

Guide to the Best Valve Sets =

# Wireless Magazine

MONTHLY

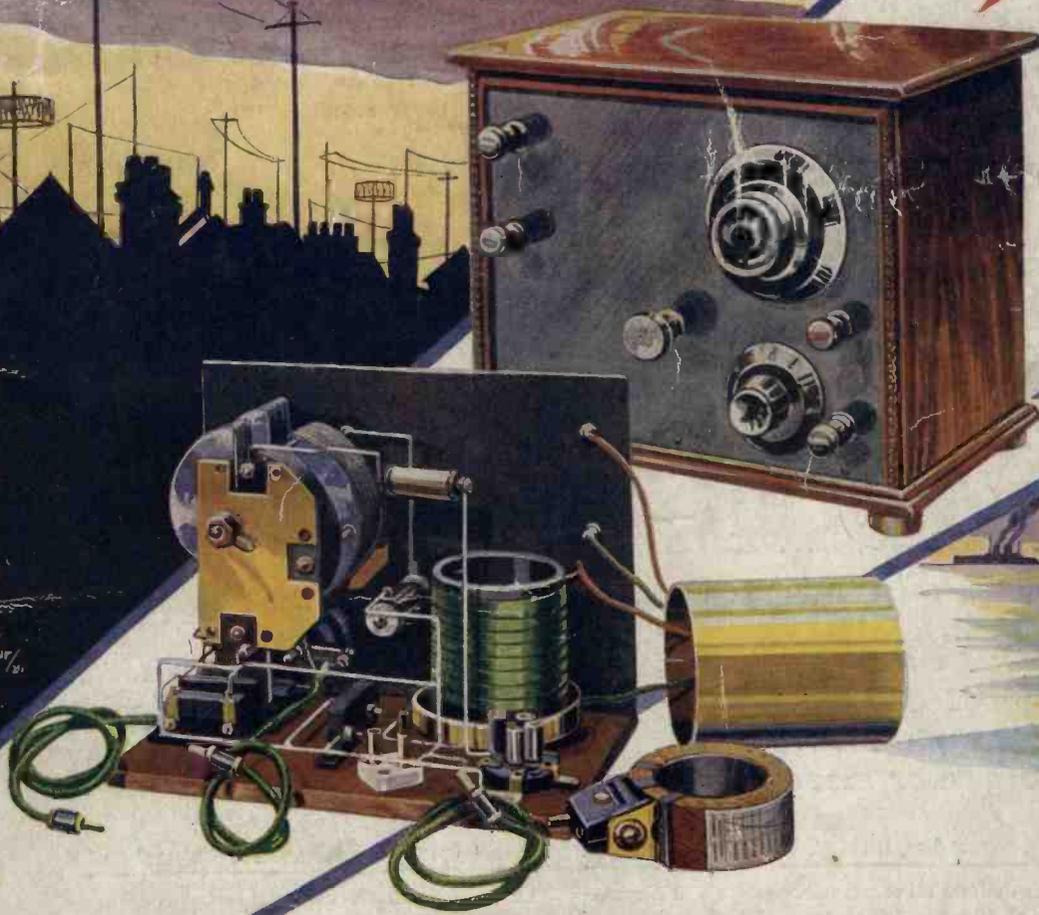
1/-

Edited by  
BERNARD E. JONES

VOL. 4 No 20  
SEPTEMBER 1926

The "W.M."  
SHIELD  
UNIT

*makes any set*  
Selective,  
Amplifies,  
and Prevents  
Interference.



Read  
Article by  
B.B.C's  
Managing  
Director  
Mr J.C. WREITH

Contains Free Constructional Guide in Colours

*The World's Greatest Magazine of Wireless*

**INVALUABLE and STRIKING ADVANTAGES of TUNGSTONE PLATES.**

**Tungstone (patented) British made Battery is practically Foolproof.**

**Standardization, Interchangeability, Simplicity and Accessibility applied to all other individual parts and plates.**

No Wood Separators used between Plates or in Cells. No Celluloid or Ebonite Containers used.

Each Plate fixed firmly and independently in the Acid resisting Metal Container.

High Pressure Die Cast Plates cannot be buckled or short-circuited in service.



Entirely of British Origin and Workmanship.

The Paste by Machinery is Riveted in and through the Lead Grid or Plate.

No sediment space is required or provided in the Acid Proof Metal Container.

Metal Container Lids not sealed. No outside creeping, sweating or spraying of Acid.

# Plumbers

**When making a repair generally create further costly repairs. Is this a fair description of your repair experiences to any of the present-day Car Batteries ?**

**Have you proved that it is to your convenience and practical working advantage that the present-day Car Battery with Plates and Cells hermetically and permanently sealed together into a block, make for an easy adjustment of infinitesimal irregularities or a quick repair of more serious defects? Is it to your security and advantage that all other car component parts are open to your inspection? Please write us your experiences.**

## *If so - why not the Battery ?*

**Can Maker of any present-day Car or Lorry Battery, or Service Station Mechanic, or Owner Driver separate and take out in a few minutes on roadside or workshop one or more defective Plates from any Two Volt Cell and replace new Plates without doing irrevocable damage to the Plates that remain or the new ones to be inserted ?**

**TUNGSTONE PLATES ARE STANDARDIZED AND INTERCHANGEABLE.**

**Each Plate separately fixed and supported independently of each other in same Cell.**

**TUNGSTONE PLATES AUTOMATICALLY FIT INTO ANY TWO VOLT CELL.**

**Tungstone Plates are not sealed together into a solid Block with Wood Separators.**

**Unskilled Labour in a few minutes on the Roadside or elsewhere, with only a pair of spanners to unlock Visloks on Terminals, can, without any risks whatsoever to any Plate, take out, replace and change over one or more Plates from or into any other Cells.**

**Apply for Copy, sent post free, Illustrated Booklet, "Photography tells the Story of the Tungstone Accumulator."**

Please address all communications to the Distributor's Offices and Showrooms : T. 33  
TUNGSTONE ACCUMULATOR CO., LTD., 3, ST. BRIDE'S HOUSE, SALISBURY SQ., FLEET ST., LONDON, E.C.4  
Telegrams : "Typify, Fleet, London." SOLD BY ALL DEALERS.  
Telephone : Central 8157 (4 lines). Series of Patent Designs and Trade Mark Issued or Applied for in the Chief Countries of the World.

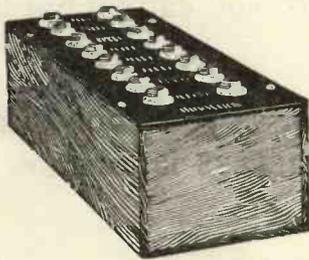
*In writing to advertisers, please say you saw the advertisement in the WIRELESS MAGAZINE.*

APPOSITE ADAGES No. 3

*Prevention is better than Cure*

Specify

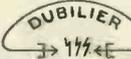
**DUBILIER**  
PRODUCTS



Have you entered for the Dubilicon Competition yet?

If not, write to us now for full particulars.

Cash Prize £200.

REGISTERED  TRADE MARK

**DUBILIER**  
CONDENSER CO (1925) LTD

ADVT. OF THE DUBILIER CONDENSER CO. (1925) LTD., DUCCON WORKS, VICTORIA ROAD, N. ACTON, LONDON, W.3. Tel. Chiswick 2241-2-3.

F.P.S. 209

# Quality & Distinction

The remarkable clarity and delightfully natural Tone of the World Famous AMPLION Loud Speaker when associated with a suitable Receiving Set render wireless reproduction comparable with the original performance.

With an AMPLION, the unseen speaker, vocalist, or orchestra, as the case may be, is brought right into the Home and the advantages of Radio Broadcast may be enjoyed to the full.

18 AMPLION models are available from 38/- and are obtainable from AMPLION STOCKISTS, Radio Dealers or Stores.

*Write for latest Illustrated Lists*

Demonstrations gladly given during business hours at the AMPLION Showrooms:

- 25-26, Savile Row, London, W.1.
- 79-82, High St., Clapham, S.W.4.
- 10, Whitworth Street West, Manchester.
- 101, Vincent Street, Glasgow.



Advertisement of Alfred Graham & Co., (Exors. of E. A. Graham) Crofton Park, S.E.4

In writing to advertisers, please say you saw the advertisement in the WIRELESS MAGAZINE.

# Amateur Wireless

The  
Great  
Pioneer  
Paper

**B**ECAUSE you like the WIRELESS MAGAZINE for its expert detailed constructional articles and the many interesting phases of wireless, which it so admirably presents, you cannot but like AMATEUR WIRELESS.

The WIRELESS MAGAZINE, as you know, leads the monthlies: AMATEUR WIRELESS is foremost of the weeklies.

Every issue of AMATEUR WIRELESS contains remarkably useful constructional articles, helpful contributions on receiving and transmitting, novelties and new developments, and—finally and particularly—the best possible news service.

Take "Amateur Wireless"  
each week and get the  
best results from your set

**3**<sup>D.</sup>  
Every  
Thursday



Cassell & Co., Ltd., La Belle Sauvage, E.C.4

In writing to advertisers, please say you saw the advertisement in the WIRELESS MAGAZINE.

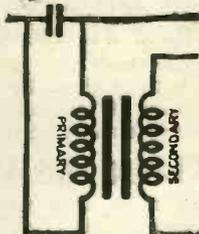
EVERY

**FERRANTI**

**L. F. TRANSFORMER**

incorporates this **BY-PASS CONDENSER**

WHICH IS INCLUDED  
IN THE PRICE.



Type AF4 17/6

Type AF3 25/-

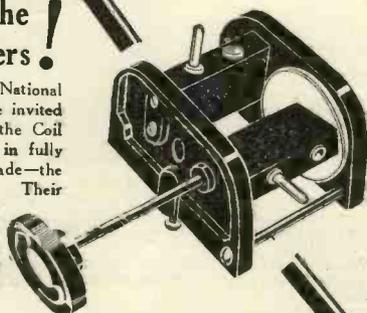
The "Nearly Perfect" Transformer.

Ask your dealer for leaflets W401 and W402.

**FERRANTI LTD., HOLLINWOOD, LANCASHIRE.**

**Come and see the  
best Coil Holders!**

At Stand No. 84 at the National Radio Exhibition you are invited to inspect for yourself the Coil Holders that are used in fully half the sets that are made—the "Lotus" Coil Holders. Their popularity with constructors everywhere is due to their unvarying good performance and the following unique features:—



**Moving Block cannot fall**

Moves in same direction as knob, thus preventing confusion. Holds heaviest coil securely in any position. Dead accurate tuning possible because encased precision cut gears reduce speed by 8 to 1.

From all Radio Dealers

**LOTUS**  
VERNIER  
COIL HOLDERS

GARNETT, WHITELEY & CO., Ltd.,  
Lotus Works, Broadgreen Road, LIVERPOOL.

Makers of the new Lotus Buoyancy Valve Holder.

Two Types:  
For outside panel mounting:  
Two-way .. 7/-  
Three-way .. 10/6  
For inside base-board mounting with 6-in. handle:  
Two-way .. 8/-  
Three-way .. 12/6

Bakelite mouldings for the side and knobs; heavy nickel plating for the metal parts.



**Your Stock of Terminals**

What is it now—a drawer or cabinet with a miscellaneous heap of ill-assorted terminals?

What ought it to be?—It ought to be exactly as illustrated here—the Belling-Lee box of three dozen sorted indicating terminals. Our experience has enabled us to make up a stock box in which the 28 different descriptions of indicating terminals are correctly proportioned, so that you do not find yourself with a stock of too many "Phones" and not enough "Aerials" or "Earths."

Order one or two boxes from your usual wholesaler now.

**TERMINALS.**

Standard Model (Bakelite-insulated) (Type B) 9d. each.  
Popular Model (Non-Insulated) (Type M) .. 6d. each.

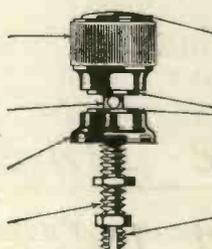
Send for Illustrated Catalogue and attractive trade terms post free on request.

Highly finished screw action Bakelite insulated head.

Cross-hole for connections, flush with clamping face to avoid shearing of wire when head is screwed down.

Highly finished Bakelite insulated collar.

Standard 2 B.A. stem with nut.



Non-rotating insulated engraved top.

Shielded metal clamping faces.

Transverse slot, with clamping nut, eliminating soldering.

Patent No. 248921.  
Registered Design No. 715,424.

**BELLING-LEE**  
**PANEL FITTINGS**

QUEENSWAY WORKS, PONDERS END, MIDDLESEX.  
Telephone: Enfield 0498.

E.P.S.6

In writing to advertisers, please say you saw the advertisement in the WIRELESS MAGAZINE.

# Amateur Wireless HANDBOOKS

each  $2/6$  net

## Loud-Speaker Crystal Sets How to Make and Manage Them

Provides working instructions for building a number of highly efficient crystal sets; making an attachment for simple connection to existing wireless set; and designs for crystal sets embodying the crystal loud-speaker system.

## Wireless Faults and How to Trace Them

By W. D. Kendrick

Tells how to locate and remedy faults—fading, weak reception, and bad functioning generally. Fully illustrated with practical diagrams, circuits, etc. A perspicuous and most useful book.

## The Wireless Man's Workshop

By R. W. Hallows, M.A.

Written by a practical home constructor, this book—containing much useful wireless information—enlightens readers on the selection and right methods of using the tools and materials used in constructing wireless sets.

## The Practical "Super-het" Book

Explains what the Super-het is, what it does, how it works, and how to build up a number of super-het sets (some of them American, and others made of tested, British-made components).

each  $1/6$  net

## Simple Valve Receiving Sets And How to Make Them

CONTENTS: A Single-valve Set with Basket-coil Tuner; A Single-valve Set with Slide Inductance; A Single-valve Autodyne Receiving Set; One-valve Variometer Set; A Portable Single-valve Set; Adding a Valve; A Two-valve Set; A Three-valve Amplifying and Detecting Unit; The "Amateur Wireless" Unit Set; An Improved Unit Set; Index.

## Crystal Receiving Sets And How to Make Them

CONTENTS: A Simple and Efficient Receiving Set; A Single-slider Set; Set with Semicircular Tuner; Crystal Set with Tapped Single Coil; A Loose-coupled Set; Set with Plug-in Basket Coils; Combined Crystal and Valve Receiver; Some Miniature Receiving Sets; Crystal Circuits; How Crystals Work; Making a Buzzer; Receiving C.W. Signals on a Crystal Set; Converting Low-resistance Phones; The Morse Code; Index.

## Wireless Component Parts And How to Make Them

CONTENTS: Components and Their Varied Purposes; Crystal Detectors; Coils, Making and Mounting; Condensers; Variometers and Variocouplers; Resistances or Rheostats; Transformers; Making a Test Buzzer; Index.

## Perfect Broadcast Reception

By Ernest H. Robinson (5YM)

Explains how most sets fall short of the ideal and how to obtain perfect reception. Is virtually a popular exposition of the main problems of transmission and reception. Very valuable alike to listeners and experimenters.

## All About the Wireless Valve

Shows how to choose a valve to meet special requirements—high-frequency amplification, detection, and either low-frequency or intermediate-frequency amplification; how the valve has developed. Full of data and practical hints.

## The Practical Wireless Data Book

The intelligent novice, and particularly the home constructor and the keen wireless amateur who is always rigging up different circuits and experimenting for progress, will find this Data Book extremely helpful.

*Of all Newsagents and Booksellers,  
2/6 net each, or 2/9 post free from  
the Editor, "Amateur Wireless,"  
La Belle Sauvage, London. E.C.4*

## Wireless Telegraphy and Telephony And How to Make the Apparatus

CONTENTS: General Principles of Wireless Telegraphy; Some Informative Experiments; Tuning and Resonance Explained; Transmission and Reception; Various Detectors Explained and Described; Thermionic Valves as Detectors, Amplifiers and Generators; Making a Single-circuit Receiving Set; Making a Complete Short-wave Receiving Set; Making a Valve Panel for a Receiving Set; Making a Five-valve Amplifier; Wireless Telephony; Arrangement and Erection of Aerials; Index.

## 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; Transmission Systems; Receiving Sets; Useful Formulae and Data; Index.

*Of all Newsagents and Booksellers  
1/6 net each, or by post 3d. extra  
from The Editor, "Amateur Wireless,"  
La Belle Sauvage, E.C.4*

*A Useful Series for Wireless Amateurs*

**Cassell  Books**

La Belle Sauvage, London E.C.4.

*In writing to advertisers, please say you saw the advertisement in the WIRELESS MAGAZINE.*

You must build  
this "W.M."  
Shield Unit!



# Wireless Magazine

for September, 1926

Vol. IV



No. 20

## That Set You Want to Buy for the Winter

will be found fully described and illustrated  
in the special "Wireless Magazine"  
Guide to the Best Valve Sets  
the first part of which appears on page  
124. In these pages will be found details  
of what each set will do, how it is  
operated, and what it costs.

	PAGE
The B.B.C. as a Public Service. An Exclusive Article by J. C. W. Reith ..	100
Under My Aerial. Halyard's Chat on the Month's Topics ..	103
Novelties and New Apparatus ..	107

### The "W.M." Shield Unit

Makes any set selective,  
amplifies and prevents in-  
terference. With free  
Structograph plate .. 94

Educated by Wireless—Unawares!	108
Becoming a Wireless Engineer ..	109
Wireless Terms Travestied: A Dull Emitter. A Drawing ..	111

### The Fireside Four

An ideal family receiver  
designed by E. Redpath,  
and as simple to operate as  
a gramophone .. 138

That Tuning Note! ..	120
When Your Aerial Collapses: What the Law Has to Say. By a Barrister- at-Law ..	122

## CONTENTS

	PAGE
Listeners!	123
Guide to the Best Valve Sets. Many Sets Illustrated and Described in Detail ..	124
Presenting the Ballet by Wireless! By Mdm. Anna Pavlova ..	134
"Crystal" Reception Without a Crystal!	135
Selectivity ..	135
Accumulators ..	135
Controlling Wavelength with the Oscillating Crystal ..	136
Writing a Broadcast Play. By C. Whitaker-Wilson ..	145
Overhauling Your Set for the Winter ..	148
The Fate of the Ossi-lata. Verse ..	148
A Few Knobs or Many? ..	150
Caged Birds. A Wireless Story ..	151
Wireless Femininities ..	158
The Hypnophone! ..	159
Tuning the Wavetrap ..	160
Smoothing Condensers ..	160
Broadcast Music of the Month. Illustrated ..	161
Gadgets, Hints and Tips ..	164
Below the Broadcasting Belt ..	165
Jottings on the Month's Progress ..	166
What the B.B.C. is Doing ..	167

	PAGE
Continental Notes ..	168
A Micrometer Crystal Detector ..	169
The Institute of Advanced Listeners ..	170
Result of Componigraphs Competition	171

### The Cosmopolitan Nine

A special nine-valve super-  
het. in three units. 1.—  
The Detector and Oscillator  
Unit .. 112

Making a Low-loss Lead-in Tube ..	171
Catalogues and Pamphlets ..	171
Questions Simply Answered ..	172
What the Reader Thinks ..	174

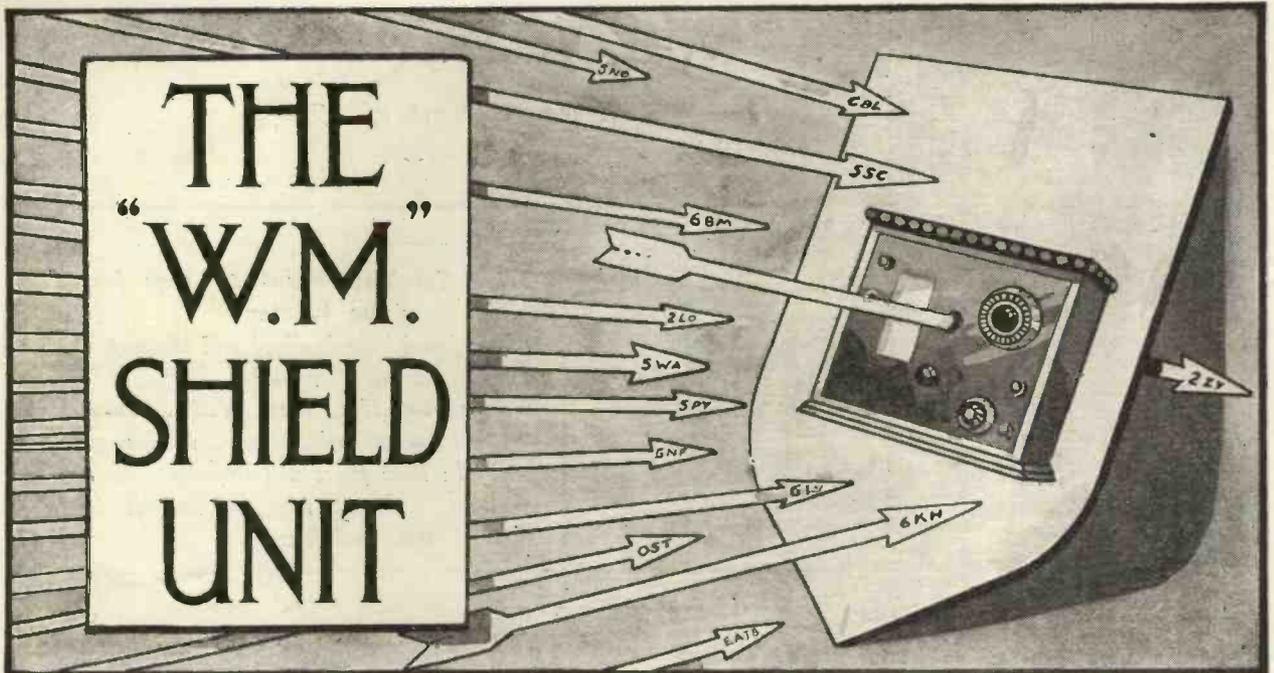
### A Novel Quick-assembly Crystal Set

A simple set of which the  
details of construction are  
clearly shown by photo-  
graphs .. 156

The World's Broadcasting ..	176
The International Set Competition ..	178
Dominion Wireless ..	180
The Buyer's Guide ..	184

**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.A. Subscriptions should be addressed to The Publisher, WIRELESS MAGAZINE.

Every Listener Must Build for Himself this Set.



ONE of the most frequent questions asked by the wireless amateur is: "How can I make my set more selective and cut out the local station?"

The answer has usually been "Change your tuning arrangement to such-and-such a circuit," or sometimes even "Use a wavetrap."

There is a very decided objection to both these replies. In the first place, the alteration of the existing tuning arrangement necessitates the re-arrangement of the interior of the set and, in all probability, of the controls on the panel. Such a course is not popular, for in many cases it might mean the purchase of a new panel and the re-wiring of the complete receiver.

Secondly, the addition of a wavetrap, although certainly increasing the selectivity, decreases the signal strength by quite an appreciable amount, and its purpose is thereby defeated. In this respect the wavetrap has been a failure.

Lastly, neither of the above altera-

tions will prevent the operator from broadcasting in all directions the resulting squeals of his efforts to tune in some distant station. The oscillation nuisance appears to be growing instead of diminishing.

Admittedly, it is very difficult to search round for distant stations without oscillating, and a squeak now

The B.B.C. and the wireless Press have both implored the public to refrain from oscillating, but with no result.

The reason for this apparent apathy on the part of the wireless public is that reaction must be used if distant reception is to be obtained, and listeners are apt to become tired of their local station.

There is only one cure, and that is to allow people to oscillate to any reasonable extent, but to prevent those oscillations from reaching the aerial, being radiated and thus causing interference.

The "W.M." Shield Unit, as we have called it, is a piece of apparatus which performs the functions set out in the following list:—

It is suitable for attachment to ANY

existing receiver.

It sharpens up tuning to an enormous extent.

It acts as a high-frequency amplifier. Stations that normally could not be received or only faintly heard can be tuned-in with this instrument.

It allows the receiver to oscillate,

*Suitable for attachment to any existing receiver, the "W.M." Shield Unit—specially designed, built and tested by the WIRELESS MAGAZINE Technical Staff—is a device that should be in the possession of every listener.*

*Not only does it make any set more selective, at the same time that it acts as a high-frequency amplifier, but it allows the operator to oscillate to any reasonable extent without causing interference to other listeners.*

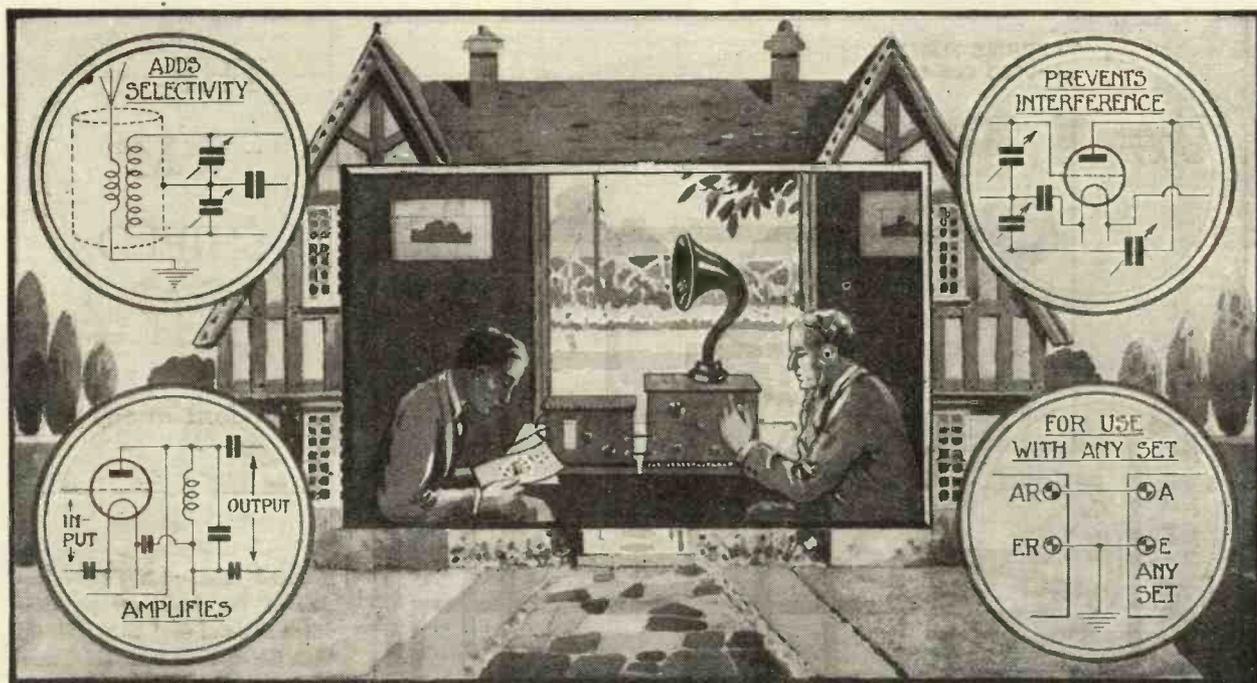
*Seldom, indeed, it can be justly claimed, has a unit so useful as this been developed for the benefit of the readers of any British wireless periodical.*

*Remember that the "W.M." Shield Unit enables you to cut out unwanted stations, amplifies the selected signal and prevents you from causing interference.*

and then would be a pardonable offence.

Unfortunately, everybody appears to be trying hard for distant reception, and the result to a listener who has settled down to enjoy some special item from his local station can only be described as devastating.

Full-size Structograph Coloured Plate Free with This Issue.



but it will not allow the oscillations to be radiated from the aerial.

The Shield Unit must not be confused with a wavetrap. The latter admits all wavelengths except a narrow band, and signal strength is more or less impaired. The Shield Unit, on the other hand, keeps out all wavelengths except a very narrow band, which it admits and amplifies before they are passed on to the receiver.

Hailing from America, the circuit makes use of the Isofarad principle in which the Wheatstone Bridge effect is employed to balance the internal capacity of the valve. Provided these capacities are exactly neutralised it is possible to feed energy through the valve only in one direction.

The valve will refuse to allow any energy to be passed back from the plate circuit to the grid circuit.

It is obvious, therefore, that while an incoming signal will be transferred from the grid to the plate of the valve and amplified in the process, any disturbance in the plate or output

circuit to the receiver, such as the receiver itself oscillating violently, cannot be transferred back to the grid circuit, and thence to the aerial.

The output circuit of the valve gives a fairly constant amplification over the broadcast wavelength band between 250 and 600 metres, and, in the present design, the instrument is

coil to the aerial coil which the neutralisation of the internal capacities of the valve could not possibly compensate.

This shield is earthed through a small fixed condenser which allows the passage of H.F. currents, but prevents the burning-out of the valve should the H.T. positive lead accidentally touch the shield.

A list of the components required for the construction of this interesting instrument is given here:—

Ebonite panel, 9 in. by 7 in. (American Hard Rubber Co., or Becol, Clayton, Trelleborgs.)

Baseboard-mounting valve holder. (A. H. Hunt or Lotus, Benjamin.)

Base-mounting coil holder. (Athol.)

Neutralising condenser. (McMichael or Gambrell.)

