Quite recently this celebrated experiment has been repeated at Mount Wilson, in the United States, at a considerable height above the earth's mean surface, and the results seem to show that there is a difference of as much as 10 kilometres per second in the velocity of light in different directions with respect to the line of the earth's motion.

The inference made from the Michelson-Morley experiment, viz., that since relative motion of the earth and the supposed ether cannot be detected, the hypothesis of an ether must be discarded is not therefore quite legitimate.

There may be no difference at the earth's surface or in a room beneath it, and yet there may be a difference at places far removed from its surface.

It is very desirable that the Michelson-Morley experiment should be repeated with apparatus of the utmost refinement at as great a height as possible, say on the top of the Jungfrau in Switzerland, 14,000 feet above the mean sea level.

The conclusion to which we may with some degree of confidence arrive is that space is not mere emptiness. Those parts of it not occupied by

material substances are nevertheless not a vacuum but a plenum.

The primary quality of space is that it permits the production in it of a physical state which we describe as electric force or electric displacement, and the places where this electric force begins and ends are called protons and electrons. We commonly speak of this state as a line of electric force. But this state can exist along endless lines or in closed loops of force, and these loops can move through space.

It is useless at present to try to go beyond these statements and imagine that an electric line consists of some sort of mechanical strain or displacement in some kind of elastic solid ether, because we have no justification for supposing that the qualities of material substances as a whole are inherent in the ether.

The ether must be something much more fundamental, and its ultimate nature is perhaps beyond the reach of our present powers of imagination or conception.

What we call matter or material substance is simply those localities in space in which the lines of electric force are very short and the protons and electrons therefore crowded together. What we call radiation consists in the motion through space of endless loops of electric force.

When a line of electric force moves through space it creates another kind of directed effect called magnetic force, and, as above mentioned, the direction of this magnetic force is perpendicular to the direction of the line of electric force and also to the line of motion of the latter.

What Radiation Is

The radiation, whether of light-rays, heat-rays, or wireless waves, consists solely in this motion through space of electric and magnetic lines of force at right angles to one another and moving together in a direction perpendicular to the plane of the two forces.

Whether we have any need to postulate the existence of a special medium called the ether as the vehicle for these forces, or whether we can accept a space distribution of electric force as the ultimate com-

prehensible fact of the physical universe, remains to be seen.

Light, and therefore all radiation, possesses momentum, exerts pressure, and conveys energy just as do moving masses of matter. Also it has been proved by observations at a solar eclipse in 1919, as predicted by Einstein, that light is subject to gravitational attraction. In fact, there is no qualitative difference between a ray of light and a mass of matter in motion.

Light and Matter

Light, in fact, differs only from matter in that in the latter the lines of electric force terminate on protons and electrons, and it is, so to speak, an entanglement of lines of electric force of finite and very short length, whereas light is composed of loops of lines of force which are endless, and these loops flit through space with a velocity of 1,000 million feet per second when they are detached.

This suggests that there may be a continual mutual destruction and re-creation of electrons and protons in material substances, and that the energy carried away by light rays from a radiating mass of matter may be only the equivalent of the potential energy of the separated protons and electrons in the atoms.

The progress of our knowledge of the astronomy of atomic structure of late is very remarkable, and may one day reveal to us much more of the secrets enshrined in that most mysterious phenomenon in the universe—a ray of light.

Using Frame Aerials

THE location of a frame aerial in the house, and even its position in a room, often has an appreciable effect on the results obtained from a receiving set.

Gas-pipes, water-pipes, electric-light wiring, etc., all tend to deflect ether waves and may either act as a shield or concentrate the waves on to the frame, depending on their exact location in regard to the aerial.

It is therefore best to try the frame aerial in several positions when testing a receiver, especially if results are not up to expectations. R.

MEESTER M'CNAB'S TEN-SHILLING TWO-VALVER

A Story of a Canny Scot

By RICHARD CAROL

Illustrated by Will Owen

NAE doot ye hae a' heard o' Clumtochty, tha'at wee village in the Heelans whaur the red-headed chie'ls o' the North an' the gentle shepherds o' the South used tae meet an' hurl abusive epitaphs at ane anither. Nae doot ye hae a' heard o' Clumtochty's deus ex machina, as ye nicht ca' him, Sandy McNab by name, by profession general merrchant an' post maister combined. Weel, tha'at's me.

Noo A maun admit that at ae time A hadna a guid wurrd tae gie for this new-fangled invention ca'ed wireless. But, ae day, a chie' wi' a muckle big baag an' a verra plausible tongue cam intae ma shop an' tellt me o' the wunnerfu' proafits that were tae be derived frae the sale o' wireless components. As there was nae wireless shop for miles an' miles, he said, A cud dae juist as A liked. A cud see he was richt sae A gied him an' oarder.

Then A startit tae read up a' the papers on wireless, aifter washin' ma hauns maist carefu'y sae that naebody wad ken the papers werena new, an' in the coorse o' a few weeks A kennt juist aboot a' there is tae be kennt aboot wireless. The muckle big names juist slippit aff ma tongue like grease aff a het girdle.

But noo ma oarder had been deelevered an' A had pit up a notice in imating that A was a certified wireless experrt. Then A thocht it wad be as weel tae hae a set masel tae illustrate, ye ken.

A had juist arrived at this momentous coanclusion when Mistress McPherson cam in.

"Meester McNab," she said coanfidentially, "A want yer help."

"Ay," A said.

"Ye mind Tammas won a twa-



valve set in yon competeection for tellin' why he shud hae the prize?"

"Ay," A said.

"Weel, Meester McNab, it's sendin' me fair crackit, it is. He juist sits wi' thon phone coantraptions ower his heid chucklin' an' sweerin' awa tae himsel for hoors. A canna staun it ony mair."

"Weel?" A said.

"Meester McNab," she said in a voice that quivered wi' emotion, "the guidman's awa tae Auchter-auchty for twa days. If A bring it doon tae ye, wull ye tak it tae pieces sae that he'll no' be able tae recognise it an' A'll tell him it's been stolen."

A thocht for a meenit, on principle ye ken, tryin' harrd tae conceal ma exultation.

"Ay," A said wi' a brave nod, "A'll help ye."

She was baack in hauf an hoor.

"Here ye are," she said, "A've broken the twa lights but it'll shair help ye tae mak it unrecognisable."

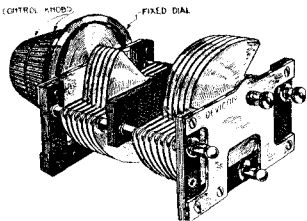
"Ay," A said wi' a painfu' smile.

Sae A took the set tae bits an' wi' them as foundation A coanstructed ma ain set, employin' a different an' verra shuperior circuit. In coansequence, A had tae use some new components which cost me a few shillins. The coils, o' coorse, A took frae stock for A cud sell them when A wanted. In fac', A cud aye point oot that thae coils had been specially tested an' found guid an' reliable.

But the valves worrit me, for the boaxes were a' stickit up wi' paper. Tha'at feckless wumman an' her ideas o' helpin' me. Guid shakes. Then Angus cam in an' speired me

(Continued on page 277)

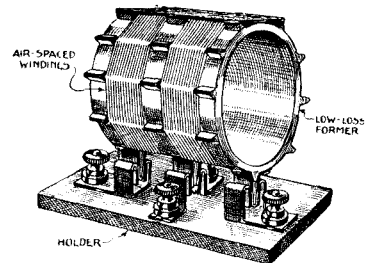
Novelties and New Apparatus



This new Devicon condenser is of the bridge type; it is made by the Radio Devices Co., of Newdigate St., Nottingham. The two sets of moving vanes can be operated independently of one another.

Wound on a low-loss former, this Dimic coil consists actually of two distinct windings, the ends of which are brought out to four separate terminals.

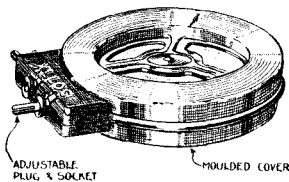
The complete unit (eight sizes are made to cover a wavelength of from 150 to 4,500 metres) can be plugged in and out as required.



The manufacturers are L. McMichael, Ltd., Hastings House, Norfolk St., Strand, W.C.2.

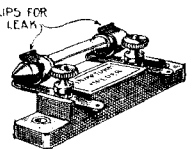
Perhaps the most interesting thing about the new Igranite Xllos coils is the number of ways in which they can be mounted. The plug-and-socket connections are adjustable in a number of ways, according to the user's needs.

The address of the Igranite Electric Co., Ltd., is 149, Queen Victoria St., E.C.

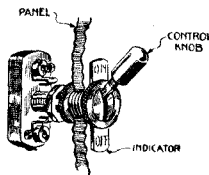


Having a metallic resistance element, the Dumetohm grid leak remains constant in value until the current passing is sufficient to heat up the filament.

For use with this new type of leak a special holder is made (this is shown in the drawing).



Dumetohm leaks are made by the Dubilier Condenser Co., Ltd., of Victoria Rd., N. Acton, W.3.

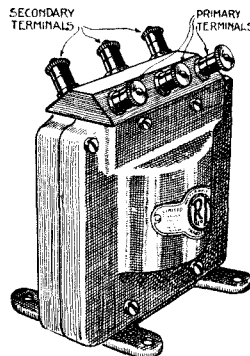


A neat Trix single-pole switch suitable for inclusion in the filament circuit of a valve set; has the additional advantage of being one-hole fixed.

It is provided with a metal indicating tag.

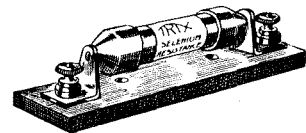
Trix components are made by Eric J. Lever, of Clerkenwell Green, E.C.

The new R.I. tapped L.F. transformer makes it possible for the amateur to obtain any one of seven ratios and a range of primary impedances from 7,000 to 60,000 ohms, a feature of real value.



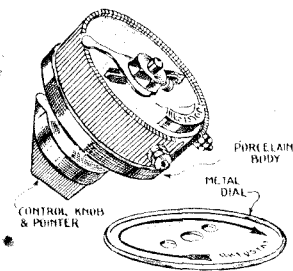
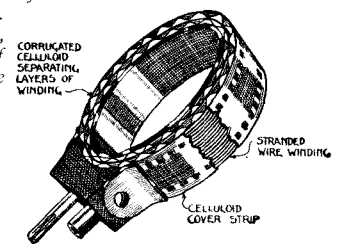
Radio Instruments, Ltd., address is 12 Hyde St., New Oxford St., W.C.1.

It is well known that selenium has an almost constant resistance under nearly all conditions (when not exposed to light), and a new range of resistances employing this element, made by Eric J. Lever, of Clerkenwell Green, E.C., should find favour with many amateurs.



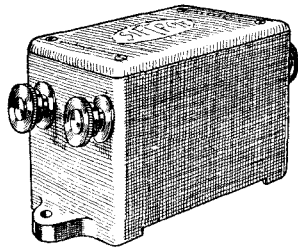
Wound with stranded wire, the layers in Lewcos coils are separated by means of corrugated celluloid strip, giving an appreciable air spacing between layers. The coils are wound on substantial ebonite formers.

The manufacturers are the London Electric Wire Co. & Smiths, Ltd., of Playhouse Yard, Golden Lane, E.C.1.



Excellently made and sold at a very reasonable figure, the Igranite-Pacent range of filament rheostats is certainly good value. The rheostats are available in the following resistances: 6, 10, 20, 30 or 50 ohms. A potentiometer of 400 ohms resistance is also made. The address of the Igranite Electric Co., Ltd., is 149, Queen Victoria St., E.C.

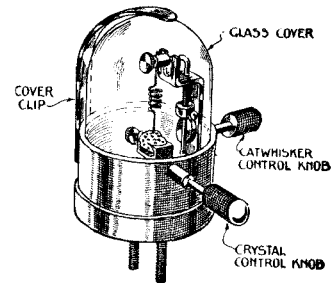
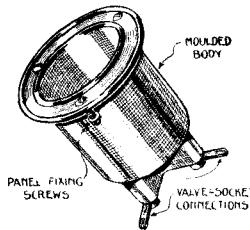
Illustrated and Described



The Sifron loud-speaker smoother, made by A. Graham and Co., St. Andrew's Works, Crofton Park, S.E., blocks the passage of any H.T. current through the loud-speaker, and thus prevents burn-outs and demagnetisation.

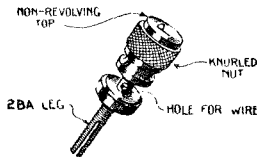
The "well" method of mounting valves is easily accomplished by the use of the Harley countersunk valve holder.

It is made by Harley Bros., 36, Wilton Road, Dalston, E.8.

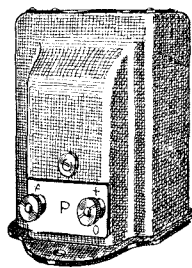


A removable celluloid cover protects from dust the C.A.V. crystal detector.

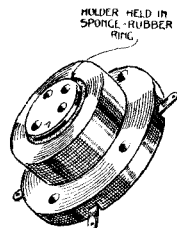
The manufacturers are C. A. Vanderwell and Co., Ltd., Warple Way, Acton, W.3.



A non-revolving indicating top and a knurled nut that cannot screw off are special features of the type M terminal marketed by Belling and Lee, Ltd., Ponders End, Middlesex.



High insulation between the primary and secondary windings ensures maximum amplification with the Gecophone L.F. transformer made by the General Electric Co., Ltd., Magnet House, Kingsway, London.



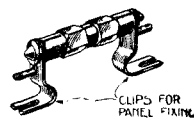
Undesirable microphonic noises are impossible with dull-emitter valves when the Sterling Non-pong valve holder is used.

It is supplied by the Marconiphone Co., Ltd., 210-212, Tottenham Court Road, W.1.

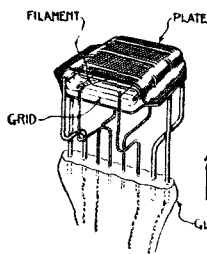
The terminals of this transformer are clearly marked, thus facilitating connecting up.

The clips attached to the new Igranite grid leak, made by the Igranite Electric Co., Ltd., 149, Queen Victoria Street, E.C., make it specially suitable for panel fixing.

The leak can also be connected in series or parallel with a condenser with ease.

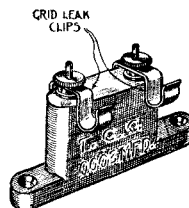


This N-type filament is an exclusive feature of the Mullard P.M.-type valves, manufactured by the Mullard Radio Valve Co., Ltd.,



Nightingale Lane, Balham, S.W.12.

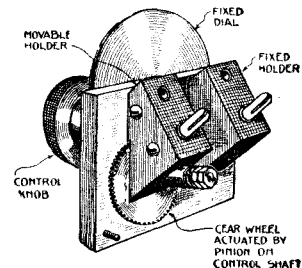
A considerably increased electronic emission is possible with such a filament.



The T.C.C. mica condenser, a product of the Telegraph Condenser Co., Ltd., Kew, Surrey, is supplied with clips as shown for use where the grid leak is connected in parallel.

Type S.P. has three terminals, and is for use when the grid leak is connected in series.

The neat back-of-panel coil holder, shown here, has recently been marketed by Eric J. Lever, Clerkewell Green, London, E.C.



Should We Use Reaction?

THERE can be no doubt that the use of magnetic reaction has played an enormous part in increasing the ranges at which wireless reception is possible; nor can there be any question that its use is most desirable for the reception of telegraphy. But it is still a moot point amongst wireless enthusiasts whether magnetic reaction should or should not be used when clear and undistorted reproduction of telephony is desired.

Increased Range

Those in favour of it point to the great increase in range which it gives, to the improved selectivity resulting from its use, and to the greater signal strength which it makes possible.

Its opponents maintain that in most cases the use of magnetic reaction leads to distortion and a noisy background, and that it is responsible for ninety-nine per cent. of the interference due to radiation which is experienced when broadcast programmes are being received.

Let us try to understand first of all just what the purpose of the reaction coil is. If you strike a note on the piano, at the same time pressing down the loud pedal, the sound persists for quite a long time. If, on the other hand, you depress the soft pedal the sound ceases to be audible very quickly indeed. When the soft pedal is put down a pad is brought into contact with the string, with the result that it cannot vibrate freely and quickly comes to rest.

In other words the vibrations are heavily *damped*; that is, the amplitude of each wave is very much less than that of the one which preceded it, and the whole wave-train due to the striking of the note is of short duration.

The wave-train produced when the loud pedal is depressed also consists of waves decreasing in amplitude. There is damping here, too, since the string is brought to rest by the resistance of the air in which it moves, and by other forces; but damping is very much less pronounced. If it were possible to arrange a string which could vibrate perfectly freely the wave-train would theoretically be endless, there being no difference

in the amplitude of succeeding waves. We often hear the expression damping used with regard to the wireless set.

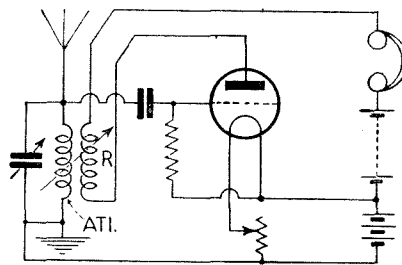


Fig. 1.—Single-valve Circuit with Magnetic Reaction.

Largely owing to the resistance to high-frequency impulses which they introduce, many of the components used in the wireless set have what we may call a "soft-pedal

It was only a few years ago that the terms of the Post Office receiving licence granted to amateurs contained a clause expressly forbidding the use of reaction directly coupled to the aerial circuit—that was to prevent avoidable interference from spoiling reception. But there are other objections to the use of reaction, especially from broadcast reception. Read this article and decide for yourself whether you will keep the reaction coil in your multi-valve set.

effect" upon ether waves. This is what is meant by damping. The proper function of the reaction coil is to minimise the effects of damping by feeding back energy into the grid

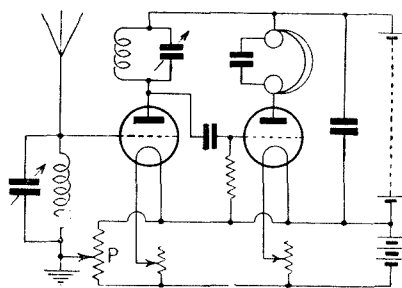


Fig. 2.—Two-valve Circuit with H.F. Amplifier.

circuit of the valve or even into the aerial itself.

In Fig. 1 is seen a popular circuit in which use is made of magnetic reaction. Owing to the relaying

effect of the three-electrode valve, tiny impulses reaching the grid give rise to comparatively large changes in the current supplied by the high-tension battery to the plate circuit.

If we lead the plate current through the reaction coil R, and couple this to the aerial-tuning inductance, the result will be, provided that the coil is connected the right way round, that energy furnished by the high-tension battery is transferred to the aerial.

Since the impulses in the plate circuit are, so to speak, exactly in step with those in the aerial, this energy will cause a decrease in the damping which would otherwise occur. As we tighten the coupling between the reaction coil and the aerial-tuning inductance more and more energy is transferred from the former to the latter, damping is increased, and signals become louder.

Further, since impulses reaching the grid are now strengthened, greater variations take place in the plate current and more energy is transferred back to the aerial circuit. The receiving set thus becomes more and more sensitive, and if we continue to tighten the coupling a point will be reached at which the feedback energy is so great that the effects of damping are completely neutralised.

When this happens the valve oscillates and will continue to do so if required so long as the batteries supply the necessary current.

Interference

As the reaction coil is directly coupled to the aerial the latter radiates oscillations which are picked up by other aerials in the neighbourhood. If the frequency of the oscillations is slightly above or below that of the incoming wave a heterodyne beat is produced which is heard by everyone using a receiving set within a wide radius.

When the reaction coil is properly used the coupling is not made so tight that the valve oscillates (unless of course continuous-wave telegraphy is being received); it is merely close enough to eliminate a large proportion of the damping so that the set becomes sensitive and selective.

It is clear that when the receiving set is in this condition the valve is amplifying enormously. Hence it will make audible in the receivers not only sounds due to the incoming waves but also any that result from faults in the set.

Thus, if the high-tension battery is at all faulty noises due to its fluctu-

with the result that the plate-circuit impulses will become still further deformed.

It follows, then, that if reaction is used distortion may occur, and that this will increase as the reaction effects are increased by a tightening of the coupling.

It must not be imagined that if

no reaction coil is fitted to a receiving set reaction effects do not occur. Energy may be transferred from the plate to the grid circuit as well as by magnetic coupling. In

enough energy to cause the valve to oscillate.

The effects of the inter-electrode capacity of the valve can be regulated very finely by the use of the potentiometer P , which allows the grid potential of the first valve to be varied.

My own views about the use of reaction after a good many years' experience in wireless experimenting are that, except in the case of the single-valve set, it is not desirable to use the magnetic form where real purity of reproduction is aimed at. That is, the results obtained by the addition of a single high-frequency stage with a loose-coupled tuner, but without magnetic reaction, will be better than those given by the use of a reaction coil.

The capacity-reaction effect already referred to gives better control of the set in nearly all cases.

With the single-valve receiver reaction must be used, for otherwise the valve is not strikingly more sensitive than the crystal. Distortion can be minimised by the use of a small reaction coil and by endeavouring always to keep the valve well away from the oscillating point.

A small amount of dis-

A CATWHISKER STORY



"What's wrong?"

ating output will be heard, and the effects of a "crackly" filament, of "chancy" contacts, or of leaks due to poor insulation will be very noticeable.

A further point is that at all times and in all places tiny atmospherics are constantly occurring of which we hear nothing at all in the ordinary way owing to the small amount of energy that they dissipate; but if we make the set very sensitive by eliminating a great deal of the damping by means of the reaction coil, these atmospherics are picked up and produce in the receivers noises not unlike those made by the wind blowing against dead leaves.

It is these little atmospherics which cause the hissing, rushing, and rustling noises that are heard just before the set goes into oscillation.

With grid-leak-and-condenser rectification a certain amount of distortion must inevitably take place. In other words, the impulses in the plate circuit are slightly misshapen. Now if we feed these back into the grid circuit of the valve it is clear that the distortion will be emphasised,

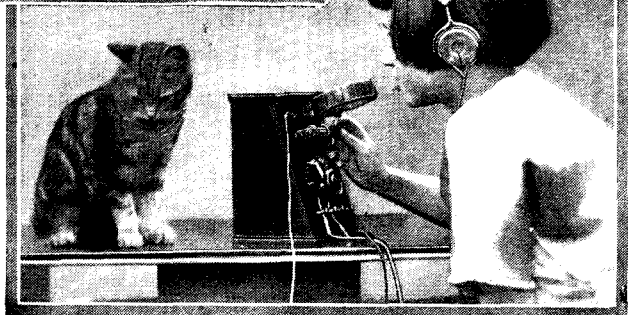
"Just a minute."

some circuits a variable condenser is used between the two circuits for this purpose.

One often finds the owner of a receiving set with a circuit similar to that shown in Fig. 2 stating that he makes no use of reaction.

As a matter of fact, he does.

Within the valve itself there is capacity between the grid and the plate. Though this capacity may seem very small if expressed as a fraction of a microfarad, its effects may be quite sufficient to feed back



"Now everything is all right!"

tortion does not matter greatly with the single-valve set, since it is not noticeable in the headphones; but in the multi-valve set working a loud-speaker it is of the utmost importance to avoid distortion so far as one possibly can, since its effect when amplified is most unpleasant. J.

"MY FIRST BROADCAST"

The sensations and impressions of John Henry, J. H. Squire, Mavis Bennett, Vivian Foster, E. Kay Robinson, Louis Hertel, Carmen Hill, Irene Scharrer, Charles Coborn and Mrs. Marion Cran on broadcasting for the first time in their lives, recorded by themselves and collected by Parkes Withers.

Nearly all the people who entertain us or instruct us with the aid of the ether and the B.B.C. have come to regard it—with practice—as quite an easy and pleasant thing to appear before the microphone. But can anybody be really happy in a first encounter with the formidable "mikē"? Here a number of well-known people answer the question.

JOHN HENRY

(The Famous Comedian, and BLOSSOM)

My first experience of the microphone was rather a pleasant one, in one respect at least, as at long last I was able to talk without being answered back.



Blossom says her first experience didn't bother her at all, as she has had lots of experience talking to an inanimate object. Just the same, I know she was nervous, because for days afterwards she was asking people if they heard her and how she "came through."

J. H. SQUIRE

(Of Celeste Octet Fame)

I must confess that I had no qualms at all before the microphone, as at the tests we made, just before the programme proper started, I was able to hear the full effect in another room, and so I started really under better conditions than the individual who cannot hear what he or she is doing.



We also have had a very good schooling in gramophone work, which is a good training for broadcasting and, if anything, far more exacting in detail; and, of course, in both cases your audience is a silent one.

MAVIS BENNETT

(The Famous Coloratura Soprano)

My first experience in front of the microphone was not actually in the studio, but from the Piccadilly Hotel—which is an absolute joy compared with studio singing. However, the thought of my voice going out, as it were, into nothingness, and then being picked up by hundreds and thousands of people on magic machines made me indescribably nervous.

My first thought was for tone—tone all the time. Half way through my first song I became panic-stricken because I had an E₅ in alt to sing at the end, and although rehearsing ordinarily at home it was an easy thing to do, faced with an audience and a microphone that note seemed an impossibility.

My throat and tongue became so dry that when I smiled in the song my lips refused to leave my teeth, so the smile became fixed. When I came to the end of the song, I just closed my eyes and "went for it."

And the ecstasy of finding myself right in the middle of the note rather tempted me to stay there. However, I let go, and then came the applause. But the strain had been so great that I had to call a waiter to give me a drink of water before my second song.

My first attempt at studio singing was from the Manchester station. One of the songs I sang was Spohr's "Rose Softly Blooming"—a song very difficult to sing if one is nervous, because it requires absolutely pure tone and steady, sustained singing.

Everything went well till I came to the end of the song, where there is a scale commencing mezzo-forte and ending pianissimo on top B. In the deadened atmosphere of the studio it is terribly difficult to know how one is singing, because there is not the smallest vibration to help.

My journey up that last scale of "Rose Softly Blooming" was one of agony. I could feel my voice getting more and more unsteady, and at the end it was almost like a sob.

There were a few very sympathetic people in the studio who applauded generously when I had finished—but I felt quite ill, because I could not get rid of the horror of having nearly broken down.

Even now, after having broadcast so many times, I am still very nervous of the studio.

VIVIAN FOSTER

(The Vicar of Mirth)

I cannot, as the Vicar of Mirth, offer you any soul-stirring account of my first broadcasting, for the microphone did not offer any terrors to me. You see, I hold the record of being the first music-hall comedian to broadcast, and that from the old Marconi House in the Strand.

Perhaps the thing that struck me most at Marconi House was the entire silence of everything around. But this was nothing new to me, for, in addition to all the theatres, music-halls, and concert halls at which I appear, I also address audiences at picture houses.

When I got up and started my comedy talk they wanted to laugh and dared not. They stuffed their mouths with handkerchiefs, they went red



in the face with suppressed mirth, and when I had finished they could contain themselves no longer, and burst into one yell. The announcer had to explain to the distant multitude what it all meant.

Of course, that was in the early days, and since then I have got the authorities to see how much better it is for me to have an audience. I could not gauge in the slightest, otherwise, how my jokes were going, and very often talked through the laughter which I hoped would be there, but did not know.

When I first appeared at 2 L O the orchestra and others stayed in, but they dared not show any appreciation, and one of the many letters received was from a lady, who said: "To hear Uncle Rex endeavouring to stifle his mirth was as good as anything."

After that a regular audience has been the vogue, and I let myself go and say things as they come to me at the moment.

E. KAY ROBINSON

(The Famous Naturalist and Editor of *Country-Side*)

My first experience at the microphone will not be very instructive to anybody, because, looking back, I cannot see how it differed from the second or third or any later experience.

I was asked whether I would talk, and I answered by asking whether I might see somebody else doing it first. So I saw somebody else doing it, and it looked so easy that I said I would do it too. And I did.

My only complaint was—and is—that I cannot hear myself at the other end. I am told that every word

comes through distinctly, but I should like to have the evidence of my own ears about this. I was told to talk in my "ordinary voice," but I have always talked a little more loudly than that.

When I have said all that I had to say, and on those rare occasions when I say something which, I think, will make people laugh, there may be a momentary feeling of embarrassment in the dead silence which follows, but one immediately realises that this is inevitable.

Fortunately, one has the consolation, when it is all quickly over, of the assurance from some expert listener at 2 L O that it was "all right"; and more than that, after a first attempt, one does not want—does one?

LOUIS HERTEL

(The Famous Entertainer)

It is now two years since that eventful night when I first stood in front of the microphone, but every detail of that unhappy experience is indelibly imprinted on my mind. And even to-day I am unable to enter the studio without some slight recurrence of the distressing symptoms which accompanied my first performance.

I have since flattered myself that I entered the studio waiting-room with a fair degree of *sang-froid*. I said "Good evening" to a waiting artist. She smiled sympathetically—I think she'd noticed my knees. I got into conversation just to see how my voice sounded, and learned that she was an experienced broadcasting artist. But it certainly didn't cheer me up to hear her confession that she was more nervous every time she entered the studio.

"Mr. Hertel, you follow this item," said the smiling announcer. My time had come, and I followed into the studio feeling quite certain that my heart-beats must have been audible to every listener.

I was amazed to find that it was necessary for me to stand so far distant from the microphone, and I was conscious of an almost overwhelming temptation to turn round and see if the bandsmen were smiling at me; but with a supreme effort I commenced to address my unseen audience.

"Hallo, everybody! Louis Hertel calling." Surely that dim croak wasn't my voice! I spoke more loudly, and as I realised that my voice, at least, did not disclose my nervousness I gained confidence.

The bandsmen smiled audibly at one of my lines, and a few seconds later a concerted laugh helped to reassure me. I attempted to get a little more expression into my voice, and managed to conclude my item without mishap.

The announcer approached the microphone, and I sneaked out of the studio, hoping that I didn't look as big an ass as I felt. Two hours to wait before my second item—I strolled to a public telephone to ring up home and hear the verdict. "Not so bad," was the reply. "We've heard worse—but not often."

But what did I care, so long as they had heard? My voice had really got over. I had broadcast. Gee, how hungry I was! And so (in the words of Pepys, who was the subject of my first wireless number) to dine.



"MY FIRST BROADCAST" (Continued)

CARMEN HILL

(The Famous Vocalist)

When I first sang into the microphone I found it very uninspiring. The deadness of the studio damped my enthusiasm, and it was difficult to believe that anyone was listening to me. It was only after I had listened-in to others myself and received letters from all over the country, from the Shetlands to Land's End, that I began to visualise a vast, unseen audience.

At first I wanted some people in the studio to keep me up to concert pitch, but now I am quite content to sing only to the little instrument hanging in its rubber hammock or the little blue cage.

The fact that I have had considerable experience in making records—which is a much more difficult thing—has helped me a very great deal.

The one great blessing that wireless ought to bring to singing is to make singers pay more attention to the quality rather than the quantity of their voice. On the platform noise is more popular than delicate nuances of tone and good phrasing, but through the microphone the latter comes into its own.

Breathing, too, and good diction are more important things on the wireless.

IRENE SCHIARRER

(The Eminent Pianist)

My first impression was of an atmosphere of tensivity, such as I have never before experienced. I was terribly conscious of a vast unlimited audience and—as I happened to know that many of my colleagues were listening-in—a very *critical* one.

The next terror came when I found I couldn't judge the *tone* I was getting at all, the acoustics of the room being such as almost to deaden the sound.

I worked like ten men, and could hear very little. The heat was almost overpowering—there was an orchestra of about sixty men and no ventilation at all. I played the C minor Concerto of Rachmaninov.



CHARLES COBORN

(The Veteran Walking Comedian)

I had no difficulty with the microphone, even from my first encounter with it. I have had much experience with gramophone work, and also with the phonograph, before the gramophone was born, and that is decidedly more strenuous and exacting than broadcasting.



With regard to the latter, it seems to me that a fair voice, clear enunciation, the stage sense, and obedience to the operating officials, are some of the main factors which make for success.

own might sound harshly upon thousands of ears that I forgot to be, in the usual sense, "audience-nervous" when I set forth that first day from the Kentish Weald to talk on gardens.

When I arrived in the studio I learned for the first time that new sensation which I have never yet lost before the microphone; quite a new feeling—as if I had entered a spirit world—a world undefended by the barriers of our common clay—in which were pressed, thick and close (watchful, interested, appraising, alert), myriads of intelligent souls about this, my naked soul.

A smile would not placate or divert them; a gesture would not point a meaning, or round a phrase. . . . All of the body was no use any more—only the personality, the soul—naked—must offer what it had to give on no more than the thread of a voice thrown into space. I forgot everything in the panic of this overwhelming plunge into the peopled air. Water-divining is child's play to talking into the microphone.

Many a moon thereafter I have made the same long journey to Savoy Hill; shattering the peace of alternate Saturdays in my garden for those short minutes of intense communion. But I have never lost that sense of a breathless dive into another world. Every time I talk at 2 LO I face a stupendous adventure.

MRS. MARION CRAN, F.R.H.S.

(Whose Garden Chats from 2 LO are so popular)

I had always been susceptible to the sound of the speaking voice—and was so obsessed with fear that my

In the land of the Soviet, only Russian-born people can have wireless receivers. From all appearances, the others have to be satisfied with Official Receivers.

As an accompaniment to certain dance music, the actual steps are to be broadcast. Let us hope that the old ditty "P.C. 49" won't figure in the programme.

Dutch listeners are increasing by leaps and bounds. So far as our own Old Dutch is concerned, however, we are afraid that she can hardly be counted as a listener.

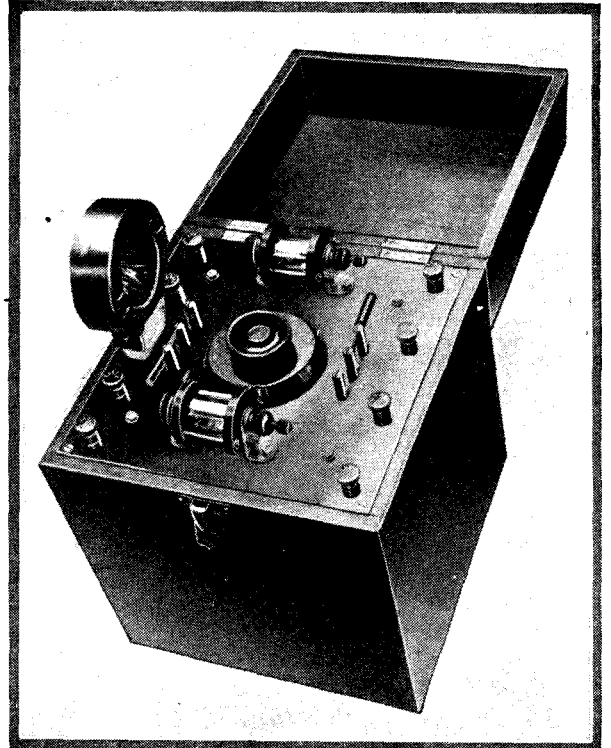
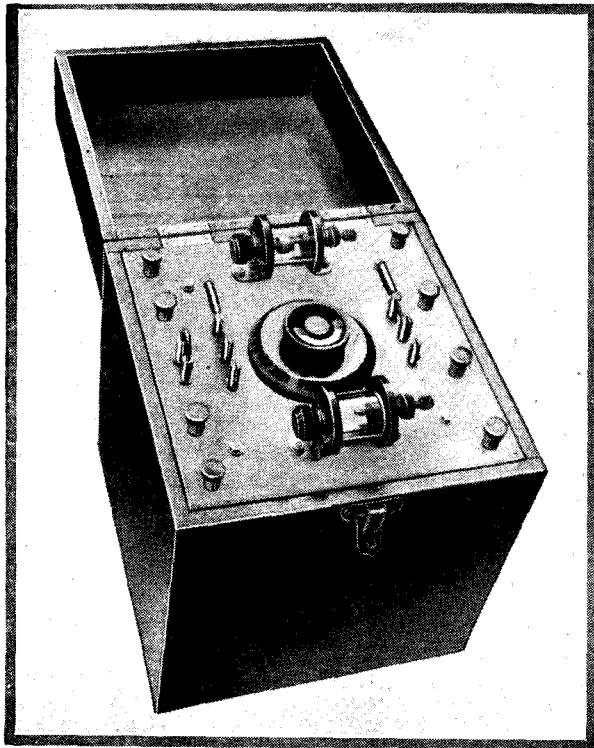
AN IMPRESSION OF THE SAVOY ORPHEANS

SLADE



Who hasn't heard the Savoy Orpheans? For over two years this famous organisation, under the direction of Debroy Somers, has been a regular and most popular feature of the B.B.C. programme. Although their Hotel transmissions have ceased, listeners will have further opportunities of hearing them from 2 L O in the future.

A Crystal Set for Daventry and the Local Station



Two Photographs of the Complete Crystal Set showing the Disposition of the Terminals, Controls and Switches.

THE set here described was designed for the reception of both the high-power station at Daventry and the local station. The method of tuning employed gives maximum signal strength, and the receiver is arranged for switching over instantly from a low wavelength to the higher wavelength, or *vice versa*.

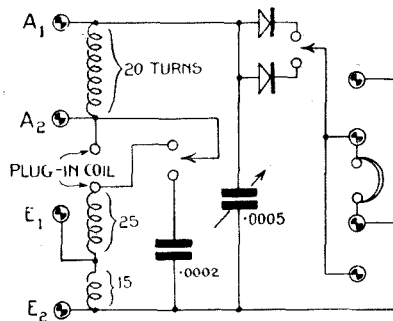
Tuning

The set is tuned by means of a $\cdot 0005$ -microfarad variable condenser in parallel with three low-loss coils of 15, 20, and 25 turns. These coils, wound with No. 15-gauge d.c.c. wire and spaced 1 in. apart, are coupled together, crystal and phones being across the whole 60 turns.

The ends of the three coils are connected to the terminals A₁, A₂, E₁ and E₂, and it will be seen from the circuit diagram that the aerial and earth leads may be across 25, 40, 45

or 60 turns, the wavelength covered with a standard aerial and with the condenser at zero being approximately 280 to 420 metres.

With this arrangement the whole of the broadcasting wavelengths can



Circuit Diagram of Crystal Set.

be covered with a low condenser reading, and as a result the damping effect is slight.

In the case of Daventry it was found that a higher capacity in

parallel had less effect on signal strength, and advantage was taken of this in cutting out the local station.