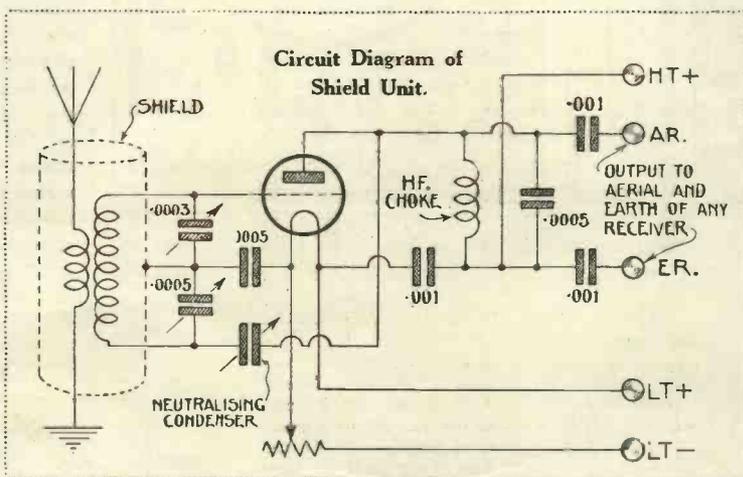
Special double-value condenser. (Ediswan.)

Vernier dial. (McMichael.)

30-ohm (approx.) filament rheostat. (Penton, or Lissen, Ormond, Igranic, G.E.C.)

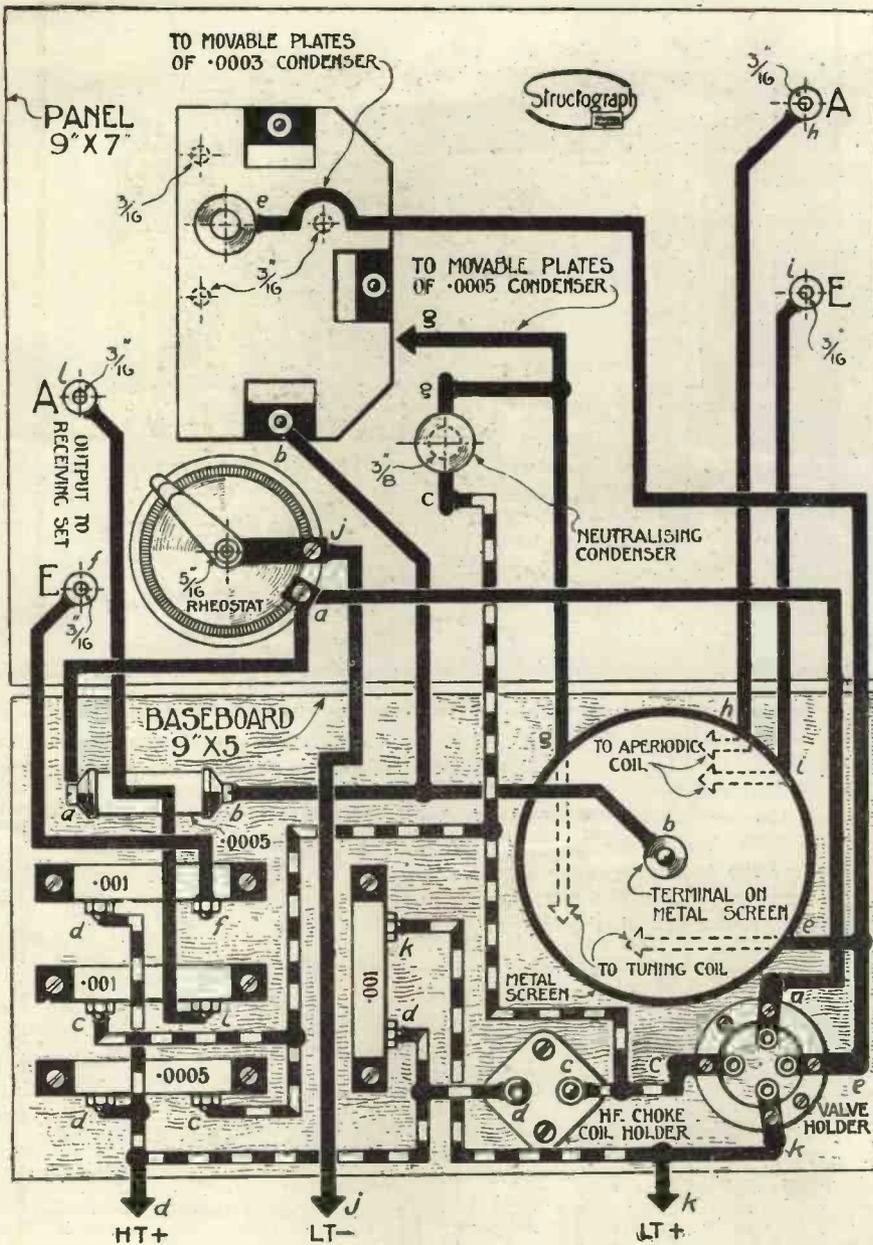
4 engraved terminals. (Belling & Lee.)

3 .001-microfarad fixed condensers. (Dubilier, or Mullard, Watmel, Igranic, Ediswan.)



only suitable for this wavelength band.

It will be noticed that the aerial and secondary coils are shielded. This is done for the reason that, owing to the compactness of the instrument, it would be possible for an energy transference from the plate

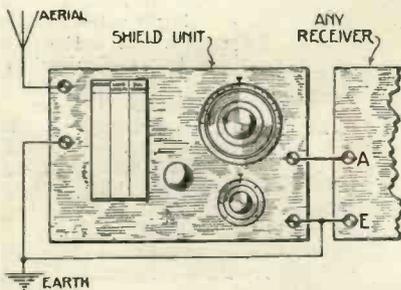


# THE "W.M." SHIELD UNIT

(Continued)

Reduced (Half-scale) Reproduction of the Structograph Coloured Plate of the "W.M." Shield Unit Given Free with This Issue. Wiring should be carried out in the order indicated by the small letters, that is, all those points marked *a* should first be connected together with one wire, or as few wires as possible, then all those points marked *b*, and so on.

Wiring should be carried out with No. 18-gauge tinned-copper wire or preferably with Glazite, which has an insulating covering of various colours. The colours can be chosen to correspond with the coloured wiring lines shown on the Structograph: for instance, red, yellow and blue wiring could be used where red, red-and-white and black are indicated on the coloured plate.



How the "W.M." Shield Unit is Connected to Any Existing Receiver, either Valve or Crystal.

When you have had your "W.M." Shield Unit in use for a week or two write and let us know what you think of it; we haven't any doubt but that you will be pleased and surprised at the improvement it makes to your existing set.

If by any chance, you come across any difficulty write to us just the same—we are always glad to be of the greatest possible service to our readers.

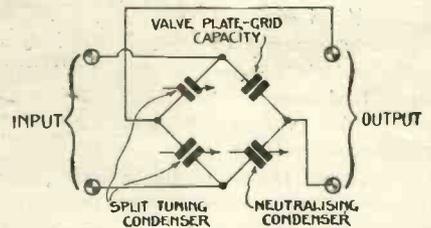
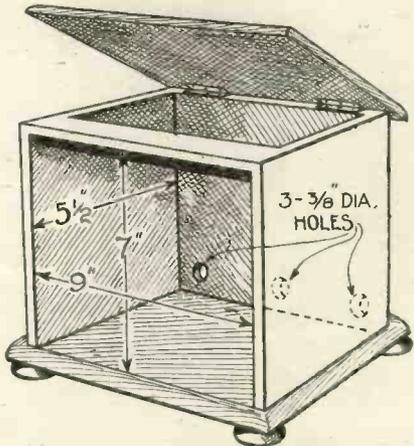
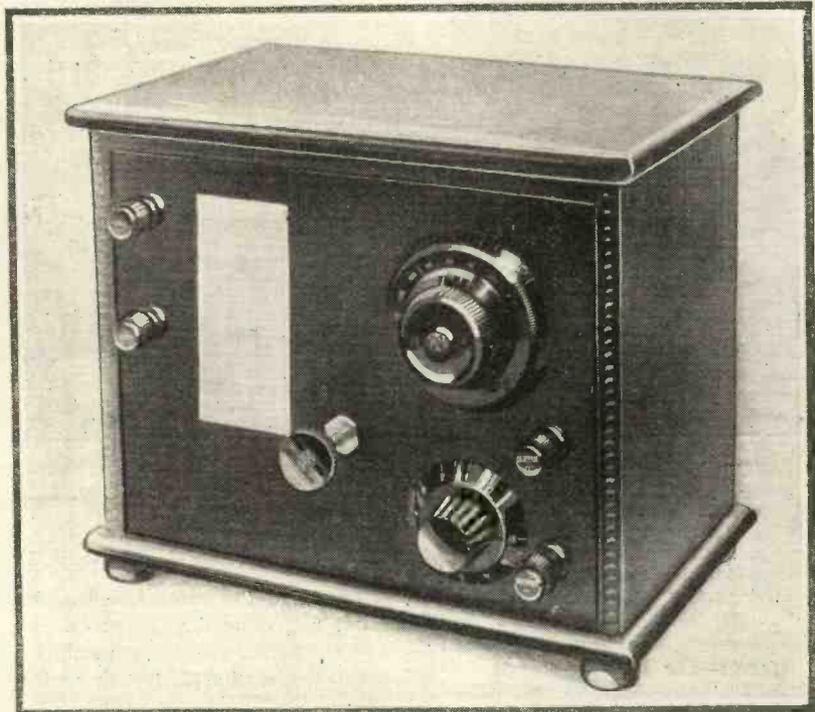


Diagram showing How Wheatstone Bridge Principle is Applied to Balance the Internal Capacity of a Valve.

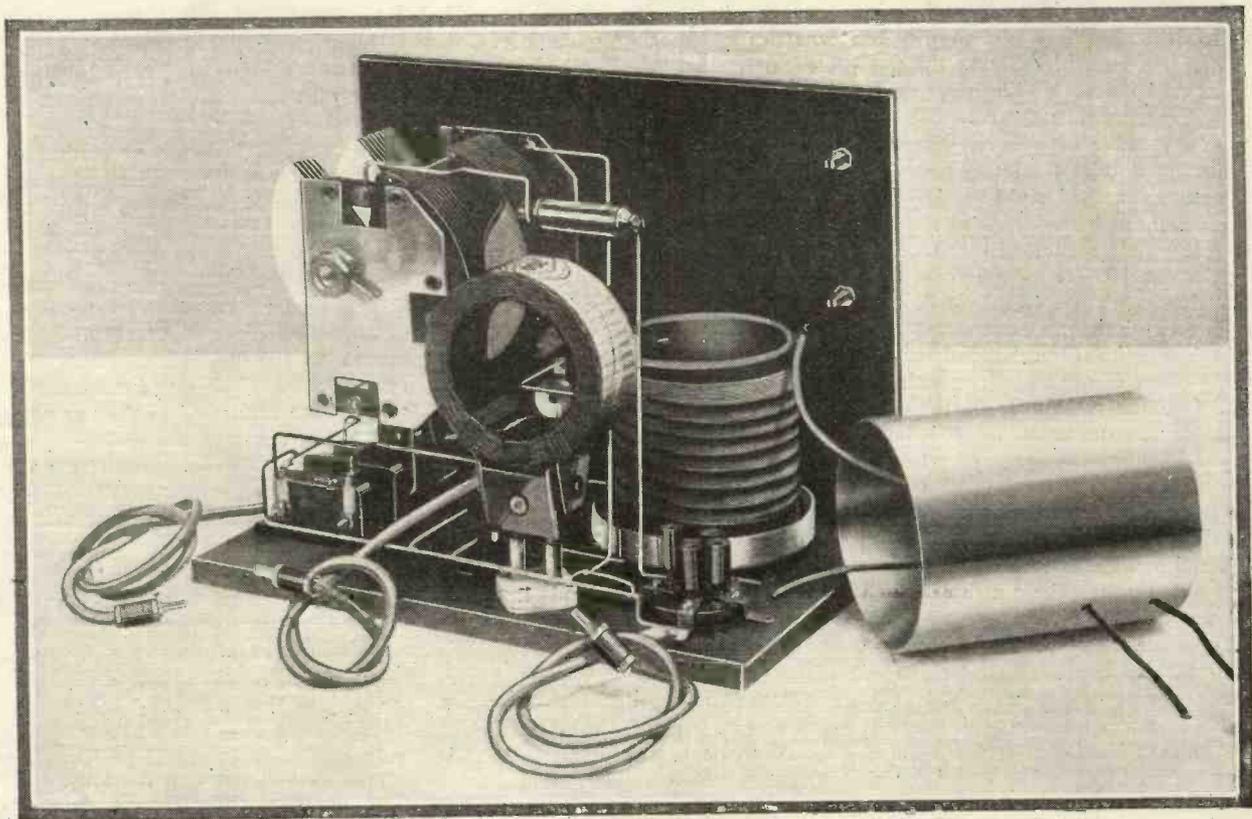


Details of Cabinet for the "W.M." Shield Unit.

**CONSTRUCTIONAL  
DETAILS OF THE  
"W.M." SHIELD UNIT**



Completed "W.M." Shield Unit with Tablet on Panel for Noting Adjustments.



Photograph of the "W.M." Shield Unit in Course of Construction.

## THE "W.M." SHIELD UNIT

(Continued)



.0005- and .0003-microfarad fixed condensers. (Wates, or Dubilier, Mullard, Watmel, Igranic, Ediswan.) Shield. (Burne-Jones.)

Cardboard former, 2 in. diameter and 3 in. long.

Cabinet and baseboard. (Unica Cabinet Co.)

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

**Construction**

The first step in the construction is to drill the panel according to the Structograph, which shows the positions and centres of the holes necessary for mounting the components.

The variable condenser, which requires four holes for fixing purposes, is mounted on the right-hand side of the panel, with the filament rheostat directly underneath. In the centre of the panel the one-hole fixed neutralising condenser is mounted.

The two input and two output terminals are bolted to the left and right edges of the panel respectively.

Before the remainder of the components are mounted on the baseboard the construction of the tuning coil should be begun. The coil is wound on a cardboard former, 2 in. in diameter and 3 in. long, having one end plugged with a circular piece of wood, through the centre of which a hole is drilled for fixing purposes.

The secondary winding is wound on first, and consists of 90 turns of No. 26-gauge d.c.c. wire, the two ends being threaded through holes in the former, leaving a free length of about 6 in. for connections.

The aperiodic aerial coil is wound over the secondary coil, and consists of 10 turns of a thick-gauge wire

(No. 18-gauge d.c.c. or insulated flex).

Holes in the cardboard former are also provided for fixing the ends of this coil, and the same free lengths are left for connecting purposes.

The completed coil is then screwed down to the baseboard, together with the lid of the shield, the fixing screw passing through the hole in the centre of the wooden plug and the centre of the shield lid.

Two holes are drilled in diametrically opposing positions in the shield itself, through which the connections to the coils are threaded. Finally, a hole is drilled in the top of the shield, to which a terminal is bolted for the purpose of earthing the shield.

With reference to the variable double-value condenser, this has been slightly modified to suit the circuit. The small knob projecting from the main dial supplied with this condenser was screwed out so that the two sets of moving plates were insulated from each other.

The complete knob and dial was then removed and the thin shaft on which the small knob was originally fitted was sawn off and a McMichael vernier dial fitted to the main spindle.

The original dial and knob, of course, may be retained if the operator makes sure that the small knob is always unscrewed.

On the baseboard, which measures 5 in. by 9 in. by 3 in., the remainder of the components are mounted, including the valve holder, anode coil holder, aerial and secondary coils, together with the shield and the five fixed condensers. The positions of

these components can be clearly seen from the photographs and the Structograph.

By closely following the Structograph wiring is a very simple matter. The Structograph shows grid, filament-lighting and plate circuits in black, red and red-and-white respectively.

Each connection is marked with a small letter of the alphabet to indicate the sequence in which the wiring should be accomplished.

All those terminals marked *a*, for instance, should be joined together first, with one wire, or as few wires as possible.

To avoid confusion, we recommend the use of Glazite connecting wire, which has coloured insulating coverings.

**Coil Connections**

It should be noted that the ends of the aperiodic aerial coil are connected to the aerial and earth terminals, while the ends of the secondary coil are connected to the two sets of moving vanes of the variable condenser, one to each. Both sets of fixed plates are joined to the shield and through a fixed condenser to the filament of the valve.

Battery connections are provided for by three lengths of rubber flex soldered to the proper leads in the set (refer to Structograph) and taken out through a hole drilled in the back of the cabinet. These leads are for connections to L.T. positive and negative and to H.T. positive.

The unit is connected up externally in the following manner: As previously indicated, the aerial and earth leads are clamped in the two

## A Special "Wireless Magazine" Design

terminals on the left-hand edge of the panel. On the right-hand edge the upper output terminal is joined across to the aerial terminal of the receiver, and the lower output terminal to the earth terminal of the receiver.

*Note that the earth terminal of the receiver should also be connected to earth.*

### *Suitable Valve.*

The choice of a valve depends on those being used in the actual receiver. If 5- or 6-volt valves are being used we recommend an Osram DE8 H.F.; for 4-volt valves, DE3B, and for 2-volt valves an Osram DE2 H.F. Other well-known makes can be used.

For the plate coil a No. 250 Igranite honeycomb type or its equivalent will be found suitable.

Having connected the unit to the receiver in the manner indicated, turn on the filament rheostats of the unit and receiver, and, by adjusting the variable condenser of the unit and tuning the receiver in the usual way, tune-in the local station.

### *Maximum Strength.*

Adjust the controls until the maximum signal strength is obtained, after which the filament rheostat of the unit is turned off, still leaving the set in a receptive condition.

Signals will probably still be heard and the neutralising condenser should be so adjusted that they become practically inaudible.

If the wiring of the receiver is too crowded difficulty will be experienced in neutralising the unit, and on the complete neutralisation depends its efficiency as an interference elimina-

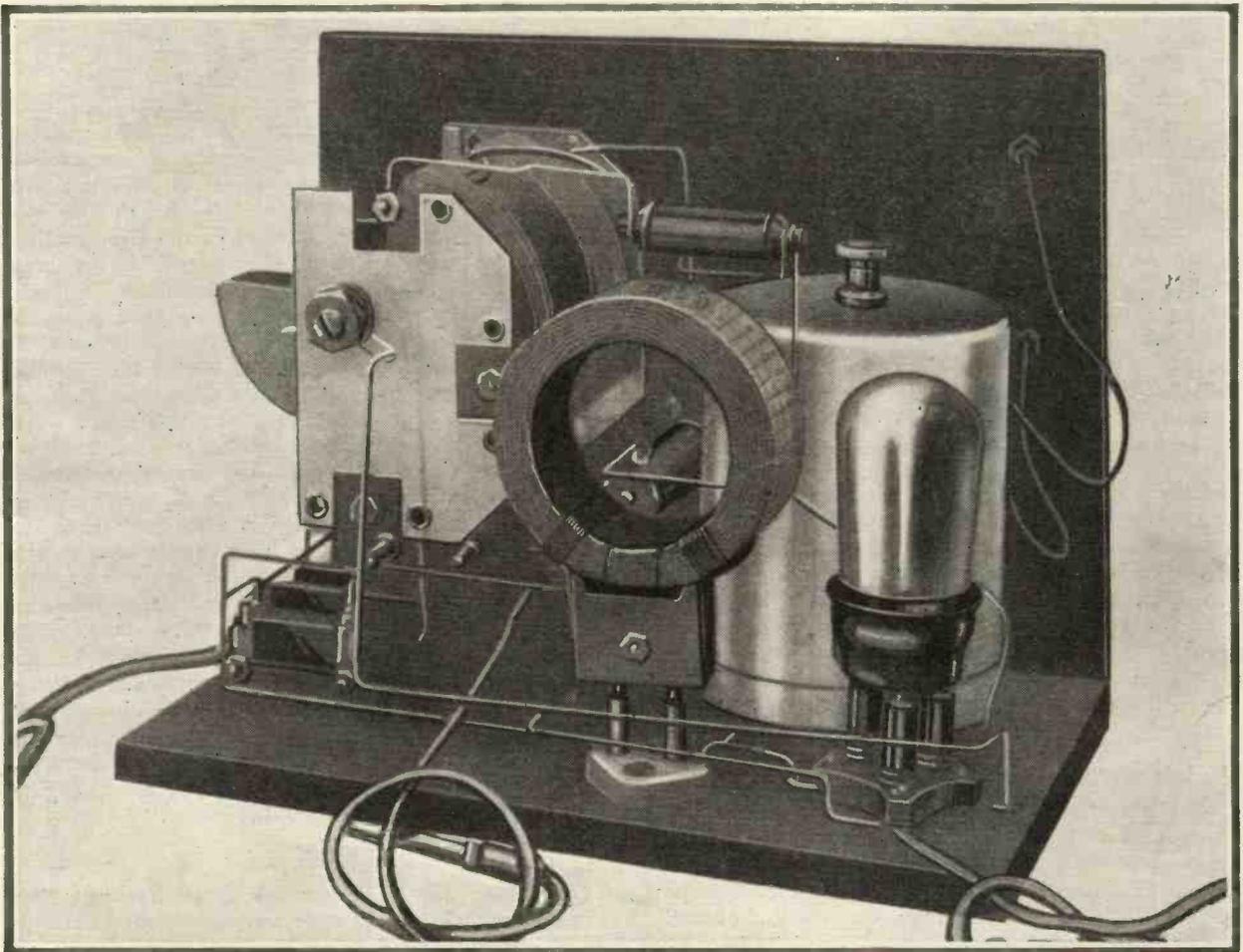
tor. Should neutralisation be found difficult we advise constructors to try spacing the components farther apart, paying particular attention to the separation of plate and grid leads.

As each station is tuned-in the reading of the dial should be noted on a slip of paper.

We have used this unit with great success and on a series of tests it was found that the interference caused by an oscillating receiver to which the unit was connected was completely eliminated.

### *Selectivity and Sensitivity.*

Selectivity is greatly increased at the expense of only one extra control and at the same time the sensitivity of the receiver was increased by an amount that made it possible to tune-in stations that, without the unit, could not be received.



Photograph of the "W.M." Shield Unit Completely Wired and Ready for Use.

# The B.B.C. As A Public Service

*This important and exclusive  
article by*

**J. C. W. REITH**

*(Managing Director, British Broadcasting Co., Ltd.)*

*has been specially written at  
the Editor's invitation.*

**T**HE British Broadcasting Company can, and does, claim that for four years it has run broadcasting as a public service. The recent Committee on broadcasting has recommended that the company should shortly be reorganised as a public service. Many, therefore, will ask themselves why it has become necessary to reorganise a public service, admittedly successful as such, into a public service.

## *New Ideals?*

Is the change (from the point of view of the listener) merely one of form, or is there some subtle implication that new ideals and conceptions of "public service" are to be substituted for those hitherto followed? Is it a case of "new lamps for old," or one of enabling the old lamps to burn more brightly?

The answer to these questions will, I think, be evident to those who have read the Committee's report. Its clear intent is that the old lamps should be retained, and, indeed, safeguarded. That, rather than any necessity for reformed administration, is the motive for the forthcoming constitutional changes; and no higher compliment could have been paid to the present Board than the recognition that it has approved a standard of practice and outlook which only an independent public Corporation, appointed by the Crown, can be sure of upholding.

## *"Public Service"*

"Public service" is primarily, in fact, a standard and an outlook, and only secondarily a form of administration. Administratively, any big and complex organisation may be good or bad—smooth or bureau-

cratic, alert or devoid of vision—irrespective of whether the ends it subserves are public or private ends; and whatever corrective to inefficiency there may be in the (not seldom over-rated) "stimulus of competition" does not in any case apply to British broadcasting, which admittedly must form a unified system.

As regards administrative efficiency, therefore, there is no need to suppose that the change from indirect to direct public control will involve retrogression. It should, and must, be obviated. On the contrary, the support and confidence that the Government (any Government) will accord to a publicly appointed Corporation is necessarily fuller and more effective than that which a Government department can accord to a public-utility company of commercial origin working under its control. And, administratively, fuller support ought to mean either increased financial resources or greater freedom in their allocation and employment, or both.

## *Need of Funds*

Actually we are most anxiously concerned that the funds contributed for the purpose of the service will not be withheld from us. There seems a danger of this happening in considerable degree.

As I have said before, administrative efficiency, however we look at it, is only the means to an end. It is the end—"public service" in the major sense—that is primary. And yet there is an intimate interplay between end and means.

Dante teaches that, in this primary sphere of purpose, all effort both of will and of intellect ceases when their activity is at a maximum; just so, in

the secondary sphere of machinery, the tractive effort required of a locomotive is minimal when the train has reached full speed.

Perfection, indeed, is unattainable, and even a convergent approximation to it is very far ahead of us yet; immense and not yet measurable efforts of will and intellect, of material push and pull, have still to be put forth, for in both domains we are only at the beginning.

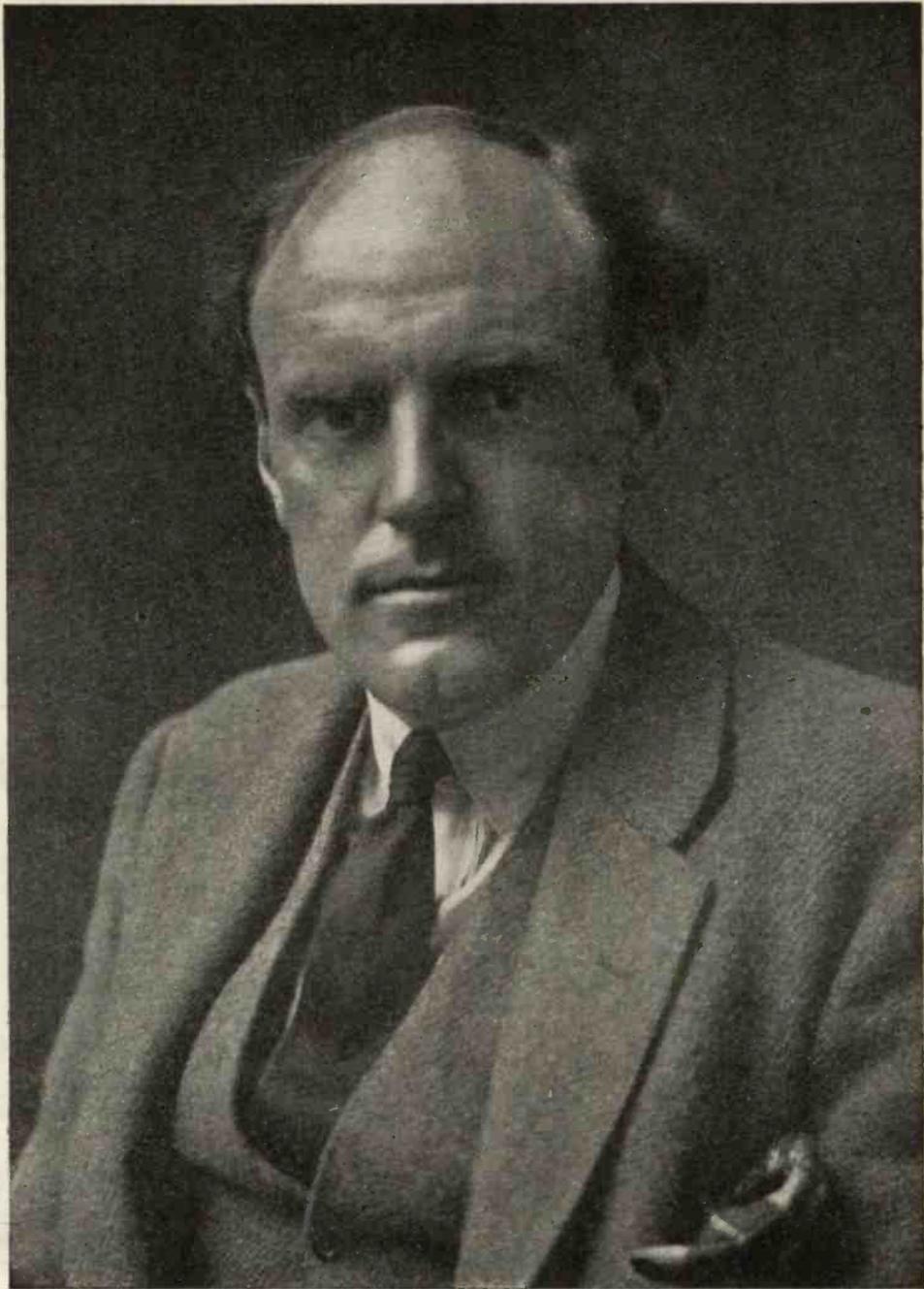
## *Overcoming Inertia*

In our most confident moods of retrospect, we of the B.B.C. hardly claim more than that we have overcome the starting inertia. It would seem—judging by some of the evidence given before the Broadcasting Committee—that we have not even overcome all of that.

But, however they interact, spirit and system stand to one another as prime mover and machine. In the case of broadcasting, the prime mover is—adapting Nietzsche's phrase—the "Will-to-serve." It is an insistent will, perhaps, like most emanations of the European soul. It is much more positive than a mere willingness to please, and it inevitably leads to our being criticised as being possessed of another Nietzschean devil—the "Will-to-power." One of the objects of the coming reconstruction is, we trust and believe, to allow a wider scope for the "Will-to-serve." Another may be to eliminate in advance the possibility of the microphone being employed as an engine of the "Will-to-power."

## *No Exclusivity*

Let no one suppose, however, that because we are imbued—and strongly imbued—with the will to serve, we



*J. C. W. REITH*  
*Managing Director,*  
*British Broadcasting Co., Ltd.*

## The B.B.C. as a Public Service (Continued)

claim for ourselves any exclusivity in the right to serve. Our medium, indeed, is peculiar. It is able to transcend frontiers, to annihilate time-lag, to reach the intimate fire-side, to speak in the ear of the sick, to raise the hue and cry over a continent.

Technically it is of such subtlety that its operation can only be figured, never shown—of such range that even low-power stations must not talk in the same frequency unless separated by many hundreds of miles—and of such frailty that reception may be spoiled by a neon advertisement or a leaking power-main in the listener's neighbourhood.

### Uniform Control

These peculiarities necessitate not only control, but control on a uniform system, and according to a uniform policy—at any rate within the limits of a state of normal European size—for without such uniformity there is neither due responsibility for "what goes out," nor binding law against mutual heterodyning by stations, nor effective aid to the listening public in other troubles.

But, with all this, radio broadcasting is far too big to be the concern merely of those who are in charge of the microphones and the transmitters. They have no monopoly of the public-service outlook, which should be—and eventually will be—common to all who initiate, transmit, or facilitate the reception of broadcast programmes.

Besides the managing authority, the statesmen, lecturers, artists and preachers, the engineers, manufacturers, traders, amateurs and technical journalists—all collectively are, as it were, producers to whom the millions who listen stand in the relation of consumers. It is production—output—that serves the public.

### No Officialised Broadcast...

The broadcasters (in this wider sense of the word) could never be officialised even if the managing organisation became so—for, widely varied as are listeners' tastes and needs, they are not more varied than artists' talents, speakers' subjects, preachers' modes of appeal and newsgeters' "stories."

In all this diversity it is useless to

look for any administrative unity. What we can and must aim at is unity of outlook, the idea of service as a ruling principle for all concerned.

It is not an unattainable ideal, but much remains to be done before it is realised on any large scale. Rarely, if ever, has a new mode of disseminating information or entertainment created such alarm and hostility in the circles of vested interests as broadcasting did in 1922-3. Even now, in 1926, some of the opposition remains recalcitrant.

To be fair, it should be added that a very small part of the opposition rested upon artistic misgivings; but it is equally fair to ourselves to say that the greater part of the opposition was, and is, based on motives of self-interest. One imputes no blame for this, for it must be remembered that the public-service conception of broadcasting has only become familiar through experience, and even now awaits Parliamentary sanction before it is formally stabilised.

But I do suggest that the time is ripe for a change of outlook on the part of those interests that still remain suspicious, aloof or over-exigent. For they too, according to the wider conceptions of to-day, are—or should be—broadcasters.

### Wider Conceptions

In other fields, also, these wider conceptions are bound to make their influence felt presently. One of these is the "controversial" talk subject. During the years of probation, and before it had been demonstrated that the very power of the microphone developed the habit of caution in those who used it, it was hardly to be expected that the licensing authority would concede an uncensored freedom to the exploiting company; and even now, probably, that freedom of discretion would not be given save to a body that was at once public and non-partisan.

But, happily, a place has been found for such a body in our elastic constitutional system, and with its creation the question of controversial topics takes on an altogether different aspect. For, while the use of the microphone to aid and abet a "Will-to-power" must be prevented, it is

doing the public not a service but a disservice to withhold from it the non-partisan review, the neutral-ground debate, or even the party leaders' pronouncements, on the question of the day. Indeed, with a press organised, as ours is, on party lines, broadcasting may often be the only medium by which the problems of our collective life can be presented fairly and clearly to the community as a whole.

### Flexibility of Institutions

Difficulties of exactly the opposite kind have been prophesied by some of our candid friends over the new authority's presumed ability to deal with the individualism and "temperament" of artists. But I suggest that in this matter, as in some others, Cassandra has failed to allow for the flexibility of our institutions.

The prospect of a governmental assessment and classification of, say, entertainers as "singers, comic, female, Class II" and so forth, is so absurdly remote as to be a fit subject for harmless fooling.

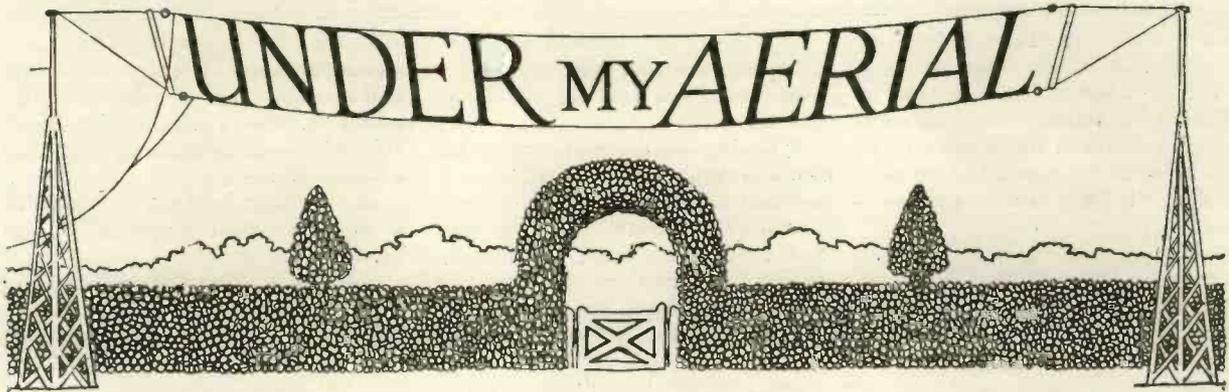
As I have said already, in broadcasting affairs administration is secondary to outlook. The artist's gifts, in whatever form they come out—the tragic, the grave, the dainty, the comic—have no meaning apart from the service of his fellow-men. But in that service, so far as we are concerned with it, there is room—as there is need—for almost all the talents.

### Mechanical Limitations

Not for all, of course, on account of the technical limitations of our medium, and the characteristic conditions of home listening. But though there may be gaps in the series, the range of the possibilities extends, like the range of human moods, from the sublime to the simple.

We do not forget that our medium is itself one of the sublime wonders of the universe and not to be vulgarised. But we have read, and marked, the moral of Anatole France's beautiful story "Our Lady and the Juggler."

## Halyard's Chat on the Month's Topics



### Group Programmes

WHEN are we going to hear a trial run of those new grouped-stations programmes in which each group of stations would use the same programme and the same wavelength and so make our choice of type of programme a mere matter of wavelength adjustment?

The idea seems to me a most entertaining one, and I have been looking forward for some time to the preliminary tests.

Do you remember the details of the scheme? As far as we listeners are concerned it would mean that, if we wanted a programme of jazz and



A talky-talky night.

such-like music, we should have to chance our arm (or rather hand) on three hundred metres, say. If we wanted classical music we should have to tune-in on three hundred and fifty metres, say. Similarly, if we wanted an educating talky-talky evening, we should adjust our dials to four hundred metres, say. The latest broadcast play would be obtainable on four hundred and fifty metres, say, and, if we desired John Henry, the Vicar, The Roosters, or some other entertainers, we should put our controls to the five-hundred metre mark, say.

What interested me most about the scheme was the probable way in which the main broadcasting stations would be grouped in order to cover as much ground as possible with each group and therefore with each type of programme.

I have tried various groupings of the main broadcasting stations, and

I do not see how you can get more than three groups with those stations. Even with only three groups, you cannot cover the ground very thoroughly.

My best set of three groups each containing three main broadcasting stations was as follows:—

1. London, Manchester, Glasgow.
2. Cardiff, Belfast, Aberdeen.
3. Bournemouth, Birmingham, Newcastle.

What is your best set?



### The Happy Medium

Has it ever struck you how difficult it would be for an announcer, when speaking by simultaneous broadcast through all stations, to please everybody over the matter of his pronunciation of our English language?

Usually, an announcer speaking through all stations from the London studios adopts the pronunciation peculiar to southern England, and talks in this fashion:—

*Corlflars are now ovah, but the kab-barge is rapidly kumming to the frunt in the Lundun rest-o-rarnts.*

With such a pronunciation,



Apt to be sarcastic.

listeners in the North are apt to be a little critical, if not a little sarcastic.

Suppose, however, that the announcer pleased his northern listeners by speaking in this manner:—

*Collyflours are now over, but the cab-bidge is rapidly kumming to the frunt in the Lundun rest-yer-ants.*

Why all the listeners in and around London for miles would arise in their anger and telephone to Savoy Hill.

Perhaps the above two examples are a trifle extreme as illustrations of our different pronunciations, but they serve to show the need for a happy medium in our pronunciation of the English language.

I am glad that the B.B.C. is trying to find such a happy medium. There is no better vehicle for the spreading of a standard pronunciation of our language than our broadcast system.



### Lightning and Atmospheric

An American wireless scientist, who has made an extensive study of



Look for a flash—then listen.

the effect of lightning on wireless reception, suggests that valuable work may be done by any listener who will watch for lightning flashes and note the resultant atmospheric in his receiving set.

If you want to carry out an investigation of this kind, all you have to do is to place your wireless set near a window when there are thunderstorms about, put on your phones, switch on, look for a lightning flash, and then listen.

No, it is not quite as dangerous a game as you might think. Of course, if you use a loud-speaker, you need not move the receiving set at all, but just go to the window yourself.

With a loud-speaker, there is practically no danger to the observer provided he keeps well away from the set. Still, even with a loud-speaker I should not let the storm come too near before turning over the earthing

## Under My Aerial (Continued)

switch to safety. The set might get a nasty wallop, you know.

I have often listened to the approach of a thunderstorm as shown by the increase in the severity of the atmospheric to be heard in my loud-speaker. I have always made it a



A crackling growler.

rule, though, to switch off as soon as ever I could see a flash of lightning.



### A Meteorologist at Home

Speaking of atmospheric reminds me that when I called on my meteorological friend last Friday evening I found him sitting before his three-valve set with his phones on.

Nothing unusual about that, you say. Wait a minute, though. First of all, my meteorological friend does not like phones, he hates them—they make his ears hum like the engines of an aeroplane. He invariably uses a loud-speaker.

Secondly, there was a thunderstorm raging in the vicinity. So near was this thunderstorm that you could occasionally see the zigzag path of the real lightning. In fact, it was because of this thunderstorm that I had switched off and gone round to see my friend of the "Weather Brewery," as F. W. Thomas so aptly calls it.

My friend was too occupied with his listening to take any notice of me, so I sat down in a chair close to him and his set. He was amusing himself making pencil lines on a sheet of squared paper.

Suddenly, there was a loud crash of thunder and a real nasty noise in my friend's phones. So loud was the noise in the phones that I thought my friend of the weather forecasts must have received a nasty smack. However, he reassured me by taking off the phones and speaking to me.

"Rather a nasty one that last one, wasn't it?" he asked.

"Decidedly," I replied. "Was it a hiss, a crackle or a growler?"

"I think it was a long drawn-out hissing crackle."

"It sounded to me more like a crackling growler. You're a very brave man, you know."

"In what way?"

"Daring to listen-in when there are thunderstorms so near."

"But I am helping in an investigation into the range of atmospheric, and I really must not fail to carry out my observations on a Friday evening, you know."

Funny what a lot of risks some people will take in the cause of science, isn't it? Anyhow, good luck to them, especially to my old friend.



### What's New?

I have been trying to find out from various sources what new component parts are likely to appear in large numbers in the wireless shops this coming autumn.

So far, I have obtained very little evidence of the likelihood of there being any really new wireless instruments to tempt us during the next few months. Everything goes to show that the great



Improvements are always taking place.

feature of the autumn and winter will be that we shall reap the full benefit of the many improvements which have been made this year in the design and manufacture of the old, familiar component parts.

To take one example, the variable condenser: if you compare the new autumn variable condensers with the condensers you bought only a year ago, you will see what wonderful strides have been made the last twelve months in manufacture.

As you know, improvements are always taking place in the design and manufacture of valves, and, during the coming autumn, we shall not be disappointed in the number of new types of valve which will be put before us when we wish to make a valve purchase.

Really novel wireless innovations are about as scarce in America just now as they are here in England. I

have been glancing through the advertisement pages of the most recent American wireless periodicals to-day, and I have been well repaid for my trouble by a discovery of the following innovations:—

(i) "Wiring harness," a kind of insulated cable to be used for connecting up a set;

(ii) A novel form of "capacity element" (variable condenser);

(iii) A "doughnut coil" (toroidal); and

(iv) A "reel" aerial.

The last of this "lil' bunch" is a copper-ribbon aerial which winds in and out of a case in the same way in which a measuring tape winds in and out of its leather case. The price, however, of this reel aerial is a trifle on the high side, being five "beans," the equivalent of a "Fisher."



### Tonics

When a wireless receiving set shows signs of being "run down a little" what is the best tonic to administer to it?

Yes, I can see you shaking your head and looking very wise while you say to me:—

"It all depends."

"Depends on what?" I ask.

"Er—well," you reply, "er—if—er—the high-tension battery has been in use a few months, the best tonic might be a new battery."

"Good," I reply, "but how about gingering the old battery up with a few new flash-lamp batteries, or a new fifteen-volt unit? The effect might be just as good."

"It might not be as lasting," you rightly say.

"Supposing, though, the voltmeter



Tonics.

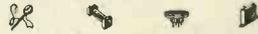
shows the high-tension battery to be full of beans, what about a tonic then?"

Rather a difficult question, the last one, isn't it? Assuming a new high-tension battery is not required, there are so many tonics to try.

First of all, I suppose, one might

try a new valve. If you are like me, though, you are by no means given to purchasing new valves on the off-chance of improving your reception.

Other possible tonics are:—A new accumulator or a new charge to the old accumulator, a new grid condenser or leak, and last, but not least in importance, a new aerial or earth, or both.



### Cum Grano Salis

"Do you consider it a good plan to pour a quantity of salt water over your earth, George?" I asked the other evening.

"Certainly," George replied, "provided it is fresh."

"Don't be silly, George. How could salt water be fresh? There's salt water in the sea and fresh water in the river, but there is no such thing as fresh salt water."

I thought I had him for once, but he replied:—

"Oh! yes, there is."

"Where is it to be found then?" I asked.

"It is not to be found. You make it," he replied.

"How do you make it then?"

"By dissolving common salt or sodium chloride in common water or aitch-two-oh with a little common sense. If the salt has only been dissolved in the water a few hours, say, it is fresh salt water. See?"

"You're quibbling, George, in order to evade an answer to my question."

"Nothing of the sort. If you pour fresh salt water over your earth, you improve reception. On the other hand, if you pour old salt water over your earth, you increase the coefficient of damping."

"Does pouring fresh salt water over your earth really improve reception, George?"



The old salt in the water.

"Rather, and then some. I know a man who did wonders by pouring fresh salt water over his earth. Every day he measured out his little dose and—put it by. When he had saved his daily dose for a whole year, he made up a gallon of solution and poured it over his earth.

"The result was remarkable. With a simple crystal set, he picked up in one evening all the B.B.C. stations, main and relay, thirty-eight Continental stations, and five hundred and forty-one American stations. He would have added considerably to his already large bag had his earth not put a stop to his reception by trying to jump over his aerial."

"George, my boy, you ought to write books, you really ought. If only you could develop your imagination a little, you would achieve fame as the Baron Munchausen of wireless."



### The H.T. Nuisance

For the last week or two, the high-tension battery has been my biggest wireless nuisance—not my own high-tension battery, for that has been behaving quite nicely, thank you, but high-tension batteries belonging to other people.

You see, it is like this. A few months ago I advised three beginners in wireless about their high-tension batteries.

I told them that, with care, their batteries should last from six to twelve months.



Beginners in wireless.

Now the three of them have been complaining to me recently that their high-tension batteries have petered out after only a few months' service, whereas I told them that the batteries would last a year.

I asked each one of the three how many hours a day they used their sets, and the reply in each case was "about five or six hours."

How can anybody expect a high-tension battery to last for six months when it is in use daily for six hours or more?

I think, in future, when I am asked by a beginner in wireless how long his high-tension battery will last, I shall do the usual rough calculation and divide the answer by two. Then perhaps I shall get a little bit nearer the truth for these good wireless folk who work their sets so much.

Yes, it is an excellent idea to give half the usual answer in these cases.

### Earth's Charge

A good deal of speculation is being made these days in scientific circles as to the effect of the earth's magnetic and electric forces on wireless transmission and reception.

Being a little hazy on the subject of the earth's magnetic and electric forces, I asked my meteorological



The "bar" type.

friend to give me the latest information.

"I suppose you know that the earth acts as a huge magnet of the bar type," he remarked.

"Yes, the isobar type," I suggested humbly.

My suggestion was repudiated with a scornful look and my meteorological friend proceeded:—

"In addition to its being a great magnet, the earth possesses a negative charge of electricity. This negative charge on the earth and the positive ions of electricity in the atmosphere attract each other and so a current is caused to flow from air to earth. How this air-earth current is maintained is an unsolved mystery."

"Surely, though, there is a theory, is there not?" I asked.

"There have been two theories, both of which have failed to hold water."

"Electricity, you mean."

"It is immaterial. The first theory was that rain restored the balance by bringing down negative electricity. Observations showed, however, that rain brought down positive electricity more often than negative electricity."

"So the rain theory was a wash-out," I remarked as I helped myself to an acid drop.

"Yes, it did not reign for long."

I passed my meteorological friend the acid drop to which he was entitled and he went on:—

"The second theory was that lightning brought down negative electricity and so maintained the earth's negative charge."

"That sounds a likely enough theory," I remarked.

"So it does, or rather did, until

## Halyard's Chat on the Month's Topics

observations proved that the electric charge brought down by lightning is as often positive as negative."

"What is the effect of the earth's magnetic force and the earth's electric charge on wireless?"

"That is not a fair question to ask me. I am a meteorologist, not a wireless expert."

For myself, I thought it a *fine* question to ask him, but there you are, you see, one never knows, does one?



### Broadcasting Overseas

A fortnight ago to-day a near relation of mine left us to try his fortune



Thoughts of home.

in New Zealand. A week ago to-day a family I know set sail for Regina, Canada.

These two departures coming so quickly one after the other made me think what an excellent thing it would be if we had one high-power long-distance broadcasting station here in England, capable of reaching out consistently to those distant lands where are so many of our friends.

I have lived in the province of British Columbia for a while, and I spent the greater part of a year in Ottawa, Ontario, and I know what it is to long for a sight of dear old England, thousands of miles away.

The next best thing to a sight of England, when one is far away across the seas, is a voice from the old country. I can imagine the effect of hearing speech from London on an emigrant listening-in in some lonely spot on the great prairies of the Dominion of Canada.

Apart from the joy such a high-power long-distance broadcasting station would bring to those overseas, I think such a station would make our broadcasters do even better than they do now.

I have had the great pleasure of speaking from two of our main broadcasting stations some little time ago. I know what it would have meant to me if I had thought that my many

friends the other side of the Atlantic had been able to hear me.



### District Wireless Numbers

Where does your district figure in the wireless championship tests in which the determining factor is the number of aerials per number of houses?

Perhaps you may not be able to make an exact count of aerials and houses, but you must have a rough idea as to your "district wireless number."

I think that the district wireless number of my own particular district must be somewhere round about one in ten. That is to say, on the average, there is one aerial to every ten houses.

For the road in which I live the number is one in six, mine being the only aerial in a short road containing six houses.

Rather a low district wireless number, one in ten, isn't it? I don't think I shall write to the wireless papers about it. All the same, I consider it a very satisfactory district wireless number, and I am not in the least perturbed at its comparative lowness.

You see we happen to be between forty and fifty miles away from the nearest broadcasting station, and, although the experienced wireless



Rather low in our district.

enthusiast can pick up the high-power station and one or two of the main broadcasting and relay stations on a simple crystal set, the crystal receiver is not a practical proposition for the broadcast listener.

Before I came to live where I am now I was in a district within fifteen miles from 2LO. The district wireless number for that locality must have been something like four in five. There were very few houses without aerials in those parts.

All the same, as regards wireless reception, I prefer my present district with its low district wireless number. There is so much less interference from oscillating receivers.

### The Record

Being very full of interest in this matter of a wireless district championship, I discussed the thing with George, who, as you know, is my hundred per cent., and then some, technical adviser on all matters appertaining to wireless.

"George," I said, "there is a village in Rutlandshire in which there are twelve houses."

"You mean eleven houses and a pub.," said George, who has travelled much and far and will yet go farther.

"It is of no consequence," I said.

"The important thing is that there are twelve houses in this village and eleven of those houses have wireless



The record.

sets. Pretty good, isn't it? Eleven houses with wireless out of a possible twelve."

"Fairish," said George.

"I suppose you know that, as good a record as it is, it has been beaten."

"Indeed?"

"Yes. In a certain parish in Oxfordshire every house has a wireless set. That is a record, of course, which cannot be beaten."

"I do not agree with you. That record can be beaten."

"But it cannot."

"But it can. Get your hat and come along with me and I'll show you."

George took me a short walk of half a mile or so and pointed at a house standing at a corner between two roads. It was a fairly large house.

"Count the aerials," said George.

"How many do you make of them?"

"Four," I replied.

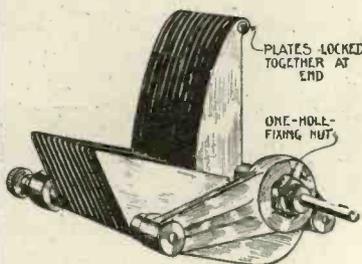
"There you are then, four aerials to one house. That beats your Oxfordshire parish with its one aerial to a house."

I had to admit it. There is no getting round George on matters of wireless.

Perhaps I ought to say that subsequent inquiry showed that there were four different families living in four separate sections of George's record-breaking house.

HALYARD.

# Novelties and New Apparatus Tested and Approved by our Technical Staff

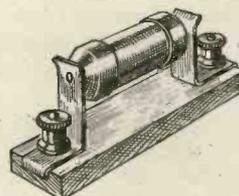


Mechanically well constructed, the new Raymond straight-line-frequency condenser will prove useful to many amateurs who want a good component at a low price.

The plates are of aluminium, as are the end pieces, which are cast.

These condensers are made by K. Raymond, of Lisle Street, W.C.2.

Wound with wire and thus having a constant resistance, Varley Bi-duplex anode resistances are made of 60,000 and 100,000 ohms value.



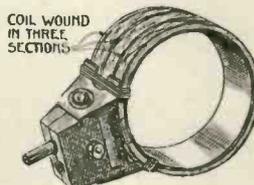
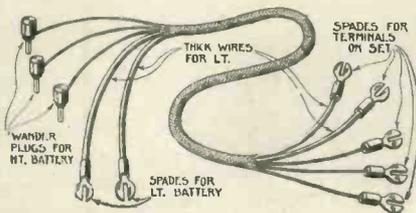
Each resistance is supplied with an ebonite base and clips.

The manufacturers are the Varley Magnet Co., of Bloomfield Road, Woolwich, S.E.18.

Of particular interest to those who wish to keep their sets tidy are the Lewcos battery leads for H.T. and L.T. connections.

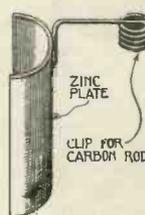
The H.T. leads are so arranged that two different voltages can be tapped off.

The London Electric Co. and Smiths, Ltd., of Playhouse Yard, Golden Square, E.C., are the manufacturers.



It is claimed for the new Igranic triple honeycomb coils that the self-capacity has been considerably lowered and that the high-frequency resistance has been reduced. The address of the Igranic Electric Co., Ltd., is 149, Queen Victoria Street, E.C.

Old dry cells can be easily converted into wet H.T. batteries by the use of zinc plates like that illustrated. The carbons from old cells are screwed into the spring clips

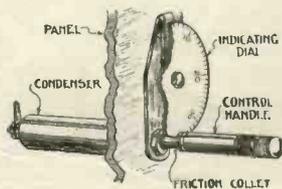


and thus the elements for the new wet battery are already connected in series. Cole & Vincent, of 147, Barclay Rd., Walthamstow, E.17, make these zinc plates.

Having a capacity range of approximately 2 to 38 micro-microfarads, the Gambrell Neutrovernia condenser is particularly useful where very fine capacity adjustments have to be made.

A particularly neat indicating dial is supplied for use with these condensers. It is of the direct-reading type and is attached directly to the condenser.

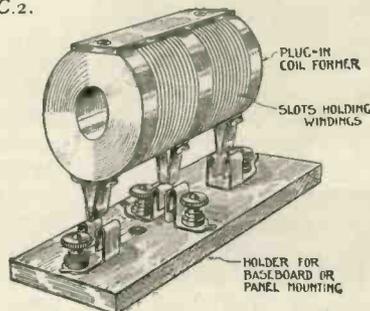
The manufacturers are Gambrell Bros., Ltd., of 76, Victoria Street, S.W.1.



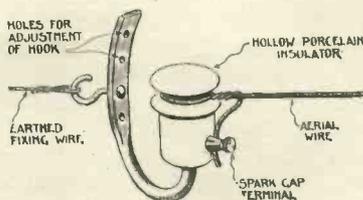
Although they have been on the market only a short time, Dimic coils are already well known amongst amateurs.

The number of coils has now been extended to cover a wavelength range of approximately 65 to 4,600 metres when used with a .0005-microfarad variable condenser.

The makers are L. McMichael, Ltd., of Hastings House, Norfolk Street, Strand, W.C.2.



Tending, by virtue of its design, to remain upright, the under surface of the Sarbolt aerial insulator also remains dry and eliminates surface leakage due to damp.



It will be seen that holes are provided for adjusting the insulator according to the slant of the aerial.

The manufacturers are the Hatton Supply Co., of Hatton, Middlesex.

# Educated by Wireless - Unawares!

THE compliment paid by one of our old essayists to a famous woman, when he said that "to have loved her was a liberal education," may be applied to the wisely cultivated love of wireless.

Looking back on the stages traversed in a country home by the unscientific members of the family in their discoveries in this marvellous new world, one observes three phases through which probably the majority of listeners has passed:—

(1) An attitude of hostility towards a nuisance, tempered by pity. This coincided with early efforts with crystal and Eiffel Tower reception.

(2) An amused trifling with a toy to be lightly flung aside. This went with our first valve and local station.

(3) A genuine wonder and delight in a thing to be taken seriously and gratefully. This goes with most regular drawing-room reception.

But as a fourth step the further discovery remained to be made that we are being educated unawares besides, and that without effort and irrespective of age.

This does not refer to the regular afternoon transmissions to schools, but to the informal education which is proceeding apart from anything scholastic, and in the widest sense of the word.

The younger members of a family are so ready to take flight at the mention of education, that the word itself is to be kept in the background. To be caught with the phones on is one way.

It is to be observed that the difficulty of getting them put on at an important point in the programme is about evenly balanced by a reluctance to remove them.

This latter often results in a talk, of which the announcement appeared uninviting in cold print, being swallowed by the curiosity inspired by

the living voice, particularly if it happens to possess personality.

The fact is that parents, living a retired country life, and inclined to lose touch with things, are more eager to listen than are their children.

If anyone had proposed that they should receive a course of instruction in serious music at their age, they would have regarded as absurd what

music be advanced to a valuable extent, the contribution of the wireless set to his education is complicated when he is electrically inclined, and he is liable to be less interested in the matter received than in performing stunts with the adjustments.

From the standpoint of domestic peace it is not advisable to possess a home-assembled wireless set for youth to experiment with; whilst

it is also questionable whether it is suitable from the science master's point of view, because adjustments have unaccountable ways of acting which may conduce to confusion of training.

Personally the murmuring morse in the background attracts me, sometimes to the exclusion of the rest, and in reading fragments of it I sense the transoceanic atmosphere of coast stations and liners, which has something of the tonic effect of the sea itself.

In the broader sense of the word education we are having our interest awakened, sympathy widened, and our lives given a more vivid contact with the world by the listening-in habit wisely used.

Beyond this there is the fostering of corporate education, by linking us all up in a national and international fellowship, and inspiring peace and goodwill.