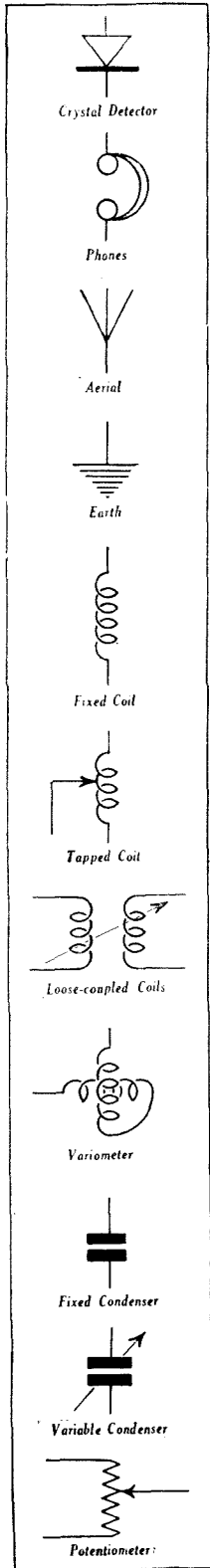
With a 125-turn loading coil and a parallel capacity of approximately $\cdot 0004$ microfarad, Daventry (90 miles) can be clearly heard and the local station almost entirely cut out.

Condenser

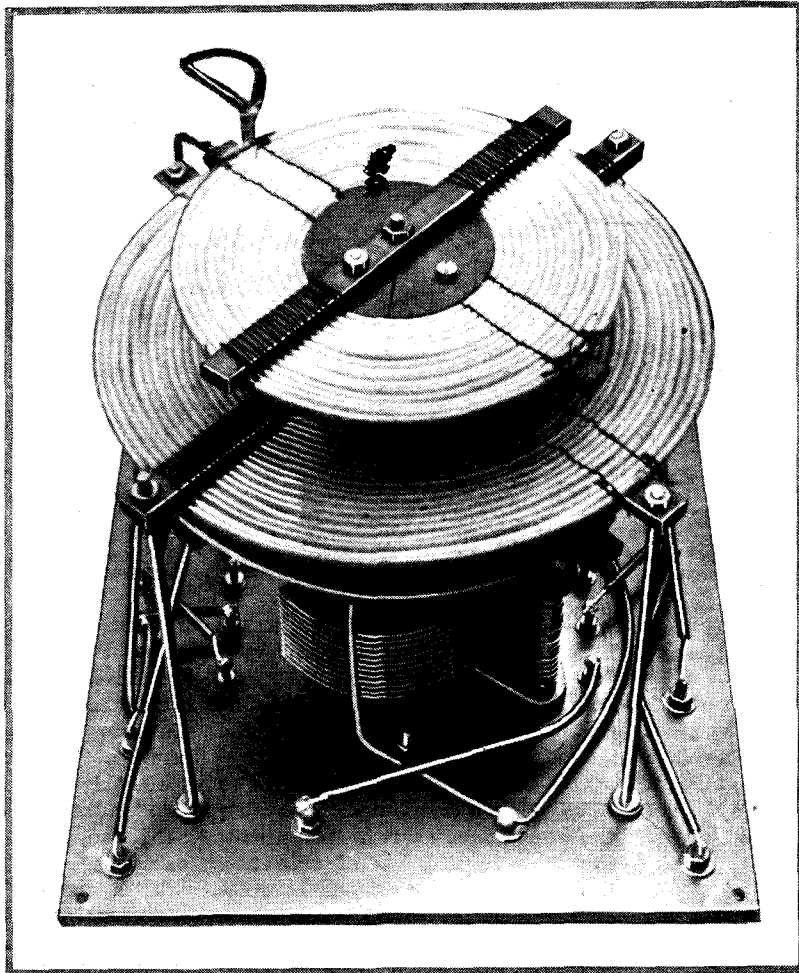
The variable condenser has a maximum capacity of $\cdot 0005$ microfarad, and as it was thought desirable to have a little more tuning range a S.P.D.T. switch was fitted which in one position "shorts" the loading coil when it is desired to receive the local station, and in the other position brings into the circuit a small, fixed condenser with a capacity of $\cdot 0002$ microfarad, thus increasing the maximum capacity to $\cdot 0007$ microfarad.

Two Mic-met detectors are fitted to the receiver. One contains a very

A Crystal Set Employing a Novel Tuning Arrangement



Memorise these Symbols.



Photograph showing Details of the Crystal Set Coils.

stable crystal combination which will remain set indefinitely; the other is of the catwhisker type, this having been found more sensitive to weak signals.

By means of an S.P.D.T. switch it is possible to change over instantly from one detector to the other, the

arrangement being very useful for comparing crystals.

This receiver, while following general practice, represents an attempt to produce a crystal set having maximum efficiency combined with simplicity.

H. N. W.

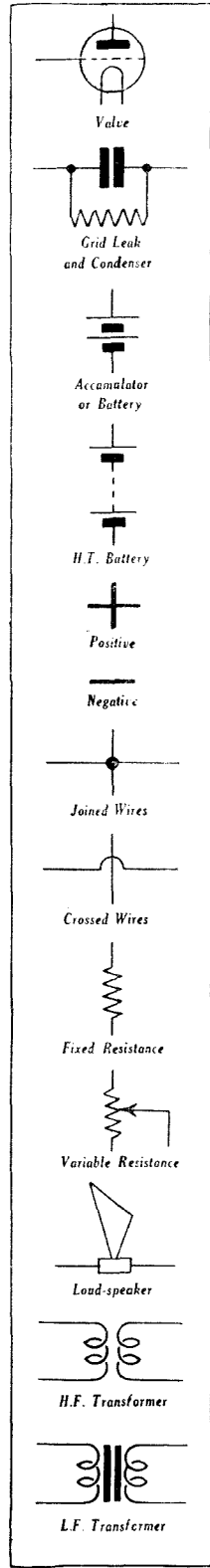
WHEN YOU ARE IN TROUBLE—

do not forget that the Technical Staff of the WIRELESS MAGAZINE is always at your service to help you out of your difficulty and put you on the right path.

If you want advice on buying a set, address your query to the Buyers' Advice Bureau, not forgetting to mention how much, roughly, you wish to spend, where you are situated, what stations you wish to receive, and whether you intend to use phones or a loud-speaker.

In all other cases, address your letters to The Editor, and not to the Buyers' Advice Bureau. Our address is the WIRELESS MAGAZINE, La Belle Sauvage, E.C.4.

When sending a query, write on one side of the paper only, and do not forget to enclose the coupon on page iii of the cover.



Memorise these Symbols.

THE largest receiving station in the Dominion is to be found in that Canadian city of strange contrasts, Hamilton, Ontario, in a splendid sanatorium created by public spirit and generosity.

The city nestles under what is known as the "mountain," and stretches for some four miles along the shores of a landlocked bay which is practically a large lagoon, for the only entrance to Lake Ontario is a passage about twice the width of an English canal. The mountain is no mountain at all. It is a plateau which extends for hundreds of miles across Ontario, and through which the Niagara River, some forty miles away, has cut, and is cutting, a chasm at the rate of about one mile in 10,000 years.

The "San"

Close to the brink of this plateau, a little west of the city, there has been built "the San," an institution for the cure of tuberculosis, famous on the American continent, and described by authorities as the most progressive institute of its nature in the world. Apparently, that it might keep its leadership, it has the first receiving set of its kind.

The sanatorium was created by public subscription, and is maintained almost wholly by gifts. The wireless equipment was the gift of one man—C. S. Wilcox, a director of the Steel Company of Canada, one of Hamilton's largest industries.

It is one of the sad things about tuberculosis that only time, assisted by rest, fresh air, sunshine and care, can stay its ravages in the human frame, and the victims of the white plague can only lie patiently in bed waiting for the day when they can once more tread the busy streets, take up interest or duty, sit at home or laugh or applaud in the "movies" or the playhouse. For many days become months, the months years, and time drags wearily along. Some



will never know any other scenes than the hospital ward or the view from the balcony where they can only helplessly watch the passing of the snow and the coming of the summer.

Only those who have lain on a sick-bed in a hospital can visualise the weariness of heart of the patient, the drab tonelessness of existence, when a visit from friends becomes an occasion for joyful anticipation and lingering memories, the entrance of a doctor an event for speculation

DO YOU WANT TO BUY A SET?

We shall be glad to advise you as to which types of sets are the best for your personal use.

Tell us how much, roughly, you wish to spend; where you are situated; what stations you wish to receive; whether you intend to use phones or a loud-speaker, and we will advise you as to the general lines of sets that will answer your purpose.

Send your inquiry with coupon (p. iii cover) and stamped addressed envelope to—

*"Buyer's Advice Bureau,"
WIRELESS MAGAZINE,
La Belle Sauvage, E.C.4.*

and talk, the attention of the nurse a welcome break in the monotony of the day and night.

And, lo! into this humdrum existence comes wireless, as a magician bringing music and laughter and song, lightening the burden of time, bringing smiles to weary faces, gladness to heavy hearts.

This organised wireless receiving system, created to bring cheer to the bedridden, covers a larger area than any other, and has more headphones.

From the wireless room, into which come the news and song of the broadcasting stations of the North American continent, there radiate six lines which in all take six miles of wire. There are seven pavilions, scattered over an area of nearly two miles—the men's, travellers', St. Julian, Dunedin, Long and Bisley pavilions.

Then there is the preventorium, the Empire cottage, the Grafton infirmary, the nurses' home, and the staff residences, in all of which there are headphones, and in which concerts from the outside world can be heard simultaneously.

Receiving Apparatus

The receiving apparatus and the distribution system were very carefully planned. The receiver itself consists of two stages of radio-frequency amplification and detector. Then follow powerful push-pull amplifiers at audio frequency. At the moment 350 headsets are connected, but each patient can disconnect his headset at the guiding post at each bed. This is necessary, for at times the sound comes in so clear and distinct and loud that it can be heard by the patient as he lies on the pillow.

The greatest problem was to have a uniform volume at each bed, consequently all headphones are of the same impedance and all connected in parallel. To operate 350 headsets all in parallel, on two groups of am-

A Receiver that Operates 350 Pairs of Phones (Continued)

plifiers, made it necessary to have special output transformers made for the push-pull amplifiers. Some of the phones are nearly a mile distant from the receiving system.

Microphone

A high-grade microphone is arranged with a speech amplifier so that announcements can be made over the physical lines by doctors, entertainers, etc. Great care was taken to shield everything in a metal-armoured cable to avoid howling.

A number of six-volt acid type A batteries light the filaments, and four 120-volt Edison alkali B batteries supply the plate voltage. The C or grid batteries are of the Edison type.

All the apparatus, which has given complete satisfaction, was made in Canada by the Northern Electric Co. Ltd., Montreal, and the set was personally installed by George Crawford, one of Hamilton's wireless

pioneers. It has a receiving radius of 2,000 miles.

It was not considered wise to provide headsets for the children, and so a loud-speaker is used in the playroom where every evening the children assemble for an hour's entertainment. The loud-speaker can be attached to any outlet, and the music can be brought in loud enough for dancing.

Committees of the convalescent patients have been appointed to arrange entertainments among themselves, which are put on early in the evening before the stations begin broadcasting.

Outside "Broadcasts"

The microphone used by the doctors is so devised that it can be used in any building in the city, and so the patients can hear any meeting, or entertainment or church service in Hamilton. All that has to be done is to attach the microphone to

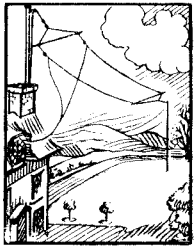
the nearest telephone wire. As in all Canadian cities, every church or building in Hamilton of any consequence at all has its telephone.

And wireless is not only an entertainer, it is a physician. The treatment of patients has not only to be physical but mental, and this equipment is "a form of psycho-therapy," states Dr. J. H. Holbrook, superintendent of the institution.

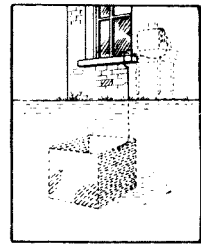
Escaping from Worry

"It enables the patient to escape from worry and morbid thoughts, helping him to respond to treatment better than he would otherwise do. Its effect has been apparent already. This scientific method of treating tuberculosis through the mind has resulted in more rapid recoveries being made, and a new avenue opened up for the healing of the body."

Wireless has come to this institute as a magician with the gifts of joy and health.



What is the Most Common Aerial Fault?



WHAT, in your opinion, is the most common fault made by the wireless beginner in the erection of his aerial?

Position of Down-lead

My own experience of the last few months has been that the new beginner's most frequent mistake is in soldering his down-lead to some point a yard or two from one end of the horizontal portion of his aerial. The down-lead should, of course, come from the very end of the horizontal portion.

In fact, far and away the best method of fixing up an aerial is to have one long continuous wire from the free horizontal end straight to the leading-in tube.

It always seems to me a great

pity to cut a length of aerial wire. There is no need whatsoever to cut it. Yet many beginners of my acquaintance seem to think it is necessary to cut their hundred feet of seven twenty-two's somewhere.

A few days ago I saw an aerial in the construction of which the aerial wire had been cut in this unnecessary manner. The horizontal portion of eighty feet was stretched between a mast and the side of a house. There was an insulator at either end of this horizontal portion.

Wrong Type

The down-lead was soldered to the horizontal portion at a point some six or seven feet from the house end. The aerial, therefore, was not of the inverted L variety, but was of the

T shape, the top of the T consisting of two parts, one part being over seventy feet long and the other part being quite short, six or seven feet.

Continuous Wire

I took it upon myself to alter this aerial by making it into a true inverted L type of aerial. When I had finished with this aerial there was one long continuous wire starting from the insulator at the mast or free end, passing through the insulator near the side of the house, and ending at the leading-in tube.

The owner of the aerial was extremely pleased with the alterations I made, for there was a noticeable improvement in reception from the rearranged aerial. AERIAL.

To Those Whom It May Concern!

FISHGLUE SNEAKS A FEW WORDS IN EDGEWAYS

ONCE again, while the Editor isn't looking, let me turn a few words edgeways and sneak them in.

First of all, I hope that you've all had a good winter, and, if you haven't, let's hope that next year it will oscillate. Mine was accumulated accumulator trouble (that's all it has accumulated since I burned those hairpins out on it). Of course it's a pity, 'cos all the heathen foreign stations were quite pally and such-like.

Still, the winter has gone, hasn't it?—so I'd better get more up to date, or the Editor will be jamming in again. (You know, between you and me and the binding post, those editor people and critics, they're like a tune I once murdered on a violin—they haunt me.) That's an aside, like Hamlet does. (Turning to the audience again.)

Well, it's C.W. weather, isn't it?—you know, constantly wet, with a corresponding damping effect. Valves are coming down now—aren't they? Soon it will be cheaper to light the dog-kennel and keep the chicken-run warm with them than to buy lamps.

I had a valve that came down too suddenly. Gave up all its K.E. at once, with a corresponding reaction (as Newton warned me, you remember) on the filament. It wasn't a receiving valve, either; it was an "intransitive" valve—absolutely "no object" in breaking it.

Well, brethren, just so as to have an excuse for being daft afterwards, I'm going to talk seriously to you on matters of vital interest to every wireless amateur, and give you the results of my research into the origin of several wireless components.

This month I intend to speak (cough! cough!) on "The Origin and Use of Crystals as Radio-frequency Detectors, and Otherwise." Start, band!

Crystals first came to our notice, or somebody's notice, in the year 25,000 S.E., or thereabouts. (Later evidence, whose authenticity is undeniable, has come forth since going to press, and points to "thereabouts" as probably being more accurate, approximately.)

From wiring diagrams, found on fossils, Epstein's monument, Boadicea's Needle, and the Pyramids, we find that Uphgump, distant (fairly distant) relation of Boadicea,



Uphgump, distant relation of Boadicea.

and H. F. MacOscillate, of Gaelic extraction, and near relation of Mary Queen of Scots, used them for placing on the vertebral extensions of mammoths, and other insects of the ichthy or brontosaurus type.

Further research into the parlour games of the period show that they were of the Na variety, in all probability, a soluble chloride. As evidence, may I quote a popular hunting song in vogue at the time?

We're hunting for the Opopogo,
That nasty little Opopogo.
He's the wavelength of a centipede,
And howls just like a whale,
And we're going to jam his morse
By putting salt on his tail.

No argument, is there?

The next we hear of them is on the decorated posters, used in the time of Helen of Troy. These state, in the heathen Greek then prevalent, that to emulate "the figure that launched a thousand ships" all one needed to do was to use a few " $\pi \phi \beta \omega \mu$ " crystals in one's annual, and the unwanted fat would

Disappear quite—overnight.

(As Horace translates it for us.)

That Helen of Troy worked in a

laundry we all know, but may I explain it to the history student?

After being taken to Paris, by Priam (and, mind you, Agamemnon was wild when he heard it broadcast under "lost, stolen, or strayed"), her figure increased, as she could no longer get her little daily dose of reducer from the magic East. (You remember that the Sinbad Line didn't run past Armentières, of course.)

She was forced to work in the Sunshine Laundry, Rue de la Paix, in order to keep that schoolgirl complexion; and as she rubbed away with the slabs of carboniferous or igneous soap then patronised, she hummed this little ditty:

Oh, alpha-cum-beta-cum-gamma!
I'm getting quite fat, I can see.
My capacity, round the equator,
Is more than .0-0-0-3.

(Refrain)—

Bring back! Bring back!
Bring back my crystals to ME-E-E.
I want tuning down,
'Cos I don't fit my gown,
Oh, bring back my crystals to me.

The next time we hear of them is in the hands of a nasty Italian family yclept Borgia, believed to be of Florentine extraction. These people frequently committed poison, and it persisted as a family failing right down to Catherine de Medici, who so annoyed Henry of Navarre by practising on his Presbyterian friends.

Cesare, the shining light, advertised as follows:

No need to fly to distant stations
Killa da aunty and other relations.
If father live longa da son's expectations
One crystal in soup give da quick expirations.

And, as an afterthought:

Caramba! 'tis true,
We no tella da bunk.
Buy de S'appristi crystals,
And try on da monk.

Horrid merchant! He had a good reception for a time, then one of the Corsican Brothers, station director to a big vendetta, cut his connection with a stiletto, and he closed down suddenly.

Then, finally, brethren, we come to the synthetic compound of unknown composition, which came to the fore with broadblasting. They are chiefly of the "ite" variety, Bungalite, Radyite, Dirtzite, etc., or so I was told by the anarchist in the WIRELESS MAGAZINE laboratory, when I had some marmalised for this article.

Properties—

Each, and every one, individually, is, sans doute (that's wrong, somewhere), the finest crystal in the world, respectively.

They are insoluble, and impervious to tears, threats, or swear-words.

If they don't work, they ought to!

Uses—

Chiefly for cutting out the distant station when listening to an interval from the local.

They provide, instead of microphonic distortion, a background of silence for the music (into which aforementioned music will fade without much persuasion).

Next time I intend to talk on "Condensers, and Why!"

I must now attend to my Kiddies' Corner, and after I've tidied that up a bit I must finish my correspondence.

"Hello, Kiddies! Uncle Fishglue wants to talk to you for a minute. Will you punch the piano, Aunt Clara? No, I wasn't rude, really. All right, then. Now we're ready. Here goes, Kiddies:

"Little Jack Horner sat in a corner, Playing a super-het. It howled UP THE SCALE

Then died DOWN TO A WAIL.
(No applause, please! I've not finished yet.)



Helen of Troy.

Little Miss Mary was feeling contrary,
Her zigzag reflex wouldn't go.
Neither honeycomb nor spider
Coils worked, so she sighed a
Big sigh! off for help she must go.

Then the expert, all shaven and shorn,
Who was waked by the cock, in the early morn,
In accents so pious
Said, 'Pray use grid bias.'
Now Mary's no longer forlorn.
So, when Jack and Jill came down the hill
(They'd been absent more time than they oughter),
They danced hand in hand
To the New Savoy Band,
Conducted by Lord Uhlin's Daughter.

"Now, then, wasn't that nice? Kiddies? Now, then, Aunt Maria is going up—I beg your pardon—going to sing 'Up in a Toy Balloon,' so good-night, Kiddies!"

Now! I've got that off my chest, so let's get on. Spring will be here soon, won't it? The little flapper-jacks in the banana-trees will be singing "A-little-bit-of-bread-and-no-cheese," or "Tit-Willow," or something just as silly, while the neighbour's rude parrot will probably screech:

Dammed high, dammed high,
I never knew! I never knew!
That with 50 in the aerial I couldn't get you!

Couldn't get you!
I can't get past six hundred,
And that's no blank use.
I've tried till I'm nearly blue.
Shanghai! Shanghai!
I'll want a Daventry coil for you.

But to forget that nasty bird's bad language, here's a nice song that must be sung @ 273° C. and N.T.P.

I can't give you the music, 'cos I've lost the formula, but play it like all the two-shilling pieces, with tears in the voice and passionata and diminuendo and such-like, and you can't go far wrong.

When you and I were seventeen,
And radio was new,
How pleased I was with crystal sets!
(And so, my dear, were you).
Six-hundred spark
Would call forth "Hark!"
Eyes wide with astonishment grew.
Do you recall
When morse was all?
But now we're twenty-two.

If I don't hurry up, though, I'll get changed over before my correspondence is answered, so here goes:

"MAID OF THE MOUNTAINS."—Yes, quite so. Pressure, atmospheric (not the sort you mean) decreases 1" of Hg for every 900' of ascent above sea level. If you live half-way up Mount Everest, then, you will naturally want to add to the 56 pounds which you find the critical pressure on your carborundum, when lodging "out in the Sahara."

"BAFFLED BRUMMAGEM."—Baffled writes:

We couldn't tune in K X X X,
Cardiff seemed to be dying.
It faded away like 2 K J.
We heard nowt else, all night, all day,
But silence, in still the same still way,
So we think the set is shying.

And that, Baffled, is probably profoundly true. Try banging it against the wall a bit, whereupon any loose connections will fall out. These should be replaced somewhere else. If it doesn't work then, you'd better get advice immediately, if not sooner. Best of luck!

"CURIOUS."—Yes, Curious. Get one by all means. The odds are on your side, if anything. Marconi and Hertz both got crystal sets to work. Don't be discouraged.

"MAC" (Aberdeen).—(a) No, it does not waste the crystal away any quicker to tune-in Daventry. Where did you get the extra coil from, though? (b) No, paying a licence fee does not entitle you to send in your card when the B.B.C. calls a dividend.

"BULLET HEAD" (Berlin).—Fritz writes:

Ach! Ich bin sehr traurig
Mein set ist gebrochen
Es will nicht der morse pick up,
Music nor "spoken."
Hard luck, Fritz! Try valves.
"Dutch" valves ought to be cheap enough round your way.

Well, that's all! This is what I call a well-finished article, but I suppose that you're beginning to think that it was never going to be, aren't you?

So—
Till the sands of the desert grow cold
And the new super-het's stale and old,



Aunt Maria.

We'll shove on the phones,
And pick up howls and groans
Till the sands of the desert grow cold
Till then, yours radiographically,
FISHGLUE.

A Four-valve Cockaday Set

How to make a set, nearly as selective as a "Super Het," that gives extraordinarily good results without aerial or earth.



Specially Designed for "THE WIRELESS MAGAZINE" by R. B. Hurton

Briefly, the Cockaday circuit can be described as a loose-coupled tuner with an absorption wavetrap between the primary and secondary coils. It is a remarkably selective arrangement and has the additional advantage of having constant dial settings.

THE Cockaday four-circuit receiver is one that was developed in America some three years ago and is named after its inventor, Laurence M. Cockaday. The circuit itself, which is confined entirely to the tuner and detector—the remainder being "straight"—is in reality a development of the well-known ultra-audion circuit, and is unique in several features.

Selectivity

Those who have never handled a circuit of this type will be surprised at its performance in several respects. In the first place it is almost as selective as a super-het, it being possible to tune out a main broadcasting station within a distance of one or two miles; in fact, at that distance it is easy to "lose" the station completely if the condenser dials are rotated too rapidly.

This feature of selectivity is undoubtedly one of the greatest advantages of the Cockaday circuit.

Secondly, the set's performance

without any aerial or earth connection is extraordinary. The actual set described has been taken by motor to places some 20 to 25 miles away from 2 L O.

It has merely had batteries and telephones connected to it and the concerts have come in at sufficient strength to enable them to be heard some two or three feet away.

Ten miles from 2 L O excellent loud-speaker strength is possible without an aerial or earth, and the quality is all that can be desired.

A further feature of the Cockaday set is that the condenser settings remain constant for a given station despite external changes. Thus, for a short aerial, a long aerial, or no aerial at all, the condenser settings are always the same. Precisely the same remarks apply to any varying characteristics in the earth leads; they simply make no difference at all.

As there are only two tuning controls the set is not really difficult to tune, always providing that the

rotation of the condensers is done reasonably slowly. Stations are brought in by listening to the carrier wave and finding the mid-point.

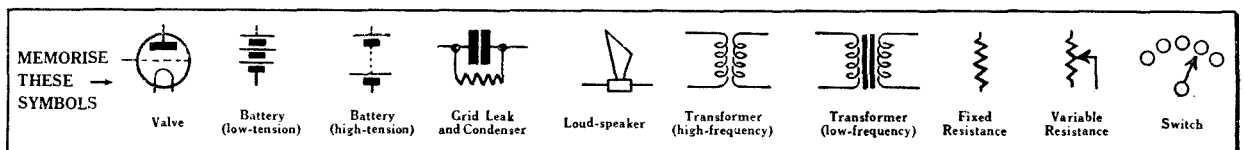
No annoyance to other people will occur from doing this, for the set is absolutely non-radiating. Oscillators may howl to their heart's delight on the Cockaday set.

Cost

So far, then, we have enumerated the set's advantages over those of the ordinary type. In some other respects it is about equal, and in others it is perhaps not quite so good. Its initial cost is about equal to that of another set employing the same number of valves and components of equal quality.

Also it takes up about the same space, and requires the same number of batteries as others using similar low-frequency methods. In addition it is no more difficult to build.

The greatest disadvantage, from the point of view of English tastes, is the fact that the Cockaday set



A WONDERFULLY SELECTIVE FOUR-VALVER

cannot be loaded successfully to bring in the high-wavelength stations. As described, the set will tune from about 200 to 500 metres. Thus it covers the whole broadcast wave-band.

Loading for Daventry is out of the question, but as that station seldom sends out a programme of its own, and as the Cockaday set will bring in other stations even when close to a particular station, this disadvantage is not felt to any considerable extent.

Despite the fact that the set under discussion is extraordinarily sensitive without an aerial, its performance on poor aerials is not so good. By poor

aerials are meant the short, cramped ones so often seen in crowded town and suburban areas. To secure maximum efficiency on an outside aerial the Cockaday set requires a long one.

As the length of the aerial does not affect the wavelength range, there is no need to fear the usual high-wavelength effect of a long aerial. Did the terms of the P.O. licence permit, one even longer than 100 ft. would be an advantage.

Some theoretical knowledge is

necessary to get the best out of the circuit, and constructional knowledge is required to make it correctly. Providing the actual listed parts are used, however, and providing the same wiring system is carried out, the set should work successfully right from the start. It is so entirely different in operation from others employing orthodox methods that

(Note the same letters are used to designate the same components in the wiring and circuits diagrams, and in the list of components.)

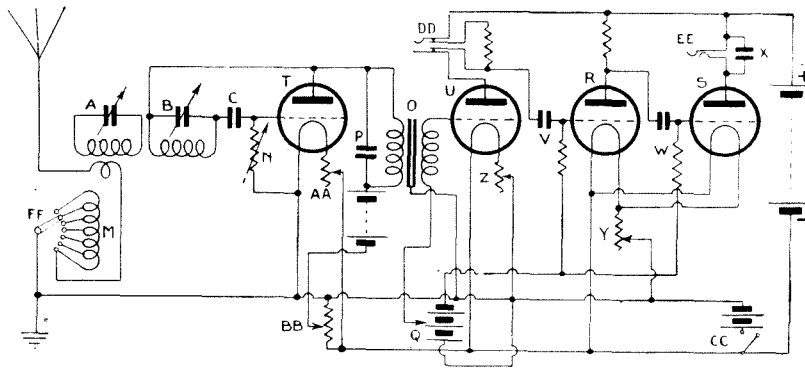
Connected to the single aerial loop is another coil, bank-wound, of 43 turns. This is placed at right-angles to the plain coil. The bank-wound coil is tapped and the tappings are taken to a seven-stud switch on the panel.

Only the actual controls are fitted to the panel, all the other instruments being mounted on a wooden baseboard at the rear. No valve peep-holes are fitted, nor are they necessary, for the Cossor Wuncells emit a glow that is hardly visible even in a pitch-

black room, and then one must look upwards into the anode.

Plugs and jacks are used for the telephone and loud-speaker connections, two being fitted—one following the second valve for telephone reception and the other after the last valve for loud-speaker use.

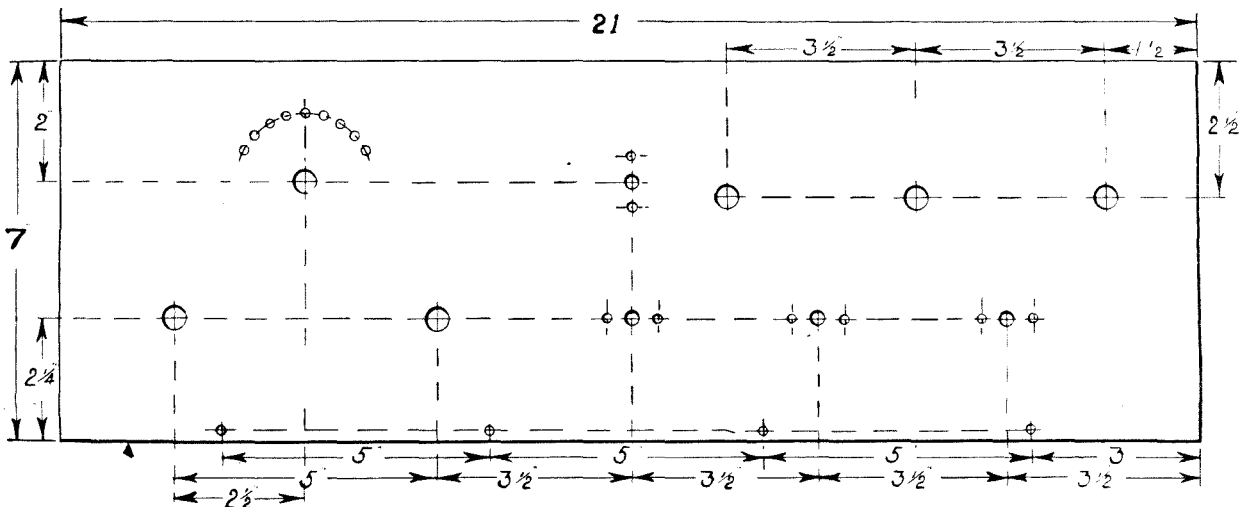
The general appearance of the set is quite pleasing even in the plain cabinet in which it is fitted. The heading photograph shows how the set appears when connected to the batteries and loud-speaker.



Circuit Diagram of Four-valve Cockaday Set.

making it is very much worth while. It is full of interest even to the most blasé ham.

From the theoretical circuit diagram it will be seen that the aerial is connected to a single loop of wire which embraces a single-layer cylindrical coil. This has 34 turns. By its side is another of 65 turns. The 34-turn coil goes only to the variable condenser (A), while the other coil is connected to the other condenser (B), the grid condenser (C), and the anode of the first valve.



Layout of Front Panel.

A FOUR-VALVE COCKADAY SET *(Continued)*

Only a small low-tension battery of one cell is required to feed all the filaments, but it is highly desirable that large high-tension batteries capable of giving a heavy current are used for amplification. An ordinary high-tension battery is quite suitable for the rectifier. The tone of the set when using reliable components is, in the writer's opinion, very good indeed.

Parts Required

The following is the list of parts required, together with their designating letters:

8 W.O. pattern terminals (D—L inclusive).

Precision Cockaday coil unit (M) (Will Day, Ltd.).

Igranic-Freshman fixed condenser (C), .0003 microfarad.

Lissen variable grid leak (N).

Eureka Concert Grand L.F. transformer (O).

Peto-Scott fixed condenser and mounting (P), .0001 microfarad.

9-volt grid-bias battery (Q) (Wates Bros.).

4 Peto-Scott anti-microphonic valve holders (R, S, T and U).

2 Polar resistance-capacity units (V and W).

Peto-Scott fixed condenser and mounting (X), .002 microfarad.

Radionmahoganitpanel, 7 in. by 21 in.

Igranic filament rheostat (Y), 6 ohms.

2 Igranic filament rheostats (Z and AA), 10 ohms.

Igranic potentiometer (BB), 400 ohms.

Lissen push-pull switch (CC).

Elwell jack and plug (DD), type D.C.

Elwell jack and plug (EE), type S.C.

2 Peto-Scott variable condensers (B and A), .0005 microfarad.

7-stud switch (FF).

2 Cossor Wuncell valves (T and U).

2 Cossor Wuncell power valves (R and S).

2 Burndept-Siemens super H.T. batteries.

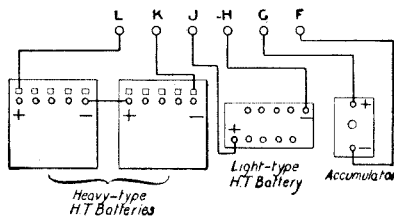
Light-type H.T. battery.

2 Igranic Vernobs.

No hole diameters have been

given on the panel layout in case constructors having other components may desire to use them instead of those listed. It must be pointed out, however, that all parts used for this set must have identical electrical characteristics with those given in the list above.

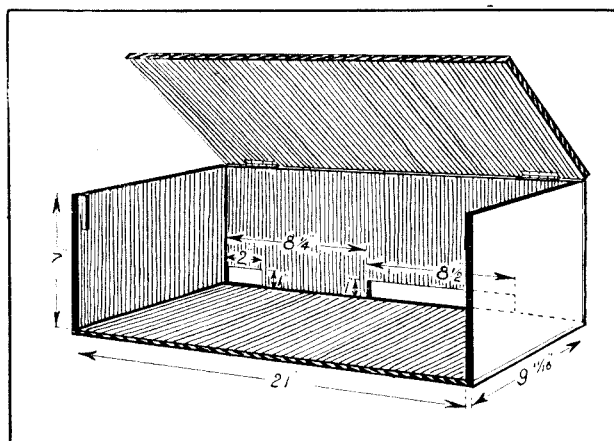
No tapping is required to secure any part to the panel, and after all have been fixed, including the baseboard, the plan (p. 256) should be



Battery Connections.

roughly scaled and the positions of the components which it carries marked out. It is important that the layout of the parts on the baseboard follows closely the plan given.

It is possible that some constructors may desire to make their own tuning coils, and in view of this a close-up view of a home-made coil set is included. It is not altogether recommended that a home-made set be used, because of the fact that it is



Details of Cabinet.

difficult to hand-wind the tapped coil without the use of shellac, and this reduces efficiency to a very great extent.

In actual practice the commercial coil will be found about 25 per cent. more efficient than the home-made

article—and quite a number have been made by the writer.

However, those who wish to make the coil must obtain some 3 1/2 in. (outside) diameter ebonite tubing. Eight inches will be sufficient, and it must be cut so that one piece 6 in. long and another 2 in. long are obtained. No. 18-gauge d.c.c. wire is used and there are two coils on the long tube, side by side, with no intervening space. The first has 34 turns and the second 65.

Winding the Coils

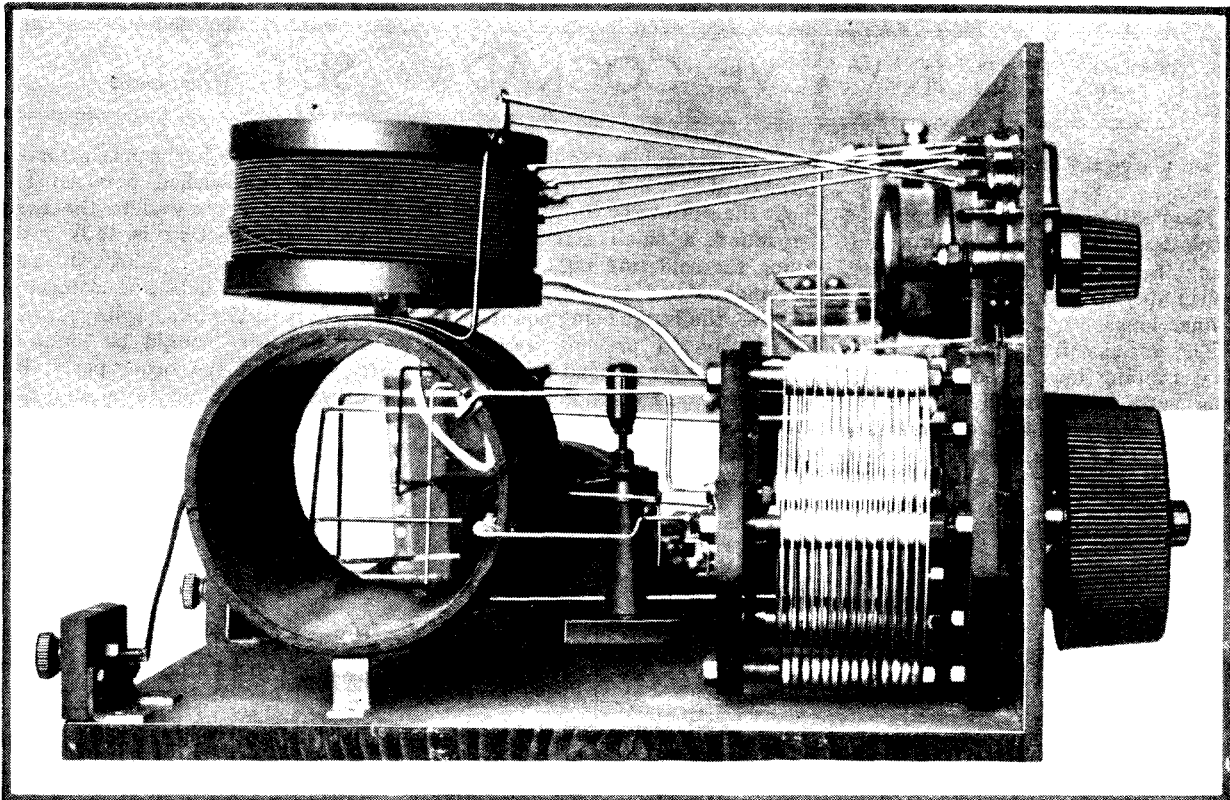
Both coils are wound in the same direction. The ends of each coil are anchored to screws fixed at each end of the tube—two screws for each coil. It is important that the actual connections shown in the photograph and diagram be repeated by the constructor. No shellac should be used on the wire.

The aerial coil is wound on the short piece of tube and has 43 turns. When the anchors for the ends of the wire have been made and fixed, some thick tacky shellac must be painted on the tube. Two turns, side by side, are then put on, being wound very tightly. At the end of the second turn, the wire is brought upwards and to the left, so that the third turn lies in the groove between the first two turns.

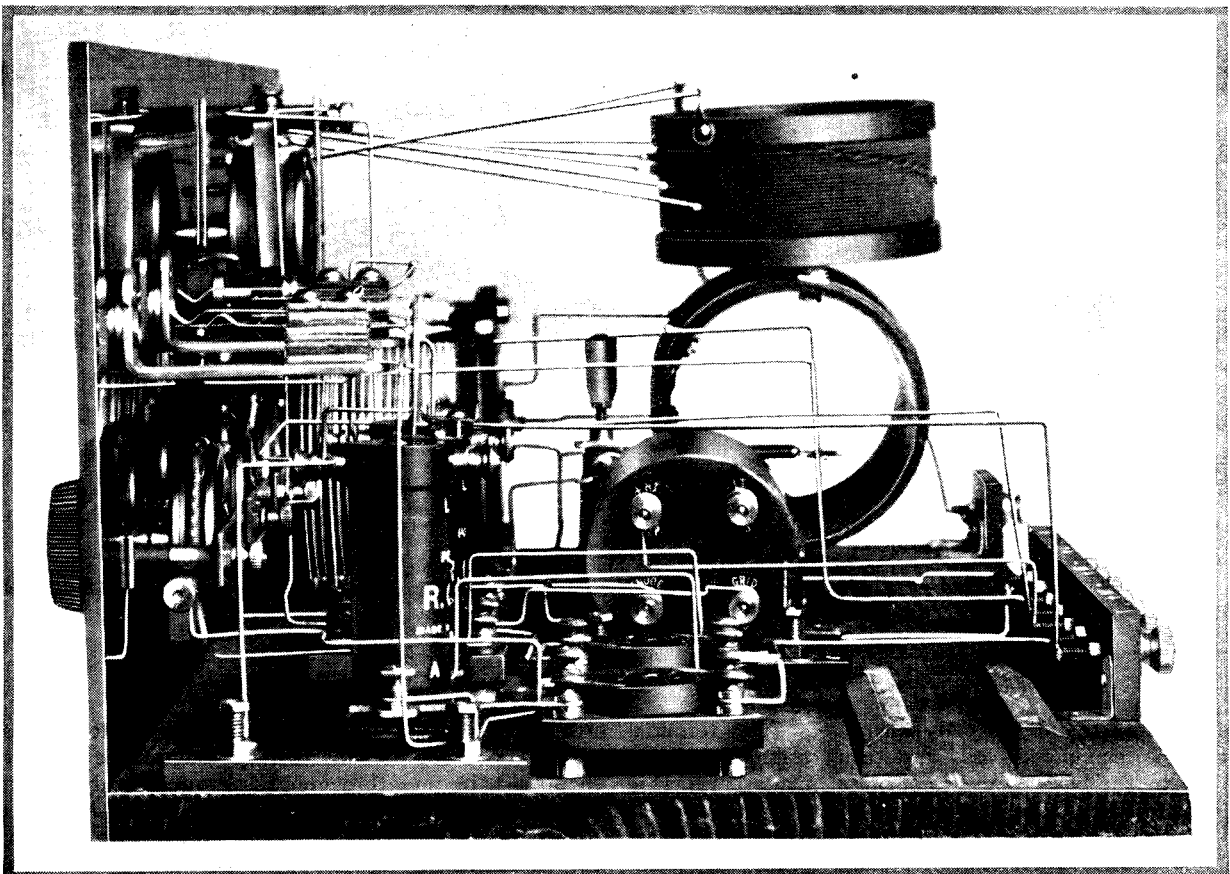
For the fourth turn the wire is taken down on the tube again, while the fifth is laid by the side of the third in the groove between the second and fourth. This process is repeated until 43 turns have been put on, the last turn being one of the second layer ones.

The tappings are made at the 3rd, 7th, 13th, 21st, and 31st turns, while connections to the switch are also taken from the beginning and the end, so that the seven studs are all occupied.

To make the tappings, first allow the coil to dry thoroughly, and then insert the end of the blade of a penknife underneath the wire at the point to be tapped. Then prise the wire slightly upwards so that it is



Side View of Completed Cockaday Four-valver.



View of Cockaday Four-valver from Other Side.

A FOUR-VALVE COCKADAY SET (Continued)

raised above the level of the adjacent turns.

The next process is to remove the insulation at the raised points and, using the very minimum of Fluxite, to tin them ready for soldering the connections.

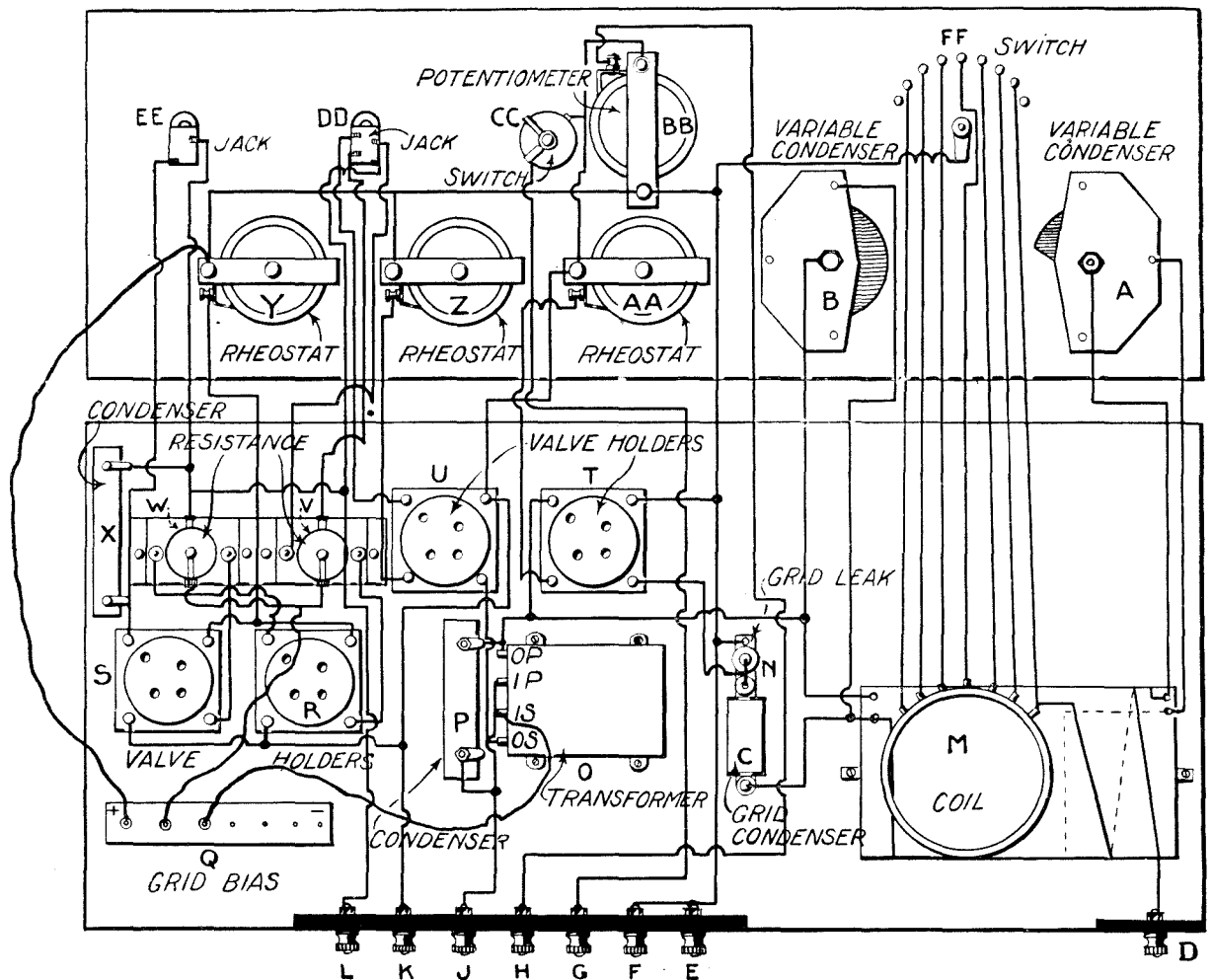
The aerial coil is placed, with its final tapping lowest, on top of the long tube and centrally above the 65-turn coil. It is secured by strong thread strung through two holes in the bottom of the tapped-coil former

one at each end, for screwing to the baseboard.

At the bottom of the grid leak will be found a small screw used for fixing the soldering tag. This screw is removed and passed through the ebonite, the latter being countersunk sufficiently to prevent any possibility of the screw head touching the woodwork. The completed leak and mounting must be fixed in the position shown on the layout plan and the photographs.

The grid-bias battery is attached by being sandwiched between two fillets of wood screwed to the baseboard. The battery is thus easily replaceable when exhausted, and, providing the fillets are accurately located, it will be fixed quite securely.

No difficulty should be found in fitting any of the other parts, but it may be mentioned in passing that the Polar resistance-capacity units are fixed with their H.T. + terminals facing the panel.



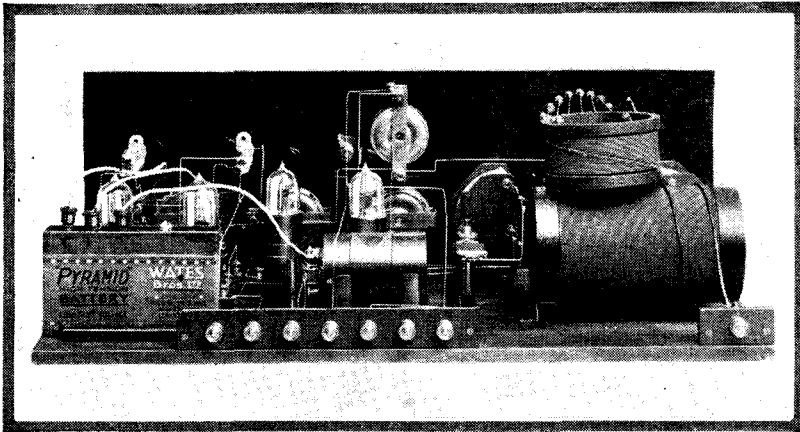
Wiring Diagram, and Layout of Components (with Letter References).

and passed round the coil beneath it. The completed coils are then fixed to the base by means of brass brackets in the manner shown.

The grid leak is mounted on an ebonite block, 1 in. long and $\frac{1}{2}$ in. wide. The latter has three holes drilled in it, one in the middle and

Two terminal strips for aerial, earth and battery connections are made from $\frac{1}{4}$ in. ebonite, 1 in. in width. One strip is 2 in. long, while the other is $8\frac{1}{2}$ in. Both strips fit flush with the back of the baseboard, being secured by brass angle brackets.

The wiring should be found easy if the wiring diagram is followed throughout. From this diagram it will be seen that a single turn of wire connected to the aerial terminal is passed spiral-fashion round the 34-turn coil. It is then taken to the start of the tapped coil. The



View of Completed Set.

whole of the wiring is carried out in bare No. 18-gauge tinned-copper wire which has previously been straightened and cut into convenient lengths.

Wiring

In wiring, the whole of the scheme shown in the photographs should be closely followed, a study of these being first made.

The Igranic-Freshman fixed condenser is supported entirely by the wiring in the manner shown in the photographs. It is thus kept well apart from surrounding components with which it would tend to form a capacitative coupling.

The following is the arrangement of the terminals: (A) aerial, (E) and (F), earth and L.T. negative respectively. (G) L.T. positive. (H) and (J) are H.T. negative and positive for the rectifier. (K) and (L) are H.T. negative and positive for the amplifiers. The exact method of connecting the batteries is shown in a separate diagram.

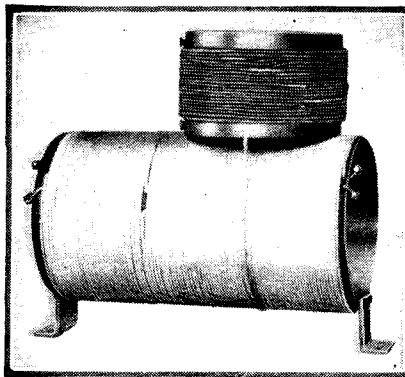
The cabinet for the set is a very simple job. A hinged lid is fitted. Any suitable well-seasoned wood may be used, according to the pocket and tastes of the constructor. The thickness of all the wood is $\frac{1}{2}$ in. Two slots must be made in the rear to allow the terminal strips to project through.

When the set has been completed, the batteries may be connected and the telephones plugged into the first (D.C.) jack. Ordinary Wuncells are used for the first two valves, while the last two are of the power type.

Turn up the first rheostat about three-quarters of the way, and the second nearly full on. Then rotate both the dials slowly until a carrier-

wave is heard. The switch arm is then moved until the stud on which the carrier is strongest is located.

Final tuning is then done by gradually increasing the rectifier



Photograph of Coils.

filament current and adjusting the potentiometer. The latter, being connected across the low-tension, which is itself connected low-tension positive to high-tension negative, gives a slight control of the high-tension to the rectifying valve.

Slight though this is—2 volts only—it is quite sufficient to prevent the set bursting into oscillation when tuned to the bottom of a carrier-wave.

Tuning may seem troublesome at first owing to its extreme sharpness, but this difficulty will soon be overcome. In the majority of cases a movement of only one degree on the scales of the Vernobs will be sufficient to tune a station completely in or out. It is thus evident that without the Vernobs tuning is a practical impossibility. The filament control of the rectifier will be found to affect the tuning to a marked degree.

Varying Capacity

While the .0001-microfarad fixed condenser across the Concert Grand transformer was found to be the best for the particular set here described, it is quite possible that other sets will require a different capacity, and in view of this the Peto-Scott interchangeable condenser system will be found a great advantage, it being possible to build up any required capacity.

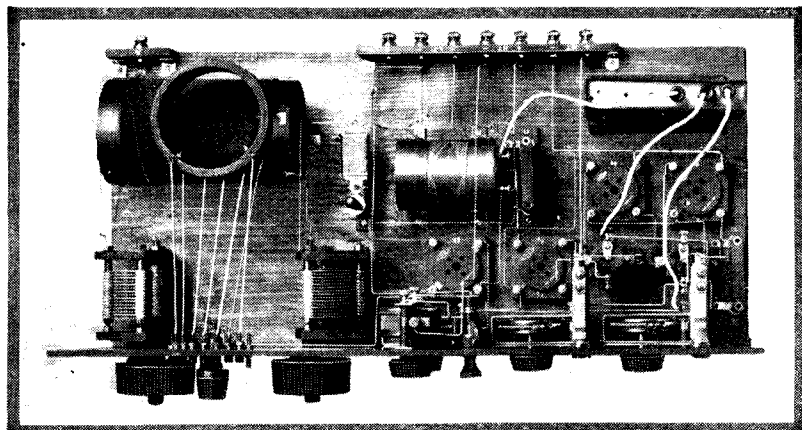
The best setting of the grid leak, once found, will remain constant.

In the majority of cases the rectifier high-tension value will be quite low, about 24 volts being necessary, but this cannot be stated definitely owing to the differences of valves and other circuit constants.



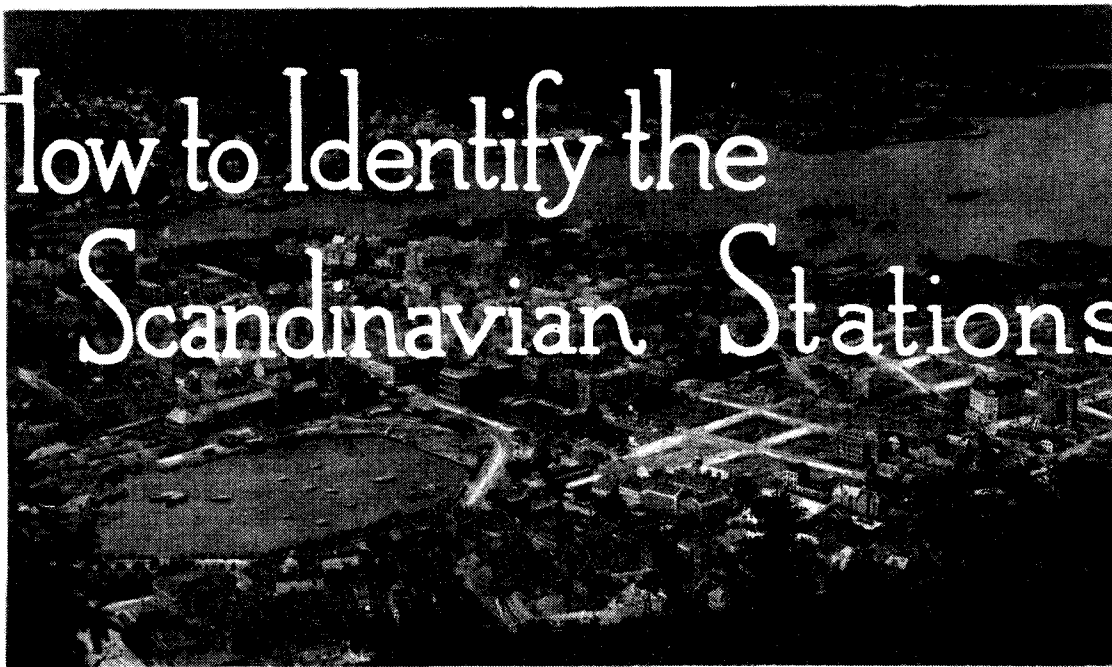
A CORRESPONDENT writes to ask what is meant by interference. That is a sure sign he doesn't live with his wife's mother.

LADIES find that shingling makes the headphones fit more comfortably. But, then, they always did get their hair off if they had to listen.



Plan View of Components on Baseboard.

How to Identify the Scandinavian Stations



Bergen.

Photo by courtesy of Norway Travel Bureau.

SWEDEN

TO the enthusiastic listener, intent on reaching out with a single- or multi-valve receiver, Sweden, with its ever-increasing number of main and relay stations (at the time of writing there are altogether fifteen), presents, for the purposes of identification, a difficult problem.

The matter is further complicated by the fact that the Swedish Broadcasting Company now effects once or twice weekly regular relays of foreign transmissions.

For this reason alone the amateur may well be puzzled when picking up an S.B. broadcast of London dance music from, say, a dozen transmitters in the United Kingdom to hear the same strains of music on some further six or seven wavelengths for which he is unable to account.

The system of relaying transmissions from the capital to the smaller provincial towns, which has been largely adopted in Scandinavia, does not allow us to identify each transmitter in turn by its individual call sign because, where an S.B. is taking place, the announcer speaks from the main studio to "whomsoever it may concern" and, unless there happens to be a break in the

programme, we do not hear a distinctive call from the particular station.

It is therefore essential, in conjunction with other peculiarities which I will later explain, that the reader should be in a position to gauge approximately the wavelength of the transmission received; the means for so doing have already been explained in a special article in the WIRELESS MAGAZINE, and we need not therefore dilate on them.

In these pages will be found a list of the Scandinavian main and relay stations with their respective wavelengths. As already stated, most of the programmes for the Swedish relay stations are given out by the Stockholm studio, but in some instances the capital city takes dramatic performances and lectures from theatres and universities in the city in which relay stations have been installed. On other occasions Stockholm has actually exchanged the children's hour with the Oslo studio, or relayed performances from the Oslo Opera House.

Fortunately for us, Stockholm, Malmö, and Gothenburg repeat their calls at frequent intervals, their respective announcers using the words "Hullo, hullo, Stockholmes,"

or "Malmöens" or "Göteborg Radio," according to the station. The word "Radiotjänst," the name of the broadcasting company, is frequently associated with the call. Also in the capital city a gong or bell signal has been adopted, and is used between items.

Where a relay is made of foreign transmissions by either of these stations, and rebroadcast by the other transmitters, it will always be found that the main studio will give its call before each new transmission and, in most instances when taking parts of programmes from either the United Kingdom, Germany, or France, the call is repeated in the language of that particular country.

In the case of dance music special care should be taken to distinguish between what may be a relay of English bands and a broadcast from the Hotel Royal's jazz orchestra, from which many popular fox-trots may be heard, and where Dick de Pauw's musicians use our language when joining in the chorus.

Although it may not appear necessary to mention smaller stations of the calibre of Norrköping, Jönköping, Eskilstuna or Falun, they must be borne in mind. Many of these weaker transmissions, in view

The Stations in Sweden, Norway, Denmark and Iceland

of the favourable geographical situations enjoyed by the transmitters, are frequently heard in the United Kingdom.

All these relay stations, including Boden, Karlsborg, Sundsvall, and so on, broadcast at times local news and short concerts, in which event they give their individual calls. These are, however, of a stereotyped nature, and one example should suffice, namely, "Hullo, hullo, Karlsborg Radio."

Within the next few months Karlsborg may become a household word, as steps are being taken by the Swedish Ministry of Posts and Telegraphs to equip this station with a 20-kilowatt transmitter.

To feed little "one-horse" coastal towns, smaller relays will be erected at Umea, Karlskrona, Kalmar, Kristinehamn, Upsala, Hernoösand, and Kiruna.

The reader must familiarise himself with these names, as they will undoubtedly later be mentioned in the main station call.

NORWAY

The Norwegian stations, few in number, offer but little difficulty in identification; Oslo has a distinctive call, "Allo, allo, Radio Oslo." It will be found that the announcer is a very conscientious man. Apart from this, on several nights of the week, as will be seen from the programmes, when an English lesson is being given, the call of the station is also "put out" in our language.

Lectures are often broadcast in English by British visitors to that country and, generally speaking, every effort is made on the part of the Oslo station to make it clear to

Radio," at frequent intervals, in several languages, and it is also usual to indicate the wavelength on which the transmission is being made.

The Aalesund (515 metres) coastal station frequently relays the Oslo programmes for the benefit of the fishing fleet, and also broadcasts, in the Norwegian tongue, weather forecasts, warnings, and news bulletins. Its call is "Aalesund Radio" (Raadee-owe), but it is not often heard on this side.

There are also two small relay stations, namely, Notodden and Skien, working on very low power, but it is hardly likely that readers will pick them up. But no station, however weak, should be classed under the heading "impossible."

DENMARK

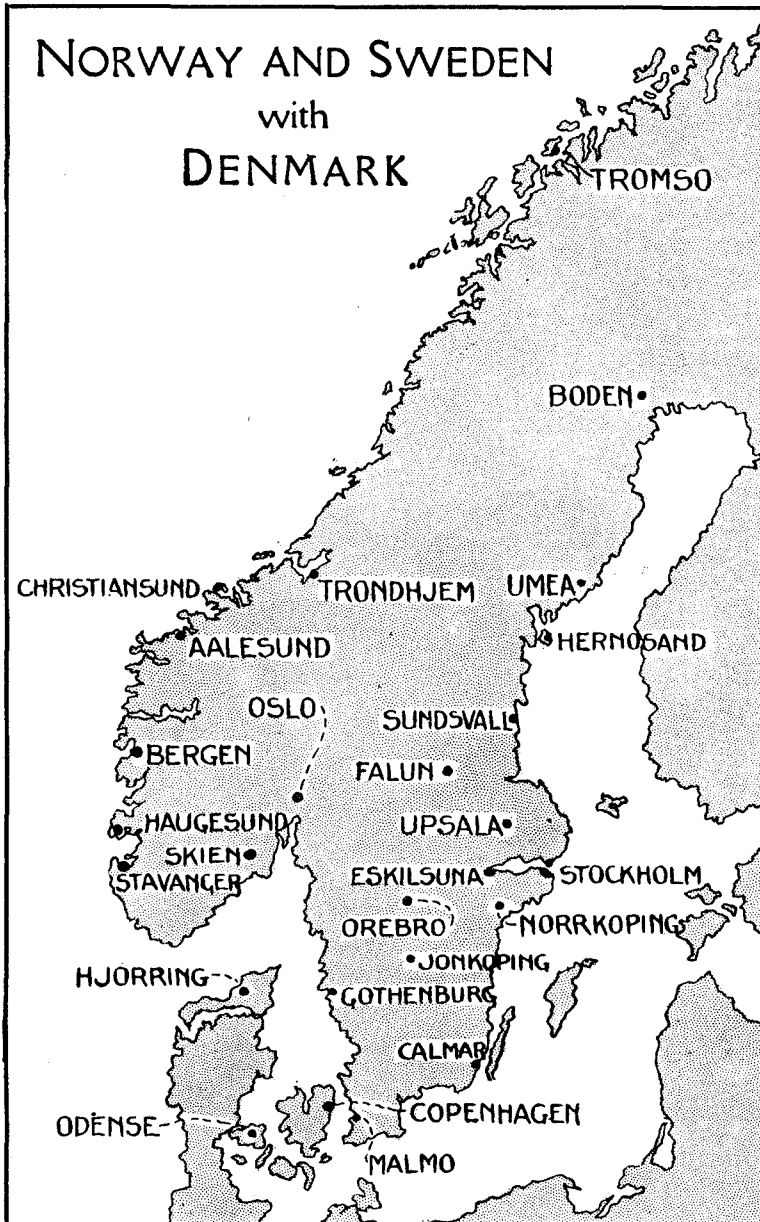
"Kjbenhavn Radio-Raadet," or "Radiofonistation," will be found to be the call of the Copenhagen main station, and few listeners will need to hesitate when hearing the transmission. There is, of course, a possibility that the same concerts may be heard in this country through Hjoerring on 1,250 metres, Odense on 950 metres, or Sorö on 2,400 metres; but these wave-

lengths are so distinctive that they cannot very well be confused with one another.

The first two relays mentioned do not give out their own programmes, and consequently in each case only the call of the main station will be

(Continued on page 299)

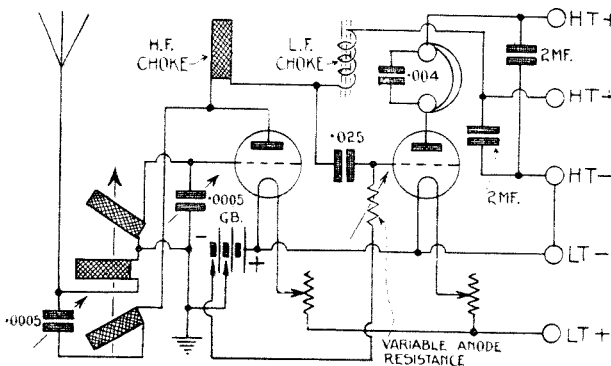
MAP OF SCANDINAVIAN BROADCASTING STATIONS



foreign listeners that they are hearing Norway.

The new station of Bergen not only takes its programmes from the capital, but also transmits its own concerts. It is still a new broom, and consequently no opportunity is lost to send out the call, "Bergen

Distortionless Valve Circuits for Loud-speaker Work



Excessive reaction in any form gives rise to distortion; in this two-valver the well-known Reinartz method of controlling reaction is employed.

The tuning system employs plug-in coils, but low-loss air-spaced cylindrical coils can be used.

The H.F. choke effectively bars the passage of H.F. currents through the L.F. amplifier circuits and therefore eliminates distortion.

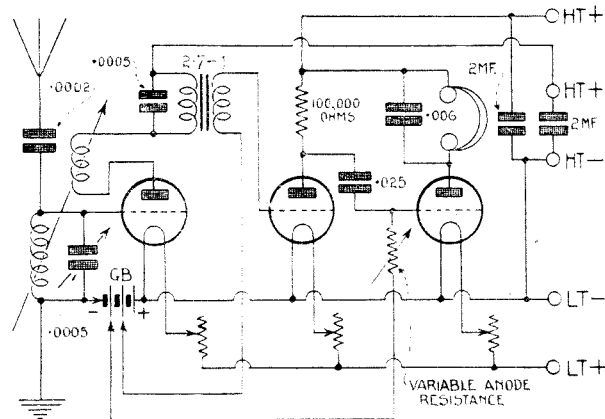
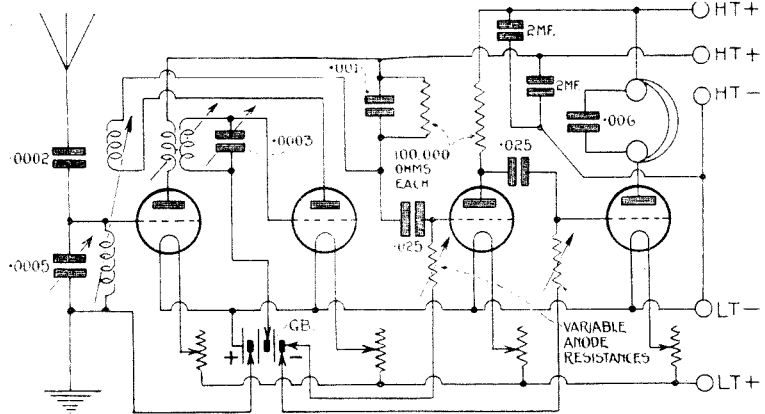
A well-designed choke coupling unit will ensure maximum amplification with minimum distortion.

Such a circuit is very effective for short-distance loud-speaker work or strong phone reception.

The diagram shows a distortionless four-valver for long-range loud-speaker work.

H.F. amplification with grid-bias control ensures almost perfect amplification of distant signals; anode rectification eliminates distortion during rectification; and two resistance-coupled note-magnifying valves give pure amplification of all audible frequencies.

The loosely-coupled H.F. transformer unit adds to the selectivity of tuning, thus helping to cut out distortion due to mush.



A local-station distortionless three-valver is shown by the diagram. The first valve gives undistorted rectification by virtue of its being an anode rectifier.

A transformer having a low ratio and high impedance ensures equal amplification of all audible frequencies, whilst the resistance-coupled amplifier still further amplifies, without distortion, all frequencies passed on from the first amplifier.

Keep reaction at a minimum and use a large condenser to get the best tone from the loud-speaker.

The last valve should preferably be of the power type.

"BRINGING UP THE 9-15"

There are those who think the life of a wireless operator dull and monotonous; others know that there is something "worth while" in the traffic of the ether. This story of a romantic SOS is founded on fact, for the author, M. McGrath, is himself a wireless operator. The illustration is by Charles Crombie.



The experienced passenger sat on the table and swung his legs.



THE *Megalian* rolled heavily to a beam swell. The experienced passenger sat upon the side-table in the wireless cabin and swung his legs disconsolately.

"Off and on," he observed, "I've been making this passage for fifteen years, and I've never seen anything but water and a few other ships plugging about their business. I've never even seen anything that could, by any stretch of imagination, be likened to a sea-serpent. The sea was the last stronghold of romance, but turbines and wireless—particularly the latter—have killed it. For a passenger, I'm an old-timer, and I say that romance at sea is dead."

"Kipling," said the wireless operator, lighting another of an endless series of cigarettes, "made a rather

pointed remark in that line. Something about romance bringing up the 9.15 train, wasn't it? Rather good, I thought."

"Oh, certainly," the old-timer agreed. "All right in poetry, of course, but it doesn't cut much ice in real life, does it?"

"No, I suppose not," the telegraphist answered.

From the deep-throated midships bell came a sudden, single stroke.

"Quarter to twelve!" exclaimed the passenger. "I'm going to turn in. Good-night, Sparks."

"Good-night," the operator returned, and the door of the *Megalian's* wireless cabin closed behind the departing guest.

The operator, yawning in anticipation of the middle watch, entered the receiving cabinet.

"All right," he said to the second. "I'll take her now. Much doing?"

"Enough," the assistant answered, "an' they're beginnin' to come to life. There's fifteen here for transmission."

"Righto. Shove your monogram in the log and hop off."

Once more the cabin door opened and closed, and the operator-in-charge was left alone. He drew a chair towards the table and slipped a pair of phones over his ears.

A clamour of various notes, an absolute inferno made up of the myriad wireless voices of the night, immediately assailed his ears. From far to the distant north-eastward came the thin cry of Cullercoats, droning out a list of ships. North Foreland and Ostend were clamour.

"BRINGING UP THE 9.15" (Continued)

ing in turn. From up-Channel came the whisper of Niton, while, at the junction of three seas, Land's End muttered in the night of wreckage sighted in the Bay and of a floating mine reported off the Irish coast. A Western Ocean "flier" was working an apparently endless series of messages, to each of which Ushant snapped a brief receipt. From far out in the Atlantic that stretched to westward, an American cargo-boat querulously demanded last night's baseball scores from a sister-ship, and, southerly, an insignificant Tyneside tramp could be heard pleading with Finisterre for a receipt.

Strong and low, from the far southward, came the rumble of Gibraltar, growling to ships within and beyond the Straits. Marseilles chattered with a Messageries boat bound for Algiers; Las Palmas, with a note of annoyance, told someone to wait, and a German steamer argued with Lisbon in bad Portuguese. Suddenly the medley was pierced by the thunder of a near-by ship, reporting to Land's End.

"Here the s.s. *Halmar*, outward bound from Cardiff for Kobe and Yokohama, via Panama and Honolulu: now thirty miles W.S.W. of your station. Have you anything for me?"

The operator of the *Megalian* had winced involuntarily as the roar of the vessel so close to him had commenced, and had shortened his wavelength to cut down the strength of his neighbour's signals. As he did so, the faint whisper of distant music came to his perceptive ears. He shortened the wavelength yet more and tuned-in. Presently, very clear and sweet in the telephones, the notes of dance music, played in far-off London, came lilting over land and sea, like a faint, melodious echo from another and a happier world.

For a while he listened, a trifle wistfully, and then, conscious of a neglected responsibility, switched back to the "long commercial." Panic seized him as an unbroken silence reigned in the telephones. He glanced keenly at the receiving apparatus. Suddenly came signals, distant but clear, a brief query from a curious ship. Instantly the hush was shattered by a score of stations and ships whose notes seemed to

Not always has S O S been the recognised distress signal. The original combination was C Q D, the general call to all stations, and the letter D to indicate danger. The combination S O S was universally adopted in 1906 because of its simplicity as a morse signal.

ring with angry command: "Q R T, S O S!" (Stop transmitting: vessel in distress).

The *Megalian's* operator stiffened and fingered his pencil uneasily. Perhaps during that minute or two when he had been listening to 2 L O . . . Then, clear, strong, and steady, came the dreaded signal:

"S O S, S O S, S O S. Here the *Maric*, struck submerged wreckage in latitude 45.10 north, longitude 5.15 west. Heavy list to port; forepeak and No. 1 hold filling rapidly. Require assistance."

As the ship concluded her signal the *Megalian's* operator dropped his hand to the electric-starter. A high, singing drone filled the cabin as the converter sprang into swift rotation. He pressed the key and the blue crackling spark flickering like chained lightning, flashed out the acknowledgment:

"S O S received O.K. Am reporting. Stand-by."

He kicked the starter-handle back and picked up the telephone to the chart-room.

"S O S from the *Maric*," he informed the bridge, and read the message over the telephone.

"Righto, Sparks. She isn't very far away," the second mate answered. "I'll tell the old man."

In an incredibly short space the chart-room telephone rang again:

"Tell the *Maric* we are heading for him. It will take about three hours to reach his present position. Warn any other ship that may happen to be nearer and keep him in touch. Please report further particulars every fifteen minutes."

"Very good, sir," the operator acknowledged the captain's instructions, and then returned to the transmitter.

The *Megalian*, proving to be the nearest ship to the distressed vessel, took command. Every few minutes the motor sprang into its humming drone and again died to stillness. Occasionally a ship queried impatiently: "Is that S O S clear yet?"

only to be immediately and peremptorily ordered to keep quiet.

The pulsing throb of the *Megalian's* engines told of her increased speed and of engineers and firemen who laboured in the dark bowels of the vessel to hasten her on her errand. The *Maric* reported an increasing list and the further and more rapid entry of water into the hull of the vessel.

At four o'clock she signalled: "You want to get a move on. We're getting wet feet over here." A hasty message of assurance answered her from the *Megalian*, and yet a further burst of speed came from the vessel as if the ship herself had become animate and was conscious of her sister's need.

Suddenly, like an alarm in the wireless cabin, came the loud clangor of the *Megalian's* telegraph, and the engines slowed to a crawl.

The operator signalled triumphantly:

"We've reached you. Get out on deck, old man."

In the grey dawn the boats of the *Maric* cleared from the sinking ship. As the shipwrecked crew stepped aboard the *Megalian*, one of the newcomers hailed the operator:

"Lord, was it you, Jimmy? Haven't seen you since that night in Rio."

The operator grinned.

"I heard you joined the *Maric*. Go below and turn my mate out. Tell him I want a sleep, and you take his bunk."

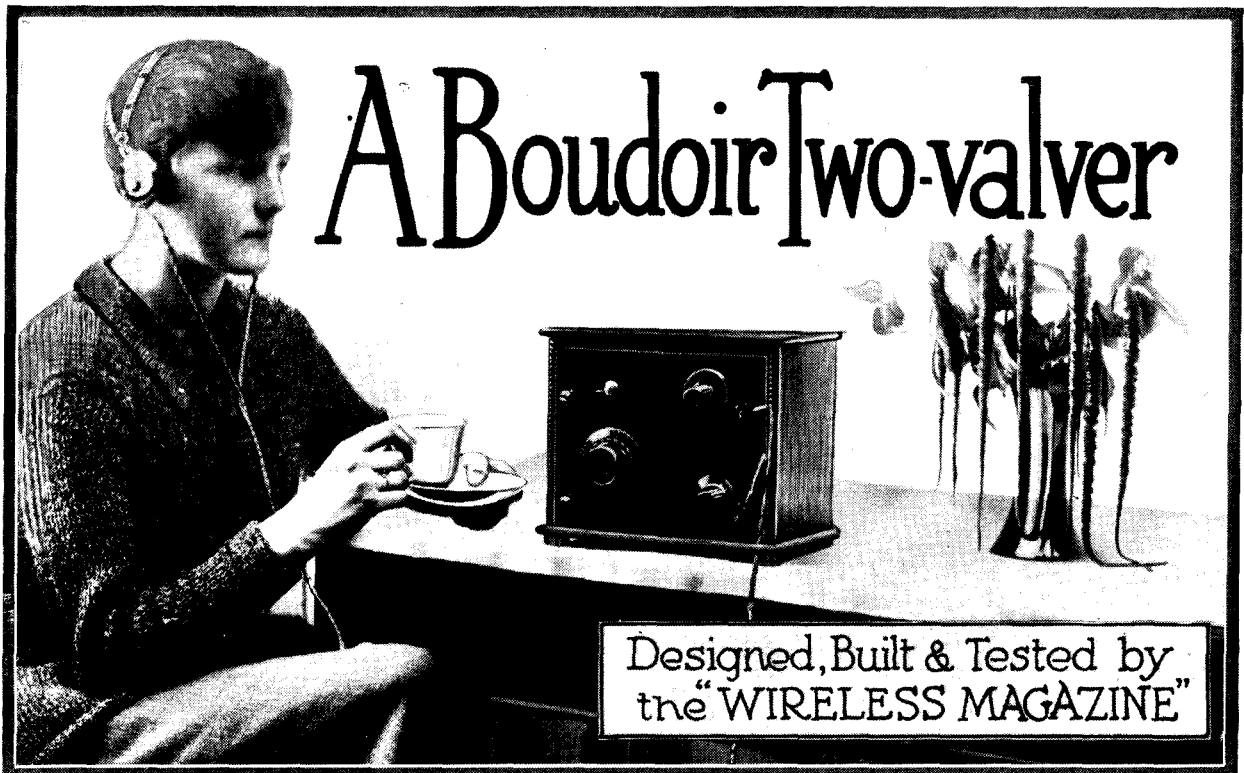
As his confrère disappeared along the deck, the telegraphist returned to the wireless cabin. Once more the motor sprang into its unwearying drone: "Signal to all ships. S O S clear. Carry on." Land and sea took up the cry: "All clear! Go ahead." Once more babel broke out as ships and stations sought to rush their delayed traffic.