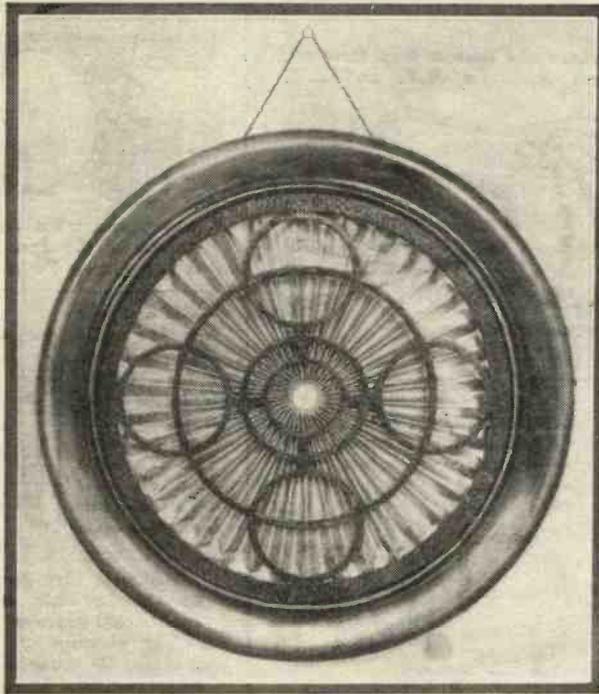
The yet higher value of broadcast preaching is be-

yond the scope of this article, but must be thankfully reckoned in our debt to the men of vision and faith who control the B.B.C. How admirably they have contrived to make entertainment and instruction go hand in hand with a high moral and religious tone has been lately testified in the *Times*, by two such "grateful listeners" as Lady Harrowby and Lord Wolseley.

And we are on the way to the realisation of yet grander things on the eve of great developments in world-broadcasting.

J. E. Y.

NOT A FRAME AERIAL—



—but a carefully-designed loud-speaker!

they now find themselves undergoing.

The same applies to the revival of our interest in English and French literature, and in history rendered to us in dramatic form.

Pupils learning music, singing, French, and even German, can all get helped along their way; and this year, besides the classes for schools now regularly organised, university lectures are being broadcast or "forecast."

Though a musical boy may delight in listening-in, and his knowledge of

# BECOMING A WIRELESS ENGINEER

*A special article, that should be read by all those who are interested in wireless engineering as a career, written for the "W.M." by J. F. JOHNSTON*

**T**HERE are numerous courses open to the amateur who wishes to turn professional, but before you decide to take up some branch of wireless work as a profession you should make sure that you are really interested. It is all very well to play about with a receiver occasionally and tune-in the different broadcast stations; it is quite a different thing to have to do a particular job day in and day out for years on end.

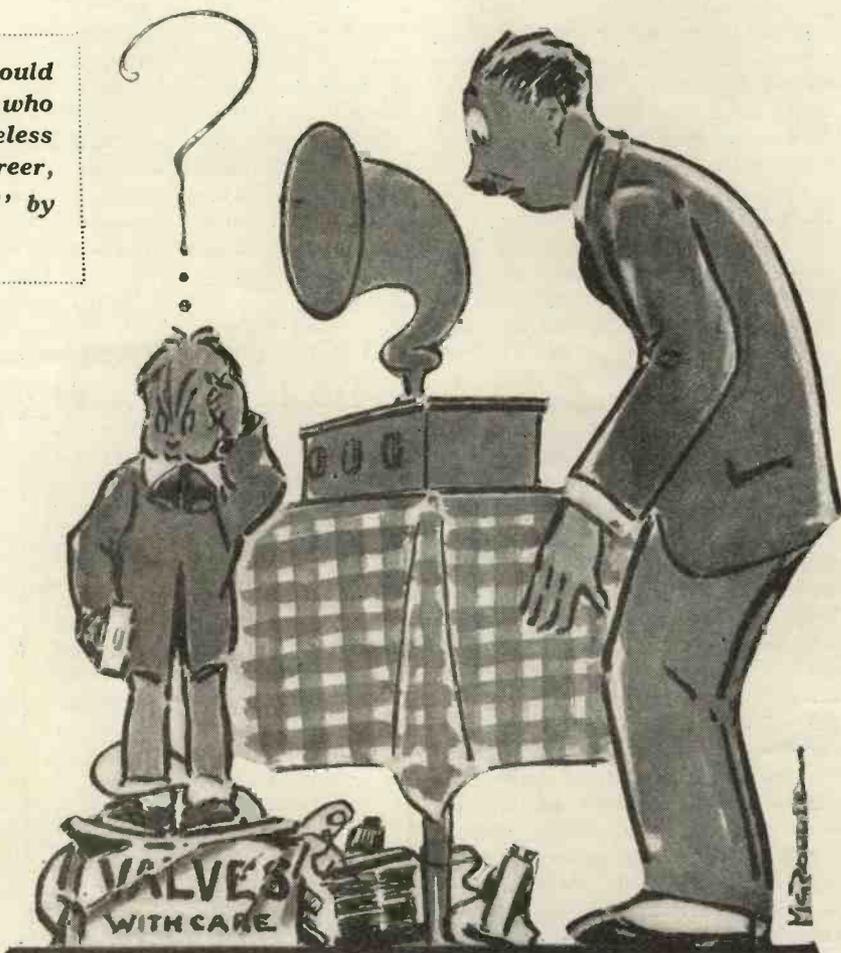
Remember that now, when you experiment, you please yourself how and when you do it, but that when you are employed by some wireless firm you will not be able to pick and choose.

Having convinced yourself on this point the next thing to decide is which side of wireless appeals to you most. The more congenial you find your work the more likely are you to be successful. The time has long since passed when one can be a really good all-round wireless man. To become really competent in any particular branch of the subject you must specialise, but this does not mean that you needn't trouble to learn anything outside your own particular work.

## *Interested for Some Years*

Suppose, as it will be in the great majority of cases, that you have been interested in reception for two or three years. You will have built a number of receivers. Did you enjoy the building of them? Or did you rush the work through, being interested only in their operation afterwards?

In the first case you may find congenial work by applying for a job in the workshop of some large firm engaged in the manufacture of broadcast receivers. Good workmen are constantly wanted. If, however, you looked upon the constructional work



merely as a necessary evil and delighted only in tuning distant stations in when the set was complete, you are cut out for an operator.

Now a commercial operator is called upon not only to receive, but also to transmit, messages. Therefore you should, if at all possible, obtain a transmitting licence and so gain practical experience of this side of your future work before taking it up professionally. Do not despise a permit to use an artificial aerial only, should this be offered to you, as a transmitter constructed within the limits thus imposed is quite sufficient to enable you to study the problems involved.

Before a transmitting licence of any kind is issued to you it will be necessary to prove that you can send and receive messages in the morse code at the rate of twelve words per minute.

Five letters will be counted as one word for the purpose of this test, so you will have to send and receive sixty letters per minute, irrespective of the actual number of words, which will depend upon their length. You will probably be tested for a period of five consecutive minutes.

## *Commercial Speed*

Although this speed is sufficient for the purposes of an experimental licence, it is practically useless commercially. You should therefore lose no time in improving your speed until you attain twenty-five words, or one hundred and twenty-five letters, per minute. You will have to become proficient in morse transmission and reception sooner or later. So why not sooner?

It is now presumed that you are prepared to go to sea as a wireless

## Becoming A Wireless Engineer (Continued)

operator, for a few years at least. Positions in land stations are hard to get and are greatly coveted by the majority of sea-going operators (particularly by those who are married) who are naturally more fitted for such positions as become vacant than would be a man without previous experience.

### P.M.G. Certificate

Before you can be employed on a ship, however, you will have to obtain a certificate of proficiency issued by the P.M.G. after examination. There are two grades of certificate, first and second class. They cover the same ground as regards theoretical and practical knowledge of wireless and the regulations governing the use of wireless apparatus at sea, differing only in the operating speed required.

For a first-class certificate twenty words per minute must be attained. As each word containing an error will be deleted the speed at which reception will be carried out during the test will exceed this, to allow for a few errors. The test will last five minutes for sending and the same time for receiving. As such a large number of candidates obtain first-class certificates at each examination a second-class certificate is practically useless and its existence may be forgotten.

It will be necessary for you, as a would-be operator, to undergo a course of instruction at some wireless college before sitting for examination. This is no reflection upon your ability to master the theory of wireless by yourself, but tests will be carried out on a standard ship installation, and you would have little chance of finding the various faults you will have to trace, within a reasonable time, if you are not absolutely familiar with the particular apparatus on which you are examined.

Before approaching the wireless college write to the various firms employing operators and enquire whether or not there are likely to be any vacancies at the time you will have qualified. Having obtained an answer in the affirmative ask them which of the wireless schools in your vicinity they would recommend. It is no use going to a college which teaches one system when you wish to enter the service of a company using another and entirely different system.

The length of time you will be at school will vary between a few months and a year, depending upon how far advanced you are when you begin. The fees will be proportionate, so study spent while an amateur will not be wasted.

Perhaps your case is different from either of those already dealt with. It may be that you are interested very little in tuning-in distant stations or in building receivers, but are keen only on experimenting. You

### 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.*

may even be an experienced transmitter. The job to suit you, then, is on the research or experimental staff of one of the large wireless concerns, but such positions, usually highly paid, are hard to get. This is, for the most part, a non-productive branch of wireless as far as actual profit-making goes, and naturally no firm can afford to maintain a very large staff on this work.

Still, very few of the large wireless companies are without their laboratories, and the positions which occasionally become vacant are well worth trying for. The highest qualifications are, of course, absolutely essential.

The construction of broadcast receivers or the operation of a ship's wireless installations will, of course, fail to satisfy the more ambitious amateur, at least for long. At the same time he may be too practical to wish for a position in a research laboratory. If you are one of this

class, and wish to reach the top of the profession, you should aim at becoming a wireless engineer.

There is no recognised and standard way of achieving this end. At least there is, at present, no recognised examination which can be passed and which will at once stamp a man as being a fully qualified wireless engineer. Some men reach it through the operating stage.

Becoming first of all sea-going operators, they next become sea-going inspectors, further promotion making them shore inspectors having a depot at one of the large ports. Their duty is then to inspect the installations of such ships as call at the port, to supply spares, information and instructions to the operators if necessary, etc.

From this they become installation engineers, when their work consists of installing wireless apparatus aboard ships, and they may eventually find their way to a responsible position in the works of the firm by whom they are employed.

This progress, of course, is necessarily slow and none too sure. Many years must elapse before a sea-going operator becomes a wireless engineer. The higher he climbs the more difficult is it to proceed further, as the more responsible positions are few in number.

If you wish to become a wireless engineer as quickly as possible you will want to take a more direct course.

You should become as fully qualified as possible at the outset. If you have had some years' practical electrical experience the examination of the Institute of Electrical Engineers is open to you, and, when passed successfully, this will very materially help you on your way.

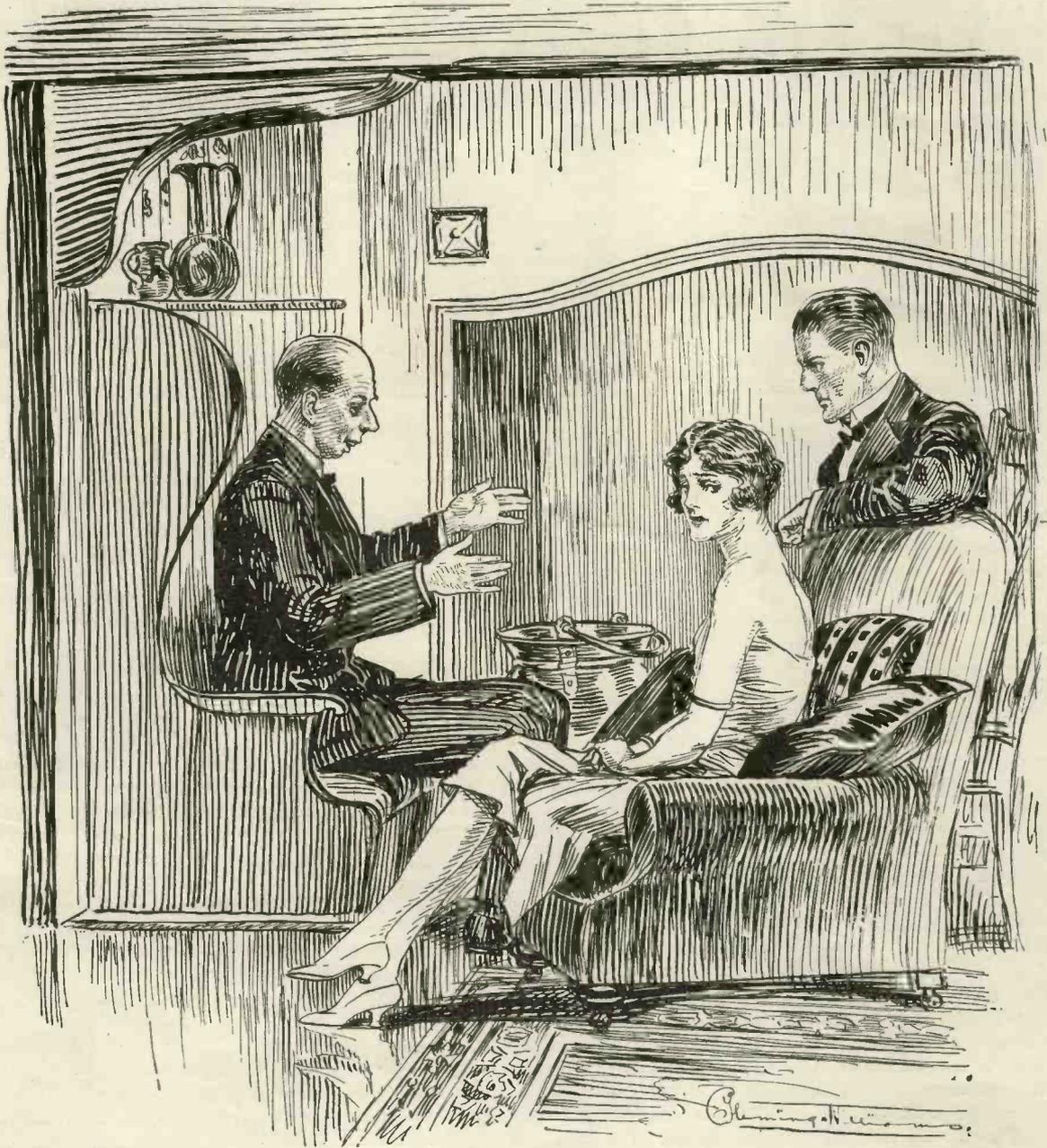
### University Degree

Otherwise you can take a university degree in electrical engineering, specialising during the last year of study in high-frequency and wireless work.

This done, you have, of course, still to find a position where your qualifications will be of advantage. This may be found either under the Government, in the Services, or in the employ of one of the large commercial wireless companies.

# Wireless Terms Travestied

*Drawn by Major C. Fleming Williams*



A DULL EMITTER

# The COSMOPOLITAN NINE

A  
THREE-  
UNIT  
SUPER-  
HET

1—The  
Detector &  
Oscillator  
Unit.



**I**N this and the two following issues of the WIRELESS MAGAZINE we are publishing details of a very sensitive nine-valve super-sonic-heterodyne receiver built in three distinct units and possessing the latest developments in this type of receiver.

As will be seen from the photograph of the completed set in the heading above, a handsome and impressive appearance is obtained.

The advantages obtained from building a super-het on this principle are manifold. In the first place, each unit may be constructed and tested by itself until it functions with a maximum efficiency.

In this respect it may be mentioned that with a receiver of this type mounted as a whole in one cabinet it is often extremely difficult to trace the cause of some defect, for the reason that the preceding and following stages of heterodyning or amplification, as the case may be, are apt to hide the fault and cause confusion as to its position.

Again, by employing the unit

system, each unit contains a definite stage in the cycle of operations, and it is well known that the farther these stages are separated from each other the less evil effect will one stage have on its neighbours.

Such separation is only rendered possible by the unit system in which the incoming signals are received and heterodyned in the first unit, producing a beat frequency which is

frequency power amplifying valves.

This article, the first of the series of three, describes the first unit containing the receiving and oscillating or heterodyning valve.

For the theory of the production of a "beat" frequency caused by the oscillating valve, our readers are referred to previous issues of this magazine in which explanations have been published at considerable length.

Let it be sufficient to say here that the whole point of the super-sonic - heterodyne method of reception is to change the wavelength of the incoming signal to one having a much higher value at which high-frequency amplification is comparatively stable. This change of

wavelength is accomplished by the oscillating valve producing waves which, when compounded with those received at the aerial, produce by the "beat" method a much longer wavelength, modulated by the same speech or music frequencies that are present in the incoming signal.

In effect, all that the oscillator

*Excellent results have been obtained with the Cosmopolitan Nine—a special three-unit super-het designed, built and tested by the WIRELESS MAGAZINE Technical Staff—as will be seen from the table of stations logged that appears on page 119.*

*Twenty-five stations were heard and identified in two evenings. Each transmission was received on a loud-speaker for not less than ten minutes and each programme was afterwards independently confirmed. Many more stations were heard, but owing to atmospheric interference (the tests were made in the middle of July) they could not be logged.*

*Conditions will be better when you have built your Cosmopolitan Nine!*

amplified and rectified in the second unit and, finally, amplified at low-frequency in the third and last unit.

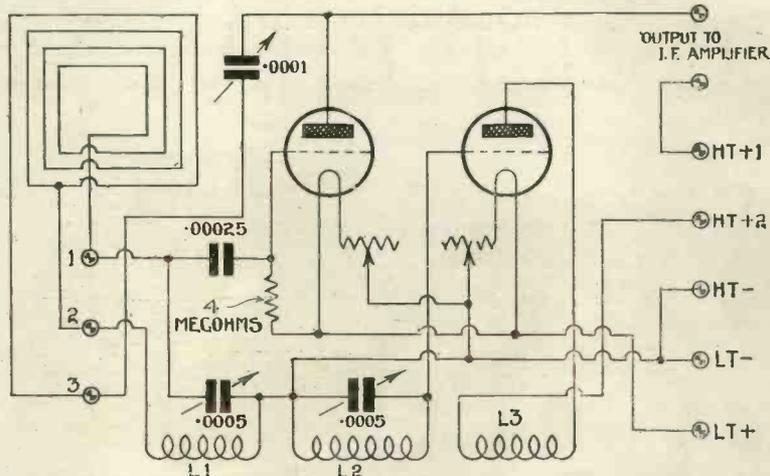
The first unit, therefore, contains a receiving valve and an oscillating valve; the second unit, four intermediate-frequency amplifying valves and a detector valve; whilst the third unit contains two special low-

does is to make the transmitting station change its wavelength from between 200 to 500 metres to any particular wavelength between 2,000 and 10,000 metres, depending on the fixed wavelength of the intermediate frequency amplifier.

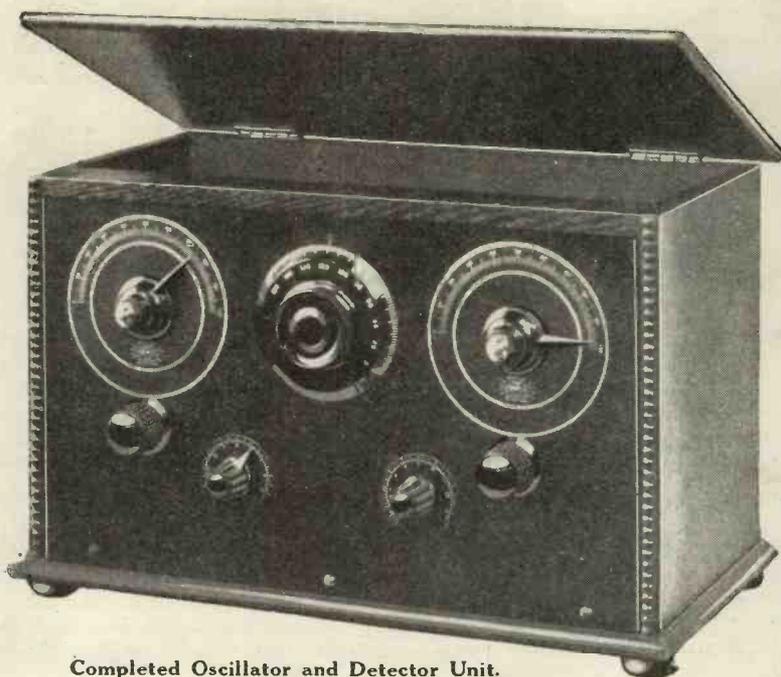
Naturally, for the reception of stations on different wavelengths, the frequency of the oscillations emitted by the oscillator valve must be changed to a value that will give the same "beat" frequency.

One of the chief advantages of the super-het is the simplicity in tuning. There are only three tuning controls—the other controls merely adjusting the filament temperature of the valves.

Furthermore, the tuning controls are located on the panel of the first unit, so that once the filament rheostats of



Circuit Diagram of the Oscillator and Detector Unit.



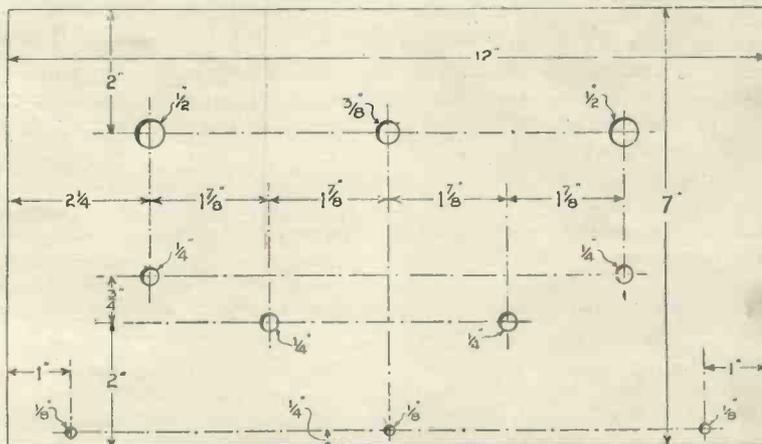
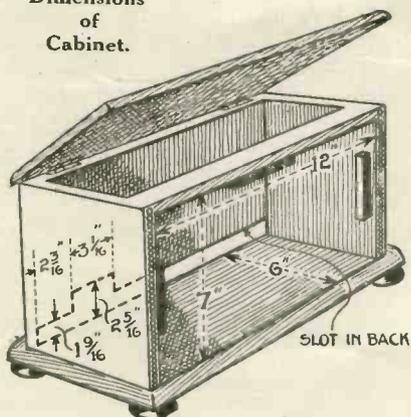
Completed Oscillator and Detector Unit.

the second and third units have been turned on, all the operating is confined to the first unit. Could anything be more simple?

Referring to the circuit diagram, it will be seen that a special frame aerial is used having a tapping. The larger portion of the frame aerial, between the tapping and one end, constitutes the actual receiving portion of the aerial, and is connected between the grid (through the grid condenser) of the valve and L.T. (through a small pick-up coil).

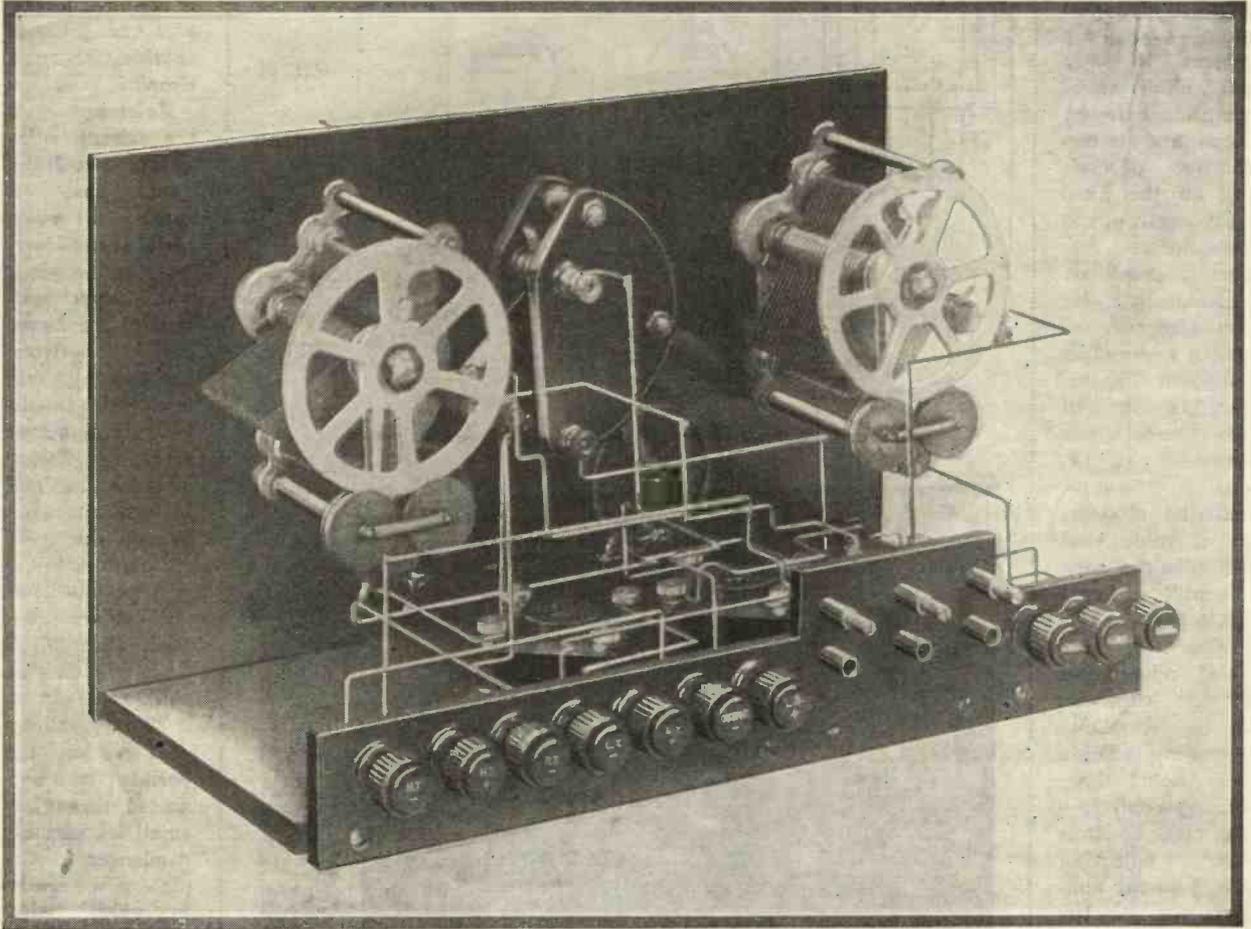
The remaining portion of the aerial is connected through a small variable condenser to the plate of the receiving valve, giving a very smooth reaction control. The incorporation of this method of reaction is the secret of the super-sensitivity of this receiver.

Dimensions of Cabinet.



Layout of Front Panel.

## The Cosmopolitan Nine (Continued)



Photograph showing Disposition of Components of Oscillator and Detector Unit of the Cosmopolitan Nine.

The plate and grid of the oscillator valve are coupled together by two coils, one in each circuit. It is important that these coils are connected the right way round, otherwise the valve will not oscillate.

In order that the frequency of the oscillations emitted by this valve may be varied at will, the grid coil is tuned by a variable condenser. The small pick-up coil inserted in the grid circuit of the detector valve collects the oscillations from the oscillator valve, and compounds them with those received at the aerial, the resultant beat frequency being supplied to the two output terminals.

#### Components Required

Coming to the construction of the first unit, a list follows of the components required. These components refer only to the first unit, those required for the second and

third units being published in the particular article that will describe their construction:—

Panel, 12in. by 7in. (Trelleborgs or Becol, Clayton, American Hard Rubber Co.)

2 valve holders, baseboard mounting. (Benjamin, Lotus, or Etherplus.)

2 35-ohm filament rheostats. (Lissen or Penton, Precision.)

2 .0005-microfarad variable condensers. (Sterling Miniloss or G.E.C., Ormond, Cleartron, Dubilier.)

.0001-microfarad variable condenser. (Ormond or Bowyer-Lowe, Devicon.)

.00025-microfarad fixed condenser. (Dubilier or Mullard, Wates, Watmel, T.C.C.)

4-megohm grid leak with clips. (Dubilier or Mullard, Edswan.)

10 engraved terminals. (Belling and Lee.)

2 ebonite terminal strips, 6½in. by 1½in. and 2½in. by 1½in.

Coil panel, 3in. by 2½in.

3 coil plugs and sockets, panel mounting.