The *Megalian's* operator leaned wearily back in his chair and yawned sleepily. A figure appeared in the open doorway.

"I say," queried the guest of last night, "were we stopped a while back? It woke me up, I think. What were we doing?"

The operator looked at him with sleepy eyes:

"Oh, just bringing up the 9.15," he answered, and grinned.



A Boudoir Two-valver

Designed, Built & Tested by
the "WIRELESS MAGAZINE"

Neat and compact, this is just the receiver for a lady.

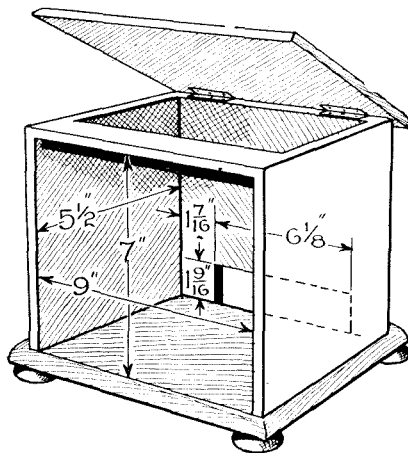
There is nothing difficult about the operation of this set.

TO be really up to date "my lady's chamber" must be able to boast a wireless set. Here is a description of a particularly neat and compact two-valve set which will not only work a loud-speaker within a reasonable distance of a broadcasting station, but which is easy to handle, efficient in operation and, moreover, does not offend æsthetic taste in whatever surroundings it is placed.

Choice of Materials

A little care in the choice of components and the wiring is all that is required to produce a set that has no limit to its receiving range. Evidence is not lacking of the sensitivity of two-valve receivers, the reception of American stations being a common occurrence.

Referring to the circuit diagram, it will be seen that the tuning of the aerial is accomplished by the usual coil and parallel tuning condenser, coupled to which is the reaction coil connected in the plate circuit of the detector valve. In the



Details of Cabinet.

grid circuit of this valve is inserted a .0003-microfarad grid condenser, with a series-connected 2 megohm grid leak joined to + L.T.

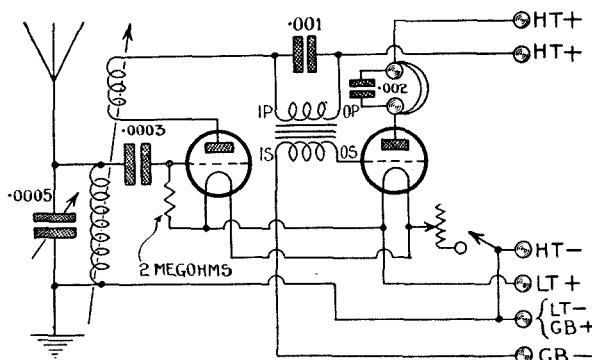
One L.F. Stage

One stage of transformer-coupled low-frequency amplification is used, a transformer of medium step-up ratio being employed. To obtain a smooth reaction control a .001-microfarad fixed condenser is connected across the two transformer primary terminals.

The brilliancy of both valve filaments is controlled by a single rheostat, whilst the filament-lighting circuit may be completely broken by the key switch inserted in the - L.T. lead.

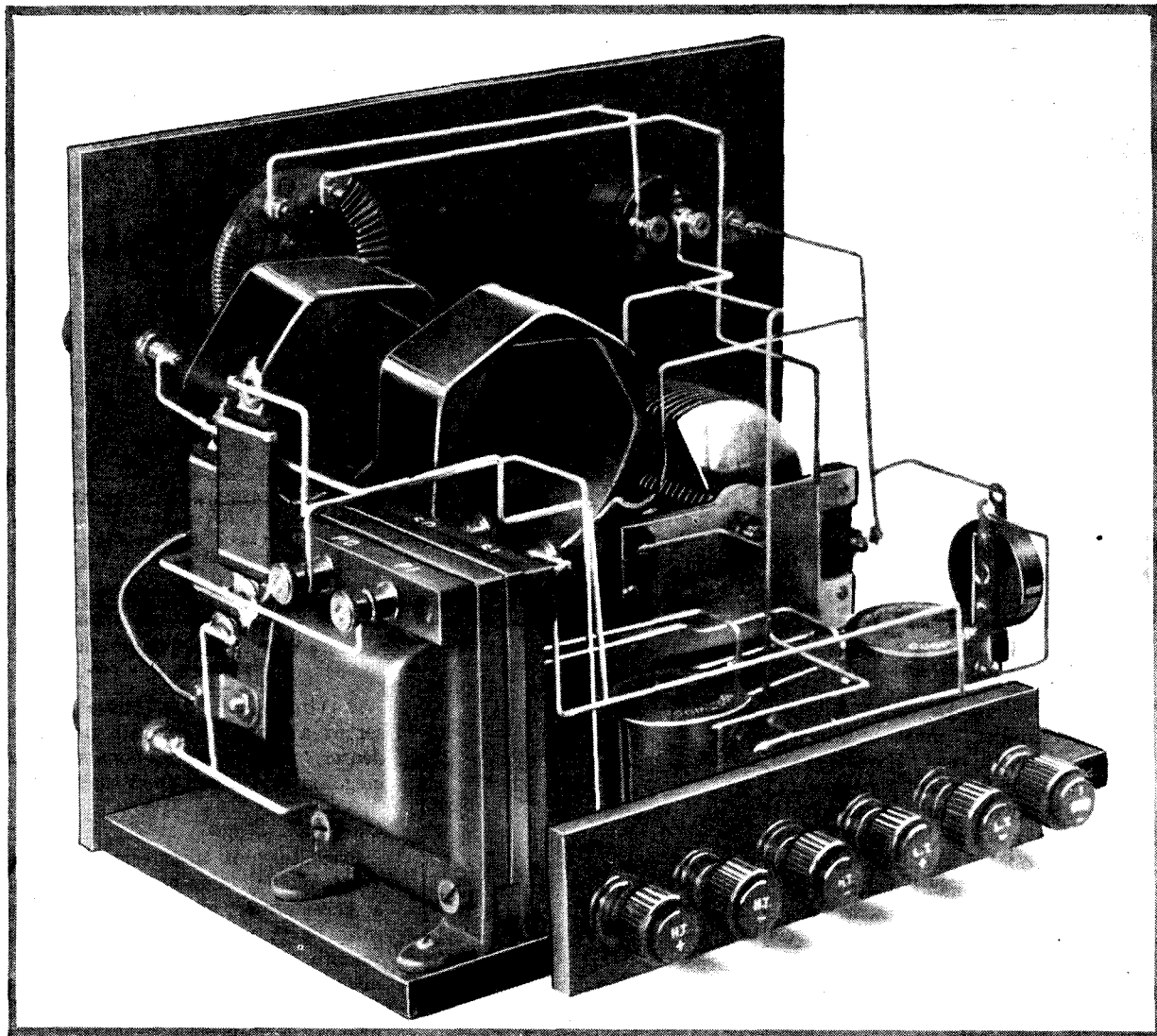
A separate H.T. supply is given to each of the two valves by the fitting of two + H.T. terminals. The voltage applied to the plate of the low-frequency amplifying valve is much greater than that given to the detector valve.

A certain amount of negative grid bias must be applied to the grid of the valve in order to



Circuit Diagram of Boudoir Two-valver.

A BOUDOIR TWO-VALVER *(Continued)*



This photograph shows the compact arrangement of the Boudoir Two-valver.

prevent the flow of grid current and its consequent distortion. For this purpose terminals are provided for connecting in circuit a small grid-bias battery.

List of Components

A full list of all the components required is given below, together with the manufacturers' names. The constructor is strongly recommended to use these components for two reasons: the first is that the components specified are of good make, and secondly, they are of such dimensions that they may be fitted to the size of panel specified, whereas other components may not:—

Ebonite panel, 9 in. by 7 in. by $\frac{1}{4}$ in. thick (Lowenadler).
 Ebonite terminal strip, 6 in. by $1\frac{1}{2}$ in. by $\frac{1}{4}$ in. thick (Lowenadler).
 10 engraved terminals (Belling-Lee).
 Filament key switch (Bulgin).
 .0005-microfarad Sexton variable condenser (Bulgin).
 3-in. condenser dial (Igranic).
 Panel-mounting two-way coil holder (Ella Varic).
 Filament rheostat (Ella Varic).
 2 anti-microphonic valve holders (Bretwood).
 Grid condenser and leak (Watmel or Dubilier).
 .001- and .002-microfarad fixed condensers (Igranic-Freshman).
 L.F. transformer, 5 to 1 ratio (Ormond).

Baseboard, 5 in. by 9 in. by $\frac{3}{8}$ in. thick.

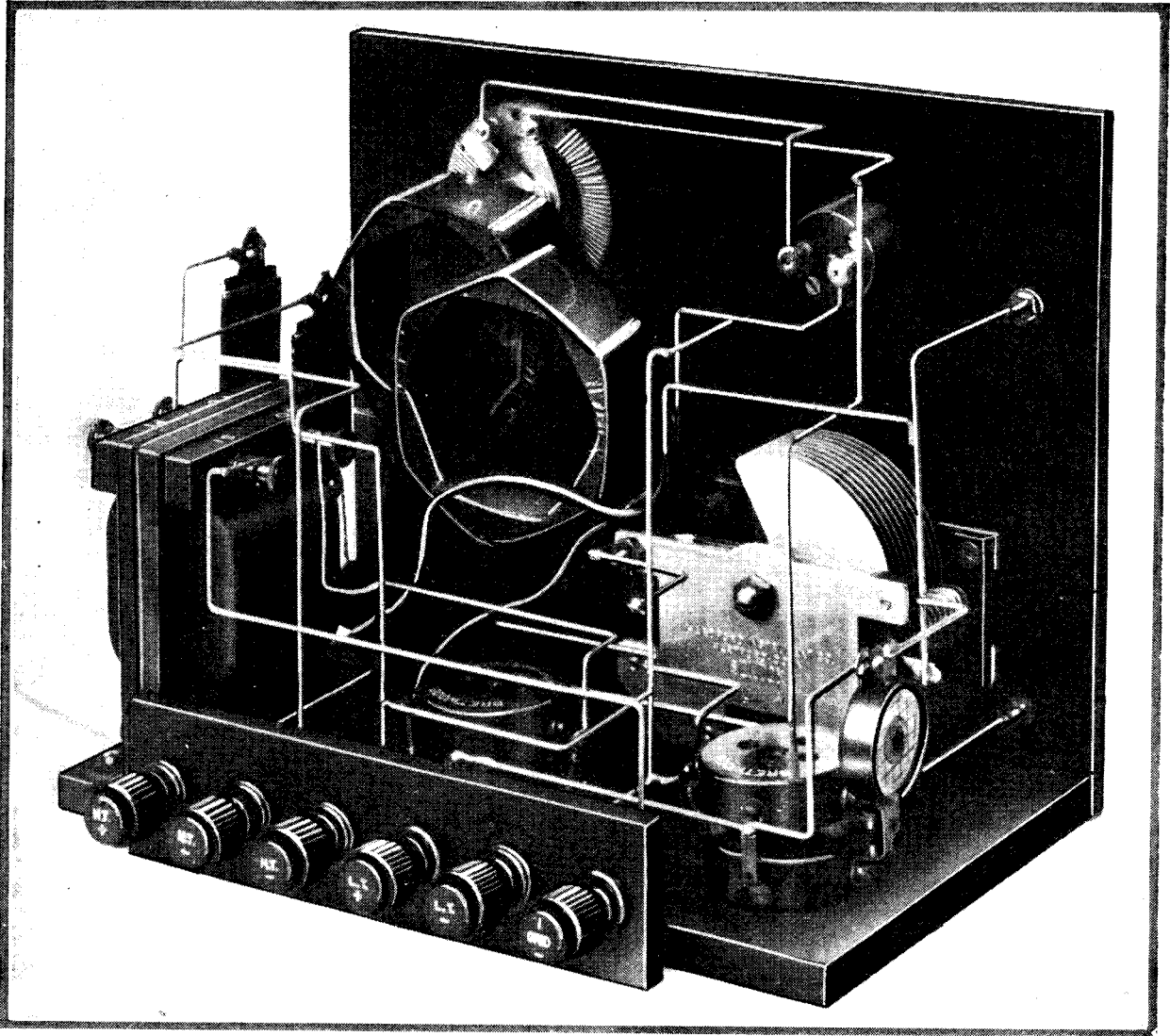
Cabinet (Unica Cabinet Co.).

Drilling the Panel

Our attention must first be turned to the panel on which are mounted the coil holder, rheostat, filament switch and variable condenser. All these instruments are of the one-hole fixing type and therefore mounting necessitates only a minimum amount of drilling. A drilling diagram is given showing the positions and sizes of all holes to be drilled.

Having drilled the panel the components may be mounted as shown in the photographs and wiring diagram. The filament switch and

A Special "Wireless Magazine" Design



When connecting up this Boudoir Two-valver, care must be taken to keep the wiring clear of the reaction coil.

variable condenser are mounted on the left of the panel one above the other, whilst the coil holder and filament rheostat are mounted on the right of the panel.

Baseboard Components

On the baseboard the remainder of the components are mounted, with the exception of the two small .001-microfarad fixed condensers, which are held in position by the wiring itself and are not actually fixed to either the panel or baseboard. A glance at the wiring diagram will show the positions of these components.

The two Bretwood valve holders

are screwed to the outer edge of the baseboard in the positions shown.

On the back edge of the baseboard is mounted the ebonite strip carrying all the terminals except those for the aerial and earth, and the phones, these being mounted on the front panel.

So that the terminal strip shall fit flush with the back of the cabinet, it may be necessary to use small distance pieces in the form of short lengths of ebonite tube through which the wood screws attaching the strip to the baseboard can pass.

The transformer is mounted on the left-hand outside corner of the baseboard.

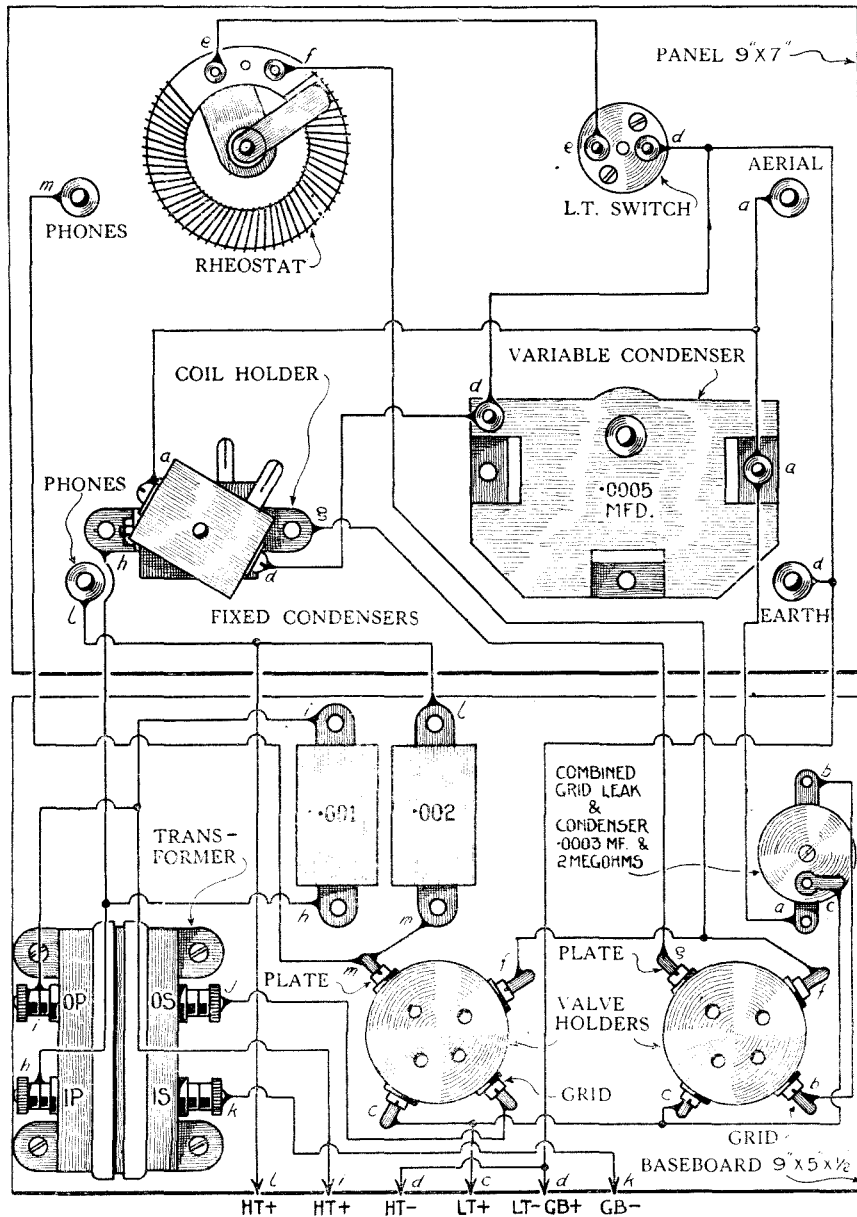
As soon as the components have been mounted, the panel and baseboard may be fixed together by means of 1-in. brass wood screws. Wiring may then be started; this should be carefully done in conjunction with the wiring diagram.

Movement of the Reaction Coil

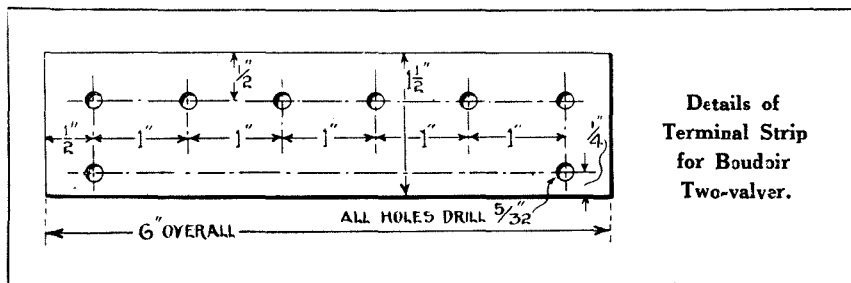
Care should be taken that sufficient room is allowed for the radial motion of the reaction coil. It will be found that the movement of this coil is restricted as it is, and the efficiency of the set will be seriously impaired if the motion is still further confined.

Connections to the reaction coil should be made with short pieces

A BOUDOIR TWO-VALVER *(Continued)*



When wiring up the Boudoir Two-valver, first connect all those terminals marked *a* with one wire or as few wires as possible, then those marked *b*, and so on. (This diagram is half scale.)



of flex. A point to note is that the grid-bias + and L.T. — leads are both joined to the L.T. — terminal, there being only one grid-bias terminal.

Wiring Up

It will be seen that every terminal of each component shown on the wiring diagram is marked with a small letter of the alphabet. Thus, some are marked *a*, some *b*, and so on. All those marked *a* should be connected up first with one wire or as few wires as possible. Next, all those marked *b* are connected up in a similar manner, then those marked *c*, and so on.

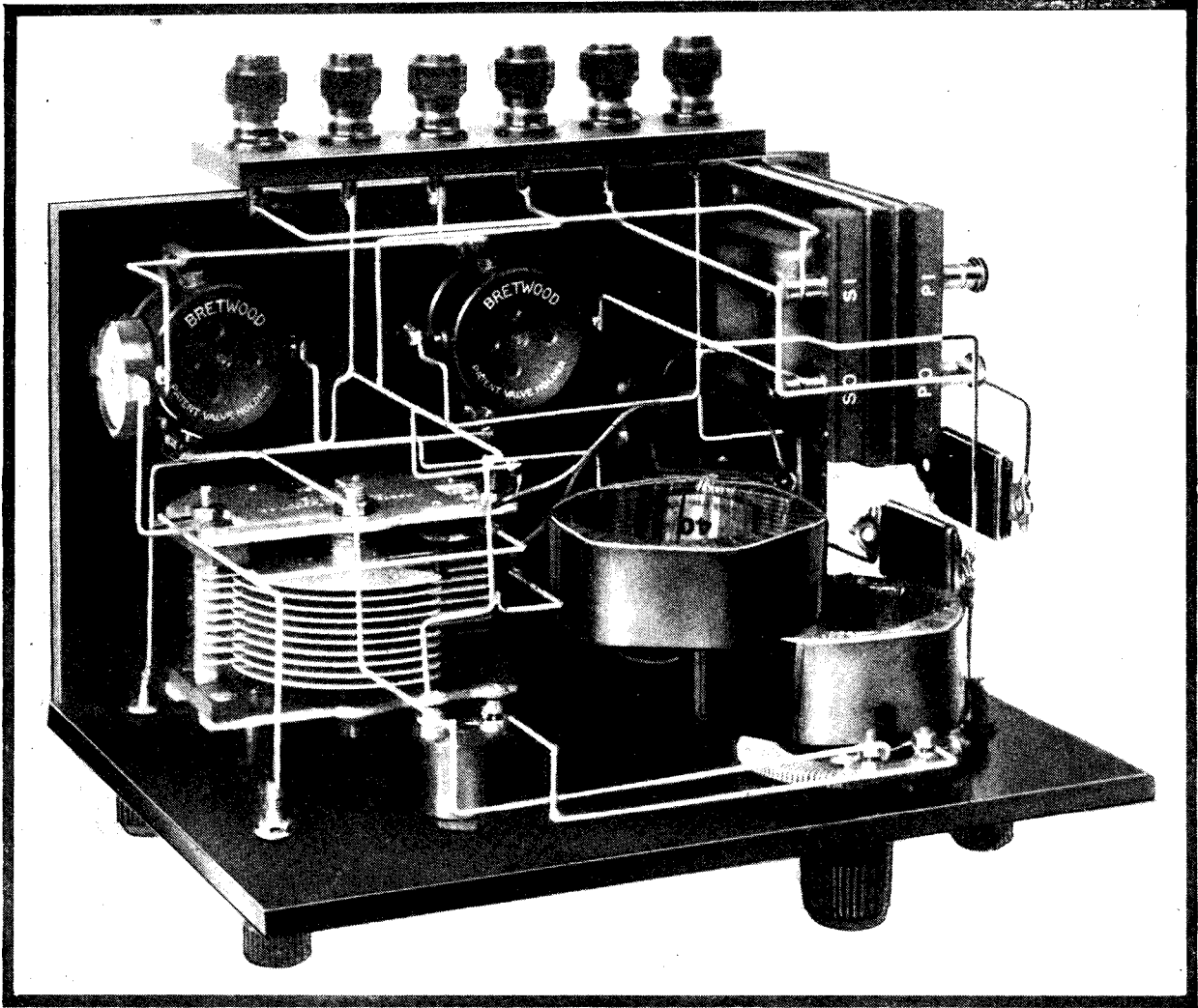
This completes the actual construction of the receiver, all that remains to be done being the housing of the latter in a suitable cabinet. This can be obtained from the Unica Cabinet Co., of 73 Camden Street, N.W.I. A slot is cut in the back of the cabinet to allow the terminal strip mounted on the back edge of the baseboard to project through flush with the back of the cabinet.

Suitable Valves

For good loud-speaker results the following valves are recommended: With a 2-volt accumulator, Osram or Marconi valves DER and DE6 are recommended as the detector and amplifier respectively. For a 4-volt battery a DE3B and DE3 in similar positions. Best results, however, are obtained by using a DE5B as the detector, followed by a DE5. These valves require a 6-volt accumulator.

The operation of the set is very simple. It should be noted that by tightening the coupling between the aerial and reaction coils an increase in signal strength is obtained. If the opposite effect takes place the polarity of the reaction coil should be reversed by changing over the two wires connected to it.

At approximately 8 miles west of 2 L O this station, Daventry, Radio-Toulouse and Birmingham were received on the loud-speaker,

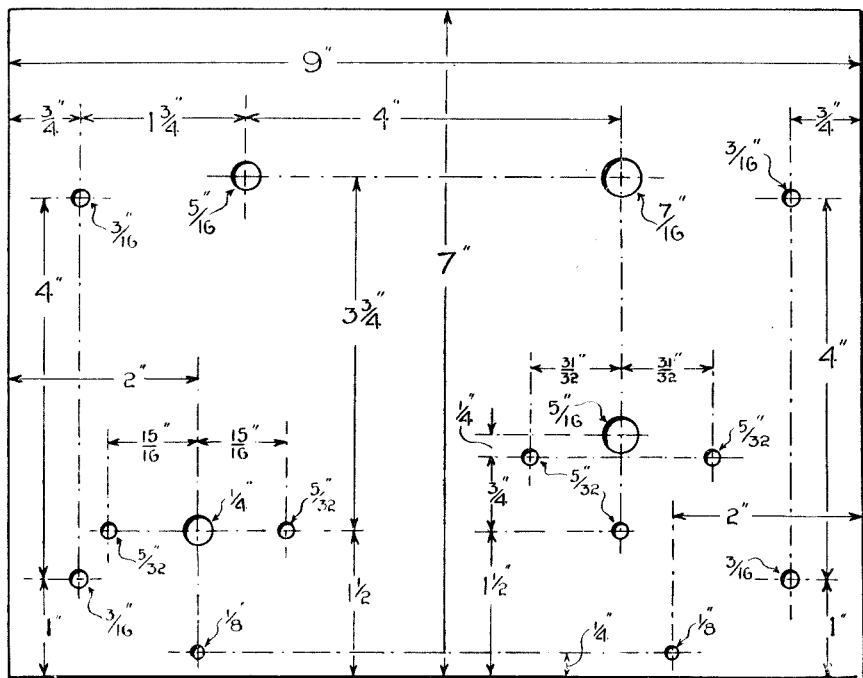


Above :
Wiring of Boudoir Two-valver.

Right :
Panel Layout (reproduced half scale).

Daventry and London with exceptionally good volume. As the set is so simple to tune it is not very selective, and other stations could not be received while London was working, but after the latter had closed down the reception of Continental stations was a simple matter. Madrid and a few of the German stations came through with excellent clarity.

By using a small reaction coil (a No. 35 for B.B.C. wavelengths) a very smooth control of reaction is obtained. Indeed, if too large a reaction coil is employed, considerable difficulty will be experienced in keeping the set from oscillating.



The Making of An Amateur!

By **BLAKE BOANERGES**

THE other day I had to wait at a dentist's. It was a full house, and all I could find to read was a copy of *Home Jottings*, for January, 1898. As I had to wait fifty minutes, I knew a good deal about the care of the infant by the time my turn came.

Afterwards I went on to a place where I had to deliver a short talk on "How to Become a Wireless Amateur." Here I reproduce my lecture for the public weal.

The thing to do is to catch him young, before he has had time to acquire wrong notions about the possibilities of galena. Choose a specimen with good flat ears, a silver spoon in his mouth, and a father in the building trade. Test him by handing him a cheap German valve. If he takes it eagerly, applies it to his mouth, and then throws it down, depend upon it he is good material.

We will assume that you have selected him and he is a week old; eyes fully open, tail nicely docked, and so forth. The next move is to cure him of howling. There is a considerable amount of moving—for you—in this move. He will probably howl at first in ignorance. Give him a B.B.C. pamphlet directly. He will stop howling while he eats this. No doubt he will howl again soon after. Tell him about it.

If he won't stop, take him out of his kennel and carry him round the room. Show him the pretty pictures. Let him look at that photograph of grandpa; I mean the one in which grandpa has a foot of beard, a silly bowler hat with no brim, and braid on his coat. When he sees that he will either stop howling or have a fit.

By the age of three the howling will be practically over and you can begin to cultivate Love of Experiment. Do not reprove him for trying to ascertain whether the kitten's head fits a jam-pot; do not discourage his researches into the works of your watch.

You should also instil Handiness. Let him wind coils with the wire in his Ma's hat. Let him test the capacity

of various instruments—gramophone, barometer, clock, etc.—preferably with harmless material, such as ink. Encourage him to use tools of precision—your razors, for example.

All the while this is going on you must teach him the morse code and engage his mind with formulæ. A good way to instil the code is to combine this exercise with those of Discipline.

For example, a short smack and

~~~~~  
**A GUILTY CONSCIENCE**

**F**ERDINAND, I'm grieved to say,  
 Stole some jam one sunny day;  
 Lifted down a monster pot  
 And he ate a dreadful lot!

Then, "Hullo!" a loud voice said—  
 Ferdie dropped the pot and fled,  
 For he didn't guess at all  
 'Twas the wireless in the hall!

LESLIE M. OYLER.

~~~~~  
 a long smack make A. His interest will probably centre on E, I, S and H; O he will not like at all, and he will certainly not appreciate the apostrophe (.----.).

As to formulæ, instead of nursery rhymes give him $C = \frac{E}{R}$. C for Cat, E for Eats, R for Rat. Again $\lambda = \frac{V}{n}$, where λ stands for Lamb, V for Virol and n for Nurse.

At an early age you must begin to stress the importance of Accurate Observation. Take care not to send him from the table if he innocently remarks upon the clicking of Auntie's top plate, or relates what he heard the maid next door tell the milkman about Mr. and Mrs. Pocklington-worthy.

And that reminds me. Encourage him in auditory exercises. Let him have plenty of practice in distinguishing between the frequency of the police-whistle, the bass drum, the toy trombone, and a kicked dustbin.

And if he ever says he heard St. Peter's in the next parish strike

seven, when you know he heard St. John's in the next street, give him some more morse practice (long strokes).

This brings me to the vital subject of Veracity. Don't let him play with kids who go fishing. Don't let him even suspect that there are wireless stations in New Zealand. Let him think in terms of seven-valve sets until he has arrived at the age of indiscretion. Never—Oh never tell him what you yourself did with a crystal, a frame aerial, one earpiece, and a home-made condenser.

Naturally, you will accustom him to the paraphernalia of wireless. Your wireless den will be open to him all day. He must dissect every known type of valve, after testing the strength of the bulbs with a hammer. You will train him to run like a monkey up a tree, with a complete set of tools in his pocket, 100 feet of wire round his neck and the insulators in his mouth.

In order to prepare him for fitting "earths" let him spend six months with some expedition looking for mummified cats of the First Dynasty at Luxor; and so that he shall well and truly solder give him a colander and an inch of solder, and let him combine them into a watertight vessel before he has his next meal.

I do not recommend any exercises in scrubbing ebonite, as I do not believe the best type of amateur would lower himself to do that. If you feel that your ebonite needs scrubbing, smear it with Bovo, and let the lions at the Zoo lick it. Any B.B.C. uncle will take it along for you. They go there every week in the hope of recording the sneeze of the sacred ibis.

And thus, at last, out steps the Perfect Amateur—non-howling, agile in mind, body, and imagination; as good a mechanic as Tubal Cain, a better tinker than John Bunyan, as veracious as Washington (complete with hacksaw), with a short wave in one hand and a set of components in the other, ready to receive anything from anywhere, anytime, anyhow.

The ABC of the Super-het

An article by J. F. Johnston explaining in simple language the supersonic-heterodyne method of reception. An introductory article appeared last month.

HAVING seen how the super-het was introduced into this country, and how it overcomes the disadvantages of straight circuits by carrying out H.F. amplification on a long wavelength, whatever the wavelength of the transmitting station, we will now consider how the change in wavelength is effected.

Appropriate Name

Unlike most of the fancy names given to many receiving circuits of American origin, the term *supersonic heterodyne* is really very appropriate. From an etymological point of view it may be unsatisfactory, as the first part of the title is taken from two Latin words and the last part from two Greek words. But for describing the action of the circuit in a brief and concise form it could hardly be surpassed.

The term *heterodyne* was added to the wireless vocabulary long before the super-het was invented. It was, I believe, first used by Fessenden to describe a method he had devised for receiving continuous-wave signals. As Fessenden's system led later to the invention of the super-het we will spend a little time considering it.

Before the introduction of C.W. transmitters all wireless communication was carried on by the now almost obsolete spark system. The discharge of a condenser across a spark gap was used to set up oscillations in a tuned circuit. Each spark caused a train of oscillations to flow in the aerial circuit and there was an appreciable time gap between each train.

As the sparks took place at an audible frequency it was only necessary to rectify the oscillatory currents in the receiver in order to have available a series of unidirectional impulses capable of producing an audible note in the telephones. The frequency of this note, of course, corresponded to the spark frequency of the transmitter.

For the reception of C.W. signals some additional process was neces-

sary. As the waves were continuous, and not broken up into separate trains, the rectification of the received signals merely gave rise to a steady direct current through the telephones as long as the transmitting key was pressed down.

Instead of emitting the long and short buzzes of the morse characters, the telephone diaphragm was merely attracted towards the magnets once for each dot or dash.

Some means were necessary for breaking up the continuous oscillations into groups either at the transmitter or in the receiver end. Many types of interrupter were devised for this purpose, by means of which one of the circuits was broken at regular intervals. A transmitter so equipped emitted what was known as "tonic train," and its signals could be received on any apparatus

which was suitable for the reception of spark telegraphy.

In other cases the interrupter was employed to break one of the receiving circuits. In either case the note heard in the telephones corresponded with the frequency of the interrupter.

Superimposing Another Current

Fessenden conceived the brilliant idea of superimposing on the received oscillations another oscillatory current of a different frequency. The result was a compound current which rose and fell with a frequency corresponding to the difference between the two other frequencies. The reason for this will be obvious.

At one moment, say, the two sets of oscillations were exactly in step. Supposing they were of equal amplitude, the resulting current was just double that of either. But at each succeeding period of time the two sets of oscillations got more and more out of step until they were opposing each other exactly. When this happened the resultant current was, of course, zero.

Thus by rectifying the compound current a unidirectional current was obtained which rose and fell at a frequency depending upon the difference in the frequencies of the two sets of oscillations. As the frequency of one of the oscillatory currents was under the control of the operator at the receiving end, the pitch of the note in the telephones could be altered at will, and this was a great advantage.

Fessenden appropriately gave the name of *heterodyne system* to his method of receiving continuous waves, *hetero* implying a mixture and *dyne* power or force. Hence *heterodyne*—a mixture of forces.

The resultant frequency produced by the ordinary heterodyne method, of course, was always within the limits of audibility. The term *supersonic* (*super*, above or beyond; *sonic*, sound) indicates something above audible frequency, from which

(Continued on page 273)

3 A.M.

'T WAS 3 a.m. in the morning,
The night was wild and dark,
But Percy sat at his wireless set
And suddenly cried, "O hark!"

'T was the bells of New York City,
Soft ringing sweet and clear—
At least, so thought our Percy then
As he quickly drank his beer.

Then all at once upon the air,
A voice he seemed to know
Came loudly and distinctly with
"Hello! Hello! Hello!"

His heart beat fast, his pulse
increased,

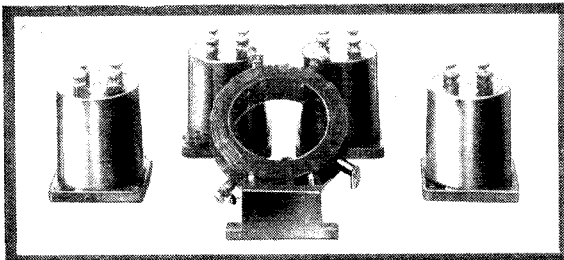
His eyes lit up with pride.
"Hurrah! hurrah! I've got New
York!
I'll tell it far and wide."

When lo! upon his vision came
A policeman's steely eyes:
"I've rung the bell; I've banged the
door,
But could not get replies;

"Your window's broken, your safe's
undone—
They left this note behind:—
"We think as 'ow the next few days
A "station" you will find."

K.E.B.

Some Well-known Super-het Sets and Kits of Components



BOWYER-LOWE SUPER-HET KIT

(Bowyer-Lowe Co., Ltd., Letchworth.)

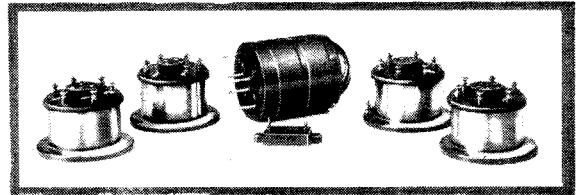
This kit comprises three I.F. transformers, a filter and a fixed condenser to put across it, and an oscillator coupler. The transformers and filter are enclosed in ebonite cases.

The oscillator is constructed for a super-het circuit working on the autodyne principle.

KEYSTONE SUPER-HET KIT

(Peto-Scott Co., Ltd., 77, City Rd., E.C.1.)

A feature of this kit is that the transformers and filter are constructed in units, with an anti-microphonic valve holder as an integral part of each unit. The oscillator coupler is provided with a small adjustable coil for coupling to the frame aerial.

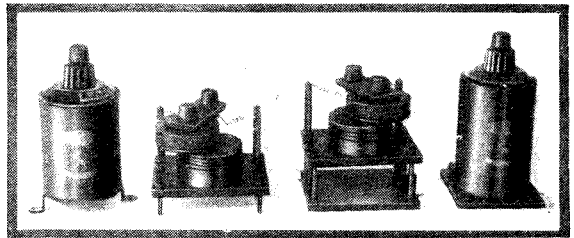


SUCCESS SUPER-HET KIT

(Beard & Fitch, 34-36, Aylesbury St., E.C.1.)

In this kit the I.F. transformers are provided with built-in variable condensers for accurate adjustment. Two plug-in oscillator couplers are supplied, one for short waves and the other for long waves.

The variable transformer-tuning condensers, when once adjusted, can be locked by means of small ebonite knobs.

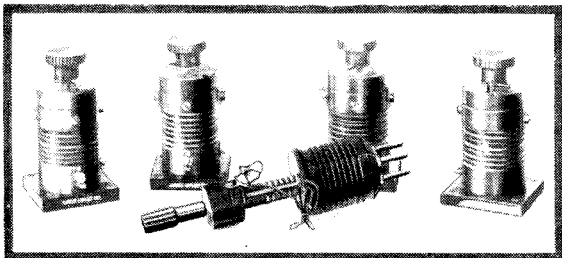


McMICHAEL SUPER-HET KIT

(L. McMichael, Ltd., Norfolk St., Strand, W.C.2.)

Three tuned I.F. transformers, a tuned filter, and a combined autodyne and reactor are the components included in this kit. All the components are wound on the familiar McMichael grooved-former principle.

For the accurate tuning of the transformer condensers a small scale is provided on the top of each unit.

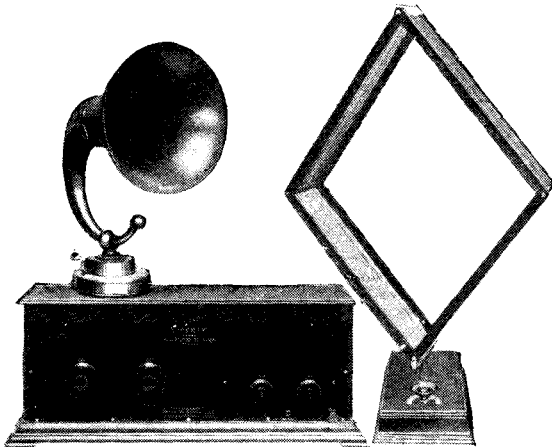
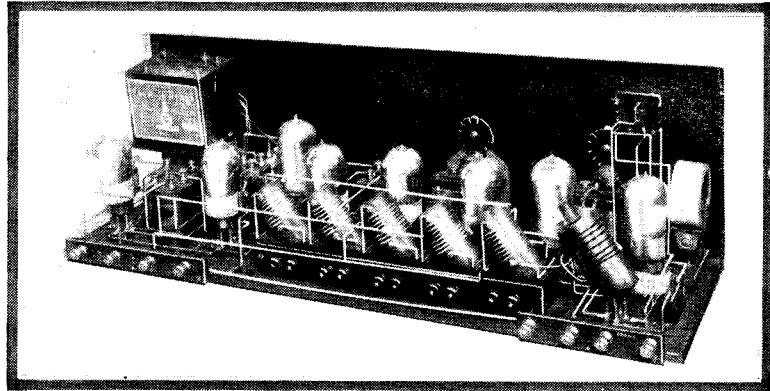


LIBERTY SUPER-HET SET AND KIT

(Radi-Arc Electrical Co., Ltd., Bennett St., Chiswick, W.4).

In addition to four I.F. transformers, two air-cored filters and separate oscillator coupler, this kit incorporates a mechanical balancing device, enabling the constructor to select his own supersonic-frequency peak.

As seen in the photograph of the set incorporating this kit, the I.F. transformers are staggered to prevent magnetic coupling and interaction between them.



The filter has a primary winding wound to the wavelength equivalent of the supersonic beat note.

As the greater part of the efficient operation of the super-het is dependent upon the beat-note adjustment, great care has been taken to ensure that this winding is accurate.

To enable all main European and American telephony stations to be received, the kit has two oscillator couplers, one tuning over a wavelength band of 250 to 800 metres and the other from 750 to 3,000 metres.

It is well known that no two valves have exactly the same internal capacity, so that variations of this capacity which occur when a broken valve is replaced can be readily rectified by means of the balancing device.

Shown in these photographs is a super-het set which incorporates this kit. Together with a frame aerial and loud-speaker the set forms a luxurious means of obtaining loud-speaker results from almost any station desired.

B.T.H. SIX-VALVE SUPER-HET SET

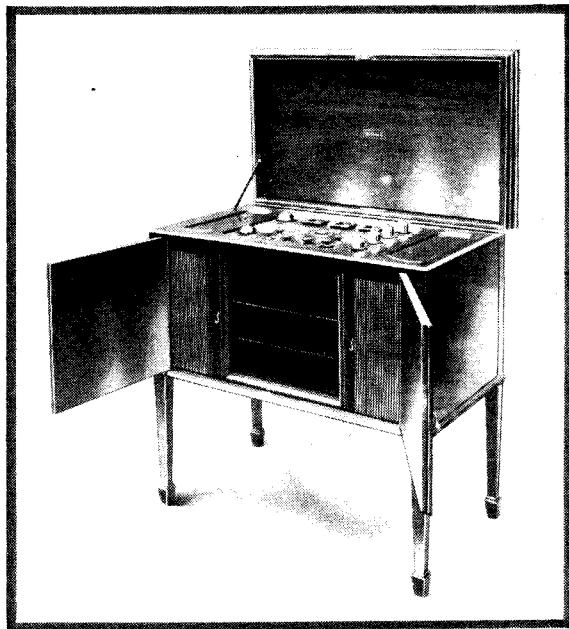
(British Thomson-Houston Co., Ltd., Crown House, Aldwych, W.C.2.)

This super-het receiver is entirely self-contained (with loud-speaker) in a mahogany cabinet. For reception on wavelengths between 300 and 1,800 metres no external aerial and earth connections are required, and excellent loud-speaker results can be obtained within a range of 60 miles from main B.B.C. stations and 120 miles from the high-power station.

An additional advantage of this set is that reception is possible from all directions without moving the cabinet, and the super-circuit employed is original and highly selective.

The filaments of the valves are heated from dry batteries, accumulators and their attendant troubles being thus eliminated. The difficulty of supplying the filaments of the valves from dry cells with the correct voltage is diminished by the incorporation of a voltmeter on the panel.

The attendant microphonic noises of dry-cell valves are also greatly reduced by mounting the valves on a special spring suspension device. By a simple arrangement of plugs, headphones may be used on four or six valves, or an exterior loud-speaker may be connected.



R.I. SUPER-HET KIT

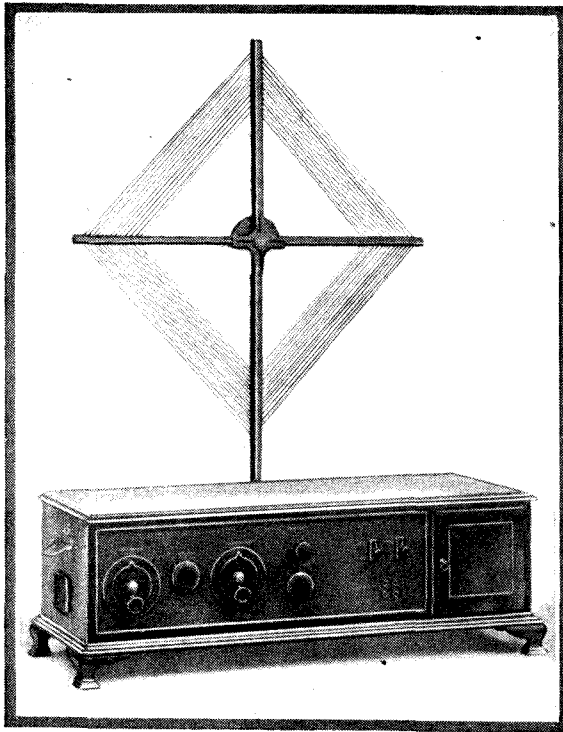
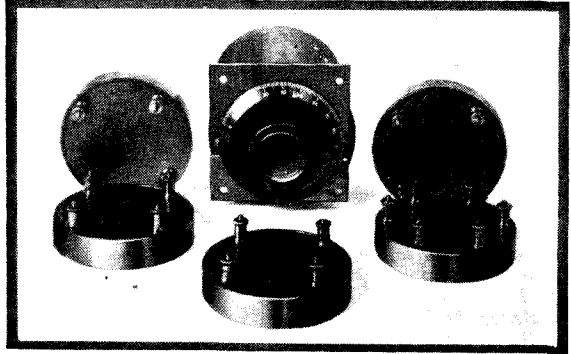
(Radio Instruments, 12, Hyde Street, New Oxford Street, W.C.1.)

Simplicity and compactness are the outstanding features of the R.I. super-het kit shown in the accompanying photograph.

There are five separate units in this kit, comprising an oscillator coupler, filter, and three intermediate-frequency transformers.

They are all the same size and have the same external appearance, being circular in shape, and having the various connections brought out to lacquered brass terminals mounted on the tops of the ebonite casings.

Each terminal is plainly marked, facilitating easy construction. The wavelength of the intermediate-frequency transformers is 5,000 metres.



NEDRON SUPER-HET SET

(Nedron Wireless Co., 2, Westgate Street, Mare Street, South Hackney, E.8.)

This imposing instrument, known as the Nedron Super VI, comprises a six-valve circuit.

The valves, together with the other components, are housed in a dark polished mahogany cabinet, which has a compartment for the dry batteries used.

Tuning is accomplished by means of two condensers, which are fitted with special vernier controls, allowing very fine adjustments to be made with ease.

No external aerial or earth is used, the small folding frame supplied with the instrument serving as an efficient collector of energy.

The selectivity of this instrument is such that within half a mile of 2 L O, the London broadcasting station can easily be tuned-out and other stations on very close wavelengths can be received.

Provision is made for the use of five or six valves as required. Thus the local station should be quite loud enough on the loud-speaker with five valves, while to bring up the strength of the more distant stations sufficiently it may be necessary to use six valves.

MAGNADYNE SUPER-HET KIT

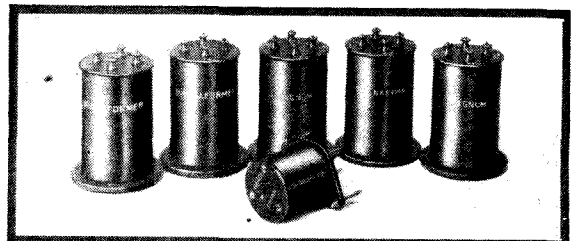
(Burne-Jones & Co., Ltd., 296, Borough High Street, S.E.1.)

This kit possesses several novel features and departs from conventional practice.

The components consist of an oscillator unit which is replaceable by other units for different wavelength ranges, and five Magnaformers (I.F. transformers), those marked A being tuned, and those marked B being aperiodic.

By using alternate stages of tuned and untuned coupling it is possible to combine great sensitivity with stability.

The complete kit, together with the usual accessories, can be made up into an excellent eight-valve super-het set. The design of the units enables a very simple scheme of wiring to be carried out.



THE A B C OF THE SUPER-HET *(Continued)*

we may understand that the super-sonic heterodyne is a circuit employing the heterodyne principle, in which the difference between the frequency of the incoming and locally-generated oscillations is such that a resultant frequency is produced which is above the limits of audibility.

Armstrong's Work

It was Armstrong who first realised that by heterodyning the received signals it would be possible to effect a change in wavelength which would allow him to pass the signals from a short-wave station through a stable long-wave amplifier, which would obviate all the trouble encountered when trying to use several stages of H.F. amplification on a short wavelength.

The best-known type of super-het circuit consists of a rectifier and local oscillator (as the valve which generates the heterodyning oscillations is called), a long-wave H.F. amplifier, the detector proper, and one or two note-magnifying valves.

The signals pass through all the valves except the local oscillator. This last consists merely of a valve with its grid and plate circuits coupled together so that it oscillates, and one of the coils is also coupled to the grid circuit of the rectifier.

Let us see what would happen to the signals from a station transmitting on a wavelength of 300 metres, supposing the H.F. amplifying portion of the super-het were designed to work on 5,000 metres. The incoming signals would have a frequency of 1,000,000 when they reached the grid circuit of the first valve, which is the rectifier.

In order that the resultant wavelength may be 5,000 metres it will be necessary to produce local oscillations with a frequency differing from 1,000,000 by 60,000, this frequency corresponding, of course, to a wavelength of 5,000 metres. The local oscillations may therefore have one of two frequencies—1,060,000 or 940,000, as both these numbers differ from 1,000,000 by 60,000.

We may therefore adjust the local oscillator valve to produce oscillations having a wavelength of 283 metres or 320 metres approximately, which are to be superimposed on the received oscillations which have

a wavelength of 300 metres. Note that a given difference in frequency above and below 1,000,000 does not correspond to an equal difference in wavelength above and below 300 metres. It is the *frequency* which is important in this case.

Whichever frequency is chosen for the local oscillations, they are introduced into the grid circuit of the rectifier where the received oscillations are flowing, and the composite current reaches a maximum (and falls to a minimum) 60,000 times every second. As the first valve of the receiver proper rectifies this composite current, the anode current of this valve drops and rises 60,000 times per second.

A coil in the plate circuit of the rectifier is coupled to another coil in the grid circuit of the first valve of the long-wave amplifier portion of the super-het. The variations in the plate current of the rectifier are therefore transferred to the grid of the first H.F. valve.

Whether the plate current of the first valve is considered as a varying D.C. current or as a composite current having a pure D.C. and an A.C. component, the current flowing in the grid circuit of the first H.F. amplifier is A.C.

This follows because only the *variations* of the rectifier plate current have any effect on the next grid circuit. This will be the case even though the variations themselves are unidirectional, because when the plate current of the rectifier is reduced the induced current will be in one direction and when the plate current returns to normal the induced current will be reversed.

Everything Straightforward

Everything is now straightforward. We have got an alternating, or rather oscillatory, current, with a frequency of 60,000 flowing in the first grid circuit of an H.F. amplifier designed to work at this frequency. The signals pass from stage to stage until they have been amplified sufficiently.

An ordinary detector valve follows the last of the H.F. amplifying valves, and this reduces the frequency of the long-wave oscillatory currents to that of the speech or music which is reaching the microphone at the transmitter. One or two L.F. ampli-

fying valves will then bring the signals up to loud-speaker strength in the usual way.

It is not intended to deal with the actual construction of super-sonic heterodyne receivers in this article, but a few remarks as regards their operation will not be inappropriate. Although there is no theoretical reason why they could not be used in conjunction with an outdoor aerial, a frame should always be used except in the case of one or two special circuits.

As the local oscillations are introduced into the grid circuit of the valve which is coupled to the aerial, great interference would generally be caused if an outside aerial were employed.

Eliminating the Outdoor Aerial

Most people will consider it worth while to use an extra valve or two if it eliminates the necessity for putting up an outdoor aerial, but there is a real advantage in using a frame with such a powerful receiver.

There are now so many broadcasting stations transmitting that it would be almost impossible to single out a distant transmission, when a receiver with a range of a thousand or more miles is used, were the ordinary tuning circuits relied upon for selectivity.

However, the directional properties of a frame aerial make it easy to cut out unwanted stations, as only those lying near to a line drawn through transmitter and receiver need be worried about. Against this advantage, of course, must be set the need for pointing the frame towards the desired station before tuning-in.

The number of tuning controls on a super-het varies widely. The frame must be tuned, as must also the circuit governing the frequency of the local oscillations. Many successful receivers have been designed in which these are the only controls. Often, however, one or both of the coils coupling the rectifier to the H.F. amplifier are tuned, and there can be little doubt that this *does* increase the selectivity.

In a few cases each of the H.F. amplifier circuits is separately tuned, but there is seldom any need to go to this length provided the intervalve couplings are properly matched.



THERE has been a decidedly retrograde step made in the character of the programmes this last month. Each week has seen works of a heavier and less popular nature, and the substitution of weekly mid-day religious services for the bright and cheerful restaurant bands.

Happier Mean?

But there should be a happier mean for the general public than nigger minstrelsy, religious or propaganda talks, and highbrow music such as works of Brahms, Beethoven, MacDowell, and inchoate Russian music.

The opera season has been far too brief. When one has such a fine

body of singers as the British National Opera Company has at command, it is hard to see why their season should have had only a seven weeks' support instead of the thirteen weeks as usual. They have been heard from Liverpool, Manchester, Birmingham, and for one brief week at Bradford.

Those operas which were broadcast were a little less hackneyed than the usual selection. Naturally, the one-act works are the best, as the listener has the advantage of hearing the complete opera.

For this reason, *Pagliacci*, and the English work, *Hugh the Drover*, found most favour, though many listeners enjoyed the excerpts from

Faust, *Carmen* and *Romeo and Juliet*. The latter gave fresh opportunity for listeners to hear a very fine singer in Mr. Herbert Langley; Miss Constance Willis, Miriam Licette, and Robert Radford also broadcast.

"Hugh the Drover"

In *Hugh the Drover* a very full cast included Phillip Bertram, who is not heard frequently enough, and William Anderson. The latter artist is heard to better advantage in his rôle of the king in *Aida*, where a fine presence adds to his vocal art.

In *Pagliacci* at Manchester were heard Frank Mullings and Miss Licette. Both these artists, however, have been heard to better advantage,



Mr. Richard Wassell.



Miss Florence Cleeton.



Mr. Geo. Stockwin.



Mr. Fred Beck.

Miss Licette especially as Eva in *The Meistersingers*, and Mr. Mullings in *Othello*.

Two earlier members of the B.N.O.C. have also been heard in the studio, namely, Miss Doris Lemon, one of the daintiest artists in *Pagliacci*, and Miss Edith Fum-edge. The latter has now relinquished the arduous work of operatic rôles for coaching other singers.

Two other operatic artists were heard in the performance of Sir Edward Elgar's great work, "The Apostles," relayed from Manchester, and played by the Hallé Orchestra, conducted by Sir Hamilton Harty. These were Miss Muriel Brunskill, the contralto, and Mr. Dennis Noble, both members of the B.N.O.C.

Their confrères on this occasion were Miss Dorothy Silk, the soprano who makes a speciality of Bach works, Mr. Herbert Heyner, baritone, and Mr. Walter Glynne. The latter has had a wide experience, and is a favourite before the microphone.

The piano has again been given ample display, the artists including several famous performers, amongst them being Wassili Sapelnikoff, the Russian pianist, and Mr. Claude Biggs, an artist who has attained a high reputation in London for his interpretations of Bach. Mr. Nigel Dallaway is the permanent pianist at Birmingham.

A second concert given by the

City of Birmingham Police Band was again conducted by Mr. Richard Wassell. This band numbers some sixty performers, and Mr. Wassell has been for a long time intimately

the month. He will be remembered as conducting one of the B.B.C. concerts last year at Covent Garden.

The violin has been well represented; Mr. Issie Schlaen, a brilliant young player, was heard twice in the second week of March—at Birmingham and at 2 L O. Miss Katie Goldsmith's name is also a familiar one to most listeners, and her playing "radios" well.

Two other solo instrumentalists were found in Miss May Mukle, the famous 'cellist, and Miss Rebecca Clarke, who made the viola a vital factor.

There is a very wide field covered by singers, and now that it has been decided to give fortnightly Welsh concerts, similar to those given on March 1 and 17, in commemoration of the patron saints St. David and St. Patrick's, when the special music of each country formed an outstanding feature, many more fine singers will be heard; there is no doubt that the best vocalists hail from Australia and Wales.

One of the best singers heard in the studio as well as at his recital with Mr. Dale Smith, at Wigmore Hall, London, last month, was Mr. Bertram Ayrton. Mr. John Goss has made a speciality of sea shanties and folk songs, and is equally noted as a recital giver. In the provinces have been heard Miss Florence Cleeton, a clever soprano, and Miss Winifred Morris.

(Continued on page 307)

Miss Miriam Licette.



connected with it. An organist at the age of sixteen, Mr. Wassell has had a hard struggle to achieve the high musical reputation he now enjoys.

A famous conductor, Felix Weingartner, was announced to give a studio concert at 2 L O earlier in



Mr. Robert Radford.



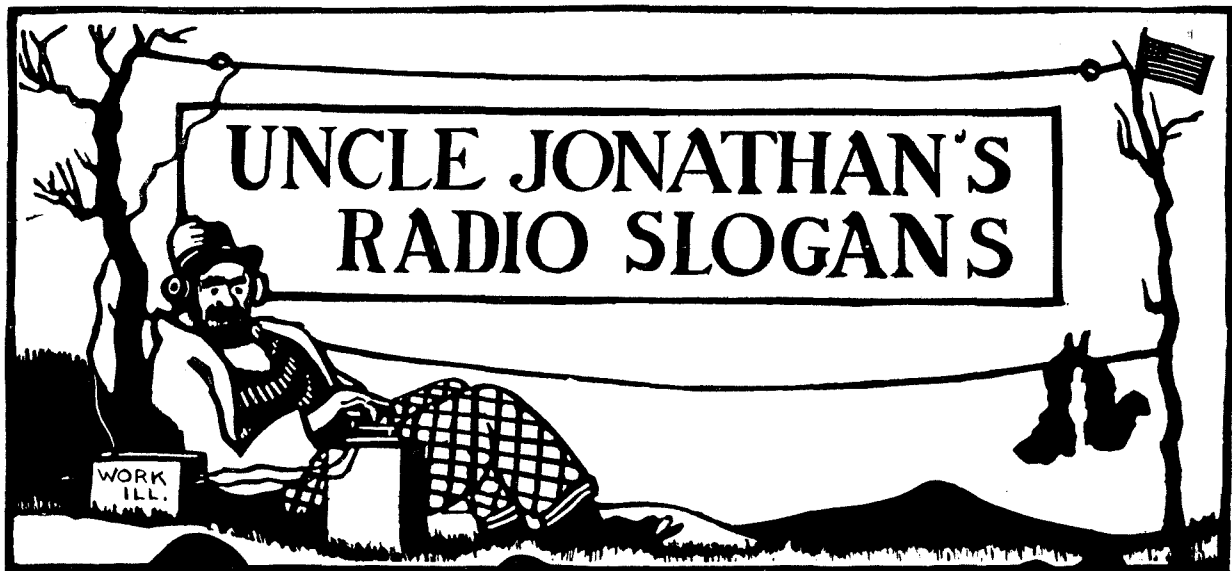
Mr. Issie Schlaen.



Mr. S. Robertson.



Miss Edith Fum-edge.



Lino Cut by William Kermodé

IN the United Kingdom our pet name for the local broadcasting station is, in most instances, simply its call letters, and we are so accustomed to hear the B.B.C. stations referred to as 2 L O, 5 S C and so on, that in the world of wireless amateurs it is rarely necessary to mention the city or town in which the transmitter is located.

Establishing Individuality

In the United States of America, however, the call signs allotted by the State to the numerous stations have not been deemed by the majority sufficiently distinctive to establish individuality, and it will be found that almost every transmitter has adopted some sentence or slogan which either incorporates a reference to its district or attempts to boost the particular qualifications of the broadcaster in question.

A few examples taken at random may be found of interest to readers of the WIRELESS MAGAZINE.

W O A I, of San Antonio (Texas), styles itself the "Winter Playground of America," and alternately, "Where the sunshine spends the Winter." W O A W, Omaha (Neb.), is modestly termed "The city surrounded by the U.S.A.," and W O C, Davenport (Iowa), with true reference to its geographical position has adopted, as a war cry, "Where the West begins," with, as sub-title, "In the State where the tall corn grows." W O A X, of New Jersey, is "The Voice from Trenton."

W P S C, a station run by the State College of Pennsylvania, takes unto itself the "Voice of the Nittany

Lion"; W O A P, Kalamazoo, is apparently "The oldest college in Michigan." W R A F, La Porte (Ind.), "The Voice of the Maple City"; W S B, Atlanta (Ga.), "The voice of the South." W T A Q, Osseo (Wis.), another voice, that of "The Wilderness," and W T A M, Cleveland, owned and run by an accumulator concern, usefully advertises itself as "The voice of the Storage Battery."

Many claims are made to priority in enterprise, and K D K A, known to all, is the "Pioneer broadcasting station of the world," but there are apparently other claimants to this title, for W R K, Hamilton (O.), proclaims itself—whether truly or not, is immaterial—"The oldest station in existence."

On the other hand, K F K X, Hastings (Nebraska), comes in a good second with "The Empress of the Air," and "The pioneer rebroadcasting station of the World"; but W Q A O (New York City) makes a distinction and adopts the slogan: "The first church owned and operated broadcasting station in the world." Whether K F A W, Santa Anna (Calif.), is used as a club or not, I do not know, but it advertises: "Where there is always a friend from your old home town."

Special claims are made by W Q A M, Miami (Fla.), as "The most Southern radiocasting station in U.S."; W R E C, Coldwater (Mis.), "The most powerful 10-watt station in the world"; W R W, Tarrytown (New York), "Everything in Radio"; W C B U, Arnold (Pa.), "The little 50-watt station in a 50-k.w. town."

In other cases the slogan is merely used for purposes of advertisement, as, for instance, W E A R, Cleveland, "Goodyear tires Wear," and W T A X, Streator (Ill.), run by a hardware company, "Tappa Kegga Nails."

Although certain districts in the States may boast of perpetual sunshine, such as W Q A M, Miami (Fla.), with "It's always June in Miami," and W Q A E, Springfield (Vt.), "Among the green hills of Vermont," or K F H A, Gunnison (Colo.), "Where the sun shines every day." K F C B, Phoenix (Ariz.), tells you that "When it's winter time in Michigan, it's summer time down here," and K F C F, of Walla Walla (Washington), parries this statement with "The valley they liked so well, they named it twice."

Indicating Locations

Locations are indicated by W T A R, Norfolk (Va.), with "Down in old Virginia"; W T A L, Toledo (Ohio), "The gateway to the Sea"; W R A W, Reading (Pa.), "The Schuylkill Valley Echo"; W R C (Washington), "The voice of the Capitol," and W S O E, Milwaukee (Wis.), "In the land of the sky-blue waters."

In Elgin (Ill.) we must presume the call letters have been, each in turn, adopted by members of the station staff, as W T A S apparently stands for Willie, Tommy, Annie and Sammy?

Some stations use their call signs as the initial letters of their slogan, for example, W O S (Jefferson City), "Watch our State," and W R B C,

Valparaiso (Ind.), "World Redeemed by Christ."

Other instances of alliterative slogans are K G W, Portland (O.), "Keep Growing Wise." K F V H, Manhattan (Kan.), "Kansas Fans Very Happy," and from K H J, Los Angeles (Cal.), a sentiment which must bring tears to the reader's eyes: "Kindness, Happiness, Joy."

Finally, K O P (significant letters, these), a station run by the Detroit Police Department, uses the very curt "Safety First"!

JAY COOTE.

A Nutshell Novel

THE OPERATION

SILENCE reigned complete. The man bending intently over the table raised his head, and a shadow of annoyance flitted swiftly across his face.

He bent down again after motioning to one of his waiting assistants for a new instrument.

As he operated, with swift deft movements of his hands, a low groan came from the inert form upon the table.

A muttered word to another assistant and one more soft light glowed in the multitude of bulbs flooding the table in a clear white light.

An impatient order coupled with a gesture of authority, a silent figure pulled down a switch, and a low hum filled the room.

The still spectator watched with interest as the swift assistants sped hither and thither, always bringing the right instrument at the precise moment; always doing the necessary act with an assurance born of knowledge.

The watcher waited as the various intricate movements were made; waiting for word that the operation was successful.

At last the supreme head of affairs, the man at the table, raised his head and heaved a sigh of relief.

* * *

"Everything is all right now," he said. "I don't think your wireless set will give any more trouble."

R. W. T.

A Seventeenth Century Prediction of Wireless

A REMARKABLE premonition of the possibility of wireless communication was published more than a century before even telegraphy with wires had been thought of.

The prediction was that of the renowned Sir Kenelm Digby, who, even if he was extravagant in some of his expectations of the development of science, showed in others a very true intuition.

In a work addressed to the Royal Society of his day (seventeenth century) Sir Kenelm, after predicting that some day the antarctic regions would be explored, and that there would be a time when flying to the remotest countries of the world would be nothing accounted of, added that "to confer, at the distance of the Indies, by sympathetic conveyances, may be as usual to future times as to us is literary correspondence."

Appropriate Words

This is quite as wonderful as anything in Mother Shipton's prophecies, and a great deal more authentic. Even modern science could hardly find two words more appropriate for the *modus operandi* of wireless telegraphy than "sympathetic conveyances."

C. E. B.

Meester McNab's Tenshilling Two-valver

(Continued from page 237)

wad A step roon an' hae a look at his set. He cud get naethin' oot o' it at a'.

A steppit roon an' aifter a carefu' exaamination discovered that his terminals had gotten corroded. Sae A tellt him that his valves had burrnt oot an' that he maun hae new yins. Angus, ye ken, has siller but nae intelligence. They droppit him when he was a wane an' he's been saft ever since.

A chaarged him for the new yins; but as he wad maist certainly burn them oot eventually A juist pit

baack the auld yins an' cleaned his terminals.

An' A pit the new yins in ma ain set. A was noo near complete. A' A required was an aerial. A didna see hoo A cud get the wire an' insulators. A thocht at furrst A micht try Mistress McPherson; but A was feart her guidman wad be a wee bittie suspecious o' a caat burrglar that got awa wi' his aerial as weel as his set. Sae A took them oot o' stock. A had tae charge masel up wi' them as A cudna use them an' sell them like the coils.

Which brocht the cost o' ma set up tae ten shillins as near as near.

For in the coorse o' a visit tae Andrew, wha's ma neebor, A expatiated caasually on the increased poo'er an' aadded selectivity obtained by ha'ein' twa aerials frae the same pole at an angle o' sixty degrees which, strangely as it happened, brocht the ither intae ma baack parlour windae. Wi' success.

Noo, as ye can weel unnerstaun, it wad never dae for a post maister tae be wi'oot a licence an' again Proavidence smiled. Auld Miss Milroy, wha likes the taalks on the gairden but doesna like disfigurin' her ain, had juist gotten a set wi' an indoor aerial. Verra precise is Miss Milroy an' she cam alang an' paid her siller for a licence. Wi' an indoor aerial tae. Persionally A thocht it totally unnessairy. But A thankit her kindly an' she gaed awa wi' an easy mind an' nae licence.

Noo A'm hoanest, A am, an' A wad never dream o' takin' siller for The Exchequer an' no' surrenderein' it duly. Sae A made oot a licence tae masel.

Ye see noo, it's no' the siller that's sae important but the wark ye pit intae it. Labour, ye ken, is aye the big item in the cost o' production.

Incedentially, Tammas McPherson was fair wild when he cam baack, an' found his set had been stolen. He's a fairmer is Tammas an' dacin' verra baadly he tellt me as he asked me tae mak him up a new set as near like the auld as possible.

Noo A dinna see hoo A can dae better than tak what's left o' his oreeginal yin, mak him pay for it oot his enormous losses an' mak the new components intae a set for masel. A aye like tae please ma customers



BACK in the early part of the year 1895, while Marconi was engaged on his first wireless experiments, which were then none too successful, it suddenly occurred to him to connect up one of the secondary terminals of his spark coil to an elevated wire and the other terminal to earth—and so the first earthed-aerial system came into being, with the result that the range of his transmitter was greatly increased.

What the "Earth" Did

Previous to this the apparatus had only been capable of transmitting over level ground, and it had been found quite impossible to establish communication if any hills intervened between the transmitter and receiver. With the earthed system, however, hills made very little difference, and it may be said without exaggeration that the discovery of earthing was responsible for turning wireless from a scientific dream into a practical and very lucrative commercial proposition.

Although there are several theories on the subject, the exact reason why a wireless set will function more efficiently when connected to a good earth, than if not earthed at all, is not known. This ignorance on our part is due principally to two factors—the first being insufficient investigation into the subject of earthing, and secondly our lack of knowledge regarding the manner in

which wireless waves are propagated round the earth.

Earthing was discovered nearly thirty years ago, yet our knowledge of the subject has hardly increased at all, and we still haphazardly join up our earth terminal to the nearest water-pipe in the same way as the amateur who first lifted the water-pipe-earth idea from the older branches of electricity, quite twenty years ago.

Now the water-pipe is undoubtedly a very good earth for electric lighting wires and telephones, but there are times when it is practically and theoretically unsound for wireless. Of course the water-pipe is almost invariably better than nothing, and may be passed off as good enough, but where real D.X. work is desired the water-pipe should be very thoroughly examined before letting it go as an efficient earth.

If, for instance, the aerial is erected in the back garden and the water-pipe runs to the front of the house, it is probable that a buried earth will be more efficient.

Testing an Earthing System

To test the efficiency of the water-pipe remove the earth wire from the set and carefully tune-in again. If signals are only slightly weaker when the earth is disconnected, the earthing arrangement is just better than nothing and no more. A good earth on a straightforward valve set should increase signals by a 100 per cent. In the case of a crystal

set, disconnecting the earth wire will usually lead to no signals at all, but because the signals come in when the earth is again connected does not mean that the earth is the last word in efficiency. Comparing notes with other crystal users in the same locality will give an idea of the average efficiency of the earthing thereabouts. Do not be put off by some theoretical hypothesis that your aerial is screened, or that you live in a dead spot. Blame the earth every time, for a good earth makes all the difference to signal strength.

This fact is proved very conclusively by the earth on a ship, as compared with the earth on a wireless land station. The ship's earth is of course the vessel itself, which, being of steel, makes excellent contact with the surrounding water—with the result that the ship's earth is far superior to the most elaborate land arrangement and gives the ship a receiving range at least double that of the land station.

This applies when the ship is in port and is receiving entirely over land, thus eliminating the additional strength obtainable when receiving over sea water. An 80-ft. aerial 20 ft. high, when erected on a ship in port and connected to the ship's earth, will give infinitely better results than the same aerial ashore, no matter how perfect the shore earth, thus demonstrating the important part played by the earth in wireless.

Inefficient Water-pipes

A perfectly reliable looking water-pipe may be quite inefficient owing to some joint or other being painted with insulating paint. Where possible the earth lead should be connected to the water-pipe a few inches above the point where it enters the ground. But where the nearest water-pipe is a considerable distance from the ground, as in the case of a flat, the earth lead should be led to this. It may happen, however, that the portion of the pipe to which you are earthing is insulated from the ground part of the pipe by some

insulating paint—and in this case it is preferable to use a long wire to the pipe where it enters the ground.

The ideal water-pipe earth is where the pipe runs below and parallel to the aerial. The advantage of this is apparent if we accept the idea that the aerial and earth (particularly that part which contains the water-pipe) are two plates of a condenser with the air as dielectric. In a condenser one likes to have the condenser plates, if not directly below each other, at least somewhere in the vicinity, which is not the case when the water-pipe runs to the front of the house and the aerial is in the back garden.

Three-wire Arrangement

An arrangement usually much superior to the water-pipe earth consists of three ordinary aerial wires buried in the ground and running parallel to the aerial, one wire being directly under the aerial and the other two about eight feet on either side. All wires if possible should be longer than the aerial. This earth has been found excellent for amateur transmitting.

Curiously enough, there seems to be some definite relation between wavelength and earth. An earth which brings in signals strongly on 600 metres may be even better for shorter waves and quite inefficient for high wavelengths. It is also a fact that the shorter the wavelength the more important the earth becomes, until on very short waves the aerial can be almost dispensed with and reception carried on by the earth alone.

Perhaps the most efficient type of earth for amateur use is obtained by driving a dozen (or as many as are available) metal pipes in the ground so as to form a circle having a diameter of about twenty feet or so. Three feet is a good length for each pipe, but it is worth while to dig a hole in the ground and see how far down it is necessary to go to obtain permanently moist soil—and cut the pipes accordingly.

Each pipe is then connected to a pipe driven into the centre of the circle, which is in turn connected to the earth terminal on the set by the thickest wire obtainable. A cage aerial may be used for connecting this centre pipe to the set.

This type of earth is very convenient, inasmuch as when it is desired to carry out any special experiments, such as listening for American or other amateurs, the resistance of the earth can be lowered for the occasion by pouring water down each of the pipes. This arrangement is greatly facilitated if the pipes are embedded in coke or cinders so that the water is quickly absorbed.

There is one school of thought which believes that the counterpoise earth is quite as good, if not better, than the ordinary earth, at least for reception. This is perhaps quite true for short-distance work, but investigation has fully demonstrated that no counterpoise can equal a good earth—although it is sometimes well worth while to install a counterpoise as well as the ordinary earth.

There are some places in Great Britain where to obtain a good earth is practically impossible owing to

atmosphere (space waves) and over the surface of the ground (the gliding wave), it follows that the frame aerial—as evidenced by the case of the uni-directional frame aerial—can only receive the space wave. Whereas the earthed aerial picks up the gliding wave in addition to the space wave, so that theoretically as well as practically the benefit of earthing is apparent.

Scope for Investigation

However, as mentioned above, very little is known, as yet, about the function of the earth in wireless, and there is ample scope for investigation by the amateur. Some scientists are firmly convinced that we have not yet found out the proper method of earthing or using the earth, and it is possible that there is some substance in which we might bury our earth plate which would make perfect contact with the ground itself by setting up some sort of chemical action and thus enabling us to collect far more wireless energy from the earth than at present. If we can discover such a substance it will enable us to do away with the elevated aerial once and for all, and receive and perhaps transmit by means of an earth connection alone. G. H. D.

Keep Your Condensers Small

MANY people make a great mistake by using in their receiving sets variable condensers of large maximum capacity. One sees quite commonly A.T.C.'s with a maximum capacity of 001 microfarad and closed-circuit or anode-tuning condensers of 0005 microfarad. These are far too large. Their only merit is that they enable one set of coils to cover a wide range of wavelengths.

Against this must be set, first of all, the fact that a tiny movement of the knob makes a big difference in the capacity, so that very fine tuning is difficult if not actually impossible. A large capacity in parallel with a coil is very inefficient.

The A.T.C. should not have a capacity greater than 0005 microfarad, whilst from 0002 to 0003 microfarad is amply large enough for condensers in closed circuit. R.

RADIO ETHER

*At times I dream a dream of dreams,
Of knobs and valves it always seems.
Of stations far across the way,
That I may hope to get some day.*

*Panels vast and gadgets strange,
By which I will increase my range.
Condensers, wires, little screws,
By which I hope to hear the news.*

*When all the earth my waves have crossed,
I will proceed to regions lost,
And "radio" the twinkling stars,
Not forgetting dear old Mars.*

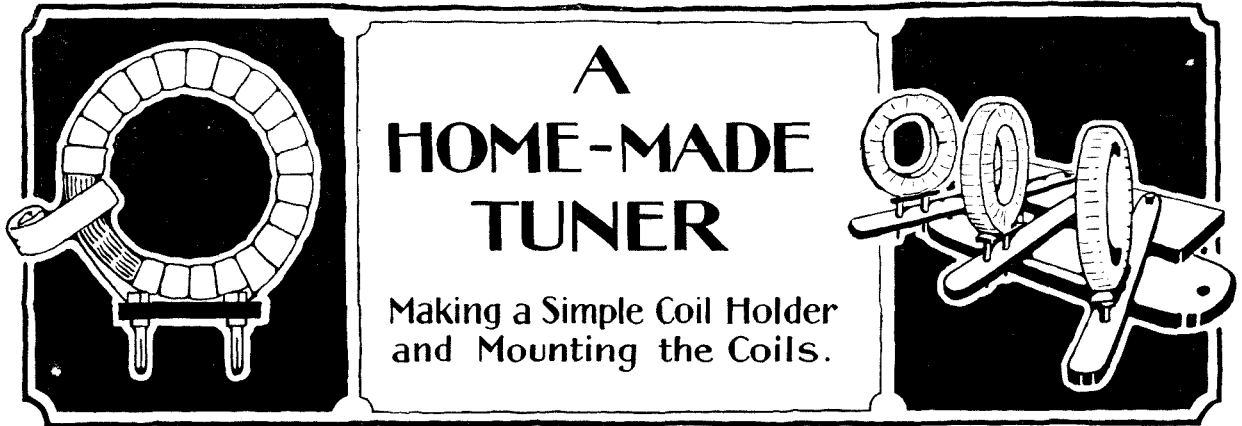
*The moon shall have its B.B.C.,
And I shall have the licence fee
Of all the people living there,
Which ought to be a goodly share.*

*But oh! to wake and find that this
Is only just a dream of bliss;
That I am but a radio fan
Who can't do what he thinks he can.*

J. V. H.

the dry, hard, rocky nature of the ground, and in these localities the counterpoise has given better results.

The fact that it is possible to receive well on a frame aerial shows, of course, that the earth connection is not absolutely essential. If, however, we are to believe the theory that wireless waves arrive at a receiver in two ways, i.e. via the



THE coil holder described below is both inexpensive and simple to construct. In many cases it can be made from pieces of scrap ebonite and components the amateur may have at his disposal.