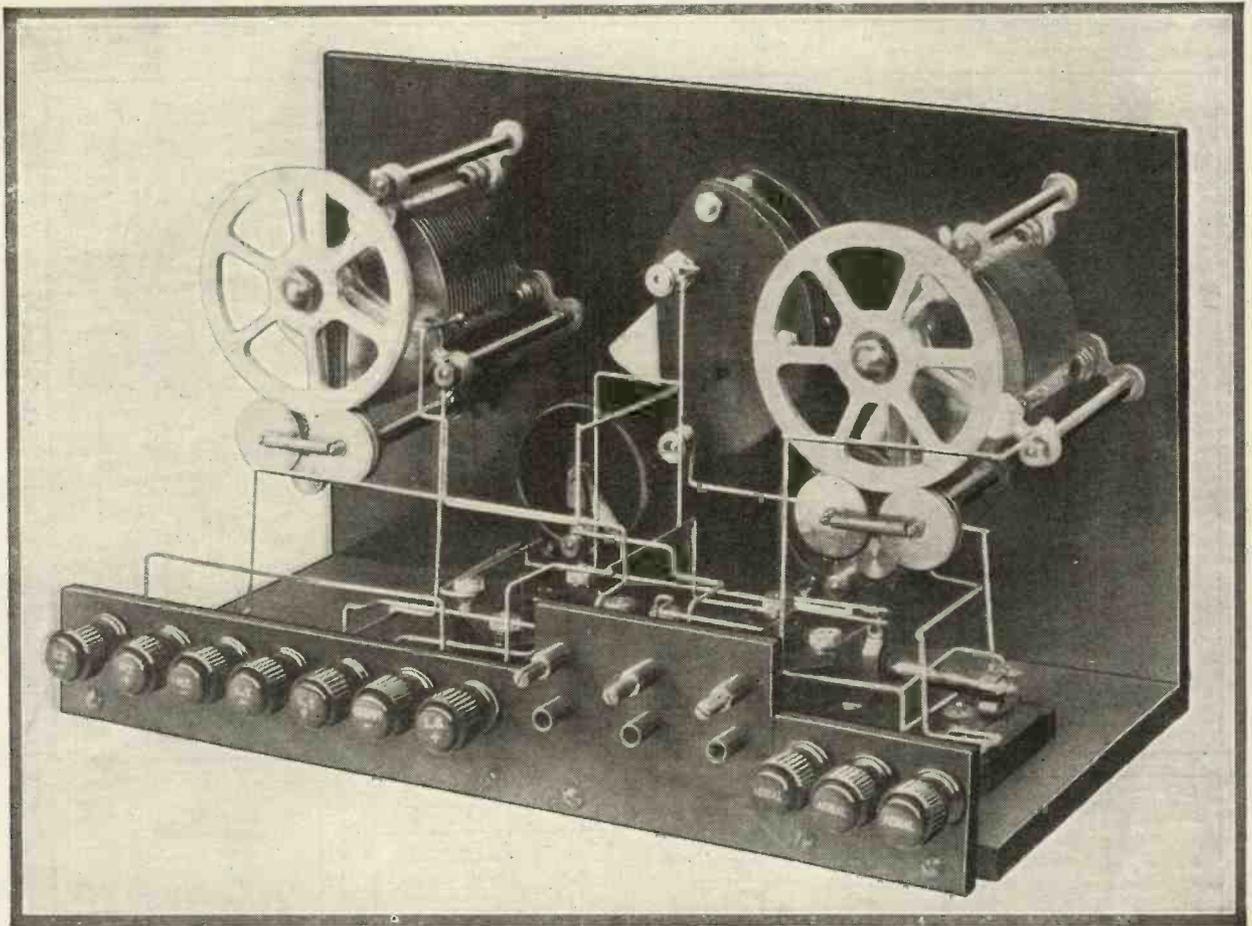
Cabinet and baseboard, 12in. by 5½in. by ¾in. thick. (Unica Cabinet Co.)

*NOTE:—The particular components shown in the photographs and allowed for in the dimensioned layout are in each case mentioned first.*

The panel, which should be obtained cut to size from one of the makers indicated in the list of components, should be drilled according to the dimensioned panel-drilling diagram, which shows the positions of the holes to be drilled and their sizes. The positions of the components and the method in which they are mounted are clearly indicated by the back-of-panel photographs and the wiring diagram.

The two large variable condensers are mounted one on each side of the panel with the small reaction variable condenser between them. Underneath, the two filament rheostats are mounted.

## Oscillator and Detector Unit



Another Photograph showing Disposition of Components of the Oscillator and Detector Unit of the Cosmopolitan Nine.

Having completed this part of the construction, the panel, with its mounted components, is left aside until the terminal strips and coil-mounting strips have been screwed to the back edge of the baseboard and the valve holders and fixed condensers mounted on the baseboard in the positions shown in the wiring diagram.

### Terminal Strips

Two terminal strips are required, measuring  $6\frac{1}{2}$  in. by  $1\frac{1}{2}$  in. and  $2\frac{1}{2}$  in. by  $1\frac{1}{2}$  in. On the larger strip the H.T. and L.T. battery terminals are mounted together with the two output terminals for connections to the input terminals of the second unit.

It will be noticed that there are two H.T. + terminals, supplying a separate H.T. to the plates of the receiving and oscillator valves. This strip is screwed to the left-hand side

of the back edge of the baseboard (looking from the back).

The smaller terminal strip, on which the three frame-aerial terminals are mounted, is screwed to the right-hand back edge of the baseboard.

Between these two strips a small panel, measuring 3 in. by  $2\frac{1}{2}$  in., is mounted, carrying the three coil plugs and sockets.

Dimensioned sketches of these strips and the small panel are given showing the exact centres of the holes to be drilled.

The two valve holders are fixed to the baseboard in such a position that when the valves are inserted they fit in comfortably between the two large variable condensers, whilst the grid leak and condenser of the receiving valve are situated directly underneath the frame aerial tuning condenser.

Panel and baseboard may now be

fixed together by three 1-in. brass wood screws passing through holes drilled along the bottom edge of the panel and screwing into the front edge of the baseboard.

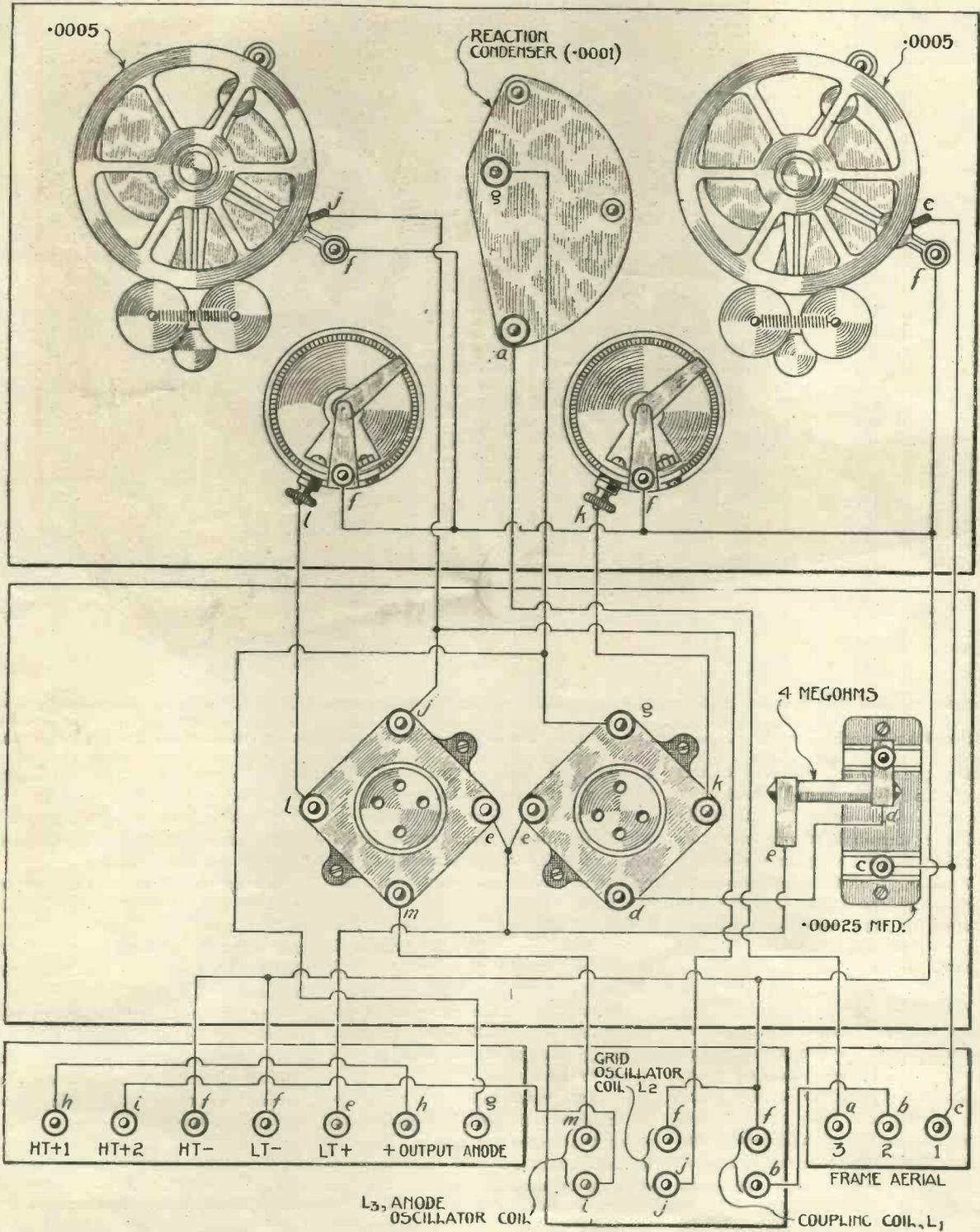
Wiring should be carried out with a thick gauge of wire such as No. 18-gauge. Better still, special connecting wire, such as Glazite, having distinctive coloured insulation, may be used.

The constructor should carefully follow the wiring diagram, which not only shows the method of connecting up the apparatus, but also indicates in what order the wiring should be accomplished.

### Connecting Up

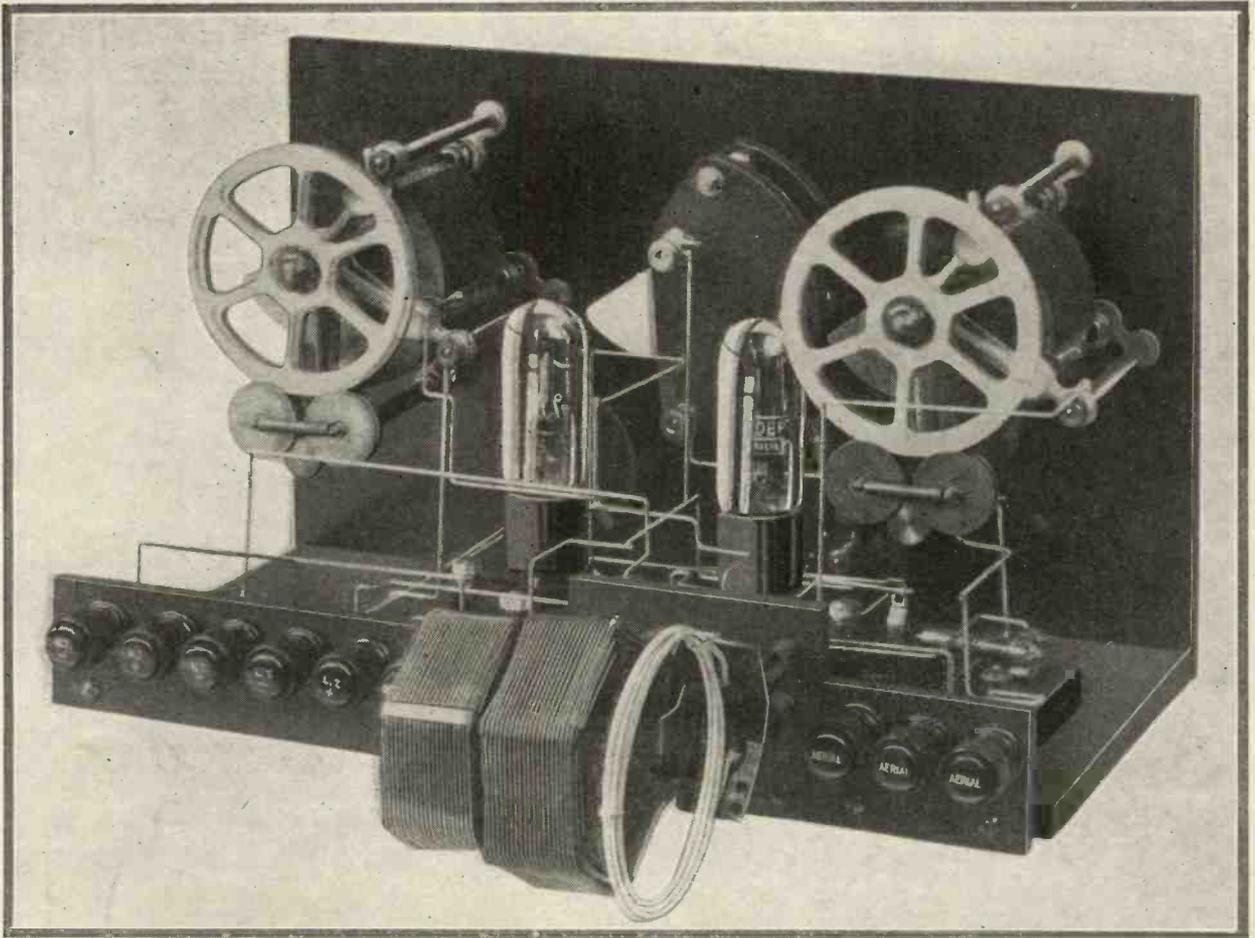
For instance, all those terminals marked *a* should be connected up first; then all those marked *b*, and so on. Note that the grid leak is not connected in parallel with the grid

# The Cosmopolitan Nine (Continued)



Half-scale Layout and Wiring Diagram of the Oscillator and Detector Unit of the Cosmopolitan Nine.

## Oscillator and Detector Unit



Another Photograph of the Oscillator and Detector Unit showing Oscillator and "Pick-up" Coils in Position.

condenser but is joined between the grid of the receiving valve and L.T. +.

Connections to the middle plug and socket of the three mounted on the small panel at the back of the baseboard should be of a temporary nature, until experiment which way round the two wires should be connected has been carried out.

Three coils are required for the oscillator valve and coupling, and these are plugged into the three plugs and sockets at the back of the baseboard.

The coils required are Nos. 60 and 75, and one having about five complete turns of insulated wire (No. 18-gauge D.C.C.) wound in a circular hank and tied together with small pieces of string or wire. The two ends are connected to a coil mount having the usual plug and socket.

The completed coil is inserted into the right-hand plug and socket mounted on the small panel (looking at the back). Into the middle plug and socket the No. 60 coil is inserted, whilst the No. 75 is plugged into the left-hand holder.

### Testing Completed Unit.

This completes the construction of the first unit, all that remains to do being the testing. For experimental purposes every amateur should equip himself with a fairly low-reading milliammeter, reading up to about 10 milliamperes.

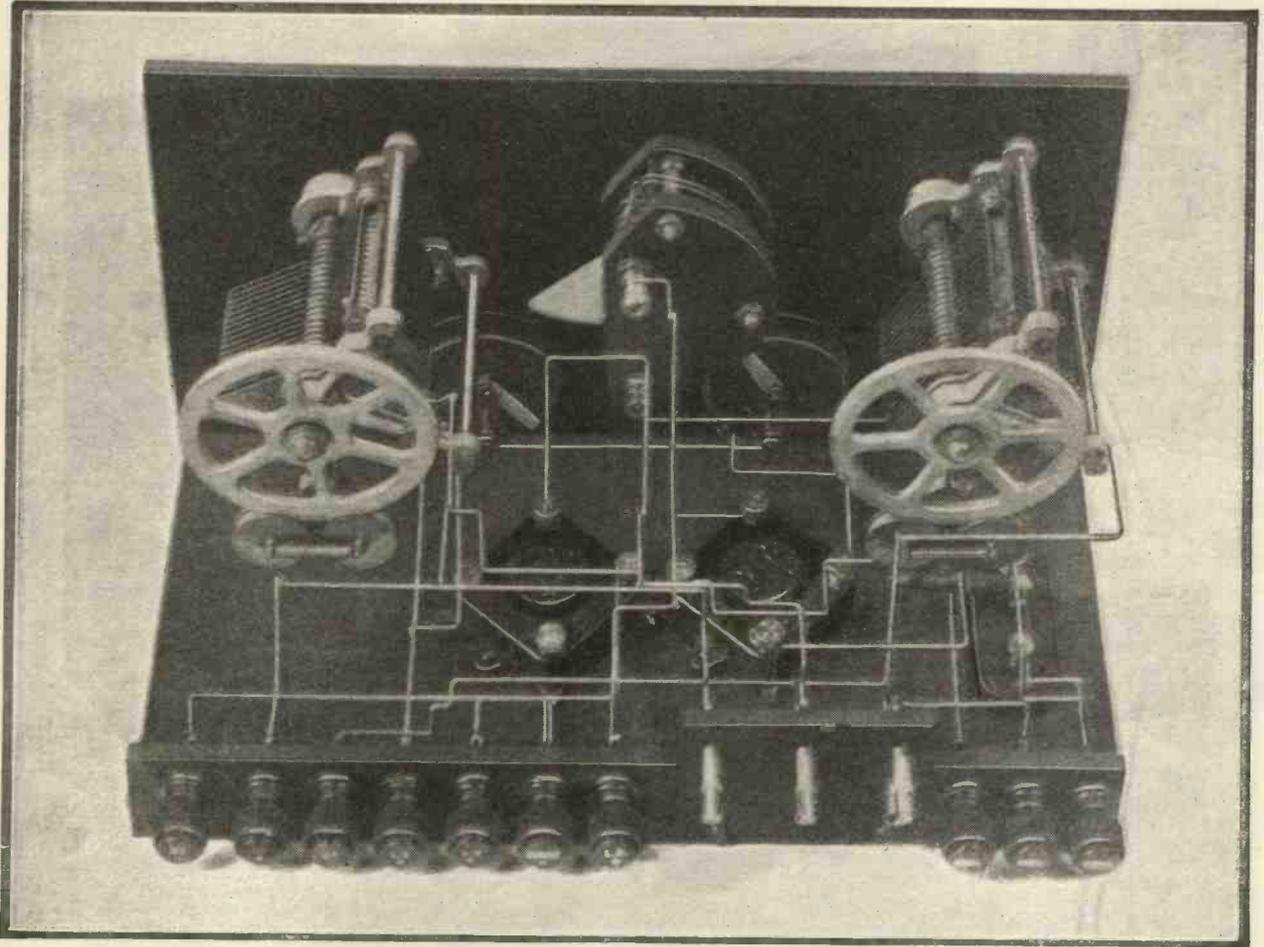
Such an instrument should be connected temporarily between the H.T. terminal supplying the plate of the oscillator valve (the second terminal from the left on the large strip, looking from the back) and the positive tapping on the H.T. battery.

A valve is then inserted in the second valve holder (the oscillator) and the filament current switched on by turning the controlling filament rheostat.

When the coils have been inserted in the sockets, the plate current of the valve indicated by the milliammeter should be noted. The leads to the middle coil holder should then be reversed and the plate current again noted. The *higher* of the two readings denotes that the connections to the middle coil are the right way round and the valve is oscillating.

These connections may now be fixed permanently, and, still watching the milliammeter, slowly turn the oscillator variable condenser (on the right of the panel) throughout its full capacity range. If, at any setting, the valve ceases to oscillate, the fact will be denoted by the sudden

## The Cosmopolitan Nine (Continued)



Photograph of the Oscillator and Detector Unit showing Arrangement of Components on Baseboard.

decrease in the plate-current value.

If this happens, a slightly larger coil should be plugged into the left-hand holder. Try a No. 100 instead of the No. 75.

It is most important that the oscillating valve should oscillate at every setting of the right-hand variable condenser on the panel. It is

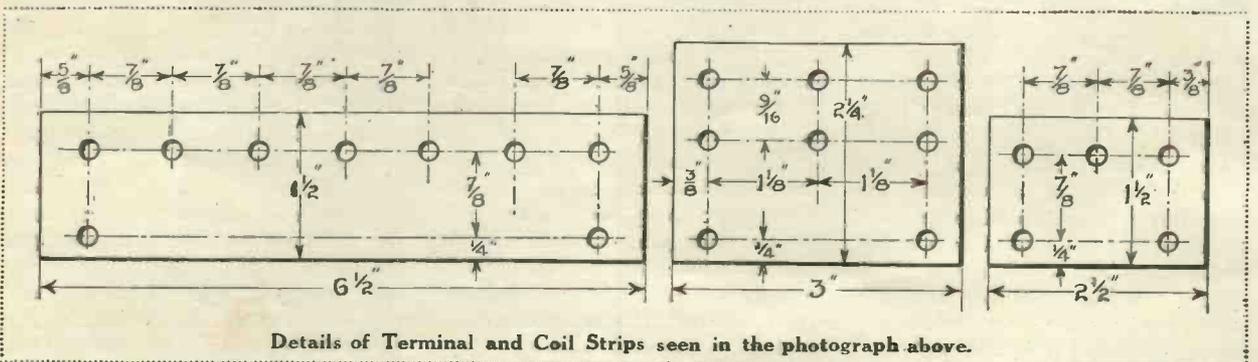
also important that as small a coil as is compatible with the preceding statement should be used in the left-hand socket.

### Suitable Aerial

A suitable frame aerial to use in conjunction with this unit is made by winding twelve turns of wire on a

square frame having sides 2ft. 6in. in length. Bare copper wire, No. 16-gauge, should be used, and the two ends brought down to the two outside aerial terminals.

To the middle aerial terminal a piece of flex with a metal clip attached to the free end is connected. The clip is clipped on to the frame



Details of Terminal and Coil Strips seen in the photograph above.

## A Special "Wireless Magazine" Set.

aerial winding at the second or third turn from the end of the winding joined to the left-hand aerial terminal (looking from the back).

Thus, between the right-hand and middle terminal there are nine or ten turns of frame winding and two or three turns between the middle and left-hand terminal.

By connecting a pair of phones in the plate circuit of the detector valve—that is, between the extreme left-hand terminal and the positive terminal of the H.T. battery—it should be possible to pick up the local station on the frame, provided the distance is not too great.

During this test the oscillator valve

and the two oscillator coils should be removed. Experiments should be carried out in this way to bring the receiver valve into its most sensitive state.

[Next month we shall describe the second unit containing the intermediate-frequency amplifier and the detector valve.]

# WHAT HAS BEEN DONE WITH THE COSMOPOLITAN NINE

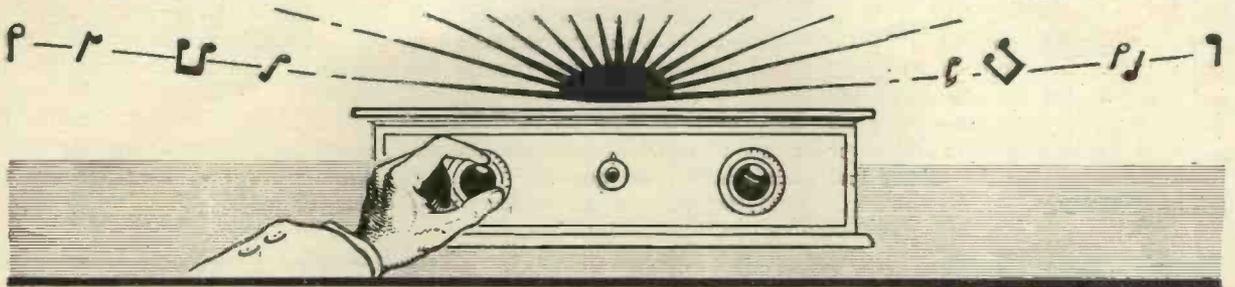
*All the stations mentioned in the following list were received on a frame aerial within a mile of 2LO, at comfortable loud-speaker strength. No station that is logged below was received for less than 10 minutes and in each case the programmes have been independently confirmed. These stations were all received during two evenings in July; many other stations were heard, but as reception was marred by atmospherics and static they were not logged.*

*Only those stations have been logged that could be received comfortably.*

### STATIONS RECEIVED AND THEIR DIAL SETTINGS

Station.	Wave-length.	Aerial Cond.	Oscillator Cond.	Station.	Wave-length.	Aerial Cond.	Oscillator Cond.
Milan . . . . .	320	27	37	Stuttgart.. . . .	446	49	61
San Sebastian EAJ8	343	31	41	Leipzig .. . . .	452	54	64
London 2LO .. . .	365	35	45	Paris PTT .. . .	458	55	66
Madrid EAJ7 .. . .	373	37	47.5	Frankfort .. . .	470	56	68
Bournemouth 6BM	386	39	50	Birmingham 5IT ..	479	57	69
Hamburg .. . . .	392	40	51	Lyons PTT .. . .	480	58	70
Dublin 2RN .. . .	397	41	52	Munich .. . . .	485	62	73
Munster .. . . .	410	42	53	Brussels .. . . .	487	63	73.5
Breslau .. . . .	418	42.3	55	Aberdeen .. . . .	495	66	78
Glasgow 5SC .. . .	422	42.8	55.5	Berlin .. . . .	504	65	75
Rome 1RO .. . . .	425	43	56	Zurich .. . . .	515	68	78
Toulouse .. . . .	430	45	58	Vienna .. . . .	531	70	81
Berne .. . . .	435	48	60				

# THAT TUNING NOTE!



*Peter Warrington explains how, in his opinion, it could be vastly improved!*

IN at least one respect the tuning-note of 2 L O is comparable with toothache—it always gives one such a feeling of exquisite relief when it stops!

Broadcasting stations have to have tuning notes, I suppose, and for the benefit of people who own dud sets, or sets beyond their comprehension, broadcasting stations have to inflict those tuning notes on several thousand sensitive ears; but personally I don't need a tuning note because I can tune-in on a tune, or even on the hum of 2 L O's aerial.

I put up with it at times lest my idea of the time should fail to coincide with that of Greenwich; but what I feel about the tuning note now in use is as nothing to what my wife feels about it—while as for our cat, he always stalks out of the room directly it begins to shatter the silence with its penetrating ping, head in air, tail erect, and obviously under the impression that I am creating the hideous noise myself on purpose to annoy him.

## Nerve-shattering

My wife declares that 2 L O's tuning note is a nerve-shattering sound calculated to drive anybody off their dot, and that she has to hold on to her sanity with both hands, so to speak, till that wonderful—almost incredible—silence supervenes and the danger is over.

"Why on earth they keep it on so long," she protests, "I simply can't understand."

Then I remind her of the unhappy days when I had an abominable two-valve set with three condensers and three coils that would never "stay put." That set used to waste all my evenings and fray all my nerves at both ends, and not merely the

tuning note but the whole evening's programme was seldom long enough to show me the way to London.

Like Dick Whittington, I turned and turned again, only to secure a veritable nightmare of London, followed by more or less perfect adjustment in the middle of the National Anthem!

No tuning note in the world could be too long for a set of that character, and I fear the land is littered with similar abominations. (I bought it for £10 in a shop that ought to be shut up by the police). But now I



*Push his nose down our loud-speaker.*

have a four-valve set fitted with tapped coils, and I can find London in an instant and switch from London to Daventry in less than five seconds by the time signal from Greenwich.

I need no tuning note—I can find London as readily on my panel as I can find it on a map of England. And our cat can—and often does—sit down on the thing to warm his whiskers at the valves without upsetting anything.

Give me a tapped coil, and I will laugh at dead-end losses; for what is a dead-end loss compared with the loss of a whole evening's programme plus the semi-damnation of a soul?

The only advantage about a set that won't be set till you yourself have become thoroughly upset and that becomes upset as soon as you have settled down, is that you don't get all the tuning note from 2 L O, or any other station. Which certainly is a mercy, for the present

tuning note has nothing to recommend it—except perhaps its persistence.

Like the cracked bell of the old church or chapel and the jangle of the bell attached to the average telephone, it offers an uninviting invitation to a service that may (or may not) be really worth while.

Even the B.B.C. are not entirely pleased with their tuning note. They realise that it leaves much to be desired—especially the silence that succeeds it. True, in November, 1924, they officially stated:

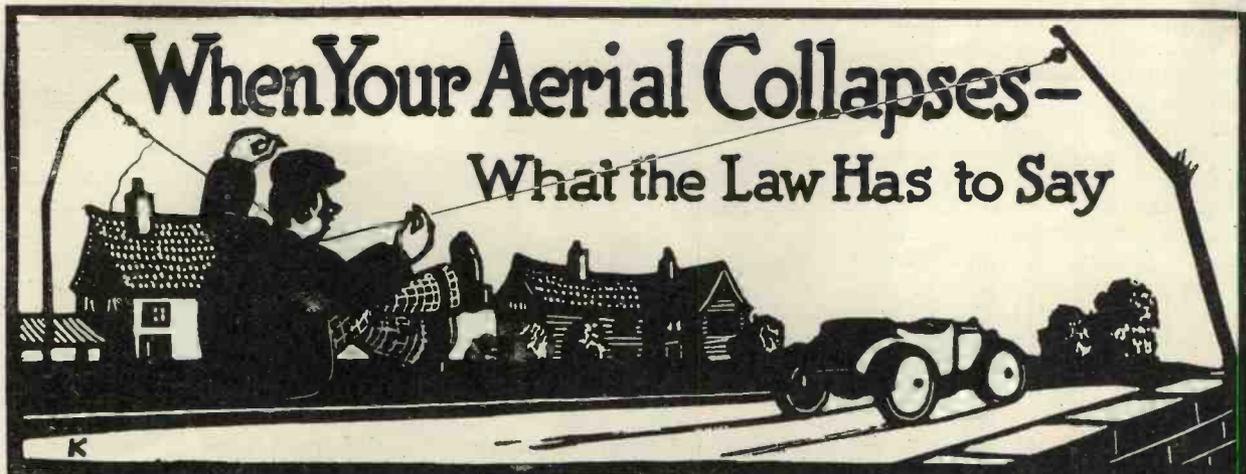
"The Greenwich time signal for 9.30, broadcast from all stations of the B.B.C., is preceded by a warning. This takes the form of a MUSICAL note similar to that employed for tuning purposes."

But they have never really imagined for a moment that the tuning note could by any stretch of the imagination truthfully be called musical—as witness the fact that early in 1925 they turned some of their brightest brains on to the problem of providing a less devastating alternative and finally gave us descending scales on the piano—which reminded most of us all too painfully of the efforts of our youngest children in the preliminary stages of their musical education, and formed no sort of advertisement either for pianos or for broadcasting since the lower notes invariably jangled and the piano sounded as though it needed far more tuning than our sets.

## Unbalanced Scales

Listeners who had suffered as uncomplainingly as tomatoes at the steak (pardon my levity), from that oscillating "r-r-r-r" rose up in their agony and inveighed against the scales. They pointed out—in effect—that the B.B.C. scales were





An article by a Barrister-at-law

[Lino Cut by William Kermode

THE question is bound to arise sooner or later, and indeed it may have arisen already, as to the responsibility of a wireless enthusiast whose aerial supports collapse and cause damage to somebody else's person or property.

### No Legal Decisions

Wireless is too new an invention to have yet been subject to much legal decision; but there are parallel instances of telegraph wires, flag-staffs and other apparatus similar to that used in broadcasting which are of assistance in indicating how far an owner may be liable for any injury caused by his fittings.

It should first be remembered that where a person is under liability for injury, that liability may be considerable.

When damages amounting to £1,000 have been accorded for injuries caused by the falling of a slate from a roof, or the collapse of a set of railings, the harmless wireless amateur may well look to the safety of his apparatus and, if possible, insure against whatever liability there is.

The general rule of the law is that a person must so manage his property that it does no harm to anyone else. Anyone who brings on to his premises and keeps there an object which may be likely to cause injury to others must shoulder the responsibility for any injury that it does.

If a person fits up an aerial wire or support at the edge of his land, or on a balcony overlooking a public street, it will be obvious that if the wire or support falls down it may be likely to cause damage to adjoining property or to persons passing along the street. And the person

to whom the aerial belonged will have to pay damages if any such damage occurs.

It will be no excuse for the owner of the aerial that he employed a competent engineer to fit it up, or that materials of the best quality were used in the supports.

His liability arises not from putting up a dangerous thing (for he can

*It is unwise to rig up an aerial hurriedly and then to leave it unattended for months on end. One day it may collapse—and you may find yourself liable for heavy damages.*

*In this article a barrister explains the aerial-owner's liabilities—simple points of law that should be known to every listener.*

do what he likes on his own property). His liability is for not keeping the thing under control and for not preventing it from doing damage. Accordingly any damage done by the apparatus will, *prima facie*, fall on the owner.

There are several very important exceptions to the rule. One of these is expressed by the familiar phrase "Act of God."

If an owner's wireless apparatus falls down, causing injury, the injured person can bring an action for damages; but the owner can defend the action by saying that the falling of the apparatus was due not to any defect in the material or mode of fitting of the apparatus, but to some unforeseen and unusual natural event such as an extraordinarily heavy storm, or an earthquake or something of that sort.

Ordinary natural events he will still be responsible for, such as warping or cracking of the apparatus by the sun's heat (causing the wood-work to get weak) or ordinary rains or winds.

It is only when there is something unavoidable and unforeseen in the event which makes it an "Act of God." The burden of proving that the event was so unusual as to be unforeseen will be upon the owner.

The owner can also defend himself from claims for damages by saying that the cause of the damage was *vis major* or *force majeure*, that is, that for the time being control was wrested from him by some superior force, such as a disorderly mob, or some person over whom he could have no control.

So if sand falling from a balloon, or the actions of a riotous crowd of people were the direct cause of the collapse of the aerial, the owner would not be liable. Forces over which he could have no control were responsible and not he. Still if the forces were such as he could have avoided he will still be liable.

Accordingly, if birds settle upon his aerial wires, or cats jump upon his apparatus and cause it to fall, he would hardly be able to plead the defence of *force majeure*, because, by the exercise of simple devices such annoyances can be prevented, and it would be the owner's duty to prevent his aerial from collapsing through such agencies.

### Injured Person's Own Fault

The owner can always plead in his defence that the injury done was due to some act or default of the injured person himself.

So if by some interference by the

next door neighbour an owner's apparatus falls and breaks the neighbour's window, the owner will obviously not be liable; for the direct cause of the damage was the neighbour's own act.

Where an object is maintained upon a person's property for the benefit of someone else besides himself, that other person for whose benefit it was maintained cannot bring an action for any damage caused by it.

Thus where a landlord of a block of flats keeps an aerial on the roof for the benefit of all the tenants in the block, none of the tenants could bring an action for damage done by it unless the landlord had in some way guaranteed to keep the aerial secure

or unless he had been grossly careless.

The case may easily arise where a lodger, or sub-tenant, fits up wireless apparatus for the benefit of all the occupants. In such a case the person setting up the apparatus will not be liable to any of the other occupants for injury caused by its collapse.

If the person has statutory authority for putting up an aerial, no claims for damage can arise against him. By such authority is meant a public or private Act of Parliament. A mere licence from the Postmaster-General will not protect him in this way.

It should be noticed, however, that an owner is only liable for the

natural consequences arising from the collapse of his property. If a passer-by was injured in the head the owner would have to pay the doctor's bill.

But if the injuries prevented the complainant from getting a situation which he was on the way to obtain, or prevented his keeping an important engagement, these would not be matters for claim against the owner.

The tendency among many amateurs is to do away with aereals entirely. With others the aim seems to be to extend and increase until the back garden looks like an Atlantic transmitting station.

It is these latter who would do well to bear in mind the liabilities of a property owner for such property.

## LISTENERS! ∴ Some Reflections (Not to be Taken Too Seriously)

ONLY a few days ago I entered a wireless shop in the West End for a couple of gadgets and a few components. It was during the luncheon hour, and the diaphragm of a loud-speaker was in active vibration. A young lady, attractive, of course, was listening intently, and Canto 1 of Scott's "Lady of the Lake" came to my mind. You know it? Of course you do!

"In listening mood she seemed to stand,  
The guardian Naiad of the Strand."

### Spelling

It may be that the last word is not spelt with a capital "s" in Scott's masterpieces but you can't have it all ways, can you?

Now, I venture to suggest that a young lady looks almost her best when listening to Mr. Godfrey's phantom orchestra playing ghostly music. Why do I say almost? Any married man will tell you—some with a sigh, others without—but the fact remains that a young lady looks her very best when she is listening to the last gasp of the poor fish before taking him home and proudly slapping him down before her parents as her catch from "life's vast ocean"; but I digress.

Strange as it may seem, I have known married ladies in the best of health and living in comfortable,

refined homes, who would sooner listen to the voice of a wireless aunt than to the ravishing music of their own voices! It was the "bad hat" of a very respectable family who described one such lady as "rara avis!" It is believed that the remark was intended to be witty; it is only necessary to observe that such ladies do honour to their sex.

I remember a married lady who counted it a crime to waste a good fifteen minutes in listening to an unseen person of either sex holding forth, without the possibility of interruption, on such debatable subjects as "Rearing a Baby," or "Should Married Couples Take Separate Holidays?" What then did the lady do? She insisted that her husband should listen to the talk and afterwards repeat it, or as much of it as he could remember, to her, in order that she might have an opportunity of contradicting as often as she pleased. Did the husband enter into the spirit of the idea with zest, you ask? No, sir or madam, he did not!

Men listeners have their own little problems to solve, and one case I recall may be of interest. A friend of mine had a very gifted wife, that is to say, she was a wonderful elocutionist, and poor Smith was quite unable to enjoy the simultaneous transmission of the weekly film talk and his wife's evening talk on social topics. However, as a

business man, he had to solve worse problems than that, so he called together a few friends in the same unhappy plight and formed a club.

The club-room was handsomely furnished with luxurious divan chairs fitted with ash-trays and glass-holders. A local wireless engineer was called in and instructed to install the best loud-speaker set on the market. From the foregoing it will be seen that the aim and object of the club was the encouragement of British Arts and Crafts.

### Open Every Evening

The club was open every evening during broadcasting hours, and members attended on such evenings as the programme satisfied their respective requirements. There were those whose moods responded best to the soothing syrup of Chopin and Schumann; others whose spirits rose highest when listening to concert parties and jazz bands; and yet others who revelled in heavy dramatic music of the Wagnerian school. A brilliant idea, you will agree! Think of the contrast between the evenings devoted to very local news and bedtime stories, and those spent with kindred spirits in the peaceful atmosphere of the Club for the encouragement of B.A. and C.!

How does it come about that I refer to the club in terms so touching? Eh! Yes! you have guessed my secret! I am Smith!

# Guide to the Best Valve Sets



*The most detailed and also the most comprehensive guide to British valve sets yet published by any wireless journal. It has been specially compiled for the convenience of WIRELESS MAGAZINE readers. Another section will be published next month.*

IN order to make this guide as helpful as possible to each prospective owner of a set, a few preliminary remarks regarding the general characteristics and capabilities of the different types of set are given at the beginning of each section.

### Conservative Estimates

Readers will appreciate that as reception conditions will vary considerably, a conservative estimate of performance is given, based upon average conditions—both atmospheric and geographical—and the use of an aerial-earth arrangement of average height and efficiency. Under favourable conditions the performances indicated will be improved upon quite readily.

To save space and needless repetition, a simple code will be employed to describe the different valve combinations; that is, HF—D—2LF represents a four-valve set having one high-frequency amplifying valve followed by a valve detector and two low-frequency amplifying valves. Similarly, C—LF represents a crystal detector plus one low-frequency amplifying valve. An asterisk (\*) against or above one of the figures means that the valve so marked is "reflexed," and therefore functions in a dual capacity.

### Prices

With a few exceptions, prices throughout are given in two forms. Firstly, the price of the set alone (including Marconi royalty of 12s. 6d. per valve holder), as this will interest readers who already have phones or loud-speakers, batteries valves, etc., and, secondly, an "all-in" price for the set (including royalties) and accessories, which will be specified as follows:—

A—Accumulator or suitable dry-cell battery.

### THAT SET YOU WANT TO BUY

*will be found described and illustrated in this or a succeeding issue of the WIRELESS MAGAZINE.*

*Whether it be a simple one-valver or an elaborate eight-valve super-het that you require, you will find details of it in these pages.*

*From the descriptions you will learn how each set is operated, what it costs and what it will do; from the illustrations you will be able to judge what each set will look like in your home.*

### SAVE YOURSELF TIME AND TROUBLE

*by writing to US for further particulars of any sets in which you are particularly interested.*

*At the end of the description of each set you will see a reference number. If you are interested in several three-valvers, say, send us a postcard bearing your name and address and the numbers of the sets of which you require more details—we will see that the manufacturers do the rest.*

*If you do not see just the set you require described in this issue, remember that*

**MORE SETS WILL BE DESCRIBED AND ILLUSTRATED NEXT MONTH.**

- B—High-tension dry-cell battery.
  - V—Valve or valves, as required.
  - E—Aerial equipment (included in some cases).
  - T—Telephones—one pair as a rule.
  - S—Loud-speaker.
- Thus "Price £10" is the price of the particular set plus Marconi royalties. "Price (ABVS) £18" is the "all-in" price of set, royalties, L.T. battery, H.T. battery, valves, and loud-speaker.

### Liabile to Alteration

Although the greatest care has been taken in ascertaining the prices and in quoting them in a uniform manner in order to facilitate ready reference and comparison, the prices shown are not to be regarded as an offer or quotation by the manufacturers.

In view of the approaching Wireless Exhibition at Olympia (September 4 to 18), and the necessity of going to press with this journal many days beforehand, prices may, in some cases, be varied.

Readers are particularly requested, therefore, to obtain from the makers of the set which most appeals to them confirmation of price, and, at the same time, a copy of the usually very interesting free booklet containing further particulars and illustrations. A postcard is all that is necessary, and time will be saved by sending to the WIRELESS MAGAZINE and quoting the reference number given at the end of each descriptive paragraph.

### At the Exhibition

Most of the firms whose receivers are reviewed will be showing at the forthcoming Exhibition, and, where possible, the stand number is given. Thus, any reader interested in a particular set will be enabled to proceed to the stand where the set in question may be inspected and all information obtained.

**ONE-VALVE SETS**

THIS type of set may profitably be installed in place of a crystal set where increased volume from the local transmitting station or the use of additional pairs of telephones is desired.

It will also enable satisfactory results to be obtained over much greater distances, say up to 50 miles from a main station and 100 miles from 5XX (Daventry).

Not recommended for use with a loud-speaker, but at distances not exceeding 4 or 5 miles a modest volume for a quiet room may be obtained from a small loud-speaker without undue use of the reaction or volume-control provided.

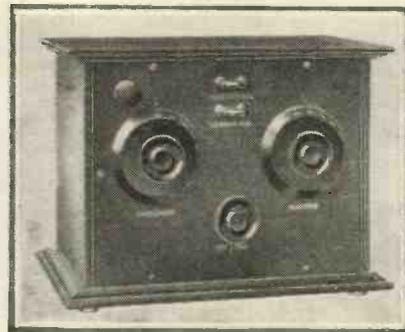
The initial cost of a set of this type is low; it is simple to operate and economical in upkeep. If a low-consumption valve is fitted, the filament may be heated by means of a suitable dry-cell battery or quite a small accumulator, which will not require recharging very frequently.

The high-tension battery need not, as a rule, exceed 45 to 60 volts, and should give satisfactory service for several months.

**GECOPHONE. General Electric Co., Ltd., Magnet House, Kingsway, W.C.2. (Stands 61, 63 and 214G.)**

A compact set in open-front mahogany cabinet operated by means of two dials (one tuning and one reaction or volume control). All connections made by plugs and sockets at back of cabinet. Standard wavelength range is 300 to 500 metres, but provision is made for additional plug-in loading coils for reception of 5XX (Daventry) or other long-wave stations. Set is switched on or off by filament rheostat—the centre knob below the dials. Fine-tuning adjustment by means of small knob near left-hand dial. With DE<sub>2</sub> valve a 20-ampere-hour accumulator will give about 150 hours service per charge. Approximately twice this "life" can be obtained by using a DE<sub>3</sub> valve, or a dry-cell battery may be used if preferred.

Dimensions of set: Height 8½ in., length 11 in., depth 7½ in.



Gecophone One-valver.

Accessories are specified as follows:—  
 A—Accumulator or suitable dry-cell battery  
 B—High-tension dry-cell battery.  
 V—Valve or valves, as required.  
 E—Aerial equipment.  
 T—Telephones.  
 S—Loud-speaker.

Price of set and DE<sub>2</sub> valve, £4-7-6.  
 All-in price (ABVT) £7-4-0.  
 Ref. W.M.101

**GILLAN I. Gilfillan Bros., Ltd., 63, High Holborn, W.C.2. (Stand 106.)**

A neat "single-valve with reaction" receiver in open-front cabinet. Plug-in coils are employed, and these, together with the valve, are completely enclosed and accessible through the hinged lid. Additional coils can be obtained, and by interchanging these the set can be adjusted to receive on any wavelength.



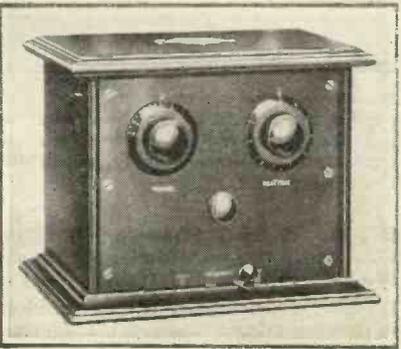
Gillan I.

Coils for normal broadcast waves are supplied with the set. A practical test shows that loud and clear results are obtainable with several pairs of telephones. Normal receiving range, 50 miles from main station and about 100 miles from 5XX. Careful manipulation of tuning and reaction dials enable several distant stations to be tuned-in quite clearly.

Price £3-15-6.  
 All-in price (ABVET) £7-5-0.  
 Ref. W.M.102

**MARCONIPHONE V1. The Marconiphone Co., Ltd., 210/212, Tottenham Court Road, W.1. (Stands 121½ and 220G.)**

A very efficient set complete in open-front mahogany cabinet. All battery connections at back. Operation by means of two dials (one tuning and one reaction or "volume"). Tuning effected by means of interchangeable "range-blocks," so that provision of additional "blocks" enables all wavelengths to be covered between 300 and 3,000 metres.



Marconiphone Type V1 Receiver.

Range-block for 300/500 metres is supplied with the set. A special feature is the means of obtaining reaction. A variable resistance is used, and alteration of this does not vary the wavelength to which the set is tuned. This is of particular value when attempting to tune in a station at a considerable distance. Altogether a most useful and easily operated little set.

Price £5-15-6.  
 All-in price (ABVT) £9-7-8.  
 Ref. W.M.103

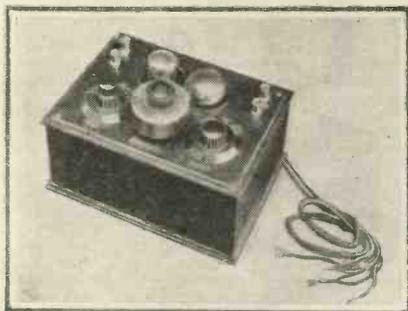
**TWO-VALVE SETS**

THERE are two familiar arrangements of this type of receiving set. The first comprises a high-frequency amplifying and a detector valve (HF-D) intended for long-distance telephone reception (say 150 miles from a main station).

The second, and much more popular arrangement, comprises a detector valve (provided with reaction or volume control), followed by a low-frequency amplifying valve (D-LF), and is capable of giving satisfactory loud-speaker results at distances up to 15-20 miles from a main station or 50-60 miles from 5XX.

It may be regarded as the simplest and most economical "home-entertainment" type of set—moderate in first cost, simple to operate and, with the provision of low-consumption valves, very inexpensive to maintain.

Where it is desired to obtain ample



B.T.H. Two-valver.

*If you want further particulars of any of these sets send a postcard to US and save yourself trouble.*

## Guide to the Best Valve Sets (Continued)

volume in two or more pairs of telephones, good reception may be obtained at distances up to 50-60 miles from a main station and a correspondingly greater distance from 5XX.

**B.T.H. British Thomson-Houston Co., Ltd., Crown House, Aldwych, W.C.2. (Stands 127/130.)**

**D—LF.** A particularly effective receiver in open-top cabinet with panel, dials, etc., in chocolate-brown insulating material. Tuning is very easy (one tuning dial with vernier knob and a smooth-working volume control) and results excellent. The right-hand dial (see illustration) is the filament control, which is arranged so that either bright or dull-emitter valves may be used, whilst the "off" position is clearly marked. At about 20 miles from a main station good loud-speaker volume was readily obtained and, under reasonably good conditions, the set would no doubt give good results up to 25-30 miles. On test, several distant stations were tuned-in on the loud-speaker clearly, but weakly, of course; but on substituting telephones the reception was quite satisfactory. Special features are a compact and evidently efficient "tuning-and-reaction" unit, interchangeable for long waves, and a very neat battery cable, permanently attached to and supplied with the set.

Price £6-5-0.

All-in price (ABVTS) £13-0-0.

Ref. W.M.204

**ETHOPHONE DUPLEX. Burndept Wireless, Ltd., Aldine House, Bedford Street, W.C.2. (Stands 140/1, 144 and 209G.)**

**D—LF.** This is a two-valve receiving set designed to operate a loud-speaker satisfactorily at distances up to 20-25 miles from a main station and about 100 miles from Daventry. It comprises a one-piece moulded case of insulating material similar in appearance to ebonite and measuring overall 9 in. square by 3½ in. deep. Reaction or volume control is provided, oper-



Ethophone Duplex Set.

Accessories are specified as follows:—  
 A—Accumulator or suitable dry-cell battery.  
 B—High-tension dry-cell battery.  
 V—Valve or valves, as required.  
 E—Aerial Equipment.  
 T—Telephones.  
 S—Loud-speaker.

ated by the knob shown in the front of the instrument. The remaining two knobs (on top of the moulded case) are for tuning and filament control respectively. Both valves are controlled by the one rheostat, which is of the dual type, to enable bright- or dull-emitter valves to be employed. By the use of additional plug-in coils the wavelength range can be extended to cover from 250 to 5,000 metres. Coils for 300-500 metres are supplied with the set.

Price (including 2 valves) £7-7-0.

All-in price (ABVES) £12-7-6.

Ref. W.M.205

**C.A.C. DUO-VALVE. C.A.C. Valve Distributing Co., Ltd., 10, Rangoon Street, E.C.3.**



C.A.C. Duo-valve Set.

**D—LF.** This is a new upright model of a popular two-valve set. It is a well-made and efficient receiver, with ebonite front panel and polished mahogany cabinet, with space provided for the internal stowage of the high-tension battery. Extreme simplicity of control is aimed at, together with good quality loud-speaker reproduction and adequate volume at the usual distances from main or high-power broadcasting stations. Tuning is effected by means of the large central dial, the small knob above the dial actuating, by means of a worm-and-nut drive, the moveable portion of a two-coil holder carrying the tuning and reaction coils. This enables fine adjustment to be made quite easily. Each valve filament current is controlled by a separate rheostat. Altogether a very neat and serviceable set.

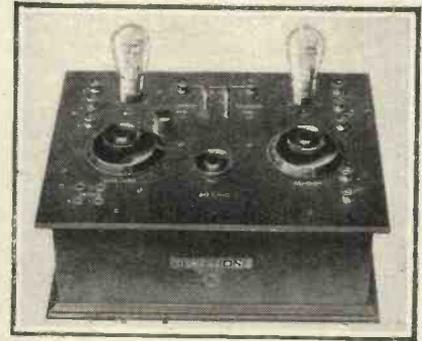
Price £6-13-6.

All-in price (ABVS) £11-16-0.

Ref. W.M.229

**GECOPHONE. General Electric Co., Ltd., Magnet House, Kingsway, W.C.2. (Stands 61, 63 and 214G.)**

**D—LF.** A flat or box-type receiver embodying the standard detector valve



Gecophone Two-valver.

and associated circuit with the addition of one stage of low-frequency amplification, and capable of giving good quality loud-speaker reception over the usual distances. An additional voltage may be applied to the second valve, thus enabling a power valve to be used in order to secure maximum volume. The panel, carrying all terminals and controls, is of matt ebonite upon a mahogany case. Operation is very simple, and a vernier adjustment is provided for fine tuning. Wavelengths other than the normal 300-500 metres may be received by the use of additional plug-in coils which fit into sockets on the panel.

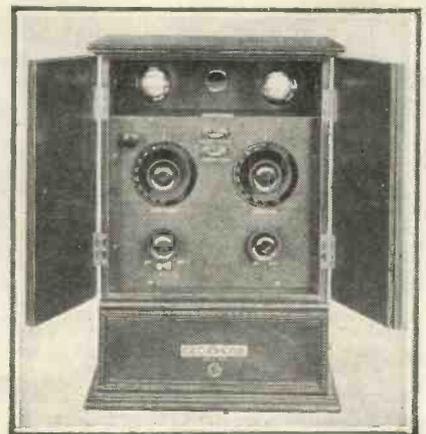
Price (with 2 valves) £8-12-0.

All-in price (ABVT) £11-5-0.

Ref. W.M.213

**GECOPHONE CABINET. General Electric Co., Ltd., Magnet House, Kingsway, W.C.2. (Stands 61, 63 and 214G.)**

**D—LF.** This model comprises the same circuit arrangement as the flat-type two-valve set described above, but is fitted complete in a neat ornamental cabinet, with accommodation for high-tension battery provided in the lower compartment. As may be seen from the illustration, the valves are fitted in a deep recess above the ebonite panel, and are thus protected, whilst the double doors of the cabinet enable the set to be closed up completely when not in use. It will operate a loud-



Gecophone Two-valve Cabinet.

speaker at distances up to 15-20 miles from a main station and 40-50 miles from 5XX. A handsome set, easy to operate, and economical in the matter of operating cost.

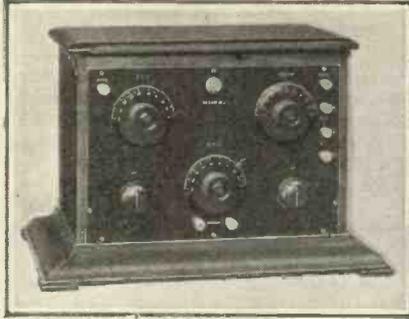
Price (with 2 valves) £11-15-0.  
All-in price (ABVT) £15-7-6.

Ref. W.M.214

**GENERAL RADIO TYPE 15.**  
*General Radio Co., Ltd., 235, Regent Street, W.1. (Stand 103.)*

D—LF. A distinctive and powerful two-valve set in open-fronted cabinet of polished walnut, the front panel being of metal with black crystalline finish. Essentially a home-entertainment set, extremely simple to install and to operate, it is capable of giving excellent loud-speaker results from the local broadcasting station (20-25 miles distant), and, with a little careful adjustment of the single tuning dial and the reaction or volume control, good results in telephones from stations at considerable distances. On actual test under good conditions some 20 miles from London, fine loud-speaker strength was obtained from that station, whilst Newcastle, Birmingham, Dublin, and several other stations were clearly received on telephones. In odd cases other stations were received at quiet room strength on the loud-speaker. The wavelength range is 250-2,400 metres. A neat battery cord containing all necessary leads is attached to the set. The com-

Accessories are specified as follows:—  
A—Accumulator or suitable dry-cell battery.  
B—High-tension dry-cell battery.  
V—Valve or valves, as required.  
E—Aerial equipment.  
T—Telephones.  
S—Loud-speaker.



Gillan II A.

A little skill is required to obtain the good results of which the set is capable, but this is soon acquired, and several British and Continental stations are then receivable upon telephones.

Price £6-5-0.  
All-in price (ABVT) £10-18-6.

Ref. W.M.203

**MARCONIPHONE TYPE 21.**  
*Marconiphone Co., Ltd., 210/212, Tottenham Court Road, W.1. (Stands 121/5 and 220G.)*

D—LF. This receiver is of an entirely new design, the primary object being to ensure satisfactory loud-speaker reception at distances greater than usual with a two-valve set. It is claimed that, under ordinarily favourable conditions, a loud-speaker range of 40 to 50 miles is obtainable. Housed in a neat open-front cabinet of polished mahogany, with valves and coils completely enclosed and protected, the set is extremely simple to operate. A master-switch is provided which cuts off both batteries from the set. This may be seen in the illustration, below the two main dials. Battery connections are at the rear of the cabinet; aerial and earth terminals on the left, and terminals for telephone or loud-speaker on the right.



Marconiphone Type 21 Two-valver.

Wavelength ranges of 300-500 and 1,200-3,000 metres may be obtained by means of interchangeable coils, a coil for the former range being supplied with the set.

Price £8-15-0.  
All-in price (ABVES) £14-14-0.  
Pedestal Battery-box (extra) £1-7-6.

Ref. W.M.206

**ANODION LONG-RANGE.**  
*Marconiphone Co., Ltd., 210/212, Tottenham Court Road, W.1. (Stands 121/5 and 220G.)*

HF—D. An alternative type of the Sterling two-valve receiver, in which a high-frequency amplifying valve precedes the detector, thus making the set particularly suitable for long-distance reception on telephones. The normal wavelength range is 300-500 metres, but, by changing the coil units, this range may be extended to cover waves between 40 and 5,000 metres. In appearance the set is similar to a slightly simpler Anodion two-valve set, but an additional dial is provided by means of which the output circuit of the H.F. valve is tuned. Generally speaking, most of the British and many Continental stations are within range, under average conditions. The short-wave American transmissions (KDKA for instance) should also be received when using the appropriate coil unit.

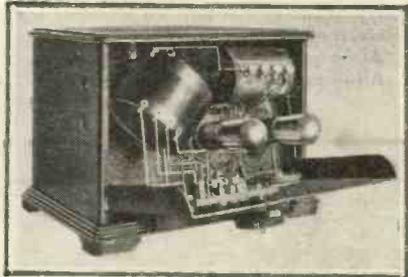


Anodion Long-range Two-valver.

Price £7-0-0.  
All-in price (ABVT) £11-10-0.  
Metal protecting cover (extra) £0-16-8.  
Ref. W.M.209

**POLAR TWIN.**  
*Radio Communication Co., Ltd., 34/35, Norfolk Street, Strand, W.C.2. (Stand 149.)*

D—LF. A simple, compact, and highly efficient two-valve set constructed upon a novel plan. The upper panel, carrying the valves, tuning coils and terminals, is of ebonite, whilst the sides of the case are entirely of metal, with black crystalline finish. The special form of tuning and reaction coils employed is neat, efficient, and very readily interchangeable for reception on different wavelength ranges. For reception of the local and Daventry stations the respective pairs of coils can be set so as to give the desired reaction effect and simply plugged in as required. All tuning is effected by means of the single dial on the front of the set, and the brilliancy of the valve filaments is con-



General Radio Type 15 Two-valver.

plete assembly of the set is so mounted that it may be swung forward upon a hinge (as shown in the illustration) to afford access to valves, etc. Switching on and off is done by merely inserting or withdrawing the loud-speaker (or telephone) plug.