A sketch of the complete coil holder is shown in the heading. If desired sockets could be fixed on the arms to take standard coils, but this would be a little more expensive.

Materials

The materials required are:

(a) A piece of ebonite, 5 in. by 2 in. by $\frac{1}{4}$ in. for the top, two holes being drilled $1\frac{1}{4}$ in. from the centre and the two in the centre being 1 in. apart (see Fig. 1).

(b) Three pieces of ebonite, 8 in. by 1 in. by $\frac{1}{4}$ in. for the arms. Two holes are drilled at each end of these (for measurements see Fig. 2).

Into these holes are fixed the valve sockets, terminal nuts being used to secure the flex wires leading from the coil holder to the set.

At the other end of the two movable arms drill holes $\frac{3}{8}$ in. from the ends, for the terminals. For the method of securing to the top see Fig. 3.

The fixed arm should have two holes drilled in it to correspond

with the holes in the top (centre). The arm and top are then secured to the wood base by means of two $\frac{3}{8}$ -in. brass screws.

(c) The wood base is composed of a block of wood ($1\frac{1}{2}$ in. cube) and a hardwood bottom $6\frac{1}{2}$ in. by $2\frac{1}{2}$ in. by $\frac{3}{8}$ in., two holes being drilled at each end of this for securing the coil holder to the cabinet.

After giving the wood base a coat of black paint, or enamel, the coil holder is finished.

When large coils are used it will be found that the movable arms are inclined to sag. To remedy this two strips of ebonite should be fixed at the front, on the top of the coil holder.

A coil holder of this kind is best suited for the upright cabinet, as it can then be placed flat on top.

Mounting Coils

A suitable method of mounting home-made honeycomb coils for this holder is described below.

Before mounting the coil a small part of it should be wound with Empire tape (this being the part that is placed just over the plug).

Then fix the coil to the plug by means of a fibre band, and fasten to the valve pins.

Make sure that the band is a good

tight fit or the finished coil will be weak. The remainder of the coil is then wound with the Empire tape.

The plugs are made from small pieces of ebonite, with two holes drilled 1 in. apart and valve-pins inserted. A sketch of a coil is shown above in the heading. L. C.

MARY had a wireless set,

Its dials were black as ink;
And everywhere that Mary went
(Well, what do you think?)

An enthusiastic etherworm writes to say that he asked a neighbourly telephone operator to listen-in on his set. The first thing she heard was an amateur calling "Hello, hello!" in a very indistinct voice. Whereupon the N.T.O. responded: "Sorry, line's engaged," and then, remembering, blushed.

A B.B.C. official says that deathlike silence prevails in the studio during programmes. That must be why some of them sound like a burial service.

THE Dutch Government has brought wireless under the scope of the luxury taxes. Holland must have a Chancellor who comes from Aberdeen

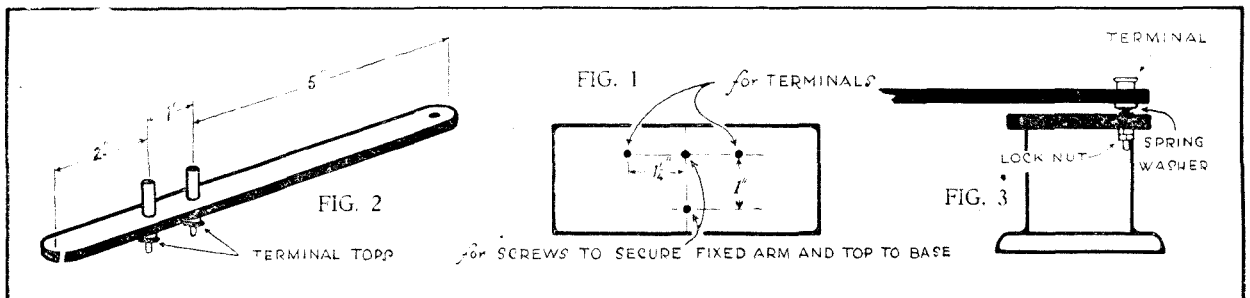


Fig. 1.—Ebonite Top. Fig. 2.—Ebonite Arms. Fig. 3.—Method of Assembly.

Broadcasting in Australia



Perth, Western Australia]

[Photo by courtesy of the High Commissioner for Australia.

By Our Australian
Correspondent

ACROSS a continent over 2,500 miles from coast to coast, and capable of holding the British Isles thirty-five times over, broadcasting during the past three years has performed a wonderful service in annihilating distance.

The advent of wireless broadcasting can be said to be definitely playing its part in developing the hinterland of the Commonwealth. The capital cities each have their broadcasting stations, and three times a day are programmes broadcast.

Standard Time

Those who live along the coast-board washed by the Pacific Ocean have a standard time. The result is that folks there have a choice of at least six programmes each night, while if they wish to sit up a little later they may tune-in the more western states, which, owing to their geographical position, come on the air between one and two hours later than the eastern states.

Broadcasting stations are of two grades. Class A is the high-power station which draws from the authorities a portion—from 70 per cent. upwards—of the available revenue. Stations of Class B are usually of much less power, and are paid about 30 per cent. of the revenue remaining after departmental expenses have been liquidated.

Each state is divided into zones, the distance from the broadcasting station being the guiding factor, and broadcast listeners are called upon to pay a fee according to the zone in which they live, the fee being cheaper as the distance increases.

Within a radius of 250 miles broadcast listeners were called upon

to pay 35s. for the first year of broadcasting, and for the second year it has been reduced to 27s. 6d.

At first the authorities would only allow of sets "sealed" to a given wavelength, but this scheme was found impracticable and was discarded. Now a resident in Perth may tune-in Melbourne and hear the latest musical comedy broadcast, while the Melbourne and Sydney man, when he tires of his local station, may metaphorically reach over 2,500 miles of land and listen to the high-power station there.

With two exceptions, the broadcasting stations are on wavelengths of between 300 and 500 metres, the exceptions being the Sydney station 2 F C (Farmers, Ltd.) on 1,100 metres, and 6 W F (Westralian Farmers, Ltd.) on 1,250 metres. Both stations use 5 kilowatts.

The stations with their wavelengths are as follow: New South Wales—2 F C, 1,100; 2 B L, 353 metres. Victoria—3 L O, 371 metres; 3 U Z, 360 metres; 3 A R, 484 metres. Queensland—4 Q G (operated by Government), 385 metres. South Australia—5 C L, 395 metres; 5 D N, 313 metres. Western Australia—6 W F, 1,250 metres; Tasmania—7 Z L, 390 metres.

Up till the end of June last licences had been taken out by 61,518 listeners-in throughout the Commonwealth, the fees collected amounting to £113,650. It is almost needless to say that Australia, like other countries, is finding difficulty in getting all sets licensed. Particularly is this so in the cities, where aerials are cleverly concealed and electric-light plug-in aerials largely used.

Some time ago in one state a comparison between the plug-in

aerials imported from overseas and the licences issued, together with stocks on hand, showed that hundred upon hundred of these devices had been sold and were providing unlicensed sets with daily concerts.

Country residents, following a good harvest, usually decide upon the purchase of two necessities. One is a motor-car and the other is a wireless set, and it is questionable on the average which receives preference.

Each station broadcasts market reports at least twice a day, and thus the farmer is kept in daily touch with the financial pulse of the world, while daily weather reports advise him of meteorological conditions.

Three or Four Valves

Most of the country sets employ three or four valves, with usually one stage of high-frequency amplification. Now it is a regular occurrence on a farm to see the family group together after the evening meal while the father or the eldest son tunes-in the desired station and connects up the loud-speaker.

Although some theatrical companies decline to have their performances broadcast, many look upon it as a good advertisement, and so the rural worker of Australia is now brought nightly into the city, joins in spirit with his city brothers attending the houses of amusement, and feels that the monotony and solitude of life in the country is broken down for good and all.

Broadcasting in Australia, it is predicted, will do much during the next decade to attract population from the overcrowded cities to the broad and fertile lands which only await the hand of man to make them prolific of wealth.



Wireless Femininities

HAVE you thought of "wireless" as a notion for a costume at your next fancy dress ball. It could be carried out in various different ways according to the fancy of the wearer.

Myself, I favour the idea of a costume on Structograph lines—you know, the coloured plates WIRELESS MAGAZINE is always giving away to delighted males. Casement cloth of the correct blue would make the dress on which the mystic lines and squiggles could be painted in oil or water colours.

The headdress could either be simulated headphones in silver ribbon and wire (the real things would be too heavy for an evening's dancing) or a pleated-paper frill in Boulogne fishwife style to suggest certain pleated-paper loud-speakers.

Maybe just the natural pride one feels in one's own inventions—but I would back this dress to get the originality prize at any discriminating costume ball!

* * * * *

Broadcasting of Novels

It seems to be chiefly women who are in favour of the proposal for the serial broadcasting of well-known novels by their being read aloud for a specified period a day over the wireless. But then it is well known at the libraries that women are the chief novel readers.

It is said that the plan would be such a boon to busy women who have no time to read but could listen while doing the household needlework.

The difficulties seem to be two. The first is that no woman who claims to love books should be content to admit herself "too busy to read." We always have time, however brief, for what really interests

us; therefore one must suspect that such a woman either doesn't really care for reading (unless combined lazily with something else) or that she could have time to peruse books herself if she arranged her work more systematically.

In either case, if the no-time-to-read slogan is merely an excuse, she will only listen-in to the reading aloud of novels until the idea loses its novelty, because no real enthusiasm is behind it.

Skipped Instalments

The second difficulty is this. Such a busy woman will certainly be too occupied on some days to spare time for the daily instalment. If this happens with a newspaper serial, she can lay the copy by and read two the next day; but via the microphone the next chapter may be unintelligible because of the one that was missed. Rather like reading a book with a good sprinkling of pages torn out!

* * * * *

Personally, I could wish we were given more of the organ—more in variety as well as quantity—in the B.B.C. broadcasting programmes. When we do get this very fine instrument it seems to be invariably relayed (from 2 L O at any rate) from a church, with music of appropriate quality.

It is curious how little we realise in England that the organ, with its varied effects that make it almost equal to an entire orchestra, is admirably adapted to playing other things than ecclesiastical music.

In the United States I found the organ properly appreciated. Every city of any size has its municipal organ and organist—the famous organist-composer, Lemare, held the post for some time in San Francisco—free concerts being given regularly.

The large stores, such as Wanamaker's in Philadelphia, have magnificent organs, on which recitals are given every day when the shop opens, at lunch time, and when it closes. Everybody, customer or not, can come in (and does) to these ten-minute treats.

Organ, Organ, Everywhere!

Perhaps more important than all, even in small towns every cinema has an organ, on which items are given between or during the pictures. And what jolly items! An organ playing jazz (which it mostly does play in U.S. picture houses) is most exhilarating. It gurgles, it laughs, it jokes!

* * * * *

Though, of course, it's as natural to human nature to grumble as to breathe (apparently), yet I think that fact doesn't quite account for the perpetual flood of grouching poured forth by listeners. The cinema and football matches—the only forms of entertainment which seem anything like as universal as broadcasting—don't come in for half so much criticism. Why?

Isn't the reason a psychological one, lying in the fact that listeners are receivers only, making no contribution whatever to the evening's enjoyment—for the licence fee is so low as to be negligible?

It is the things we participate in and help to make that we appreciate most.

No Exertion, No Appreciation!

It may be said that the audience at a picture palace or theatre are also lookers-on; but not to the same extent. They participate by making certain sacrifices for their pleasure. They must buy tickets at considerable cost; they must often queue up for seats and turn out, whatever the weather, to reach their place of amusement. And though they receive the performance, at a stage play or football match they certainly give in the form of applause.

But listening-in is so easy. Nothing to pay (practically), no exertion. Merely draw up a chair to the fire, start the loud-speaker—and grumble!

I wonder if the occasional stunts which do call for the co-operation of listeners—such as the telepathic attempt some time ago, the mystery play for which solutions were invited by post, and so on—will do anything to decrease grouching?

A. M.

When the Variety Artist Broadcasts

DURING the last few months—possibly in reply to certain criticism—the B.B.C. has broadcast fairly regularly short “turns” by music-hall artists, but the results have in many ways been unsatisfactory.

Famous artists who never fail to give excellent performances on the stage have seemed unable to grip their wireless audience and have sounded monotonous and lifeless to the listener. This is evidently due to the inherent difference between the methods suitable for the stage and those suitable for the broadcasting studio.

Material and Talent

At first sight the success of the music-hall artist depends on whether he sings his song, performs his trick or dances his dance well or badly, that is, on his material and talent. It seems, therefore, that the better the material and the better the talent the better the performance.

But many variety artists only moderately talented, using very inferior material, can be called to mind who are nevertheless extremely popular and successful, and who attain the results that give them the right to “top the bill.”

This is especially noticeable in the case of certain comediennes who as singers are very incompetent, and who use the musically worst types of song, but who are received rapturously by the section of the audience that cannot judge the quality of the material and talent, and who are admitted by the section that can to have some curious means of arresting their attention and even of giving distinction to the poor material.

The force which enables the artist to do this cannot be connected with any of the externals of his performance, but is found to be part of himself, personal to him.

In order that this personality may be communicated—we may say—to the audience two things are essential, firstly, that the audience shall watch the performer and, secondly, that the audience shall be present in the same hall or room as the performer.

The second condition is not so obvious as the first, but a considera-

tion of the cinema actor's only partial success in communicating his personality will make it clearer. The communication is followed by the dulling of the audience's faculty of judging the intrinsic value of the performance—the value of the material and talent being offered.

An untalented artist, then, using bad material may, by means of a strong personality, be very successful, and conversely a talented artist with good material but no person-

ally suitable for performance in a music-hall.

What happens when the artist appears before the microphone? He gives the same “turn” with the same actions and gestures and vocal intonations; in fact, he has become now so used to it that he cannot do otherwise. He asserts his personality in the usual way, but forgets that his audience, not physically present, and not able to see him, cannot feel its effect.

He is left with only his material and his talent, which are but two of the three elements essential to the successful performance of his “turn.” His performance seems inanimate, listless and uninteresting, and reveals unsuspected harshness and crudeness in his methods.

This argument needs modification when some of the listeners have seen the “turn” at a music-hall and remember it. These people can recreate the sight of the artist in their imaginations, and thus get more enjoyment from the broadcast “turn” than those who have not. This does not increase from an artistic point of view the value of these broadcasts, but merely suggests that there will always be a demand for the broadcasting of, at any rate, familiar “turns.”

Some artists do not place so much reliance in their personality to make their performances effective, and these, notably mimics and character comedians, have been successfully broadcast, though much of the fullness and completeness of their performances has been lost.

Attention to Material

It is possible that a means of communicating personality through the voice will be found, but until then it seems that artists engaged to give variety “turns” on the wireless must pay attention to the material they use, getting the best possible, and to finding the most effective way of using it.

It is very doubtful if the established music-hall favourite will ever be able to change his methods, and it will possibly be better to rely on a new school of artists who have made a special study of the peculiar requirements of broadcasting.

GEORGE CRAYTON.

THE LOST STATION

*SEATED one day at my “super,”
I was weary of “B.B.C.’s,”
And my dials wandered idly
Over the scale degrees.
I know not to what they were
pointing,
Or what was their wavelength then,
But I heard one far-off station
From a land beyond my ken.*

*It flooded the room with music,
Like the shock of a sudden shower,
And it fell on my fevered headphones
With a current of infinite power.
I have sought, but I seek it vainly,
That lost far-off call sign,
Which came from the heart of my
“speaker,”
And floated into mine.*

*It may be two neutrodyne stages
Will speak at that range again.
It may be that only with power valves
Shall I tap that etheric vein.*

JOHN LINNSEN.

ality may be unable to get recognition.

We may say, then, that the variety artist's stock-in-trade consists of personality, talent and material, the first of which is very much more important than the other two.

Now a music-hall “turn” is usually given twice every evening for many months before it is discarded and something new substituted, and it is found to be practically identical at every performance after perhaps the first few, which may be more or less experimental to find out what parts are not appreciated by the audience.

The result is that a turn is evolved every word and every gesture of which is sure of approval by the audience, in short, a “turn” per-

What the B.B.C. Is Doing

A feature supplied by the officials at 2, Savoy Hill, W.C.2

WHY, if an artist is sent on a tour of the broadcasting stations, is he paid a separate cheque in respect of each broadcast? This seems a rather cumbersome method of discharging one's liabilities and, indeed, has led to the reproach levelled at us from certain quarters that we show "the meticulous accuracy of a Government department" in drawing cheques; but the system which has been introduced by us is designed for specific purposes, and firms who have large numbers of cheques to handle constantly might very well investigate the system.

The sending of a separate cheque to an artist for each of his broadcasts is, in fact, the one small price (in duplicate) which we have to pay for the institution of a new system of cheque writing that is believed to be in advance of anything of the kind in this country. It is based on the principle of the cheque-typing machine, and several labour-saving details have been incorporated in the layout of the cheque, which is specially designed for us.

Fees as they are Earned

So far as artists who tour the stations are concerned, it is preferable to send, say, six cheques for six dates, instead of one inclusive cheque, for by this method artists receive each fee shortly after it is earned, which is far more satisfactory to themselves than to wait until the whole amount is due at the end of a tour.

Among the economies accruing from the cheque-typing system are the abolition of the need for writing a counterfoil and for writing up a

cash book. The automatic system of allocation of programme expenditure as between the stations is also secured and seventeen clerk-days per month are saved. It is understood that one of the railway corporations is

have been reached, and the need for the extension and improvement of the service will become more insistent.

* * * * *

Going back to the early days of broadcasting, we recall the decision of the then Postmaster-General (Mr. Kellaway) that facilities for more than one broadcasting concern in Great Britain, owing to geographical difficulties and for other very obvious reasons, were practically non-existent.

The case for one broadcasting organisation needs no emphasis here, but it is a case that has frequently been made out, and at the end of three years and a half we count ourselves fortunate in finding that critics,

even those who have borne witness before the Broadcasting Committee, have advanced nothing that would give a more satisfactory service than has been given.

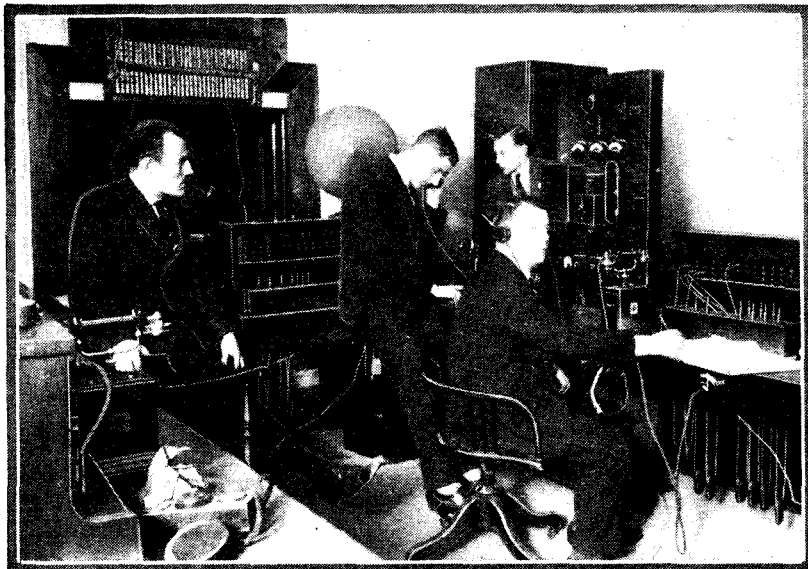
Destructive Criticism

There has been a good deal of destructive criticism. In some quarters it is alleged that the broadcasting machinery is used too freely for the purpose of educating the public and too little for the public's entertainment. Other complaints have been made that too much of the lighter kind of music, including dance music, has been provided.

This sort of criticism can be met, but it is harder to cope with prejudiced views, and it has been a stern and uphill fight to deal with those who see no good at all in broadcasting. By the end of the year broadcasting in this country will be

(Continued on page 286)

B.B.C.'S NEW STUDIO AT BIRMINGHAM



Engineers at work in the modulation room.

investigating our system with a view to its introduction.

* * * * *

We are now within measurable distance of attaining the two-million mark in terms of licences. It will be recalled that up to the end of 1923 progress was slow in securing the first half-million, but in the twelve months from January, 1924, the number of licence holders rose to 1,192,000. It was expected that a million additional listeners would take out licences during 1925, but the increase in the first half-year was little more than at the rate of 20,000 a month.

It was not until the Wireless Telegraphy (Explanation) Act was passed in August, 1925, that any appreciable advance took place, and during the later months of last year the increase was between 40,000 and 50,000 a month. Before midsummer next, the two-million mark should

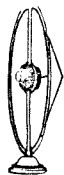


Build your own Cone Loud Speaker

The LISSENOLA—the latest and most instantaneous success of all the famous Lissen parts—is the essential sound-reproducing base which you convert yourself into a loud speaker of whatever type you please. Used in accordance with the directions given with each instrument, the LISSENOLA yields results equal both in quality and in volume to loud speakers selling at several pounds. The secret of this remarkable efficiency lies in the effective manner in which the electro-magnetic sound reproducing system is concentrated.

Compare the price last. Make this test *before* buying: Go to your dealer—ask him to put on the best loud speaker he has in stock—then use the same horn on the LISSENOLA, and see if you can notice any difference.

A very successful type of speaker that can be made quite easily and cheaply from the directions given in almost any wireless journal is the Cone Diaphragm.



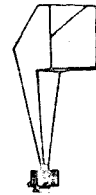
Make the Diaphragm yourself—then fit the Lissen Reed to the LISSENOLA and clamp it to the centre of the cone by means of the two nuts provided.

The purity of tone—and the volume—obtained will surprise and delight you. The illustration shows

one method of mounting a cone diaphragm speaker.

But for biggest volume of all, build a big horn from the directions and full-size exact patterns given with every LISSENOLA.

The illustration shows this effective horn, which can be covered with fancy paper and painted to resemble a factory article, and made by you for a few pence.



In addition, the LISSENOLA will fit the tone-arm of any gramophone, instantly converting it into a loud speaker.

Your dealer will gladly demonstrate and supply—or the LISSENOLA can be obtained post free by return from the makers—price 13/6, or with Lissen Reed 14/6.

THE LISSENOLA COSTS 13/6

—but compare the price last

Lissen Limited, 500-520, Friars Lane, Richmond, Surrey

*Phone: Richmond 2255 (4 lines).

*Grams: "Lissenium, 'Phone, London."

L.14.

What the B.B.C. Is Doing (Continued)

put on a more stable basis; but before that time arrives we shall continue our fight against prejudice. In order to secure protection in definite measure against the exorbitant demands of other interests which are, apparently, not farsighted enough to realise that as broadcasting can neither be stayed nor vanquished, it were wiser to seek satisfaction by a policy of mutual co-operation.

The Press and Broadcasting

The relations between broadcasting and the Press in the future are likely to be identified to a greater extent than is at present generally realised. From the early days, the newspapers were quick to see that broadcasting had come to stay, and that its utility as a channel of news information would be no less actual than its value as an educational factor and entertainment medium.

The newspaper proprietors, unlike other interests, did not evince an attitude of suspicion towards radio telephony; it was clear that at best broadcasting could only be supplemental to the Press and could not replace the printed word.

Some newspaper owners may have been seized with a desire to make use of broadcasting as an adjunct to their newspaper interests and to establish stations for the purpose of circulating news during periods between the publication of one edition of a paper and the next; and a mild hostility may possibly have been created towards the broadcasting organisation in consequence of the State's decision to place the responsibility for broadcasting in the hands of one concern.

But we have been able to show, in the course of our existence, that we have no desire or thought of entering the province of the Press except in so far as co-operation is entirely acceptable to both sides concerned.

In America, an entirely friendly attitude exists towards broadcasting. While we can broadcast functions and speeches at any hour of the day, so long as the transmissions are limited to what the microphones can pick up direct, it is the usual thing in the United States of America for a narrator to be present at certain

kinds of public event to describe what is happening.

It has not been found that transmissions of this character detract from the value of the news sheet published later, and there is no reason to suppose that the papers in the British Isles would suffer if a similar method were adopted here.

Nor is it likely that newspaper circulations would be affected if eye-witness accounts could be given in the studio during the evening of events which have occurred by day.

Nothing, let us repeat, can replace the printed word. Sixteen million copies of Sunday newspapers and roughly double that number of other journals are sold every week. To all these broadcasting can be but supplemental.

* * * * *

In some other directions the influence of broadcasting has, perhaps, been more marked. Almost from the beginning of its history the concert profession has been overcrowded and a large proportion of the lower ranks has been forced to live below a certain standard. Only the few could make a name, and there was no hope of improved conditions for a large number of professional singers until the advent of broadcasting.

The B.B.C. fought vigorously the craze for names. We take the unknown singer and make of him or her a star. Anyone who is of any use at all has a chance. One of the most important parts of broadcasting work is to give auditions to thousands of people who are in quest of fame before the microphone, and many names could be mentioned of singers who have earned renown in this way.

Through the Ear Alone

The great asset provided by the broadcast performance is that the true artist has the opportunity of appealing to the public through the ear alone. He does not make a physical appeal, nor does he need money or influence to obtain renown. Our policy is, moreover, to pay fees commensurate with those received by artists when appearing on the concert platform. This gives the broadcast artist some considerable advantages.

For example, the concert artist has to dress very well to appear on the public platform. He has sometimes to travel a great distance for his performance. He may then only sing to 200 or 300 people and for this he gets a fee of three or four guineas. When he broadcasts, he gets his three or four guineas, has no extra expense in the matter of dress, and, in some cases, makes a name for himself by one broadcast.

While we have had many famous people on the wireless, we are not dazzled by a name. We are out to get the best that can be obtained, to provide the facilities of broadcasting and to leave the public to be the final judge. It may be mentioned that many artists have received far more for a broadcast performance than for a performance in the theatre or concert hall, and if a really good artist appears, who can give what is wanted, he is paid well.

DO NOT DROP YOUR PHONES

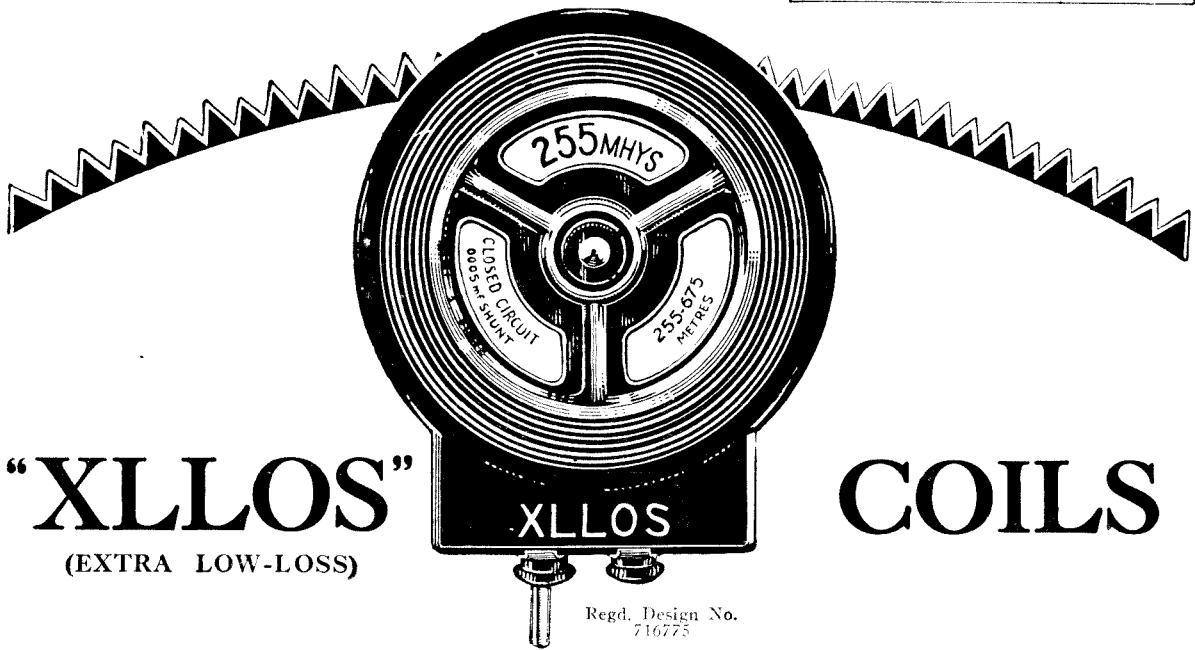
WE are all rather careless with our telephones, forgetting what delicate pieces of apparatus they are. Not infrequently, for instance, one sees a wireless man let his telephones fall with a bump on to the table instead of putting them gently down.

Now there is nothing worse for the health of magnets than any kind of violent jar. If you wish to test for yourself the results of rough handling upon a magnet, purchase a simple bar and subject it to hammering. Test its strength before and after this process and you will be surprised.

When telephones are needlessly knocked about they lose a great deal of their sensitiveness because the magnets become weakened. The greatest care should therefore be taken always to lay the telephones down gently and to protect them from any kind of rough usage.

Another point that is not always realised is that when telephones are knocked about their thin diaphragms are apt to become bent, and when this happens the quality of their reproduction may be seriously impaired.

J. H. R.



“XLLOS” COILS

(EXTRA LOW-LOSS)

Regd. Design No. 716775

Another IGRANIC achievement

EXTRA LOW LOSS—that is the keynote of the new Igranitic “XLLOS” Coils. The special formation of the windings, the method of mounting, and the absence of solid supporting material are all factors in making the coils highly efficient.

Igranitic “XLLOS” Coils possess high inductance and low self-capacity for a given size of coil, together with minimum H.F. resistance, and give sharper tuning with increased signal strength and greater range of reception.

They are extremely adaptable as regards mounting and may be used in standard coil-holders, or the pin and socket may be spaced widely—with a consequent reduction in self-capacity and absorption losses—for use with special low capacity coil-holders.

Two contact pins are provided with each “XLLOS” Coil, and these being removable permit of two pin, two socket, or pin and socket mounting. The pins may also be inserted as shown in sketch 4 for pivotal mounting in conjunction with special clips which may be affixed to a vertical panel, thus providing a simple, efficient and inexpensive combination.

ADAPTABLE TO ALL METHODS OF MOUNTING



1. Contact pin and socket spaced for standard type coil-holders.



2. Wide spacing of pin and socket for special low capacity coil-holders.



3. Double pin mounting: the pins may be spaced as desired.



4. Low capacity pivot mounting to provide angular adjustment of coupling.

Sizes and Wavelength Ranges :

No. of Coil.	Inductance micro-henries.	Self-capacity micro-mfds.	Natural wave-length metres.	Wavelengths in metres when shunted by .0005 mfds. variable condenser.		Price.
				Aerial Circuit using standard P.M.G. aerial.	Closed Circuit.	
L 25	29	12	36	220—280	85—225	5/-
L 30	49	14	50	250—360	110—280	5/-
L 40	90	16	72	350—490	155—400	5/2
L 50	150	14	85	435—650	200—520	5/2
L 75	255	13	109	550—835	255—675	5/6
L100	425	12	134	700—1000	325—865	7/-

One side of coil bears coil number and approximate wavelength range in aerial circuit with .0005 mfd. condenser. On other side is stated inductance in micro-henries and wavelength range in closed circuit with .0005 mfd. condenser.

Write for the Igranitic leaflet Z 996, which describes the Igranitic “XLLOS” Coil in detail, or see the coil at your dealers.

Exclusive Manufacturing Licensees



of Patent Radio Essentials.

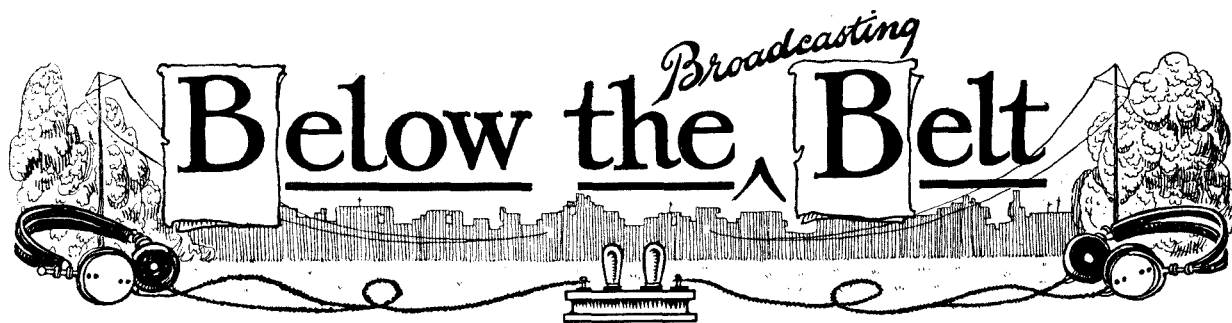
149, Queen Victoria St., LONDON. Works: BEDFORD

The Igranitic Instructional Carton

for constructing a six-valve Supersonic Heterodyne Receiver according to the Igranitic design contains a comprehensive fully illustrated descriptive handbook, full-sized general arrangement drawings, wiring diagrams and drilling template. Obtain a copy from your dealer.

Price 2/6

In writing to advertisers, please say you saw the advertisement in the WIRELESS MAGAZINE.



An article by that well-known amateur transmitter and experimenter — 5 Y M

SINCE I wrote the notes which appeared last month I have devoted three Sunday afternoons and evenings exclusively to the reception of amateur telephony.

Too Busy for Telephony

Usually I am far too busy transmitting and receiving morse on Sundays to worry much about the telephony merchants; but I thought I would find out just how much telephony was going on, for the benefit of the readers of these columns who may still be hesitating as to whether it is worth while to build a short-wave set.

I may say, at once, that though I knew there was quite a bit of telephony to be heard, I was astonished at the amount of it, and the excellence of much of it—and the terrible badness of some of it.

As to the amount, you can judge for yourselves when I tell you that on one of the Sundays I heard forty different stations in the short space of four hours. Of these, four were French, two were German, one was Belgian, two were Dutch and one was Swedish. The rest were British. The times of listening, and the wavelengths, were, noon to 1 p.m. and 2 to 3 p.m., 45 metres or thereabouts; 6 to 8 p.m., 90 to 150 metres.

Most of the long-distance stations were heard on the 45-metre band and, on this band, I found the strength was much greater than on the lower frequencies. This I was prepared for, because morse seems to come in far stronger at my station on 45 metres than it does on 90 metres, even when the 90-metre reception is done in the darkness.

Gramophone Records and Speech

The greater number of the stations I have heard during these three week-ends have been just talking wireless; but there have been quite a large number who were putting

out "canned music." Some of this was really excellent and most enjoyable to listen to. But I wonder why it is possible for an amateur to broadcast Gilbert and Sullivan, for instance, when the B.B.C. cannot do it?

One of the German stations, whom I heard on two Sundays between 2 and 3 p.m. on just over

ARE YOU BINDING YOUR "WIRELESS MAGS"?

Suitable cases, in cloth and of an attractive colour and design, are now available (in response to hundreds of inquiries) for Vols. 1 (Nos. 1-6) and 2 (Nos. 7-12) of the WIRELESS MAGAZINE.

Each binding case, with index and title page, costs 2s. 6d., or 2s. 9d. post free. Cases can be obtained from your local newsagent or direct from the offices of the WIRELESS MAGAZINE, La Belle Sauvage, Ludgate Hill, E.C.4.

40 metres, seemed to have an orchestra. At any rate, if it was gramophone transmission it is the best to which I have ever listened. Though I heard, in all, some four or five items from this station I did not get his call sign. He may have been a professional.

The other German station seemed to be giving a lecture on short-wave inductances; but my German is not nearly good enough for that sort of thing, and so I soon left him.

One of the Frenchmen seemed to have a passion for Chopin, for I heard one nocturne right through and then, when I went back to him some twenty minutes later, he was playing another.

The Britons seem to prefer jazz to anything else, for I heard more of that than anything, except speech. But I did hear "Softly awakes my heart" being played by two stations, one on 43 metres (of course, he thought he was on 44) and the other on just

over 45, within ten minutes of one another.

A short-wave set certainly makes a wet afternoon interesting! You never know what you are going to bring into your net. But I couldn't help thinking of those exciting old days before the advent of broadcasting when, on a Sunday, one would patiently fiddle and fiddle until Two En Emma or 5 C P, or one or other of the stalwarts, would start up.

I suppose one always thinks that the old days were better and more exciting than the present; but I certainly miss the "intimacy" of those old days. One seldom now-a-days hears anything like the "back chat" and friendly slanging matches that went on then.

* * * * *

The reception of amateur telephony is not a difficult job, even on 45 metres; but one must have a set with practically perfect reaction control. That is really the whole secret. Any set in which oscillation starts with a "plop" is quite useless for the reception of faint and distant telephony.

Smooth Reaction Control

In my own set the start of oscillation is so gradual that it is impossible to tell whether it has started or not without touching the grid end of the tuning inductance. That is, of course, when no signals are coming in. For the reception of clear telephony it is, of course, essential that there is no oscillation, and for the reception of faint and distant telephony the set must be just on the verge of oscillation.

This delicate control precludes, at once, any method of reaction control which depends on changing the coupling between two coils by any means equivalent to the two-coil holder familiar to all users of broadcast receiving sets.

(Continued on page 290)

An ounce and a half of metal and glass !

INANIMATE—fashioned by men and women from the most commonplace of all materials, metal and glass. A valve. Yet has anything ever been endowed with such magical gifts ?

At its behest, millions respond to the ennobling influence of a Melba or a Chaliapin—to the majestic grandeur of a great oratorio—to the welcome cheerfulness of a jaunty regimental air—to the witticisms of a Harry Lauder and the drolleries of a John Henry.

When it commands, a nation's feet move obediently to the captivating swing of a Tango melody. A great statesman appears before the microphone, and from Land's End to John o'Groats the country is stirred by the fervour of his eloquence.

To this admixture of glass and metal is given the power of obliter-

ating international dissensions, for Radio knows no boundaries. By its aid the overhanging fear of wars and strifes will be removed. Nations will lose their insularity and their prejudices so that ultimately the whole world must benefit.

Cossor is proud of the share it is contributing to this great work. The knowledge that the Wuncell * Valve is the chosen means by which Broadcasting enters so many homes—not only in this country, but on the Continent and in the Colonies—is a constant spur to greater efforts on the part of those responsible for its production.

With its exceptionally long life—due to a robustness of construction found in no other valve—its miserly consumption of current, and its greater sensitiveness, the Wuncell is everywhere winning golden laurels among discriminating wireless enthusiasts.

*Wuncell Valves cost 14/- each. They work from any 2-volt Accumulator and consume only one-sixth of the energy required by any ordinary bright emitter. For Loud Speaker use we recommend the Cossor W3—the valve with the green top. Price 18/6.

Cossor Valves

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

Gilbert Ad. 4563

In writing to advertisers, please say you saw the advertisement in the WIRELESS MAGAZINE.