Price £6-15-0.  
All-in price (ABVES) £12-0-0.

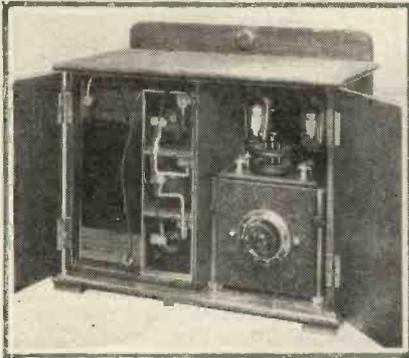
Ref. W.M.212

**GILLAN II A.**  
*Gilfillan Bros., Ltd., 63, High Holborn, W.C.2. (Stand 106.)*

HF—D. Of similar dimensions to the Gillan II, but designed for long-distance reception on phones, additional range and selectivity being obtained by the high-frequency valve (with separate tuning control) which precedes the detector valve. As shown in the accompanying illustration, the controls (apart from the filament rheostat knobs) are three in number, two for actual tuning purposes and one for reaction or volume control.

*If you want further particulars of any of these sets send a postcard to US and save yourself trouble.*

## Guide to the Best Valve Sets (Continued)

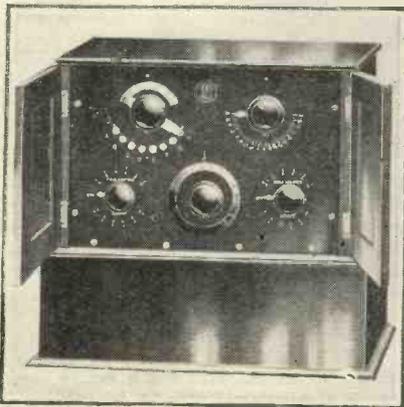


Polar Twin Set.

trolled by the single rheostat (with interchangeable resistance to suit different types of valves) on the right-hand side. Upon a regulation aerial good loud-speaker results are claimed at distances of 20 to 60 miles—certainly excellent volume was available on actual test at about 20 miles—whilst an indoor aerial will give quite good results up to 10-15 miles. With a little careful manipulation more distant stations were tuned-in at quiet room strength, and many British and Continental stations were clearly received upon telephones. The standard equipment includes both short and long-wave coils.

Price £6-15-0.  
All-in price (ABVS) £12-12-0.  
Ref. W.M.201

**R.I. Radio Instruments, Ltd., 12, Hyde Street, New Oxford Street, W.C.1. (Stands 145 and 147.)**



R.I. Two-valve Set.

D-LF. A compact and efficient two-valve set in completely enclosed mahogany cabinet, to which may be added a pedestal battery-box base if desired. A special feature of the arrangement is the method of providing grid bias for the L.F. valve without the usual separate dry-cell battery. Good tone and reasonable loud-speaker volume at the usual distances have been the objects of the designer. Additional valve amplifier may readily be added if greater volume is required. The operation is particularly straightforward,

Accessories are specified as follows:—  
A—Accumulator or suitable dry-cell battery.  
B—High-tension dry-cell battery.  
V—Valve or valves, as required.  
E—Aerial equipment.  
T—Telephones.  
S—Loud-speaker.

and satisfactory results can be obtained by anyone without the slightest technical knowledge.

Price £13-5-0.  
All-in price (ABVET) £19-1-6.  
Pedestal base (extra) £1-10-0.  
Ref. W.M.211

### THREE-VALVE SETS

OF three-valve receiving sets there are three serviceable types available. First, the arrangement consisting of two high-frequency and a detector valve (2HF—D), which is particularly suitable for selective long-distance reception on telephones, but not really suitable for loud-speaker operation. Performance of this kind is not in any great demand, and accordingly not many sets are manufactured with this circuit arrangement.

Secondly, there is the combination of detector valve (with reaction) followed by two low-frequency amplifying valves (D—2LF), which gives powerful loud-speaker results from a main station within 50 or 60 miles and, with careful adjustment, reasonable loud-speaker volume over much greater distances. Satisfactory reception from Daventry is obtainable up to 200 miles, whilst the operation of this type of set is quite as simple a matter as in the case of a single-valve-with-reaction receiver.

The third arrangement, which may be considered the average of the first and second above mentioned, comprises one H.F. valve, detector valve and L.F. valve (HF—D—LF). The high-frequency valve ensures satisfactory range and increased selectivity, and the low-frequency valve following the detector ensures a strength adequate in most cases for good loud-speaker volumes at distances up to 100/120 miles from a main broadcasting station and 200/250 miles from 5XX.

It is to be noted that this type of set will permit a selection of programmes to be received provided that (a) the receiver is situated at least a few miles from the local broadcasting station, and (b) that the difference in wavelength between the local and the desired station is sufficiently great for the degree of selectivity provided in the set.

**BRITISH GENERAL CABINET SET.** *British General Manuf'g. Co., Ltd., Tyrwhitt Road, Brockley, S.E.4.*

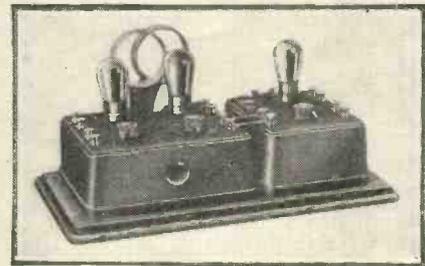
D—2LF. This all-enclosed cabinet receiver is similar in all respects to Receiving Station No. 3, except that it is fitted into a larger cabinet provided with double doors to afford protection to the



British General Three-valver.

control panel, and that space is available in the base for stowage of both H.T. and L.T. batteries. This enables all external battery leads, with their untidy appearance, to be dispensed with. The only outside connections are the aerial and earth leads and loud-speaker flex. Tuning adjustment, Autostat filament and valve switching controls, also the general performance of the set, are identical with Receiving Station No. 3.

All-in price (A equipment) £15-0-0.  
All-in price (B Equipment) £20-7-6.  
Ref. W.M.314



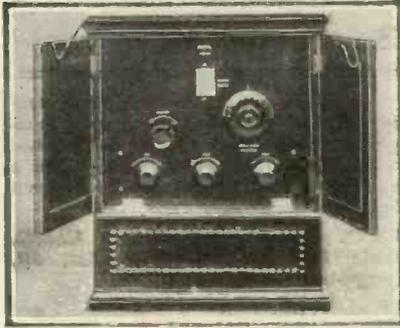
Ethophone Triplex Set.

**ETHOPHONE TRIPLEX.** *Burn-dept Wireless, Ltd., Aldine House, Bedford Street, W.C.2. (Stands 140/1, 144 and 209G.)*

D—2LF. This set comprises the Ethophone Duplex (two-valve) receiver already described, with an additional low-frequency amplifying valve, all mounted complete upon a neat wooden baseboard, and suitably inter-connected. A considerably increased loud-speaker volume is thus obtainable, whilst operation of the set is not complicated in any way. Further advantage as regards volume may be gained by the use of special 6-volt power valves, and, for heating the filaments of these, an accumulator is preferable to dry batteries. Included in the equipment provided for in the all-in price is a larger type of loud-speaker.

Price (Set: coils, and super-power valves) £14-0-6.

All-in price (ABVES) £24-6-0.  
Ref. W.M.303



Magnum All-enclosed Three-valver.

**MAGNUM ALL-ENCLOSED.**  
*Burne-Jones, Ltd., 296, Borough High Street, S.E.1. (Stand 76.)*

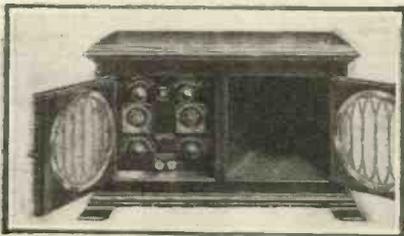
D—2LF. This set is designed for receiving from the local broadcasting station with purity and sufficient volume for all ordinary purposes. The cabinet is of oak, and the valves and components can be tilted forward to afford ready access to all parts, or, when desired, to change plug-in coils. Coils for both normal broadcast waves and Daventry are supplied as standard. High-tension and grid batteries are accommodated in the base of the cabinet, and are accessible when the sliding back of cabinet is removed.

Price £14-7-6.

Ref. W.M.309

**B.T.H. British Thomson-Houston Co., Ltd., Crown House, Aldwych, W.C.2. (Stands 127/130.)**

HF\*—D—LF. This represents a very successful effort to embody an efficient and powerful receiving set, complete with all accessories and loud-speaker, in a cabinet which forms a neat and artistic piece of furniture. The only external items are the aerial and earth leads. All controls (there are only two for tuning purposes) are upon a characteristic brown panel in one half of the cabinet, the flare of the loud-speaker occupying the other half. The valves are completely enclosed and protected behind the panel. A dual-amplification (reflex) circuit is employed, and, by a simple arrangement of plugs, two or three valves may be used with telephones, or the loud-speaker may be brought into use. The loud-speaker reception range is 60-90 miles in the case of main stations and 150-200 miles from



B.T.H. Three-valve Set.

Accessories are specified as follows:—  
 A—Accumulator or suitable dry-cell battery.  
 B—High-tension dry-cell battery.  
 V—Valve or valves, as required.  
 E—Aerial equipment.  
 T—Telephones.  
 S—Loud-speaker.

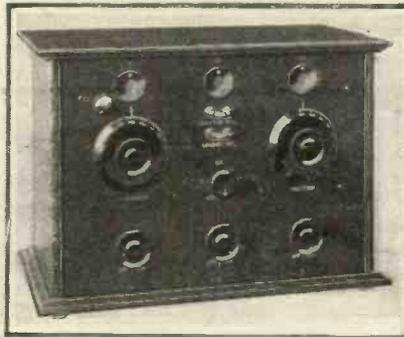
Daventry, The valve filaments are heated by a dry-cell battery in lieu of the usual accumulator, and all batteries are enclosed within the cabinet. Each set is accompanied by an instruction booklet, which renders the installation and operation perfectly straightforward.

All-in price (ABVT and built-in LS) £36-17-6.

Ref. W.M.302

**GECOPHONE. General Electric Co., Ltd., Magnet House, Kingsway, W.C.2. (Stands 61 and 63.)**

D—2LF. A neat and well-finished set intended to afford reliable loud-speaker reception and good quality reproduction at distances up to 80-90 miles from a main station and correspondingly greater distance from Daventry. Valves, etc.,



Gecophone Three-valver.

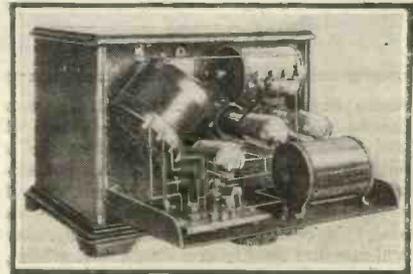
are enclosed and accessible through the hinged lid of the cabinet, the latter being of polished mahogany. All controls are carried upon the vertical ebonite front panel, and comprise main tuning and reaction dials, separate rheostat for each valve, a master switch of special design which enables one or both of the L.F. valves to be cut out of circuit, or, in another position, cuts off both H.T. and L.T. batteries. The normal wavelength range may readily be extended by the use of additional coils which fit into sockets provided upon the panel. An easily-operated and very satisfactory set, moderate in first cost and inexpensive to maintain. With dull-emitter valves as recommended and included in the equipment, a 6-volt 30-ampere-hour accumulator will give about 60 hours' operation per charge.

Price (set and 3 valves) £18-2-6.

All-in price (ABVT) £23-9-6.

Ref. W.M.316

**GENERAL RADIO TYPE 17. General Radio Co., Ltd., 235, Regent Street, W.1.**



General Radio Type 17 Three-valver.

D—2LF. Of similar external appearance to the Two-valve Broadcast Receiver (Type 15) made by the same firm, this set includes an additional low-frequency amplifying valve, thus enabling much greater volume of sound to be obtained. The actual operation, as in the case of the two-valve set, is extremely simple. The accompanying illustration shows the compact internal arrangement of the receiver—the tapped aerial coil (on the left), in conjunction with the three-way switch shown, enables a wavelength range of 250-2,400 metres to be covered. The main dial of the G.R.C. variable condenser will be noticed below the edge of the metal front panel which, in one piece with the metal baseboard, hinges forward to afford easy access to the interior. Certainly a well-made set in polished walnut cabinet, with performance in every way equal to its smart appearance.

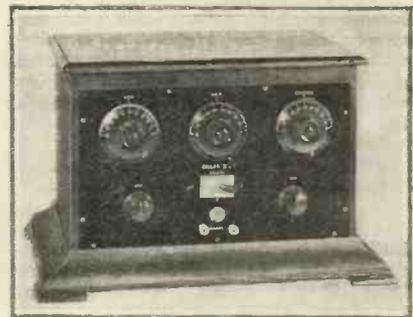
Price £9-17-6.

All-in price (ABVES) £15-0-0.

Ref. W.M.311

**GILLAN IIIA. Gilfillan Bros., Ltd., 63, High Holborn, W.C.2. (Stand 106.)**

HF—D—LF. An excellent example of the general-purpose three-valve circuit, comprising high-frequency valve (for range and increased selectivity), detector valve and low-frequency amplifying valve (for increased volume). It is a well-made set in neat open-front cabinet of polished mahogany, but also obtainable in oak. Operation is fairly simple, involving the adjustment of two tuning controls (one of which may be calibrated irrespective of the aerial employed) and a reaction or volume control. The three



Gillan IIIA.

If you want further particulars of any of these sets send a postcard to US and save yourself trouble.

## Guide to the Best Valve Sets (Continued)

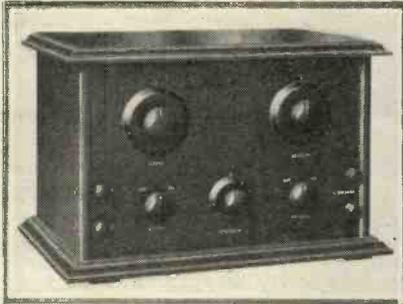
valve filaments are controlled by two knobs and, once adjusted, the action of the entire set may be controlled by a simple master switch which also permits the third (L.F.) valve to be cut out if telephone reception (on first two valves only) is desired. Excellent loud-speaker volume and quality are obtainable, whilst, under favourable conditions, stations at considerable distances are receivable at moderate loud-speaker strength.

Price £11-17-6.

All-in price (ABVET) £18-2-6.

Ref. W.M.306

**MARCONIPHONE 31.** *Marconiphone Co., Ltd., 210/212, Tottenham Court Road, W.1. (Stands 121/5 and 220G.)*



Marconiphone Type 31 Three-valver.

D—2LF. A straightforward set in which ease of manipulation, together with excellent loud-speaker reproduction, are the chief points aimed at. It is also designed to give a good performance as regards distant reception, and is claimed to operate a loud-speaker, under normally favourable conditions, at ranges up to 150 miles. The adjustments comprise a tuning dial, reaction or volume-control dial, a separate strength control, and switches by means of which either two or three valves may be brought into action, as considered necessary, and which enables the set, if left in correct tuning adjustment, to be simply switched on or off as required. Alternative wavelength ranges of 300-500 and 1,200-3,000 metres can be obtained by the use of interchangeable coils. Coils for the former range are supplied as standard with the set. Enclosed in finely finished mahogany cabinet and supplied complete with carefully compiled instruction booklet.

Price £15-17-6.

All-in price (ABV only) £21-15-6.

Pedestal battery box base £1-15-0.

Ref. W.M.305

**STERLING ANODION.** *Marconiphone Co., Ltd., 210/212, Tottenham Court Road, W.1. (Stands 121/5 and 220G.)*

D—2LF. Incorporating a detector valve (with reaction) followed by two stages of low-frequency amplification, this set is particularly adapted for full-volume loud-speaker reception at the usual distances from broadcasting stations. As illus-

Accessories are specified as follows:—

A—Accumulator or suitable dry-cell battery.

B—High-tension dry-cell battery.

V—Valve or valves, as required.

E—Aerial equipment.

T—Telephones.

S—Loud-speaker.

trated, the set is of the characteristic Sterling desk type, with sloping ebonite top panel carrying all controls, terminals and valves. The main tuning dial, with vernier knob for fine tuning, is in the centre front of the panel, with the reaction or volume-control knob on the right and wavelength range selector knob on the left. A Sterling reaction unit is employed and the wavelength range is approximately 275-925 metres. This range can be extended, if desired, to 7,600 metres by substituting other interchangeable units.

Price £14-7-6.

All-in price (ABVT) £22-19-2.

Metal Protecting Cover (extra) £0-16-8.

Ref. W.M.317



Sterling Anodion Three-valver.

### FOUR-VALVE SETS

ALTHOUGH several combinations of valves are possible in a four-valve set, experience and popular demand have resulted in one particular type being made almost exclusively.

This is a set comprising one high-frequency amplifying valve, detector valve and two low-frequency amplifying valves, and usually provided with some form of switching arrangement so that the last valve may be cut out of circuit when adequate volume is obtainable upon three valves.

For the user who desires a selection of programmes from British and Continental stations at good loud-speaker strength, with occasional full-strength dance or outdoor music from the local station or Daventry, this type of four-valve set is thoroughly recommended. Its operation does not call for any special skill as the controls usually do not exceed two dials (for tuning purposes) and some form of volume adjustment.

If used in conjunction with a reasonably good aerial-earth system, good loud-speaker volume may readily be obtained at distances up to 100-150 miles from a main station and about 300 miles from Daventry.

**C.A.C. SUPER-FOUR.** *C.A.C. Valve Distributing Co., Ltd., 10, Rangoon Street, E.C.3.*

HF—D—2LF. A well-finished and efficient receiving set in open-front mahogany cabinet with hinged lid, affording access to valves, coils, etc., in the interior. The vertical ebonite front



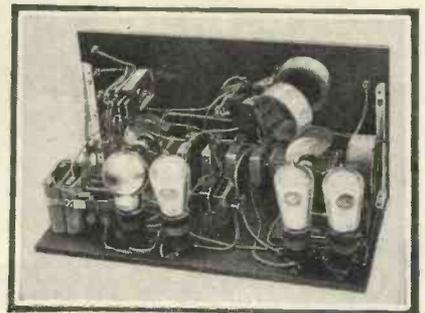
C.A.C. Super-four.

panel carries the two main tuning dials and the reaction-control knob, which comprise the normal operating adjustments. Four rheostats, of very neat and compact type, are fitted—one for each valve. A change-over switch, seen above the right-hand dial in the accompanying illustration, enables the last (power) valve to be cut out when not required. Reaction is varied by means of a worm-and-nut gear which enables a satisfactory fine adjustment to be made, so that the best results either on nearby or distant stations can be obtained without distortion or self-oscillation. The second illustration is of interest as showing the extremely compact layout, which enables the overall dimensions of the receiver to be kept within reasonable limits whilst maintaining efficiency in performance. Loud-speaker reception from normal-power broadcasting stations is obtainable at distances of 150-200 miles, and correspondingly greater distances from high-power stations.

Price £13-0-0.

All-in price (ABVS) £20-8-0.

Ref. W.M.413

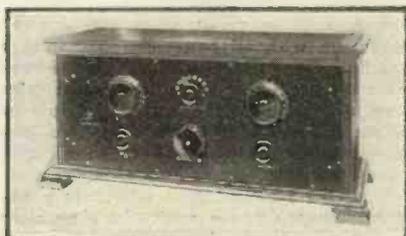


C.A.C. Super-four (interior).

### GECOPHONE TABLE MODEL.

*General Electric Co., Ltd., Magnet House, Kingsway, W.C.2. (Stands 61, 63 and 214G.)*

HF—D—2LF. This set, illustrated below is a four-valve model incorporating several improvements and refinements in design, whilst the polished mahogany cabinet and neat panel layout gives it a distinctive appearance. The operation is quite straightforward, the controls comprising two main tuning dials which actuate Gecophone slow-motion variable condensers tuning the aerial and high-frequency circuits, two filament-control knobs, a volume-control switch (seen between the condenser dials) which takes the place of valve-to-valve switching



Gecophone Table-model Four-valver.

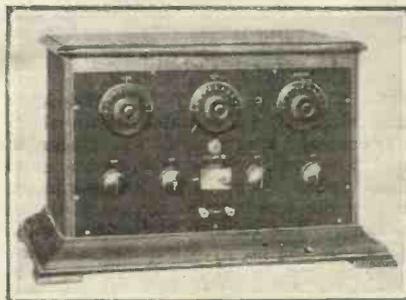
arrangements, and reaction unit of a new pattern. All connections are made at the back of the cabinet by means of non-reversible plugs and sockets. Primarily designed for clear and strong loud-speaker reproduction, the set has a considerable range and fairly good selectivity which should enable many British and Continental transmissions to be received at satisfactory loud-speaker strength. The normal wavelength range is 260-500 metres, but additional coils and reaction units may be obtained at a small extra cost, to enable this range to be extended. Overall dimensions of set as illustrated are 24 in. by 11 in. by 11 in. Maintenance costs are low, as, with the valves recommended and included in the equipment quoted for below, a 6-volt 30-ampere hour accumulator will give approximately 45 hours' operation per charge.

Price (including four valves) £30-0-0.

All-in price (ABVT) £37-5-0.

Ref. W.M.416

### GILLAN IV. *Gillilan Bros., Ltd., 63, High Holborn, W.C.2. (Stand 106.)*



Gillan IV.

Accessories are specified as follows:—

A—Accumulator or suitable dry-cell battery.

B—High-tension dry-cell battery.

V—Valve or valves, as required.

E—Aerial equipment.

T—Telephones.

S—Loud-speaker.

HF—D—2LF. A well-built set in substantial open-front cabinet of oak or mahogany, with valves and tuning coils (plug-in) completely enclosed, but readily accessible when the one-piece hinged lid is raised. Controls, as illustrated, comprise three dials—two for tuning and one for reaction or volume regulation—and, in addition, separate filament control knob for each valve. All connections are made to terminals at rear of cabinet, with exception of loud-speaker leads, which connect to the two terminals shown on front panel. In centre of panel, above loud-speaker terminals, is a neat master-switch which enables three or four valves to be used as required and, in the "off" position, switches off the set entirely. On actual test this set gave a very good performance—great volume with good quality from the local station and fairly easy selection of several other stations.

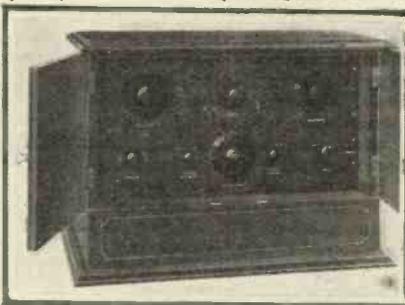
Price £15-2-0.

All-in price (ABVET) £21-10-0.

Ref. W.M.401

### MARCONIPHONE 41. *Marconi-Phone Co., Ltd., 210/212, Tottenham Court Road, W.1. (Stands 121/5 and 220G.)*

HF—D—2LF. A straight four-valve set contained in a substantial, polished mahogany cabinet with double doors which completely enclose the control panel, and with space provided in



Marconiphone Type 41 Four-valver.

the base for stowage of high-tension dry battery. Really a development of the same firm's three-valve set (Type 31), with additional features comprising a high-frequency amplifying valve to ensure additional range and selectivity and a rejector or wavetramp to prevent or minimise interference from an undesired local station. This latter feature is operative upon both the normal and the 1,600-metre wavelengths. A master switch controls the operation of the set and affords a choice of three or four valves. Various ranges of wavelengths are obtainable by the use of interchangeable coil and reaction units,

in conjunction with the two tuning dials. Coils for normal broadcasting wavelengths are supplied as standard with the set. On actual test under favourable conditions, some 20 miles from London, an excellent selection of programmes (British and Continental) was available, whilst the rejector enabled 2LO to be eliminated whilst Cardiff and Manchester were received. The quality of tone in all cases was exceptionally good.

Price £28-0-0.

All-in price (ABV only) £34-12-0.

Ref. W.M.405

### STERLING REGINA AND IMPERIAL. *Marconiphone Co., Ltd., 210/212, Tottenham Court Road, W.1. (Stands 121/5 and 220G.)*



Sterling Regina Four-valver.

2HF—D—LF. The Regina set, in oak cabinet, and the Imperial, in mahogany cabinet, represent a further development of the Sterling four-valve receiver, which, together with the Primax loud-speaker, is manufactured as a complete and self-contained floor cabinet set. (See illustration.) The pleated diaphragm of the loud-speaker is mounted upon a vertical front panel, protected when not in use by double doors, whilst all batteries are accommodated within the cabinet. The only external connections are the aerial and earth leads.

Price, Regina set complete (ABVT and S) £64-9-9.

Price, Imperial set complete (ABVT and S) £73-9-9.

Ref. W.M.410

### POLAR. *Radio Communication Co., Ltd., 34/35, Norfolk Street, Strand, W.C.2. (Stand 149.)*

D—3LF. This is a four-valve receiving set specially designed for use in conjunction with a house-wiring system, and provided with a special remote control device whereby the set itself may be in-

*If you want further particulars of any of these sets send a postcard to US and save yourself trouble.*

## Guide to the Best Valve Sets (Continued)



Polar Four-valver (open).

stalled in any convenient position and yet be fully controlled, both as regards station selection and volume, from any one of the several listening points to which the loud-speaker may be attached. If desired, several loud-speakers may be in operation on the system at the same time. The receiving set incorporates



Polar Four-valver (closed).

three stages of resistance-coupled low-frequency amplification, and has two distinct tuning circuits, each of which may be tuned to receive a different station. These tuned circuits are brought into use as required by means of relays which, in turn, are actuated by the remote control switch from any point of the wiring system. Not intended for long-distance reception, the set affords a choice of two programmes (say from London and Daventry), and enables full loud-speaker strength and practically perfect reproduction to be obtained from either. Full instructions regarding the installation and operation of the set, together with diagram of wiring system are supplied with each receiver. The appearance and finish of the set enables it to be placed in any room if desired, and in this case, a battery-box base of corresponding finish can be obtained. The second illustration shows the receiver, closed, mounted upon this base, which is included in the all-in-equipment.

Price (with remote control, plugs and leads) £32-10-0.

All-in price (ABV and £7-7-0 loud-speaker) £54-9-6.

Approx. price of wiring system complete for four rooms £10-0-0.

Ref. W.M.415

Accessories are specified as follows:—  
 A—Accumulator or suitable dry-cell battery.  
 B—High-tension dry-cell battery.  
 V—Valve or valves, as required.  
 E—Aerial equipment.  
 T—Telephones.  
 S—Loud-speaker.

### PORTABLE RECEIVING SETS

IN this section have been included all types of sets with real claims to portability, whether completely self-contained (that is, with batteries, frame-aerial and loud-speaker all fitted into one case), or intended for use with a small, temporary outdoor aerial and (or) separate and external loud-speaker.

The degree of portability desired by users or prospective users, the circumstances in which sets are to be used, and the class of results desired, vary over wide limits, but, for the purpose of this guide, only sets which may be carried complete, including all valves and batteries—even though not actually assembled as one unit—properly protected and provided with convenient means for carrying, are considered as portable sets.

The range extends from one-, two-, and three-valve sets to eight-valve super-het sets, so that no general indications of range, etc., can be given in this preliminary note.

To facilitate reference, however, the following simple classification has been adopted, and the class letter will be found after the title of each receiving set.

Sets entirely self-contained, with valves, batteries, frame aerial, and loud-speaker ...CLASS A.

Sets complete with valves, batteries and frame aerial but for use with external loud-speaker ...CLASS B.

Sets complete with valves and batteries, but for use with temporary outdoor aerial and external loud-speaker ...CLASS C.

Sets complete with valves and batteries, but for use with temporary outdoor aerial and phones only ...CLASS D.

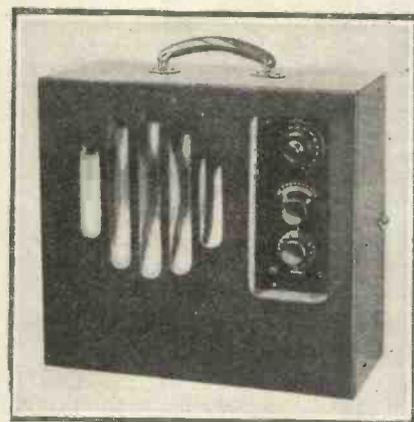
**HART-COLLINS.** *Hart Collins, Ltd., 38a, Bessborough Street, S.W.1. (Stand 118.)*

HF—D—2LF. (Class A). This set is particularly well-finished and entirely suitable for use as an ordinary set (but without aerial) indoors in addition to its special portable feature. In oak or leatherette cabinet (to choice) the overall dimensions of which are 19½ in. wide by 16 in. high by 7½ in. deep, the receiver complete with all batteries, etc., weighs 28 lb. Special features are easy operation by means of one tuning dial only and a volume-control knob; a switch to effect a change over from the 300-500-metre to the 900-2,000-metre wavelength range without any additional coils; and, lastly, the inconspicuous but quite effective loud-speaker aperture. Loud-speaker reception from main stations up to 30 miles and from Daventry up to 150 miles is obtainable by means of the circuit employed, whilst the tonal quality is excellent. Instead of a switch, the insertion of a plug attached to a short flexible lead puts the set into operation.