BELOW THE BROADCASTING BELT (Continued)

It is practically impossible to adjust matters satisfactorily in the brief time usually available in following amateur work, though, in skilled hands, and with a good set, ordinary magnetic reaction may be used for tuning-in such transmissions as those of the short-wave broadcast stations. Methods such as capacity reaction or the combination of a variable condenser in series with a fixed coil, as is used in the Reinartz circuit, are much to be preferred.

Best Method of Control

The very best method, however, is the recently discovered one of using resistance control. This method gives a really wonderful control, but it needs a considerable amount of skill to use properly and is, emphatically, not a method for the beginner.

* * * * *

The short-wave enthusiast already in possession of a set which does not give the best results on telephony has two or three methods of attack open to him. In many cases the substitution of another type of detector valve will give much improved results. It is always worth while trying a V24 or other tubular low-capacity valve when the ordinary

four-pin type is difficult to control. This often makes a very considerable difference in ease of handling.

The use of variable condensers of smaller maximum and minimum capacity is another great help, though, very often, this is followed by a considerable increase in hand-capacity effects. Modern condensers with slow-motion dials are a great help; but these are useless when oscillation control has not already been brought down to a fine point.

A filament resistance that works noiselessly and gives fine control of filament heat is often imperative, and the use of an H.T. battery tapped at every $1\frac{1}{2}$ volts allows of the necessary close adjustment of plate voltage.

* * * * *

Those receiving amateurs who are interested in short-wave work—they are a rapidly-growing band—have often a difficulty in getting hold of the address of a foreign station they hear working. The addresses of owners of British stations are published in directories, such as the excellent one recently put out by the Editor of *Amateur Wireless*, but any directory of the foreign stations must, of necessity, be incomplete.

As most short-wave enthusiasts collect Q S L cards, and as these are only to be obtained by sending a report to the amateur station you have heard, things are rather difficult where a foreign station is concerned.

However, for the benefit of readers of the WIRELESS MAGAZINE I have ascertained that stations in Holland can be reached through M. Tappenbeck, Hoogduin, Noorwyk-aan-Zee, Holland. M. Tappenbeck was good enough to give me his address by radio one evening, and I am glad to pass it on. All cards sent should be enclosed in an envelope as transmitters in Holland are not yet officially licensed.

Belgian Transmitters

The same rule applies to Belgian transmitters, who can be reached through the Secretary, Réseau Belge, 11, Rue du Congrès, Brussels. Many French amateurs can be addressed through M. Georges Veuchlin, *Les Journal des 8's*, Rue du Cauche, Rugles, Eure, France.

In sending abroad it is well to remember that all this work of forwarding cards is quite voluntary, and that fully-stamped envelopes containing the cards are appreciated. 5 Y M

Wireless Wakes Up Our Village

"WAGNER, ah! he's the chap for music."

"Give oi Mozart. There be something pretty about them tunes of his that fair beats oi."

Conversation like the above is quite common nowadays in the taproom of our village inn. Since an enterprising landlord installed a wireless set in the public bar, the village has turned quite highbrow. Such threadbare topics as the weather, the crops, and the chances of the local eleven in the county cup-ties, are no longer the only themes on which to bring our conversational prowess into play.

Whilst in one corner the old shepherd and the jobbing gardener discuss the respective merits of Bach and Chopin, in another the village carrier listens with awe to the cobbler holding forth on literature. The cobbler has views of his

own on literature and is not afraid to criticise the views broadcast by others.

Hitherto regarded as an outsider, having lived but two years in the village, the squire's chauffeur is now listened to with respect. By virtue of his calling, his opinions on the future possibilities of wireless, of television and even of telepathy, carry considerable weight in our nightly scientific debates.

Drama, once merely a word signifying "The Mystery of the Red Barn" or "The Corsican Brothers," is discussed with interest. After listening to a wireless talk on the trend of the present-day drama, the landlord quite startled some obviously London visitors by his advanced views on the subject.

Before the advent of wireless, the latest popular songs filtered through to the village some two years afterwards. Nowadays, thanks to jazz

bands, the youth of the village scorn to whistle a tune which is not the rage of the moment. As for dancing, no longer does a violin and an asthmatical piano satisfy us. Did we not dance to the same strains as the revellers of the Albert Hall at our last bi-monthly dance?

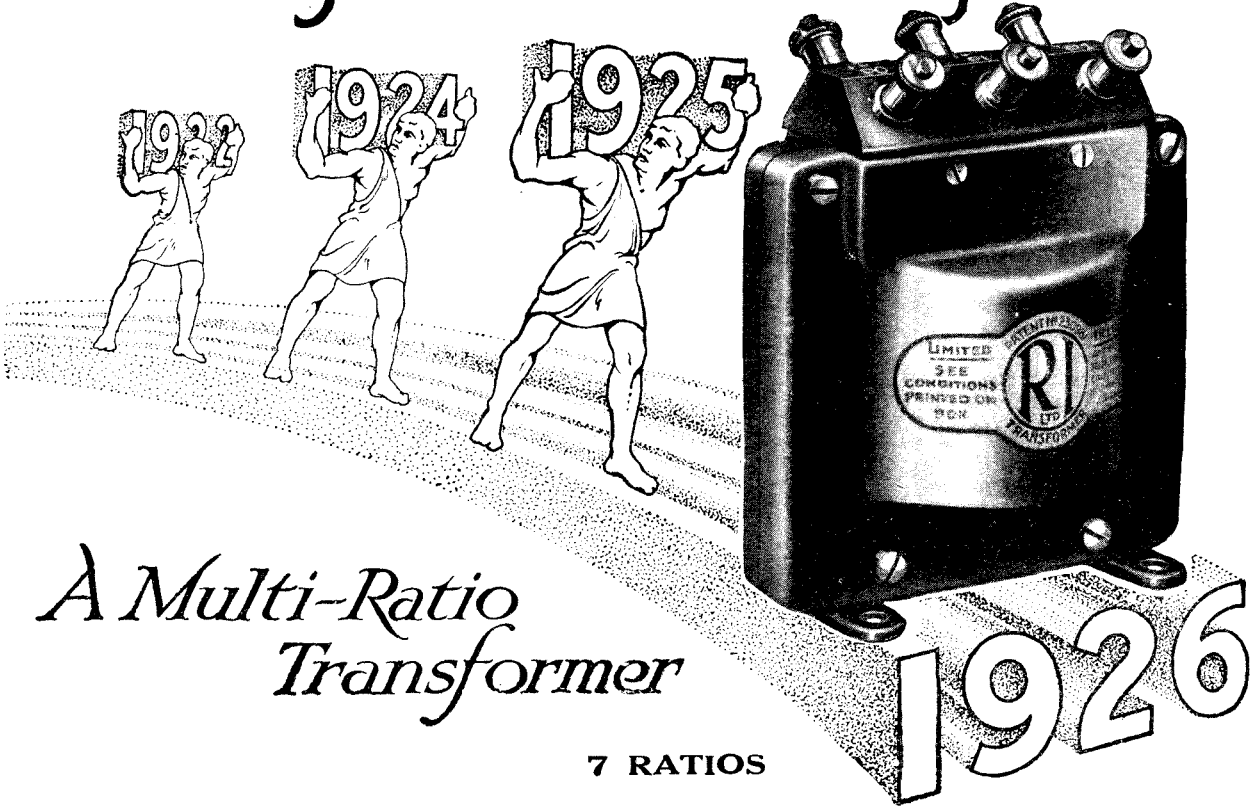
Not only has wireless wakened us up, but it keeps us awake. In pre-wireless days lights in the cottages were rare after nine o'clock at night, for the simple reason that diversions after such an hour were few and far between. Things are different now.

When the clock strikes nine we glance at it contemptuously, realise that by Big Ben it is a quarter of an hour slow, and settle down to hear what is doing in Paris, London and Berlin.

Yes, wireless has undoubtedly worked wonders in our village.

V. R. R.

For every valve — for every circuit



A Multi-Ratio Transformer

7 RATIOS

R.I. are now able to market, after many years intensive experimental work, a multi-ratio transformer which, while still retaining all the features of their original model, has a larger number of turns on the primary and secondary, and by tapping certain points in the primary and secondary and bringing them to a terminal block **seven** different ratios can be selected as desired. The impedance value covers approximately the wide range of from **6,000** to **60,000** ohms. Thus, whatever the circuit or valve in use, a winding of an impedance suitable for that particular circuit or valve can be chosen at will.

In addition to the **seven** ratios available it is possible to obtain the main one by three alternative methods, allowing a different value of impedance to be selected for the same ratio.

The self capacity of the transformer is greatly reduced by the patented system of winding the coil, giving a greater degree of amplification on the higher frequencies, up to the useful point of audibility.

This new model is totally encased with a **steel shroud**. The coil is treated in such a way as to render it suitable for any climate in the world, and the celluloid enamel is practically rust-proof. The terminal block is a bakelite moulding.

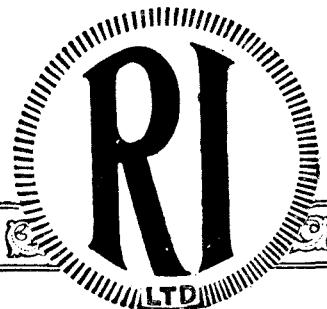
A year's guarantee is given with each instrument, and, in addition, a book of circuits showing the best method of using a transformer as a standard intervalve coupling.

Write now for special booklet W.M.

PRICE **27/6**

RATIO TABLE

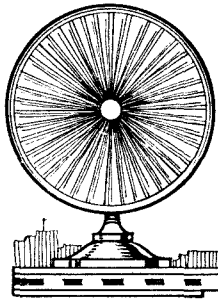
Ratio.	Approx. Primary Impedance in ohms.
1 — 1	60,000
1½ — 1	28,000
2 — 1	60,000
	7,000
3 — 1	28,000
	60,000
4½ — 1	28,000
6 — 1	7,000
9 — 1	7,000



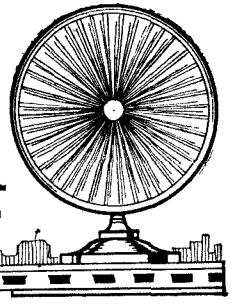
THE MARK OF BETTER RADIO

Advt. R.I. Ltd., 12, Hyde St., New Oxford St., London, W.C.1.

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Questions Simply Answered



A Selection of solutions to readers' difficulties

Tuner Settings for Best Possible Three-valver

Q.—Please give the correct positions for the switch arms of the R.I. tuner and anode unit of the best possible three-valver for the London and Daventry stations.—T. C. M. (Romford).

A.—To receive the London station set the retroactive-tuner switch to either B or C and the anode-unit switch to 2 or 3. For Daventry use F or G and 6 or 7 for the aerial and anode switches respectively.—H.

How the Valve Works

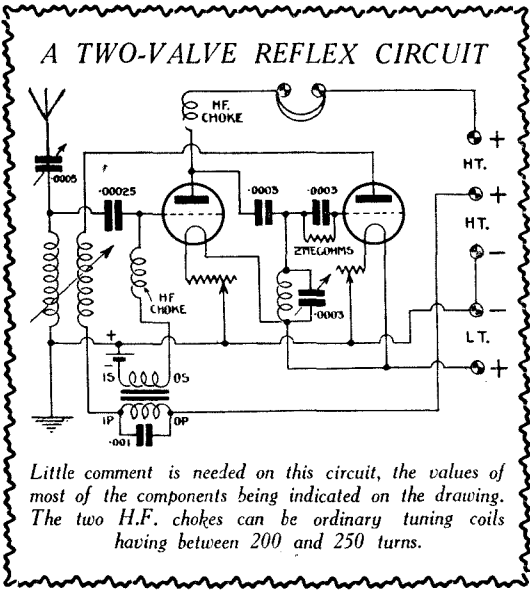
Q.—In the January issue of the WIRELESS MAGAZINE there is an article entitled "How the Valve Works." I should like to draw attention to the following points regarding the paragraph explaining how the B.T.H. valve model works: In the diagram the lever N, according to fundamental mechanical laws, will, when the cord M is stressed downwards, exert a pull on N, enabling it to make contact with the pulley B and thereby braking the latter. This is contrary to the explanation given.

Similarly, when the pulley D is pulled out normally by tension in A, caused by the momentum of the pulley E becoming greater than the circumferential speed of B, the cord M will be thrown in the opposite direction (upwards), causing a release of the pressure, if any, bearing on B through N, or the lever N will drop. The explanation in the article, in my opinion, is again faulty.

I cannot understand how the release and contact of N are affected, and I should be glad if you can enlighten me on the point.—P. K. R. (Glasgow).

A.—The clue to your difficulty will be found in the top paragraph of column 3 on page 576 of the article in question, which explains that "the pulley B... is controlled by a centrifugal speed-regulating brake of the kind used in gramophones."

It is there clearly stated that a downward movement of the "control lever" N (which is not the actual brake—although the artist has by chance made it resemble an ordinary shoe brake),



Little comment is needed on this circuit, the values of most of the components being indicated on the drawing. The two H.F. chokes can be ordinary tuning coils having between 200 and 250 turns.

accelerates the motor speed when moved downwards, and brakes it when moved upwards.

This, you will find, is consistent with the explanation given in the paragraph entitled, "How it Works."

Once the misconception that the lever

LET US HELP WHEN YOU ARE IN DIFFICULTY—OUR SERVICE IS FREE OF CHARGE!

Even the most experienced amateur at one time or another comes up against some little difficulty—some little problem of which the solution momentarily escapes him. Have you any such problem?

No matter how trifling or how important the point is we are always ready to help you out of your trouble—we keep a special staff just for that purpose.

Moreover, we make no charge whatever—we are glad to do it! Just write your query on one side of a sheet of paper (this small point greatly facilitates the handling of your question) and enclose it, together with the coupon on page iii of the cover and a stamped envelope addressed to yourself for return, in an envelope addressed to The Editor, WIRELESS MAGAZINE, La Belle Sauvage, E.C.4.

N acts directly as a shoe brake is removed, you will have no further difficulty in following the text of the article.—B. A. R.

Wireless as Doctor

Q.—In the January issue of the WIRELESS MAGAZINE there is an article on the use of radio-frequency currents in the treatment of disease, with a diagram of a suitable circuit for producing high-frequency medical currents. As I am personally interested, I shall be much obliged if you can give me the necessary particulars of the values and windings of the various components to enable me to build this apparatus.

I intend to use the apparatus, when constructed, for the dispersion of swelling and pain caused by rheumatoid arthritis.—W. N. E. (Iver).

A.—Practically all the types of apparatus used in modern diathermy work are protected by letters patent. You will find a typical set described in British Specification No. 2051111, and another in Specification No. 210743, both of which specifications can be purchased from H.M. Patent Office, Chancery Lane, W.C., at the cost of 1s. each.

The circuits in question cannot, however, be used except by permission of the patentee without running the risk of infringement proceedings.

You may perhaps find matter of interest to you in one or other of the following books:

(a) "High-frequency Practice for Practitioners and Students," by Dr. Burton B. Grover (Chapman & Hall, of Henrietta St., London).

(b) "Practical Electrotherapeutics and Diathermy," by Dr. G. B. Massey (J. & A. Churchill), of 7, Gt. Marlborough St., London).—B. A. R.

Moscow station regularly broadcasts a political lecture. We have never heard it, but we are prepared to take it as Red.

Now that one experimenter has made a cage aerial out of two bicycle wheels, we shall perhaps hear of a motorist using his Ford for a loud-squeaker.



**THERE'S ALWAYS
A BRIGHTER SIDE TO THINGS**

— when you fit

**ROYAL
"EDISWAN"
FULLOLITE
LAMPS**

and see things in a Clearer light!

See your home at its cheeriest with the help of Royal "Ediswan" Fullolite Lamps! Continue the sunny radiance of Spring each night! The opal glass bulbs (*genuine opal glass, not merely "white-sprayed"*), give perfect diffusion and maximum light value without risk of eye-strain through glare. The glazed surface does not attract dust, and the lamp, as a whole, has quite a decorative effect.

IN ALL VOLTAGES AT ALL ELECTRICIANS.

Fully Licensed under Patents Nos. 23765/12, 10918/13 and others.

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What the Reader Thinks

Our readers contribute items of interest to every listener

Old Folks' Corner?

To the Editor of the "Wireless Magazine."

SIR,—I have no complaint to make against the B.B.C. programmes. But I should like to make a suggestion. In our present programmes we seem to cater for everybody except the old folks.

There is the Children's Hour, plenty of talk and music for the "kiddies," which I am sure they enjoy. Then again later we get plenty of dance music for the young and middle-aged. But we seem to have left the old people out altogether.

Surely we can spare them an hour and let them have it all to themselves? It could be called the Old Folks' Corner—chats about old times, old tunes, old songs, and talks about health.

I feel sure thousands of the old folks would enjoy and appreciate this; it would do much to help them along the eventide of their lives.—G. SMITH (Abertillery).

Improving the "Earth"

SIR,—Recently I fixed up a new earth. Previously I used a water-pipe direct from the main; I found this very satisfactory.

However, with my new earth I get results nearly twice as loud as before, and it is very suitable for D.X. work.

For this earth I used two empty one-gallon Vacuum Oil tins. Having scraped the paint off the two tins, I punched several holes in them. I wired them together, soldering the wire to the tins at intervals. I then filled the two tins with ashes and buried them about three feet down. When I buried them I surrounded them with ashes.

In the evening (with this earth) I received Oslo on a one-valver at good phone strength.—D. B. PARKER (Thames Ditton).

American Short-wave Transmissions

SIR,—The following details taken from a letter from WGY of Schenectady, New York, in reply to my report of their 41.9-metre transmission, may be of some interest to your readers.

There are five different transmissions from WGY, each having a separate wavelength and call sign.

There is 2XAD on 20.9 metres; 2XAF changed recently from 41.9 metres to 35 metres, and transmits on

Mondays, Tuesdays, Thursdays and Fridays. 2XK on 109 metres transmits on the same days as 2XAF. 2XAG on 379.5 metres and 2XAH on 1,560 metres transmit on Thursdays only.

It is also added that 2XAF will shortly be changed to 30 metres.

2XAF is quite an easy station to

Lissen and Seagull tuning coils. Exide and Ever-ready batteries. 1 Cossor and 1 Mullard valve.

With these components I constructed a straight-circuit one-valver, and results are better for "reaching out" than any set I have had.

The moral is that British components are best, so to every wireless fan I say, "Do likewise!"

I have no connection with any of above firms.—A. J. SABOURIN (Brixton).

Reconditioning Dull-emitters

SIR,—Whilst carrying out an experiment I accidentally shorted 90 volts H.T. (from a wet battery) across the filament of a DE8 L.F.; luckily the filament did not burn-out, but the valve as a dull-emitter was useless. I therefore decided to experiment with the valve in order to see if I could restore the emission at normal L.T. voltage.

First I tried 9 volts across the filament for two minutes (no H.T.). I then tried the valve as a detector with normal L.T. and H.T., and found it to be working at about half its normal efficiency. Next I decided to put 11 volts across the filament (no H.T.) for a further half-minute.

This restored the valve to normal, and it has been functioning perfectly for several weeks now.

Last week I shorted another DE8 L.F. filament with 90 volts H.T. (readers beware of neutrodyne-condenser vanes touching in certain circuits!) but luckily the filament survived. The treatment this time was 10 volts across the filament for three minutes (no H.T.); the valve after this treatment was found to be quite normal and still continues to give normal results.

It seems to me that valves of other voltages could have their emission restored by the application of a suitable voltage for a period to be found by experiment.—J. R. RUTHERFORD (Uxbridge).

B.B.C. Continental Relays

SIR,—I wish to make a suggestion which I think most readers will back up about the Continental relays.

I think that the B.B.C. should give more of these relays—say at least once a week. All your readers have not got four-valvers, and like to hear some of the foreign stations.

I would suggest the relays be from about 10.30 p.m. to 11.30 p.m.—D. McCALL (Fife).

WE SHOULD LIKE TO HEAR FROM YOU!

Have you any interesting comments or suggestions to make on any phase of wireless that will interest other readers of the WIRELESS MAGAZINE?

If you have, then write them briefly on a piece of notepaper (write on one side only, please) and address them to The Editor.

To the writers of the letters published each month we award valves. This month's letter-writers will each receive Cossor bright-emitter valves; next month's writers will be sent an Ediswan bright-emitter valve each.

tune-in on any efficient short-wave set, and should present no difficulties to makers of the Round-the-World Short-wave Three-valver, published in the February WIRELESS MAGAZINE.

It has been heard by the writer as early as 7.30 p.m. quite recently, although its volume is much less now than it was in December last.—E. J. LEWIS (Streatham).

"Buy British—and Buy the Best"

SIR,—I have been a wireless fan for over three years; valve sets have I constructed by the dozen, from one to three valves, both straight and otherwise, and I have found faults in every one I have handed.

Recently I disposed of every gadget I had, and with the proceeds I purchased the following:

- Gecophone slow-motion condenser.
- Lotus coil holder.
- Dubilier fixed condensers and leaks.
- Burndent valve holder.

A Need Supplied!

2-VOLT VALVES

Giving a 6-Volt Result

H.F.

Osram D.E.2

L.F.

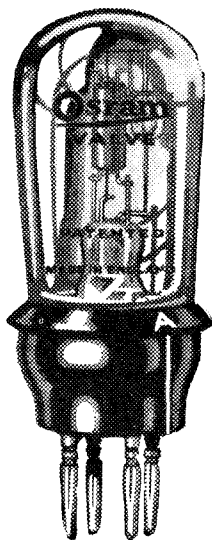
Only 12 amp. Filament Current Consumption at 1.8-Volts

The introduction of D.E.2 H.F. and L.F. OSRAM VALVES marks another big step in radio progress, and one which will be welcomed by every wireless user. The most severe practical tests have proved conclusively that it is possible to get the same volume and tone from these new 2-volt OSRAM VALVES as from many valves requiring 4 or 6-volt accumulators. *The use of D.E.2 OSRAM VALVES means that accumulator expenses are halved or reduced by one-third for the same, if not better, results.*

D.E.2 H.F. and L.F. OSRAM VALVES are developments from the well-known and popular D.E.R. class, but possessing better characteristics, a third of the current consumption and the same immunity from possible destruction by over-running. You cannot over-run the D.E.2 with a 2-volt accumulator and a standard 5 ohms filament resistance.

Users of 4 or 6-volt accumulators can, by arranging the cells in parallel, make their accumulators last two or three times as long on one charge and still get the same volume and purity.

D.E.2 H.F. and L.F. OSRAM VALVES employ the latest form of thoriated tungsten filament, which ensures a steady and lasting emission throughout a long, useful life.



The electron emission of the D.E.2 L.F. OSRAM VALVE is exceedingly liberal, and, as the internal resistance is markedly low, the D.E.2 L.F. proves a most sensitive *Detector* for picking up distant stations. The anode current it passes also makes this type excellent as an L.F. amplifier for providing full mellow tone and plenty of volume.

The D.E.2 H.F. OSRAM VALVE is specially designed to provide the utmost sensitivity to weak signals when used in the H.F. stage; and in addition gives surprisingly increased volume in a choke or resistance-coupled amplifier. *Use a D.E.6 OSRAM VALVE in the last stage.*

For 2-volt accumulators an ideal combination is the D.E.2 H.F. as H.F. Amplifier, and D.E.2 L.F. as Detector and L.F. Amplifier, with the D.E.6 OSRAM VALVE as Power Valve

Characteristics H.F. Type

Filament Volts .. 1.8
Filament Current .. 0.12
Anode Volts .. 40/120
Impedance .. 45,000 ohms
Amplification Factor .. 12

Price 15/6 each

Osram Valves

for Broadcasting

THE G.E.C.—YOUR GUARANTEE.

Characteristics L.F. Type

Filament Volts .. 1.8
Filament Current .. 0.12
Anode Volts .. 20/80
Impedance .. 22,000 ohms
Amplification Factor .. 7

Price 15/6 each

Continental Notes :

*Identifying Stations
Silent Nights
Learning the Morse Code*

OF late I have been overwhelmed with inquiries from listeners in respect to the identification of transmissions which they have heard, and it is a noteworthy fact that most of the lectures or concerts picked up have been done so by these friends on Sundays, in the hours between the afternoon and evening home broadcasts.

Dwellers in Cities

I should qualify this by adding that such a sweeping statement refers, in the main, to dwellers of cities or towns in which a local broadcasting station has been installed, for most of my enquirers who are fortunate enough to log distant transmissions apparently live in the country or, in any case, at a goodly distance from a B.B.C. transmitter.

It is easy to understand that for the inhabitants of cities the Sunday period is the only one in the week which allows them to reach out and to obtain reception from more distant lands, the while their local broadcasting station is resting.

On recent occasions, when the B.B.C. authorities, for the purpose of locating interference with their stations by foreign transmissions, organised a fifteen minutes silence, I plead guilty to the fact that for a period of two or three minutes I butted in with my receiver just to see whether listeners had taken to heart the B.B.C.'s appeal to the effect that they should not use their sets for the prescribed time.

Oscillation Again!

Whether or not my district is particularly troublesome in this respect I do not know, but I do not appear to have been the only backslider, because the ether simply oscillated with howls. One particular delinquent, who could only have lived a few streets away, made the welkin ring with a yell which could only be compared to the Tarzanic cry of the victorious bull-ape!

* * * * *

The adoption of a *silent night*, as practised by New York, Chicago and other United States cities, is not a suggestion which could be conveniently carried out on this side of

the Herring Pond; but I really do not see why we should not be granted two silent hours weekly, apart from those now in existence on a Sunday, to enable us to hear what other lands are doing.

At present this scheme is being carried out at Copenhagen, Oslo, Stockholm, and in several German cities, much to the delight of the local fans. If not convenient, in the ordinary course of the day's programme, why not cancel one evening's dance music?

DO YOU WANT TO BUY A SET?

We shall be glad to advise you as to which types of sets are the best for your personal use.

Tell us how much, roughly, you wish to spend; where you are situated; what stations you wish to receive; whether you intend to use phones or a loud-speaker, and we will advise you as to the general lines of sets that will answer your purpose.

Send your inquiry with coupon (p. iii cover) and stamped addressed envelope to—

"Buyers' Advice Bureau,"

WIRELESS MAGAZINE.

La Belle Sauvage, E.C.4.

Surely this would prove no hardship to the bulk of the population in these Isles, as we cannot get away from the fact that if the majority of listeners is constituted of owners of crystal sets, most of them do not possess loud-speakers. You cannot dance whilst wearing head-phones: it would not be a tango, but a tangle!

* * * * *

By way of a "stunt," Radio-Agen recently organised a shorthand competition for all listeners. This took place on various dates. Paragraphs were read by the announcer in several languages on different days and taken down by the competitors. The long-hand transcriptions were subsequently sent to the

station and the most accurate copy secured the prize. Why not organise *morse* classes and exams for the benefit of wireless listeners?

* * * * *

Increased Scope

As a matter of fact, these are already being given at some of the Continental stations—Munich, for instance—and have been heartily acclaimed by the majority of local wireless amateurs. To learn and practise morse on one's own is somewhat of an onerous task, but the acquirement of the capability of deciphering the innumerable messages which are transmitted by ships or other stations considerably increases the scope of one's entertainment with a wireless receiver.

If the B.B.C. could see their way to adopt such a suggestion and give a morse hour on one or two nights a week, the transmission would be welcomed all over the United Kingdom.

* * * * *

A New-comer

We must register a new-comer, namely, Reykjavik (Iceland). A few weeks ago this station was testing on various wavelengths, but now appears to have settled down in the neighbourhood of 430 metres. Although on very many occasions I have attempted to capture transmissions, not an Icelandic squeak have I succeeded in conveying to my ears, but a correspondent informs me that from North Britain he has on many occasions picked up the Reykjavik call, and that once the announcer, presumably an English engineer, placed his watch in front of the microphone, and informed his listeners that what they heard was the ticking of a chronometer which he had with him on a patrol boat at Zeebrugge.

It is possible that the Reykjavik station will transmit some local programmes, but mostly it will relay the Copenhagen transmissions by wireless link as well as those of other foreign countries.

* * * * *

Pending installation of the new high-power Rhineland transmitter,

(Continued on page 298)

THE FIRST WIRELESS LOUD SPEAKER WAS A Brown



FOR the man of modest requirements there is no finer Loud Speaker than the new Brown H.3. Embodying all the exclusive Brown features, it is responsible for a volume comparable with many Loud Speakers cost-

ing twice its price. While for purity of tone it is fully up to the recognised Brown standard. The mellowness and richness of music reproduced on the H.3 is a revelation to those who hear it for the first time.

Type H.3. Loud Speaker 15 in. high 4000 ohms	£3	Featherweight Headphones 4000 ohms	20/-
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Retail Showrooms: 19 Mortimer St., W. 1. 15 Moorfields, Liverpool; 67 High St., Southampton.

S. G. Brown, Ltd., N. Acton, London, W. 3

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BRITISH

Brown

THROUGHOUT

In writing to advertisers, please say you saw the advertisement in the WIRELESS MAGAZINE.

CONTINENTAL NOTES (Continued)

I find that the Frankfort-on-Main station is reaching out beyond its normal district, inasmuch as of late it has been relaying concerts from both Mayence and from the Wiesbaden Kurhaus.

Apparently the engineers are copying the B.B.C. policy of installing studios in various parts of the country from which they can pick up local lectures or performances. The scheme is an excellent one, from an advertising point of view, particularly in respect to Frankfort-on-Main, in view of the fact that by tapping various districts outside ordinary crystal range the interest of the local population is aroused, and thus many more listeners are brought into the fold.

In the same manner the German Reichsfunk is also extending its use of land-line relays, and on many occasions the Berlin programme has been conveyed to Frankfort-on-Main, Cassel, Hamburg, and even as far afield as Königsberg. But with the advent of the high-power station of Königswusterhausen, by wireless link, all transmitters in Germany and even Austria are able to pick up the programmes given out in the capital.

Official Freedom

The ceremony in celebration of the official freedom of Cologne after the British troops had evacuated the city was relayed to the Münster station, thence broadcast again, picked up by Königswusterhausen, and by wireless link relayed to all parts of that country. It will be seen that good use is made of Königswusterhausen as an effective loud-speaker, and I think we may expect to hear on future occasions important political speeches and other interesting events from that station.

* * * * *

From a broadcasting point of view more use is made in Continental

cities of the local zoological gardens than in this country. I do not, of course, refer to the stunt transmissions in which listeners are given an opportunity of hearing the voice of the hyena, or the growling of the bear. Zoos abroad—or at least those which I have visited in Antwerp, Berlin, Hamburg and Amsterdam—constitute popular resorts for the summer evenings, and, in most instances, contain large concert halls,

Brussels possesses no zoo, but the Antwerp collection of animals is quite a good one, so Radio Belgique has decided to relay transmissions from the symphonic orchestra playing in the new building attached to the gardens. It is, of course, quite possible that on some occasions you may hear a ballad sung by a soprano with, in the background, the roaring of hungry lions, should the performance coincide with their

feeding time—in that case no call sign would be needed in order to identify the origin of the broadcaster! JAY COOTE.

A SPARE VALVE CUPBOARD!



How valves are stored at the Rugby station.

in which, during the winter, military and other bands give regular performances. As a rule, gala nights take place at least twice weekly.

The broadcasting companies are therefore now tapping their local zoological gardens in the same manner as relays would be made of outside concert halls. Berlin in particular has installed a microphone "am Zoo," and during the summer months there is no doubt that via Königswusterhausen you will be receiving on your loud-speakers concerts by many of the Prussian regimental bands.

Six hundred summonses have been taken out against wireless pirates in Aberdeen. Presumably the remaining listeners are settlers from England.

A FRENCH general believes that wireless will encourage the colonisation of uncivilised regions. So we may look out for an increase in the population of Kilmarnock.

EVERY week 2 L O now includes in its programme a summary of the week's wireless papers. Needless to say, this is relayed to the Scottish stations.

A JUDGE has been broadcasting a part of the Children's Hour programme from 2 L O. We have long felt that the childish remarks of some of our judges ought to be turned to useful account.

STORING YOUR VALVES

HOW many valves come to an untimely end through being left lying about either on the wireless table or on the shelves of the cupboard in which odds and ends are kept? By far the safest way to keep valves when they are out of use is to place them in the boxes in which they came and to make a point of putting these in some safe place.

It is best to lay the boxes on a strip of felt so as to subject them to the least possible amount of vibration.

How to Identify the Scandinavian Stations

(Continued from page 259)

picked up, but with the last the matter is different, as frequently after 10 p.m. this station, for the benefit of Danish listeners, relays dance music from our own high-power station, and on these occasions the name of Sorö is mentioned.

With regard to Ryvang, a military station temporarily placed at the disposal of the Radio Raadet, the call "Radio Ryvang" is always given. Lyngby is of little interest nowadays to broadcast listeners, as it only transmits weather reports.

The belfry of the Copenhagen Town Hall has been equipped with a microphone, and the chimes, as well as the striking of the hour at 5 p.m. G.M.T., can be heard on Sundays. It is, however, now proposed to relay the striking of the Copenhagen "Big Ben" at various hours during the evening in a similar way to that adopted by the B.B.C. in this country.

ICELAND

Finally, mention must be made of the new 500-watt station which (at the time of writing) is testing at Reykjavik (Iceland). By wireless link it will relay the Copenhagen programmes as well as other foreign transmissions. The native call has not yet been definitely fixed, but it is certain that a reference to the name of the city (pronounced "Ray-kee-ar-veek") will be made. For the present, when "taking the air" on 430 metres, Reykjavik endeavours to attract your attention by sending out its call in various languages, including English. JAY COOTE.

THERE is said to be too much dialect stuff in the B.B.C. programmes. Is this a hit at the Oxford accent of some of the announcers?

HEADMASTERS feel that they will be able to teach scholars quite a lot of things by means of wireless lessons. Such as how to switch on to another station as soon as the lesson begins, for instance.

A D X experimenter reports that he heard a loud bellowing noise at 11.30 p.m. the other night which he could not identify. Sounds as though he picked up the sergeants' mess.

The Little Giant 2-Valve Set



FELLOWS WIRELESS

£6-15-0

Two Astonishing Bargains

The Little Giant 2-Valve Set shown above is the most wonderful offer that has ever been made in the history of Wireless. For £6 15s. you can get our Little Giant 2-Valve receiver (£3 15s., including 25/- Marconi Royalty), a Fellows Junior Loud Speaker with adjustable diaphragm (19/6), a Fellows 6 Volt 20 Amps. Accumulator (20/-), a Fellophone 54 Volt H.T. Battery (9/-), Two Silver Clear Louden Valves (4/6 each), Aerial, Insulators, Wiring, and complete instructions (3/6).

You can only obtain this set direct from us or our Branches. In this way we save you all middlemen's profits, sell at marvellously low prices, and still maintain the high quality for which we have always been famous.

You can obtain the Little Giant Set on deferred payments by sending 38/4 with order and balance in 6 monthly instalments of 19/3.

All our goods are sent packing free, carriage forward, on SEVEN DAYS' APPROVAL, money willingly refunded if not completely satisfied.

The FELLOPHONE 3-VALVE GRAND

An ideal long-range Loud Speaker set, the Grand complete includes the following:—H.T. Battery (108 Volts and Grid Bias, Fixed in Cabinet), 6 V. Accumulator (25/-), 3 Silver Clear Louden Valves (4/6 each), Headphones (11/6), Aerial, Insulators, etc., (3/6). The Grand Cabinet alone (with H.T. Battery and Marconi Royalty paid) costs £12 15s. The complete set costs £15 10s. cash, or by deferred payments, £5 now and 6 monthly payments of 41s. Volutone Loud Speaker, 55/- extra.

£15 : 10 : 0

WRITE TO-DAY FOR OUR FREE 40pp. ILLUSTRATED CATALOGUE.



BUY BY POST AND SAVE MONEY

The FELLOWS MAGNETO CO., LTD.,
Cumberland Avenue, Park Royal, N.W.10

You can only obtain Fellows apparatus of us direct at address above or from our Branches:—LONDON: 20, Store St., Tottenham Court Rd. (Museum 9200). NOTTINGHAM: 30 Bridlesmith Gate. CARDIFF: Dominions Arcade, Queen St. E.P.S.219.

In writing to advertisers, please say you saw the advertisement in the WIRELESS MAGAZINE.

Notings on the Month's Progress

THE well-known inventor of the telegraphic apparatus now in general use for the telegraphic transmission of "static" pictures, announces that he has practically succeeded in solving the problem of securing "moving picture" effects at a distance. M. Belin has been experimenting with television for many years, and is probably the first living authority on this subject.

Breaking-up the Light-rays

He utilises a rapidly rotating steel disc provided with a large number of silvered facets for the purpose of breaking-up the incident light-ray, and thus analysing the object picture into a series of light pencils of different densities. These are then used to modulate high-frequency carrier waves, which at the receiving end are converted by means of a photo-electric cell into their original optical form.

In this way a succession of pictures are built up or reconstructed with sufficient rapidity to give a kinematographic effect.

At a recent test carried out at M. Belin's experimental station at Malmaison, the inventor rang up his assistant in Paris by telephone, and succeeded not only in hearing the latter's voice, but also in seeing his features made visible on a screen attached to the calling instrument.

Now that he has solved the problem of television over a line wire, it remains for M. Belin to apply his methods to radiated ether waves and true "radio vision" will be an accomplished fact.

* * * * *

Ether Drift

The Einstein theory of relativity appears to be endangered by the recently published results of observations made by Dr. Miller at the Mount Wilson Observatory, in California. Dr. Miller claims to have found definite proof that the earth and the surrounding layer of ether do not move as one, but that there is a decided slip or drift between them, due to the rotational movement of the former. There appears to be evidence that the degree of slip diminishes with altitude, as might

naturally be expected, owing to the decreasing grip of the earth.

If Dr. Miller's conclusions are correct, the existence of ether drift must be taken into account in considering the well-known peculiarities of ultra short-wave wireless radiation, and may probably tend to corroborate the Meissner theory of refraction as distinct from the older hypothesis based upon reflection from the Heaviside layer.

The whole subject is, however, highly controversial, and it will be wise to suspend judgment until further evidence is forthcoming in support of the Miller experiments.

* * * * *

Wavelength Redistribution

Extensive tests are being carried out under the direction of the International Broadcasting Bureau in connection with Captain Eckersley's new scheme for re-allocating Continental wavelengths. The whole broadcast band between 200 and 600 metres is being divided up first of all into eighty "exclusive" wavelengths, each separated by a gap of 10 kilocycles. These will be allotted to the same number of high-power stations distributed throughout the various European countries.

Non-exclusive "Groups"

In addition, some sixteen "group" or non-exclusive wavelengths, each separated by a frequency gap of fifty kilocycles, will be available for an indefinite number of low-power relay stations, designed to feed crystal areas of from six to ten miles radius. As many as fifty relay stations may each operate on the same "group" wavelength, provided that their reception areas do not overlap. So long as all stations using the same wavelength maintain an absolutely constant frequency, it will be impossible for one to heterodyne the other.

It will be seen that the scheme only provides for a total number of eighty main distributing centres. These may be rated at anything between five and twenty-five kilowatts, and will be allotted amongst the various countries in proportion

to their size and density of population.

As regards the low-power relay stations, however, there is practically no limit to the number which may operate on one or other of the sixteen "group" wavelengths, free from mutual interference, provided that a distance of at least 30 or 40 miles separates stations using identical wavelengths.

* * * * *

Power of Cathode Rays

Dr. Coolidge, Director of the G.E.C. Research Laboratories at Schenectady, has published particulars of some recent work carried out with high-voltage cathode rays. A high-vacuum tube is provided with an aluminium-foil window, approximately three inches in diameter, from which the rays stream outwards into the air for a distance of slightly over two feet.

The luminosity of the air in the beam is strangely beautiful, appearing like a solid body with a full purple glow.

Calcite crystals, brought into the path of the beam, become strongly fluorescent, and retain this property for many hours afterwards. Crystals of cane sugar turn white under the beam and subsequently liberate quantities of gas. Castor oil, on the other hand, rapidly becomes solid.

* * * * *

It is interesting to note that in the course of last year, amongst the various B.B.C. stations, less than 0.1 per cent. of a total of over 45,000 working hours was lost owing to technical breakdowns. 2 L O easily holds the record for time of transmission, with 3,221 working hours, or an average of nearly 62 hours per week.

Daventry's Bad Luck

Daventry, on the other hand, was the worst offender as regards technical mishaps, showing a wastage of 5 in every 1,000 minutes working time. This was mainly due to a run of ill-luck and to exceptionally severe weather conditions, which resulted in the breakdown of part of the aerial system. B. A. R.

Amateur Wireless

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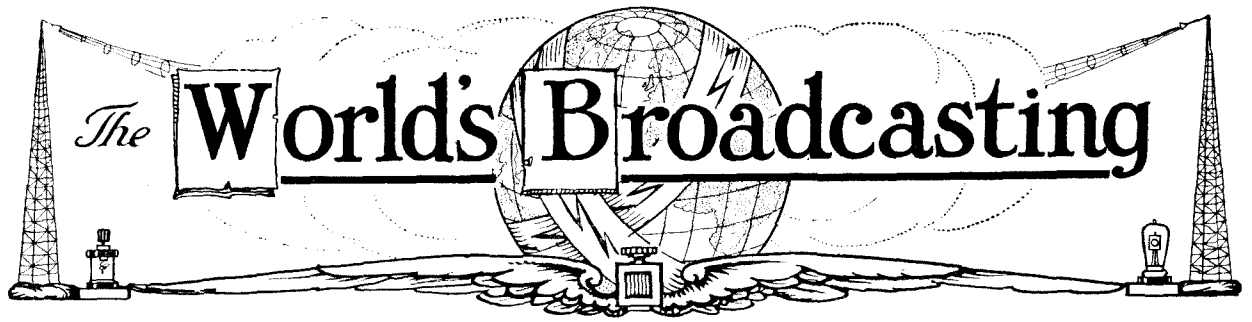
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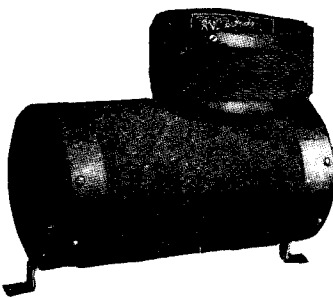
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Some of these wavelengths may have been altered before the next number of the WIRELESS MAGAZINE is published. But under the heading of "Broadcast Telephony" a similar list of European broadcasting stations is published in AMATEUR WIRELESS every week, and you can keep yourself up to date from that.

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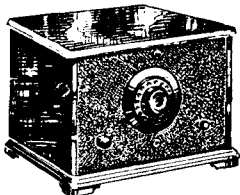
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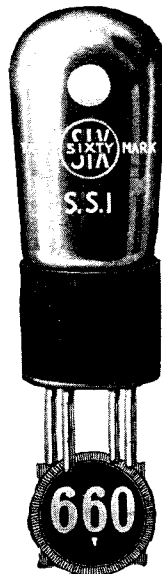


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He went about with his long-handled brushes crying "Sweep, Sweep," and he made all the difference to your fire. **SIX-SIXTY VALVES** make all the difference to your set; they hold a potential store of volume at your bidding, while they ensure perfect quality of tone. The secret of this wonderful difference is to be found in the extensive research and perfect workmanship expended on each particular valve. Not only has this research been the means of ensuring a wonderful purity of tone and increased power, but, due to our success in considerably reducing filament temperatures, the life of 660 Valves has been immeasurably increased. Every valve of our new range is specially designed to carry out its particular job; they are all stamped with the Six-Sixty mark of **PERFECTION OF QUALITY.**

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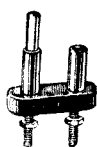
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Catalogues and Pamphlets

GECOPHONE transformers, coil holders and other components are fully described in a new folder issued by the General Electric Co. Ltd., Magnet House, Kingsway, W.C.2.

Full particulars of the Ericsson range of sets and components are given in the catalogue issued by the British L. M. Ericsson Mfg. Co., Ltd., 63-73, Kingsway, W.C.2.

Leaflets issued by the Telegraph Condenser Co., Ltd., West Park Works, Mortlake Road, Kew, Surrey, deal with the well-known T.C.C. moulded mica condensers.

Particulars of Acton glass accumulators can be had from C. A. Vandervell & Co., Ltd., Warple Way, Acton, W.3.

The Sparta concert receiver and the Sparta low-loss coil former are the subjects of two lists obtainable from Fuller's United Electric Works, Ltd., Woodland Works, Chadwell Heath, Essex.

New leaflets issued by the Marconiphone Co., Ltd., 210-212, Tottenham Court Road, W.1, deal with a new shock-absorbing valve holder, Sterling headphones, and the new Sterling Miniloss condenser.

A useful and unique folder giving pictorial and theoretical circuits for nine different types of receiver has recently been issued by the Igranic Electric Co., Ltd., 149, Queen Victoria Street, E.C.

"Cabinets of Distinction" is the title of a catalogue containing full details of wireless cabinets obtainable from W. & T. Lock, 15, St. Peter's Terrace, Bath.

The Beco hornless loud-speaker is the subject of leaflets issued by the British Electrical Sales Organisation, 623, Australia House, Strand, W.C.2.

The General Electric Co., Ltd., Magnet House, Kingsway, W.C.2, have recently issued a leaflet giving full particulars of their new D.C. charging resistance for H.T. accumulators, and a new D.C. charging board for both H.T. and L.T. batteries.

A list giving particulars of considerable reductions in the prices of components has recently been issued by J. E. Hough, Ltd., Edison Bell Works, Bermondsey.

The Nedron Super VI, a six-valve super-het receiver that requires no aerial or earth, is described in a folder obtainable from the Nedron Wireless Co., 2, Westgate Street, Hackney, E.8.

You want to keep in touch with all that is happening in the world of wireless? Of course you do. But what is the simplest way? One way is to send for those catalogues that particularly interest you (any of them will be sent post free if you mention the WIRELESS MAGAZINE); another way is to read carefully the Novelties and New Apparatus pages in this issue.

A leaflet giving full particulars of the Valco method of valve repairing can be had from Valco, Ltd., 13A, Tabor Grove, Wimbledon, S.W.19.

Catalogue 6 W, obtainable from Alan Wright, Sentinel House, Southampton Row, W.C.1, contains full particulars of the latest American components.

A new folder issued by Peter Curtis, Ltd., 75a, Camden Road, N.W.1, deals with the Curtis supersonic heterodyne receiver.

L. McMichael, Ltd., Wexham Road, Slough, Bucks, have ready leaflets giving full particulars of the new M.H. Dimic coils.

Wireless cabinets of all sizes and types are illustrated and described in a leaflet, copies of which can be had from the Compton Electric and Radio Trades Supplies, 63, Old Compton Street, W.1.

The new Hart Enduro cells are described in a leaflet obtainable from the Hart Accumulator Co., Ltd., Marshgate Lane, Stratford, E.15.

The Marconiphone Co., Ltd., 210-212, Tottenham Court Road, W.1, have issued a new folder dealing with their new gramophone-amplifying equipment.

Full particulars of genuine Léclanché cells for H.T. supply will be sent on application to Ripault's, Ltd., King's Road, St. Pancras, N.W.1.

A copy of the first catalogue issued by B.S.A. Radio, Ltd., can be had from that firm at Small Heath, Birmingham.

A copy of a new catalogue describing Formo components can be had from the Formo Co., Crown Works, Cricklewood Lane, N.W.2.

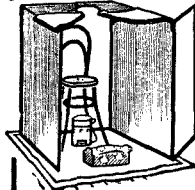
Particulars of electrical appliances suitable for wireless are contained in a folder issued by B.E.N. Patents, Ltd., 100, Victoria Street, S.W.1.

A new catalogue issued by the Igranic Electric Co., Ltd., 149, Queen Victoria Street, E.C., contains particulars of all new lines including the Igranic-Pacent series of components.

An artistic set of instrument catalogues, complete in pocket case, can be had from the Cambridge Instrument Co., Ltd., 45, Grosvenor Place, S.W.1, for 3s. post free.

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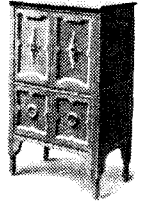
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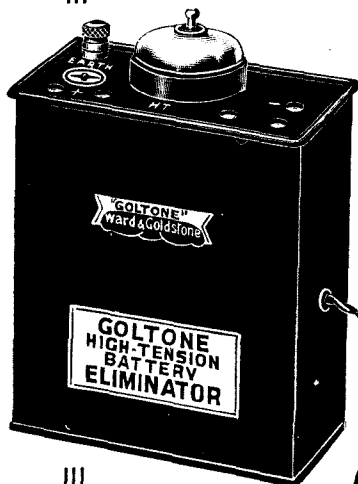


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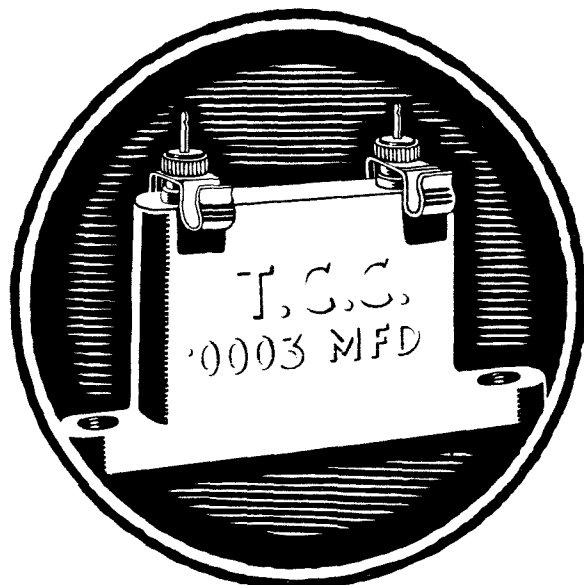
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Grid leak clips supplied free

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BIG BEN

"IN two minutes you will receive the time signal from Big Ben." Thousands of wireless enthusiasts have listened in wonder to the deep boom of this Westminster clock, and although it is close on seventy years since Edward Dent began the work, Big Ben is always to be relied on.

The original Big Ben was cast in 1856 at Stockton-on-Tees, and for the benefit of the public was sounded every week before being hauled up to its resting place. This bell was unfortunately cracked, and it was in 1857 that Edward Dent, of Cockspur Street, who was known to all London because of the time-ball he dropped daily at one o'clock (Greenwich time), had a smaller bell cast at Whitechapel.

But misfortune followed this, and after a very short reign it gave way, and for three years the hours were sounded on the largest of the other

four quarter bells. Later it was quarter-turned, which enabled it to be used once more for hours, although its tone was not as resounding as before.

The Government stipulated that Dent should guarantee the clock's accuracy and that it should not lose more than one minute in seven days. Dent did not live to see the work completed, but its accuracy remains one of its outstanding features.

Many are the tales of the derivation of the name Big Ben. One is that it was named after Sir Benjamin Hall, the First Commissioner of Works at the time the bell was cast; others say it was in honour of Benjamin Brain, a noted pugilist of that period.
W. G. H.

An experimenter says that he picked up Los Angeles the other night. We suppose he recognised it by the divorce verdicts that are given out at half-minute intervals.

Of a California loud-speaker it is claimed that it can be heard 24 miles away. We understand that Hyde Park orators are beginning to grow apprehensive, lest some improvement on it infringes their copyright

SOFT VALVES

THOSE of you who use single-valve sets should certainly try the effect of using a soft instead of a hard valve. The type required is one that will "blue glow" with between 30 and 40 volts on the plate when the filament is working at its normal temperature. For rectification purposes such a valve will require a plate voltage of from 15 to 25.

It will be found as a rule that the soft valve gives a greater volume of sound in the receivers, and that it allows reaction to be used to a much greater degree than does the hard valve without causing any trouble by bursting into oscillation. With the soft valve the grid leak can often be eliminated.

Care must be taken never to allow the valve to "blue glow" during reception or a particularly horrible form of distortion will result.

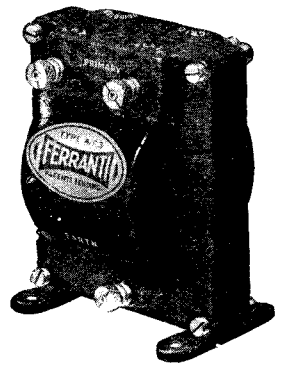
J. H. R.



INTERVALVE TRANSFORMER

TYPE AF3
British Made

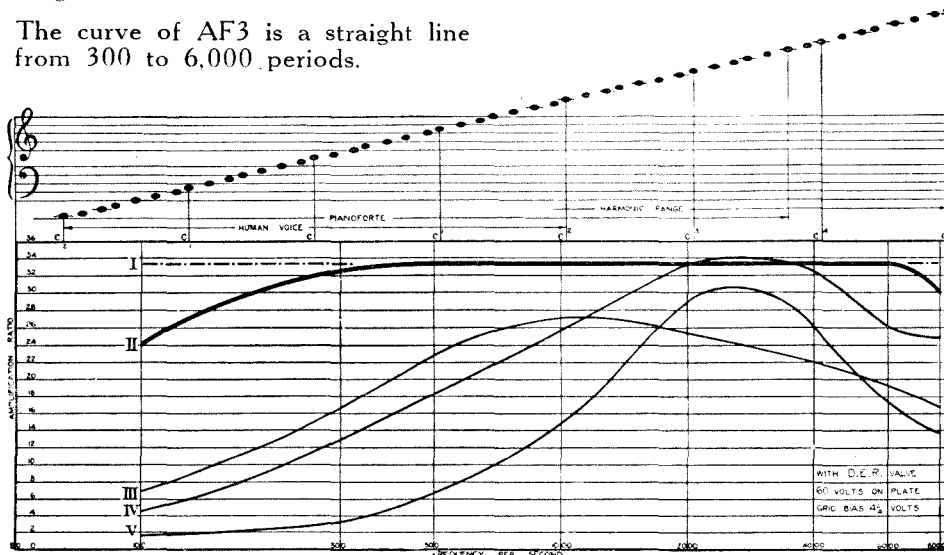
25/-



Transformer Amplification curves are of great interest to every radio user.

They must be on the musical scale to give the true value.

The curve of AF3 is a straight line from 300 to 6,000 periods.



Curve I. Perfection.

Curve II.

FERRANTI AF3,
very nearly perfect.

No better Transformer is available at any price.

Curves III, IV and V.
Other Transformers on the market.

ASK YOUR DEALER FOR
LEAFLET Wa. 401

FERRANTI LTD.
Hollinwood, Lancashire

In writing to advertisers, please say you saw the advertisement in the WIRELESS MAGAZINE.

Broadcast Music of the Month (Continued from page 275)

The lighter side of the programmes is still the side which is getting conspicuous by its absence. With the exception of the two revues, *Listening Time*, which has taken the place of *Radio Radiance*, and *Winners*, only allowed to run occasionally, we have had very little light entertainment.

A superfluity of ballads and negroid minstrelsy, with talks and a few dance programmes, are causing discontent. Put the programmes in the hands of professional managers and a far different result would be obtained!

Amongst those who have been heard may be mentioned Sir Harry Lauder, an admirable comedian and excellent broadcaster in his own particular style. Some of the real professionals, such as Miss Muriel George and Mr. Ernest Butcher, have figured in brief programmes. De Groot's concerts, reduced now to once a month, are a loss, like several others of the restaurant bands.

In the provinces have been heard two earlier broadcast entertainers, Fred Beck and George Stockwin, noted for their concert-party work, but, for the most part, the programmes are but dreary affairs.

Let us look forward to better results in the near future. The fault lies in attempting too much. If the programmes were devised on broader lines, and with a view to providing amusement instead of a religious and educational matter, no one would have reason to complain.

Renovating a Panel

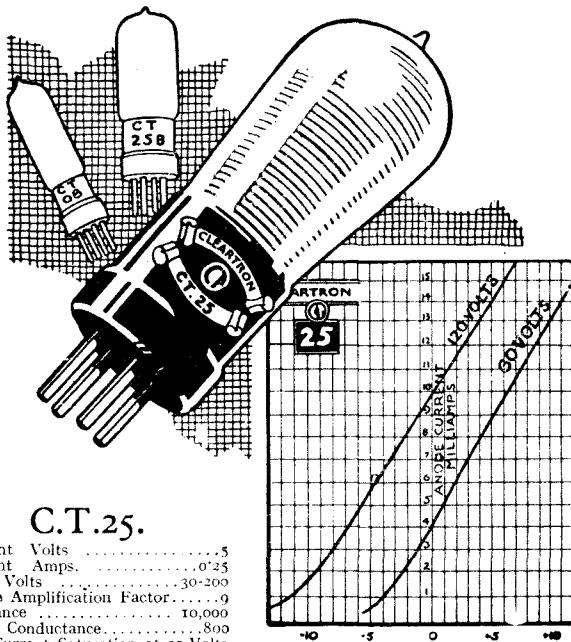
SHOULD an ebonite panel become discoloured it can be "renovated" by rubbing with a soft rag on which has been placed a few drops of olive oil.

The olive oil works like magic, and any piece of ebonite, however badly discoloured by exposure, can be made like new in a few minutes.

E. H.

If distilled water is not handy, says a professor, for topping up accumulators, it can be obtained by melting freshly fallen snow. Yes, but what about if the accumulators want topping-up before summer comes?

CLEARTRON CHARACTERISTICS



C.T.25.

Filament Volts 5
 Filament Amps. 0.25
 Anode Volts 30-200
 Voltage Amplification Factor 9
 Impedance 10,000
 Mutual Conductance 800
 Plate Current Saturation at 50 Volts over 30 milliamps.

HERE we show you the electrical characteristics of the CLEARTRON Dull Emitter C.T.25; we could talk to you for hours about its general excellence. But charts and talk cannot convince like an actual trial. Give it a "try out" and prove by your experience that CLEARTRON valves in your set mean vastly increased volume and greater distance; operatic purity, keener selectivity and longer life. And unless the C.T.25 produces all these claims and all these advantages it will be replaced without cost or question—our IRONCLAD GUARANTEE sees to this.

Send for illustrated catalogue post free.

Type	Accumulator or Battery volts	Fil.volts.	Fil. amp.	Purpose	Price
C.T.08.	Dry cells	3	0.08	H.F., L.F. Detector	12/6
C.T.15.	2 volt Accumulator	1.8	0.15	H.F., L.F. Detector	12/6
C.T.25.	6 volt Accumulator	5	0.25	H.F., L.F. Detector	15/-
C.T.25 B.	6 volt Accumulator	5	0.25	General purpose resistance coupled amplification	15/-

America's foremost valve made in Britain's newest factory.

CLEARTRON RADIO LIMITED

1, CHARING CROSS, LONDON; AND BIRMINGHAM.

Telephone: Regent 2231/2.

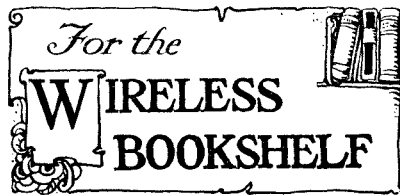
Grams: Cleartron, Westrand, London.



36/524B

Service Advertising

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"The Wireless Man's Workshop"

READERS of the WIRELESS MAGAZINE will recognise in the author of "The Wireless Man's Workshop," the latest addition to the "Amateur Wireless" list of handbooks, the name of a frequent contributor to this journal.

Mr. J. Hartley Reynolds, to whom we refer, was part author of "Wireless Telephony Explained," and is a skilled constructor of wireless apparatus.

His work in this connection has afforded him an exceptional opportunity of devising better ways of doing many of the little jobs associated with set construction, and he has not hesitated to pass these on, to all interested, through the medium of his book.

A notable feature of the publication is the easy language Mr. Reynolds has used in the passing on of his knowledge and advice.

As is the case with all "Amateur Wireless" handbooks, "The Wireless Man's Workshop" is edited by Bernard E. Jones, Editor of the WIRELESS MAGAZINE and "Amateur Wireless," and is published by Cassell & Co., Ltd., price 2s. 6d. net.

"The Slide Rule Simplified"

Since the inception of the slide rule many text books on its usage have been published, but the majority of these err in one direction. They presume at the outset that the reader is endowed with a considerable

amount of mathematical knowledge, and as a result are practically useless to the ordinary student. In "The Slide Rule Simplified" (published by Drawing Office Supplies, Ltd., price 5s.), the author, Donald E. Rogers, has laboured under no such presumption, with the result that he has compiled a text book that is of use to the youngest student of engineering as well as to the experienced craftsman.

As will be realised, the task set himself by the author has been no easy one, and the success that attends his effort is all the more noteworthy in consequence.

Numerous examples of the use of the rule, each of which is fully worked out, are included in the publication, and exact rules for the position of the decimal point in all cases are given.

Bent Phone Diaphragms

AS the diaphragms of telephones are subject always to the pull of the permanent magnets they tend in time to sag down towards the polepieces, becoming distinctly concave. When this happens reception may be very unpleasant if signals are at all loud, since the diaphragms will come into actual contact with the polepieces as they vibrate.

An improvement can sometimes be effected by unscrewing the cap of each earpiece in turn and reversing its diaphragm. If, however, the diaphragm has become very much bent it will now be rather too far away from the polepieces, in which case the telephones will not be very sensitive.

The best course in such a case

is to discard the old diaphragms altogether and to fit a new pair. These can be purchased from many wireless shops for about sixpence a pair.

All that is necessary is to measure the diameter of the old diaphragms very carefully and to buy a pair of the same size. In purchasing new diaphragms see that you obtain thin ones of the very best quality. J.

A Useful Instrument

THE ammeter is an exceedingly useful instrument for the wireless enthusiast to possess. It need not be of a particularly expensive type provided that its readings are reasonably accurate. Quite a good ammeter of the moving-iron pattern reading up to 5 amperes can be bought for a few shillings.

If the ammeter is kept wired permanently into one of the low-tension leads one is able to know always what the valves are receiving in the way of current.

It is not always easy to measure the voltage across the filament of any particular valve since a high-resistance voltmeter of the moving-coil type is the only instrument that is really suitable for this purpose.

The ammeter, however, enables us to ascertain the voltage without difficulty. Suppose, for example, that the makers' figures for a valve are .6 ampere at 3.5 volts; if we adjust the rheostat until the ammeter reads .6 ampere the voltage across the filament will then be 3.5.

The ammeter is also most useful in helping one to keep a check both upon the load placed upon the accumulator and upon the number of ampere-hours that it gives at a charge. H.

—the dependable

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TUBES,
SHEETS,
MOULDINGS.

BECOL is more than a trade mark—it is your protection. It stands for all that is best in ebonite manufacture—it is a positive guarantee of panels free from surface leakage. That's why the expert, wherever he may be, says "BECOL." He knows from experience there is no better ebonite in the world. Always ask for "BECOL."

The British Ebonite Co., Ltd., Hanwell, London, W.7.

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The **Book of**
RADIO MEASURING
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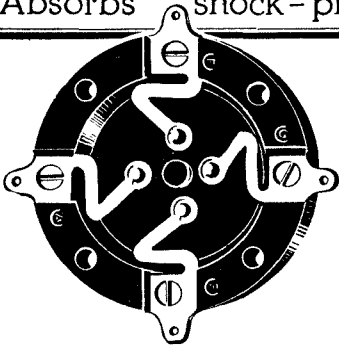
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INSTRUMENT CO

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Absorbs shock - protects the valves



You know it's good because of the name "Lotus"

Don't have your valves spoiled by shock. The Lotus Valve Holder has been specially designed to counteract the microphonic elements that are so injurious to the delicate valve filaments.

The unique and original springs of the Lotus Valve Holder absorb any shock and eliminate all microphonic noises. Protect YOUR valves by fitting the Lotus Holder.

Valve sockets and springs are locked together by a mechanical process, making a definite and permanent connection. Bakelite mouldings, nickel silver springs and phosphor bronze valve sockets. Nickel plated.

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VALVE HOLDER

ANTI-MICROPHONIC

From all Reliable Radio Dealers.
GARNETT, WHITELEY & Co. Ltd.,
 Broadgreen Road, Liverpool.

Makers of the famous LOTUS Coil Holder.

2/3
 With
 Terminals
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Build the SELECTOSONIC THREE

as fully described in this issue.

	£	s.	d.
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3 Microstats	8	3	
3 Burndept Anti-phonie Valve Holders	15	0	
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3 T.C.C. Fixed Condensers .5	10	0	
1 Mullard .0003 Condenser & 2 meg. Leak	5	0	
2 Fixed Coil Holders	3	6	
1 Polar Neutrodyne Condenser	5	6	
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12 Belling Lee N.P. Terminals	4	6	
	£7	5	0

Cabinets for above, Oak or Mahogany. Prices on application.

We specialize in all sets described in "Wireless Magazine" and allied Wireless publications. Send stamp for Lists dealing with the following:—A Boudoir Two-Valver, a 4-valve Cockaday Set, The Distortionless Three-Valver, Step-by-Step Super-Het., One Valve Amplifier, One Control Crystal Set, The Round-the-World Short-Wave Three-Valver, A Long-Range Two-Valver, A Family Four-Valver for the Loud Speaker, A Low Loss Crystal Set, "As good a set as money can buy" Four-Valver (new edition), Three-Valve Amplifier, The Housewife's Crystal Set, and One-Valver for KDKA.

OMNORA LTD.,

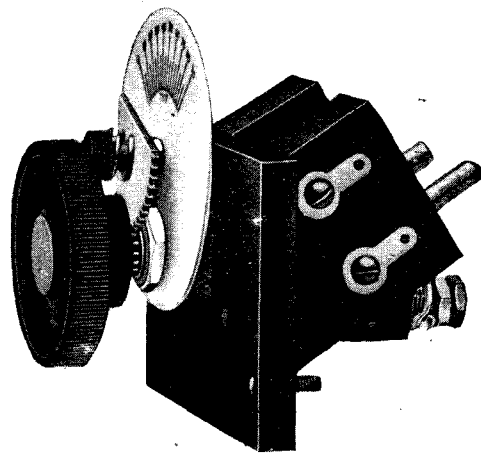
Specialists in Wireless Apparatus,
 288, BOROUGH HIGH ST., LONDON, S.E.1.

Any coil-holder holds coils, BUT—

here is a coil-holder that does more. It provides a simple and practical method for adjusting coil positions behind your panel. It moves the coil smoothly and accurately to the exact position that you want it, and a geared pointer in front of the panel shows you the exact movement.

You don't work in the dark.

It is the New **TRIX** Coil Holder



The moving coil block moves at one quarter the speed of the control knob so that the movement is slow enough for very fine adjustment, while at the same time only one complete turn of the knob is needed to give the full range of movement when making a coarse setting.

The nickel-plated pointer is geared so as to indicate the exact motion of the coil on a white ivory dial. The coil plugs are mounted at an angle of 45 degrees for better control, and ease of insertion and removal of the coils.

One-hole fixing is standard.

TRIX Two-way coil-holder **5/6**
 No. 272. Pat. applied for.

TRIX

Specialities obtainable from
 all dealers.

Manufactured by
ERIC J. LEVER

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Get ready for
TRIX
SELENIUM
 ANODE RESISTANCES
 AND GRID LEAKS
 Better beyond
 comparison.

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K. RAYMOND

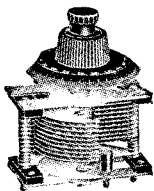
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(back of Daly's Theatre)

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Supreme **SELECTIVITY**.
Each station has **CLEAR TUNING SPACE**.
CROWDING entirely **ELIMINATED**.
SIMPLIFIED tuning.
DISTINCT and **DEFINITE** Radio reception.
PRECISION workmanship.
HEAVY BRASS VANES. **BRITISH MAKE**.
Pictorial connection to rotor gives silent working.
Special Spring top Bush gives a firm but easy movement.

LOW LOSS.

Including knob and dial as sketch. With vernier. Including knob and dial. No vernier.

*0003 .. 8/-	*0003 .. 6/-
*0005 .. 8/9	*0005 .. 6/9

POST 6d. PER SET.

UNSOLICITED TESTIMONIAL.

78, Copenhagen Road, Gillingham, Kent.
Messrs. Raymond: 19/2/26
Whilst in town a short time ago I purchased 3 of your Low Loss Straight Line, etc., condensers, viz.: .0003, .0005, and .0005 with vernier. I did not have an opportunity for testing these until Wednesday evening last, when I banked up a straight one-valve, incorporating the .0005 without vernier. The results were absolutely astonishing, because I got a station with almost every degree of the dial. I got as far as Stockholm. The other stations were London (of course), Berlin, Bournemouth, Breslau, Brussels, Hamburg, San Sebastian, Paris, Elversrum, and Daventry. I almost forgot to include Dublin. This station is rarely heard in this district but it came in well on two pairs of phones. I have never used a better condenser and I felt that you would like to know. The hook-up was on a piece of board.
(Signed) A. BOWER.

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All 4,000 ohms. Ericsson E.V. Continental, 10/-, Dr. Nesper new lightweight adjustable. 12/11. Telefunken, ditto, 14/11. Brunet, 12/6 and 14/11 (de Luxe). The new N. & K. lightweight, a perfectly wonderful phone. 12/- per. (Name in full on back of case). British Sterling, 22/6. B.T.H., 20-. Brandes Matched 20-. W.E. 20-. Brown's adjustable reed, 30-. Featherweight, 20-.

VALVES.

Clearfon C/8 or C.15, 12/6. Power 6v., C.25, 15-. Cosmos S.P. 18 Red or Green, 12/6. Neutron .06 H.P. or L.F. 12/6. Ditto 2v., 12/6. All Mullard, Ediswan, Osram, Marconi, Gosport, stocked. Bright D.E. and Power, 8/-, 14/-, 15/6, 18/6, 18/6, 22/6, 24/6, 30-, 42. Mullard P.M.4, 22/6. Do. P.M.3, 16/6. 1 burnt-out valve taken in part exchange for any of above. Usable valves bought or exchanged.

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All Models Stocked.
Lists Free.

A. J. S.

specially recommended.

Your old Loud Speaker taken in part exchange or bought for cash.

MAKE OUT LIST

of what you require and lowest quotation given.

With orders of £5 worth of our goods is given a Pair of Brunet, N. & K., or Dr. Nesper Phones free.

£10 Order

A 37/6 Loud Speaker.

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No Second-hand articles are sold by post.

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THIS IS A REAL RADIO STORE!

Be sure you ask "Is this Raymond's?"

SPECIAL PRICES over the counter given for orders of £2 upwards.

By An Official at 2, Savoy Hill, W.C.2.

HOW BROADCASTING AFFECTS MUSICAL EDUCATION

THERE are many subjects which experience has shown can be successfully taught through the microphone, but of all these there is none so pre-eminently suitable as that of music. While some—such, for example, as pictorial art—may suffer more or less from the lack of visual demonstration, in music there is no such disadvantage.

Schools Benefit

And there is hardly a single elementary school in the British Isles which cannot benefit by such expert teaching as that available from the stations of the B.B.C. For it is not very often that we are fortunate enough to find an expert musician among the teachers in our day schools.

The B.B.C. has been particularly happy in its choice of broadcast teachers, for Sir Walford Davies has devoted many years to successful experiments in teaching music to children in schools and colleges, and he has proved equally successful in dealing with the subject over the microphone.

Many of the provincial stations, too, among which may be mentioned Belfast, Birmingham, Glasgow, Leeds, Manchester and Newcastle, have had weekly lessons on the appreciation of good music, which have been of the greatest educational value.

Adults as Well

But the influence of broadcasting on the musical education of the nation does not stop with the children. No one, whether they are advocates of the newest science or whether they are still in the stage of unbelief, can deny that hearing good music day after day, night after night, must in course of time lead to a very much higher standard of musical knowledge than any to which we have yet attained.

To take one instance only, think how much broadcasting has done in less than three years to popularise

operatic singing. How short a time ago it seems since the appreciators of the Wagner operas, of *Lucia de Lammermoor*, or of *Samson and Delilah* were the select few only.

To-day there is scarcely a village in the land where these are not thoroughly familiar, and even if King Jazz does still hold sway in the minds of thousands, his dominion is not unchallenged, as the post-bag of the B.B.C. could bear abundant witness.

High Standard

And this is only one of the ways in which broadcasting can influence the body politic. The B.B.C. has a high conception of its duty. Circumstances may at times be too strong, and the ideal not easy to attain, but the higher the aim, the less the risk of failure, and out of to-day's mistakes are built to-morrow's achievements. And as music is the greatest and sublimest of the arts, so correspondingly high is the standard set. But the B.B.C. in the ultimate issue is not the handful of people with whom lies the present responsibility for the daily programme.

B.B.C.'s Constitution

The B.B.C. is a unique undertaking. For it is in reality made up of thousands, nay, millions of people, those who listen rather than those who perform. And, as always, it is the majority who rule.

So everyone who believes in the future of broadcasting as an enormous factor for good or evil in the life of our nation should take thought with himself or herself as to how we can best lend our aid. If we keep clear before us the idea that wireless is something more than an entertainment, that it is the most powerful influence which has yet been known, that through its means whole nations may be permeated either with good or evil doctrines, and that the decision lies in our own hands, we shall be a long way on the road to help.

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A Useful Series for Wireless Amateurs

Simple Valve Receiving Sets and How to Make Them

This handbook, which is compiled from the writings of many contributors to "Amateur Wireless," seeks to show in close detail, and with the aid of 112 illustrations, how to make and operate about ten different types of valve sets.

Simple Crystal Receiving Sets and How to Make Them

Compiled from the pages of "Amateur Wireless," this handbook deals in a simple, straightforward manner with the making of a number of crystal sets. With 114 illustrations.

Wireless Component Parts and How to Make Them

Detailed instructions for making the various component parts of many kinds of wireless receiving sets. It does not describe the making of any one complete set, but just all the parts likely to be required. With over 200 illustrations.

Wireless Telegraphy and Telephony and How to Make the Apparatus

This revised edition is by Mr. E. Redpath, the well-known writer on wireless. The explanations of principles are up to date, and there are directions for making apparatus, including detectors, amplifiers, single-circuit and complete short-wave receiving sets, a valve panel, and a five-valve amplifier.

Wireless Telephony Explained

CONTENTS: The Electron; Induction and Electro Magnetism; Waves and How They Travel; Inductance and Capacity; Rectification; Amplification; Reaction and Beat Reception; Aerials and Earths; Transmitting Systems; Receiving Sets; Useful Formulæ and Data; Index.

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From all Newsagents and Booksellers, or 1/9 post free, from the Editor of "Amateur Wireless."

An unrivalled series, uniform in style and price with Cassell's famous "Work" Handbooks, and edited by Bernard E. Jones, the Editor of the "Wireless Magazine." The information is reliable, practical, and up to date, and each book is profusely illustrated.

Cassell,
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The "Wireless Magazine" Buyers' Guide

The announcements below mentioned are in the November, 1925—April, 1926, issues (Vols. 2 and 3)

Accumulators and Batteries	PAGE	Components (continued)	PAGE	Phones	PAGE
General Electric Co., Ltd.	658	Kapner, Ltd.	431	Brandes, Ltd.	75
Radio Service Co.	547	K. Raymond	310	Falk, Stadelmann & Co., Ltd.	429
Rotax (Motor Accessories), Ltd.	663	Rotax (Motor Accessories), Ltd.	85	J. Miller	304
Service Battery Co.	213	Sterling Telephone & Electric Co., Ltd.	6	Simpson's (Brighton), Ltd.	547
Siemens Bros. & Co., Ltd.	654	Ward & Goldstone, Ltd.	305		
		Wates Bros., Ltd.	213	Repairs	
Battery Chargers				J. W. Miller	200
Philips Lamps, Ltd.	633				
Books & Publications		Condensers		Sets (Crystal)	
Cassell & Co., Ltd.	212, 301, 311	Dubilier Condenser Co., Ltd.		Belling & Lee, Ltd.	556
Bazaar, Exchange & Mart	304	General Electric Co., Ltd.	95	Falk, Stadelmann & Co., Ltd.	429
Foyles	200	Igranic Electric Co., Ltd.	637	General Electric Co., Ltd.	401
		Ormond Engineering Co., Ltd.	99	Lissen, Ltd.	393
Cabinets		Telegraph Condenser Co., Ltd.	305	Radio Instruments, Ltd.	
Carrington Mnf'g. Co., Ltd.	431			Cover iv, Nov.	
Caxton Wood Turnery Co.	213				
G. A. Hanchard	549	Crystals and Detectors		Sets (Valve)	
Hobbies, Ltd.	659	E. J. Lever	660	Belling & Lee, Ltd.	556
Makerimport Co.	304	Paramount Wireless Co., Ltd.	422	British L.M. Ericsson Manufacturing Co., Ltd.	106
Pickett Bros.	648	Tungstallite, Ltd.	557	Falk, Stadelmann & Co., Ltd.	429
				Fellows Magneto Co., Ltd.	299
Coils and Coil Holders		Distant-control Systems		General Electric Co., Ltd.	401
Athol Engineering Co.	303	Lissen, Ltd.	625	De Leeuw & Co., Ltd.	107
Falk, Stadelmann & Co., Ltd.	661	Radio Communication Co., Ltd.	655	Peto-Scott Co., Ltd.	653
Garnett, Whiteley & Co., Ltd.	210			Radio Communication Co., Ltd.	197
Igranic Electric Co., Ltd.	287			Radio Instruments, Ltd.	657
Lindalls, Ltd.	187			A. J. Stevens (1914), Ltd.	214
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		American Hard Rubber Co. (Britain) Ltd.	210	Soldering Flux	
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Brandes, Ltd.	395	Cleartron Radio, Ltd.	647	Tools	
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British Thomson-Houston Co., Ltd.	212	Fellows Magneto Co., Ltd.	643		
A. H. Clackson, Ltd.	207	Fuller's United Electric Works, Ltd.	650	Transformers	
Climax Radio Electric, Ltd.	425	Alfred Graham & Co.	209	Brandes, Ltd.	627
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Dubilier Condenser Co. (1925), Ltd.	Cover ii, Feb.	Sterling Telephone and Electric Co., Ltd.	110	Ferranti, Ltd.	306
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