All-in price £27-1-0.

Ref. W.M.606.

**REES-MACE.** *Rees-Mace Manufacturing Co., Ltd., 39a, Welbeck Street, W.1.*



Rees-Mace Portable Set.

HF—D—2LF (Class A). A well-finished and completely self-contained set in which all controls are immediately accessible and with which is incorporated a cone loud-speaker, mounted immediately behind the openings in the front of the cabinet. The cabinet measures overall, 18 in. by 16½ in. by 8 in., and the complete set weighs 28 lb. By means of a switch, a choice of three or four valves is afforded. The controls comprise two tuning dials and a volume-control knob, with an additional switch for use only when changing over for reception of 5XX or other long-wave station. Demonstrated a few miles only from 2LO three



Hart-Collins Portable Set.

## SPECIAL SETS

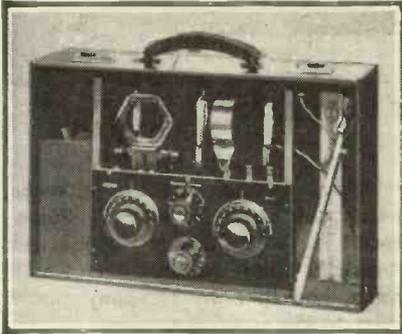
valves gave adequate volume, whilst the tonal quality was very pleasing. Although these remarks apply particularly to the four-valve set, the makers supply two- and three-valve sets also and undertake to build special sets (up to seven or eight valves) to order at short notice. Prices of these on application.

All-in price £26-10-0.

Ref. W.M.605

**MAGNUM ALL-SEASON.** *Burne-Jones, Ltd., 296, Borough High Street, S.E.1. (Stand 111.)*

HF—D—LF (Class D). A special feature of this receiver is the mounting of all components upon a wooden sub-



Magnum All-Season Portable Set.

frame, which may be withdrawn from the leather case and used as an ordinary three-valve set indoors. Self-contained in a leather case, measuring 17 in. by 10½ in. by 6 in., the complete outfit weighs 20 lb., which also includes the aerial and earth wires (the latter with spike for driving into the ground), and phones. Designed essentially for good phone reception upon a temporary outdoor aerial, slung over a tree or as convenient, it will give a satisfactory performance over considerable distances, and, if fairly close to the broadcasting station, say, three or four miles, moderate loud-speaker results are obtainable. The operation of the set is easy—two tuning dials to be adjusted and filaments to be turned on.

All-in price (ABVET), £17-12-6.

Ref. W.M.608

## SUPER-HET SETS

THE comparatively rapid development and increasing popularity of super-het sets (or, to give them their full title, supersonic-heterodyne sets) is indicated by the fact that there are now a dozen or more makes available at prices ranging from £25 to £140.

The special claims and advantages of this type of set may be summarised as follows:—

(1) It has practically unlimited range, determined principally by outside considerations, such as atmospheric conditions, local noises, etc.

(2) Remarkable selectivity is afforded so that a distant station may be received

to the complete exclusion of a much nearer station although their respective wavelengths differ only by a few metres.

(3) The amplification obtainable is so great that good loud-speaker results can be produced, without distortion, from the infinitesimal amount of electrical energy intercepted by the frame aerial.

(4) The receiving set, with frame aerial, is entirely independent of any ordinary aerial or earth connections and therefore may be used in any room of a house or flat, or, in a modified form, it makes an ideal portable set. To the actual cost the manufacturer is obliged to add the Marconi royalty of 12s. 6d. per valve holder and a fixed amount of 30s. for patent royalty payable to the proprietors of the supersonic patent.

**B.T.H. SIX-VALVE.** *British Thomson-Houston Co., Ltd., Crown House, Aldwych, W.C.2. (Stands 127 and 130.)*

A beautifully made and completely self-contained receiver in drawing-room cabinet of figured mahogany. Really good loud-speaker reception from stations at a moderate distance, with easy adjustment and absence of any external aerial or earth, has been aimed at rather than extremely long-range reception. For instance, it would prove ideal for use in a flat within 60-70 miles of London (or other main station) or 120-150 miles of Daventry. Duplication of the internal frame aerial enables reception to be obtained from any direction without moving the cabinet. Provision is made for the use of telephones on four or six valves, or an external loud-speaker, in addition to or instead of the "speaker" built into the cabinet. Valves are heated by dry-cell batteries, and a voltmeter is fitted on the panel to ensure correct operating length range is 300-1,800 metres.

All-in price, £132-15-0.

Ref. W.M.701



B.T.H. Six-valve Super-het.

**MARCONIPHONE STRAIGHT-EIGHT.** *Marconiphone Co., Ltd., 210/212, Tottenham Court Road, W.1. (Stands 121/5 and 220G.)*

5HF—D—2LF. This eight-valve receiver is quite in a class by itself. It is



Marconiphone Straight-eight.

designed to have the highest possible performance and to combine satisfactory range, selectivity, power and quality of tone with straightforward simplicity of operation. The circuit arrangement comprises eight valves, of which the first five are high-frequency amplifiers, the sixth the detector, and the last two low-frequency amplifiers. Apart from the aerial selector switch (upper left-hand), the main on-and-off switch (centre) and the volume-control switch (upper right-hand) there are six controls, but five of these which tune the H.F. amplifying stages are calibrated directly in wavelengths on the ivory scale against each dial. Actual operation of the set therefore reduces to switching on, setting five dials to the desired wavelength, and tuning in with the left-hand dial in conjunction with the "aerial selector" switch. The total current consumption of the filaments of all eight valves (as recommended and supplied by the makers) is .73 ampere, or about as much as one general-purpose bright-emitter valve. The set is housed in a desk-type lock-up cabinet of polished mahogany, with ample space in the base for H.T. batteries. It is claimed that the degree of selectivity obtained is sufficient to permit the complete separation of Bournemouth and London transmissions within a mile of the latter station. Illustrated descriptive booklet may be obtained from the makers, free, upon application.

Price, £54-10-0.

All-in price (ABV only), £67-16-0.

Ref. W.M.801

*If you want further particulars of any of these sets send a postcard to US and save yourself trouble.*

# Presenting the Ballet by Wireless!

Madame Anna Pavlova.



An article written specially for the WIRELESS MAGAZINE  
by Madame ANNA PAVLOVA.

HOW many people, I wonder, realise the strain on physique and purse which is entailed in touring with a big company of artists all round the world, year in and year out without ceasing, and even then being able to reach only a quite inconsiderable portion of the potential audience.

## *Desire to Thrill*

This last point causes dissatisfaction to every true artist. There is always present the desire above all things to thrill all the people in the world with one's work, and one is grieved that life is so short, and the way so long.

Therefore wireless does in a great measure endear itself to us. Are not its possibilities boundless? It embraces all nations, all peoples, all climes! At last we have within our reach a medium by which we may achieve our dream, and conquer the world with art.

Ah, it is a pity that the ballet is no easy subject for wireless handling! But the march of invention is so swift and sure that it is certainly within the bounds of reason to assume that it will not be long before television becomes one of the commonplaces of life. Then it is certain that our art will be presented by radio to the world.

You think it sounds an extravagant prophecy that a ballet could ever be adequately given except at an opera house? But so many things have been written that have been considered quite impossible! At least the beginnings of television are an accomplished fact, and one which the

artistic world cannot afford to overlook.

This is how the combination of wireless sound and television would affect me: My touring days would be ended, and, except for holidays, I should no more experience that ever-new feeling of excitement consequent upon a departure or an arrival. My cheque-book would enjoy a wonderful rest, and my wardrobe-skips would be relegated to the box-room.

Instead of all the rush and fuss which has constituted my life for so many years, I should, with perfect composure and repose, periodically produce a new ballet. Within the walls of a huge studio, which I would have erected in the grounds of my Hampstead home, I would have time to devise—oh! such gorgeous scenery and effects as have never been seen before.

## *Best of Everything*

The very best of everything—artists, music, scenery, lighting, dresses, would be used to produce these spectacles, in the full knowledge that there would be time to improve vastly upon each. I should be marvellously stimulated when I realised that, when the production was at length perfect, it would be only the matter of pressing a switch and *immediately the whole world would be looking at my work!* Wonderful thought, indeed!

There is, however, another side to this rosy picture. What of my art itself? I wonder if it would suffer as a result of this almost mechanical effort, which I can only liken to a

rehearsal taking place of a scene which will never be shown. Somehow I feel a dread that I should get "stale," that enthusiasm would wane, and that my company would react to the same sensations.

## *Keyed Up*

These long journeys over the world, in spite of the fatigue they cause, tend to key one up to one's work. The very fact of sitting for long hours in a train over a tedious, monotonous journey makes one the more keenly anxious to dance at the journey's end for the very contrast.

Or, if the journey is through fresh country and a variety of scenes, the mind becomes fresh and fit and easily gets "in tune" with the mentality of the audience at the end.

Again, passing through wonderful country like the Alps, all gem-studded with lakes, or the teeming colour of Egypt, fresh ideas are born and new details of life and colour introduced to improve the setting of old scenes. All these things would be lost if radio-ballet were made general.

And now I come to the greatest objection to the great scheme. What of the applause? It is absurd to imagine that any artist, however mediocre, would work for money alone without applause. It is the fount of the artistic life. To dance and not to hear an audience express approval is bad enough; to dance to an audience which cannot express its appreciation is infinitely worse!

I love my audience more than I can say. Although, nine times out of ten, they are no more than a confused mass of subdued colour, I know I am

dancing for each individual, and each can watch every moment, criticise every motion—and be satisfied. Then I *must* do my best, or my reward at the fall of the curtain would be denied me.

One more objection. The audience thrills the artist to the summit of endeavour, driving away lassitude by its very expectancy. There is always an invisible bond of sympathy which, were it not present, would completely spoil the effect. Now, I defy scientists to reproduce this atmosphere without the presence of both parties. How, then, may its absence be remedied?

Surely you have seen an artist not quite keyed up at the beginning of a performance who, after a few minutes, is on the very top note of "concert pitch"? Why? Because the audience expects it! The true

artist sways the temperament of an audience almost at will; but how could the shades of feeling be appreciated by the greatest of us when dancing in London to an invisible audience at Tokio? For the audience must still remain unseen and unheard, television or no.

Ah! the whole question is very interesting and wonderful, but I shall be surprised if the broadcast ballet ever entirely supersedes the older method. Much is lost even if world-conquest by art is gained.

For myself, I should very much like the idea of doing my work free of care and fatigue, for a time, at any rate.

Yet I feel that in the end I should become impatient to be on the road again—if only to find out for myself what the world was still thinking about me!

## "CRYSTAL" RECEPTION WITHOUT A CRYSTAL!

ONE of these days you may make the discovery that you can receive on your crystal set when the crystal is not in its cup. If you do, keep perfectly calm. Don't take out a provisional patent as this "discovery" is constantly being made.

What I mean is that, if you live fairly close to a main broadcasting station, you may find it possible to receive fairly good signals by carefully adjusting the catwhisker to a sensitive spot on the empty crystal cup.

Such reception will be much weaker than when a really good crystal is in use, but still it may be fairly good.

If you are successful there is no need to try to explain the matter by supposing that minute portions of crystal are adhering to the surface of the metal. It has long been known, in scientific circles, that a rectifying action can be set up at a point of contact between a clean point of metal and the oxidised surface of another piece of metal.

If you clean the crystal cup thoroughly until it is bright and shining you will fail to obtain any result.

It is therefore clear that a thin film of oxide is essential for the action described.

Most metals, however, oxidise rapidly when exposed to the action of the atmosphere, which is the reason why the polished surface of any metal has to be regularly cleaned in order to retain its sheen.

A contact between a fine copper wire and a piece of slightly rusty iron also has fairly good rectifying properties.

L.P.R.

### AT YOUR SERVICE

*If your set is not giving the results you think it should; if you do not understand how any particular piece of apparatus works; if you are in trouble over any wireless point—we are ready to help you.*

*Send your query, together with a stamped addressed envelope and the coupon on p. iii of the cover, to The Editor, WIRELESS MAGAZINE, La Belle Sauvage, E.C.4.*

## SELECTIVITY

EVEN in the most selective sets it will always be found that the aerial circuit is the most flatly-tuned circuit in the set. Lack of selectivity is directly due to damping, and damping is due to resistance.

If a circuit had no resistance the damping would be zero and the selectivity infinitely greater. While it is not possible to construct an aerial circuit having no resistance whatever, it is a simple matter to reduce the resistance to a very small value in every part of the circuit except at the earth connection. Except when a counterpoise or frame aerial is used it is safe to say that the resistance at the earth connection, however good this latter may be, greatly exceeds that of all the rest of the circuit.

Therefore when one is troubled with excessively flat tuning efforts should be at once directed to improving the earth connection, if there is the slightest room for such improvement.

G.R.

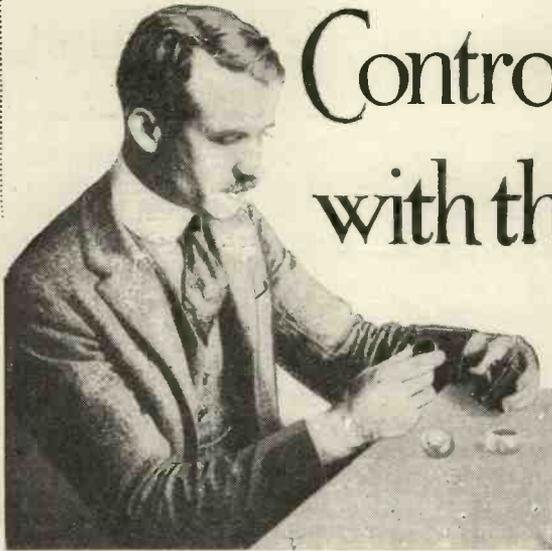
## ACCUMULATORS

AS so many amateurs now charge their accumulators at home from the electric-lighting mains of the house, the following warning may be of considerable importance.

Never use a naked light in the vicinity of accumulators which are being charged. During the charging process an action known as electrolysis takes place which results in the acid being decomposed to a certain extent. Two products of this decomposition are the gases oxygen and hydrogen. The latter gas is given off in considerable quantities and is highly inflammable.

The danger of this gas exploding in an enclosed place, such as the container of an accumulator, will be obvious and nasty accidents occasionally occur through accumulators on charge being examined with the aid of a naked light

J.Y.P.



# Controlling Wavelength with the Oscillating Crystal

A Special Article by  
D. C. ROGERSON

 Dr. August Hund, of the U.S. Bureau of Standards Radio Laboratory, inspects some "oscillating" crystals.

SOME years ago the Curies, famous for their pioneer work with radium, found that if a crystal of Rochelle salts is placed between two metal plates, where a difference of

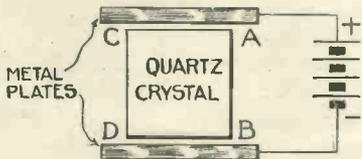


Fig. 1.—Quartz Crystal connected between Two Charged Plates.

potential exists, its shape is changed. If, as in Fig. 1, the two metal plates are connected to a battery so that one plate is at a positive potential with respect to the other, one of two things will happen, depending on which plate has the positive potential. The crystal will either lengthen along the lines AB and CD and shorten along AC BD, or *vice-versa*.

### Rubber Analogy

The action is analogous to that of a piece of rubber which, when squeezed between two plates, will become thinner and longer.

Other crystals show similar effects, but not so markedly as Rochelle salts. The latter, however, are hygroscopic, that is, they absorb moisture from the atmosphere, and they are so weak mechanically that the slightest pressure will crush them and render them useless for our purpose.

In experimental work the quartz crystal is most frequently used, its shape being changed by applying a positive and negative electrical charge.

By compressing a quartz crystal between two plates, the opposing faces of the crystal become electrically charged.

Returning to our analogy of the piece of rubber squeezed between two plates, when the pressure is suddenly released the piece of rubber will return to its normal position so suddenly that it will overshoot the mark, becoming larger than its normal size. Again it will contract to try to regain its normal size, but again it will overshoot the mark.

This overshooting each side of its normal size is called "oscillating," and, in action, is identical to what happens with a piece of quartz crystal which has been distorted by mechanical means or by a momentary voltage applied to the metal plates.

When a bell is struck with a hammer, the bell remains in a state of oscillation for some time, the oscillations being at an audible frequency. A quartz crystal oscillates at a frequency inaudible to the ear—at radio frequency. (see Fig. 2).

To show the action of a crystal oscillating at high-frequency an oscillatory circuit may be connected up,

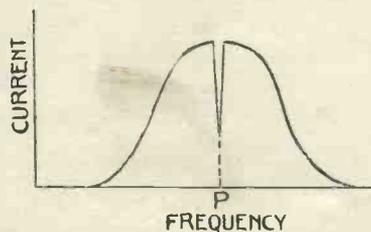


Fig. 3.—Current-frequency Curve of Oscillating Crystal.

consisting of a coil tuned by a fixed condenser in parallel, across the terminals of which is connected the oscillating crystal, properly cut and mounted between two metallic plates.

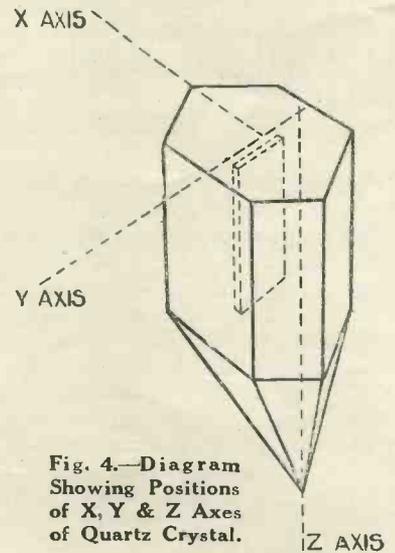


Fig. 4.—Diagram Showing Positions of X, Y & Z Axes of Quartz Crystal.

Coupled to this oscillatory circuit is a generator of H.F. oscillations, such as an oscillating valve.

By gradually increasing the frequency of the latter and noting, by means of an H.F. ammeter connected in the oscillating crystal's oscillatory circuit, the current flowing, a curve may be plotted—current against frequency.

Such a curve will resemble that shown in Fig. 3, from which it will be seen that the current increases as the frequency increases until a certain point is reached (P, Fig. 3), at which

the current suddenly drops, and, if the frequency is still further increased, as suddenly rises again.

The frequency at which this sudden drop in current occurs is the fundamental frequency or a harmonic of the oscillating crystal. In order to obtain a definite frequency at which the quartz crystal will oscillate it is absolutely essential that the crystal should be accurately cut and ground to size.

**Discrepancies**

A very slight discrepancy in this respect will result in the crystal exhibiting all sorts of peculiar frequencies, rendering it entirely useless for the purpose we have in mind.

Every quartz crystal is not suitable for the control of transmitters. The crystal used for this purpose must be carefully selected and as carefully prepared. Crystals already cut and mounted may be bought; and, incidentally, they are rather costly. The uncut crystal must be free from flaws, air bubbles and cracks, and must not be what is known as a twin crystal.

In order to ascertain whether or not a crystal is a twin, a reputable firm of opticians should be consulted, for a twin crystal is not obvious to the eye.

Moreover, to obtain a good crystal it must be cut from the original crystal along certain axes, which are generally referred to as the X, Y and Z axes. The last axis is known as the optical axis, and usually coincides with the geometrical axis of the crystal, but there are exceptions to this. An optician will soon discover the Z axis in a special piece of apparatus.

Drawn at right-angles to any two parallel and opposite sides of the crystal is the Y axis, whilst the X axis (or the electrical axis) is drawn through two opposite corners of the crystal and at right-angles to the Y axis. These axes are clearly shown in Fig. 4.

Having ascertained the positions of these axes the piece of crystal which is eventually used is cut out so that its length lies parallel to the Z axis, its width parallel to the Y axis, and its thickness parallel to the X axis.

The thickness of the cut crystal depends on the frequency at which it is desired to oscillate. In wavelength notation, for every millimetre of thick-

ness the crystal will oscillate at approximately 105 metres. Thus if it is desired to transmit on a wavelength of 250 metres the thickness of the crystal should be just under 2.5 millimetres.

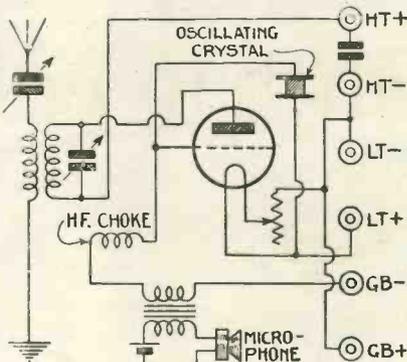


Fig. 6.—Simplest Oscillating-crystal Transmitting Circuit.

The oscillation frequency of a crystal must not be judged by measurement, however accurate, but the crystal should be inserted in an

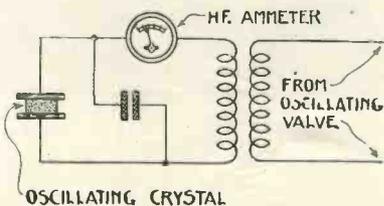


Fig. 5.—Circuit for Measuring Frequency of Oscillating Crystal.

oscillatory circuit and the frequency ascertained by means of the H.F. ammeter (see Fig. 5).

We have left the crystal just as it has been cut from the original crystal.

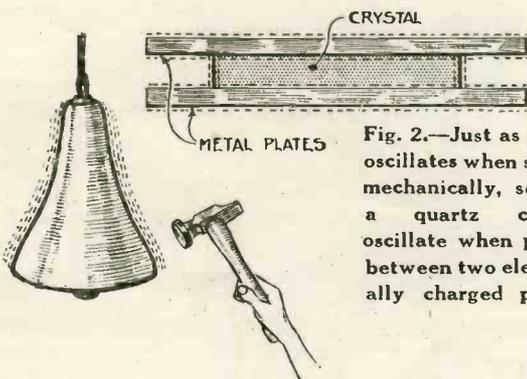


Fig. 2.—Just as a bell oscillates when struck mechanically, so will a quartz crystal oscillate when placed between two electrically charged plates.

The next step is the most tedious part of the manufacture and requires a large amount of patience. Having approximately a length and breadth of 1in., the two surfaces of the crystal

are ground until each surface is quite flat and parallel to the other.

A suitable grinding paste can be made from fine emery powder and paraffin mixed into a paste having a fairly thick consistency. The grinding paste is then smeared evenly on a steel surface-plate and the crystal is ground by pressing it on the surface-plate and giving it a circular motion.

When it is assured that the surface of the crystal is perfectly flat, the crystal is turned over and the other surface ground flat in a similar manner. The grinding process is carried on until the crystal has the desired thickness, it being certain that each side is not only flat but is parallel to the other. On nearing the desired thickness the frequency of the crystal should be repeatedly tested.

A few final grinding strokes should be made, using a very fine emery powder and oil, after which the crystal should be cleaned with carbon tetrachloride.

**Final Mounting**

The finished crystal is mounted between two metal plates, the underneath surface of the top plate and the upper surface of the bottom plate being ground smooth and flat to make perfect contact with the surfaces of the crystal. It is advisable to use some adjustable spring device so that the pressure of the plates on the crystal may be regulated.

Fig. 6 shows the simplest transmitting circuit using an oscillating crystal. When the plate coil, coupled to the aerial coil, is tuned to the frequency at which the crystal oscillates, the valve will begin to oscillate at that particular frequency and at no other—unless it happens to be a harmonic.

The advantages of the crystal-controlled transmitter are so obvious that the writer predicts that in the near future, when the world's chief broadcasting stations have each been allotted a definite wavelength, and when the minor stations that are situated a great distance apart are allotted an identical wavelength so that no heterodyning between them takes place, the crystal oscillator will come into its own—it is a rigid control on wavelength.

# The FIRESIDE FOUR



A WELL-KNOWN statesman remarked recently that there existed a tendency to "press the button and expect someone else to do the rest." It occurred to the writer that a receiving set to which the remark might be applied correctly would meet the requirements of many readers who, though perhaps possessing some technical knowledge themselves, require for home use a set which can be operated by any member of the household.

## Some Sacrifices

Obviously, in order to secure this simplicity of control, certain sacrifices had to be made. For instance, well-known and efficient methods of obtaining selectivity and sensitivity could not be incorporated because of the additional variable controls necessitated.

At the same time it was considered essential that the completed receiver should be something more than a local-station loud-speaker set, so that, apart from Daventry, for the reception of which an easy change of coil would be required, alternative entertainment should be available by the simple rotation of a station-selector dial.

It would thus be quite unnecessary to trouble about wavelengths, or, except as a matter of passing interest, to know the name of a single station. All that would really matter would be the music emanating from the loud-speaker.

The local station would be indicated by the volume of sound when the set was adjusted to receive its transmission, and if, for instance, a classic discourse entitled "Bus Conductors I Have Known" should not prove acceptable entertainment, the selector dial could be rotated until some more agreeable transmission was tuned-in. Even in the case of an S.B. "Bus Conductors" there would probably be at least one Continental station available.

So much for the general conditions which were made to govern the design of the receiving set.

Upon the small ebonite panel in the centre front of the set will be seen the four-inch selector dial of the variable condenser with the small knob of the volume-control or reaction condenser immediately beneath. Normally, the reaction condenser is adjusted so that self-oscillation does not occur at any setting of the selector dial, and then

it may be practically ignored except when it is desired to strengthen a particularly weak distant station.

The remaining fittings upon the panel are phone jacks, that on the left affording reception upon three valves and that on the right upon four valves. Upon inserting the plug in either jack, the appropriate number of valves is lighted and, when the plug is withdrawn, are extinguished.

## Simple Appearance

To preserve the simple appearance of the front of the set, all terminals (batteries, aerial and earth) are placed at the back of the cabinet upon suitable ebonite panels attached to the wooden baseboard which carries the valves and other components. Holes are cut in the back of the cabinet through which the terminal panels are accessible.

Referring to the circuit diagram, it will be seen that there are four valves, each with a separate fixed filament resistance:  $V_1$  functions as a high-frequency amplifier;  $V_2$  as rectifier; and  $V_3$  and  $V_4$  as low-frequency amplifiers. The fixed resistances are Amperites (Type 1A for 6-volt, .25-ampere valves). Other types are available to suit different valves.

The coils  $L_1$  and  $L_2$  together form the aerial-tuning unit,  $L_1$  consisting of from 6 to 12 turns of No. 20- or No. 22-gauge double-cotton or double-silk covered wire wound closely upon

one end of a Becol low-loss former. The smaller the number of turns used, the greater will be the selectivity, within limits, and, as a guide, it is recommended that 12 turns should be used when the nearest main station is 25 miles distant; 10 turns for 15-20 miles; 8 turns for 5-15 miles; and 6 turns for distances under 5 miles.

It is an easy matter to start with 12 turns and decrease the number as necessary to obtain freedom from interference by the local station.

The coil  $L_2$  consists of 56 turns of No. 24-gauge double-silk covered wire, the whole winding being tuned by means of the .0005-microfarad variable condenser  $C_1$ , but 48 turns only being included in the grid-filament circuit. The remaining 8 turns (that is, on the anode side of the tapping point) enable a very smooth reaction effect to be obtained in conjunction with the two condensers  $C_2$  and  $C_3$ .

It will be noticed that of these condensers,  $C_2$  alone is variable.  $C_3$  is a fixed condenser (capacity .001 microfarad) introduced as a safety-first measure to avoid accidental short-circuit of the high-tension battery.  $C_2$  is a Polar Junior condenser (capacity .0005 microfarad) fitted with a small ebonite

knob instead of the usual dial. The valves  $V_1$  and  $V_2$  are coupled by means of an aperiodic high-frequency transformer  $T_1$ . In this connection both the Constant-tuned

The low-frequency valves  $V_3$  and  $V_4$  operate in conjunction with the low-frequency transformers  $T_2$  and  $T_3$ , each of which has its primary winding shunted by a fixed (T.C.C.) condenser (value .002 microfarad),  $C_5$  and  $C_6$ . The transformers themselves are Eureka, Concert Grand and Second Stage, respectively.

By means of phone jacks provided with suitable contacts, the last valve is switched into or out of circuit and the filament current to all valves is switched on or off merely by inserting the phone (or loud-speaker) plug.

The jacks used in the present set are supplied by the Formo Co., and, although the diagram may appear a little complicated, the connections in the actual set are really simple, calling only for a little care in shaping the connecting wires to clear the reaction condenser.

$B_1$  is the usual filament-lighting battery;  $B_2$  the anode or high-tension battery with two positive tapping points so that 60 to 66 volts may be applied to the first and second valves and the full 100 or 108 volts to the low-frequency amplifiers.

It will be noted that a grid-bias battery ( $B_3$ ) is provided, and the grid-return leads from the two L.F. transformers

are connected to the negative of this battery.

Reservoir condensers (T.C.C., each of .2-microfarad capacity) are connected between each positive tapping

*In this article are given full constructional details of a four-valve set which ensures a selection of the world's wireless entertainment and is as simple to operate as the family gramophone, with the additional advantage that it does not require winding-up.*

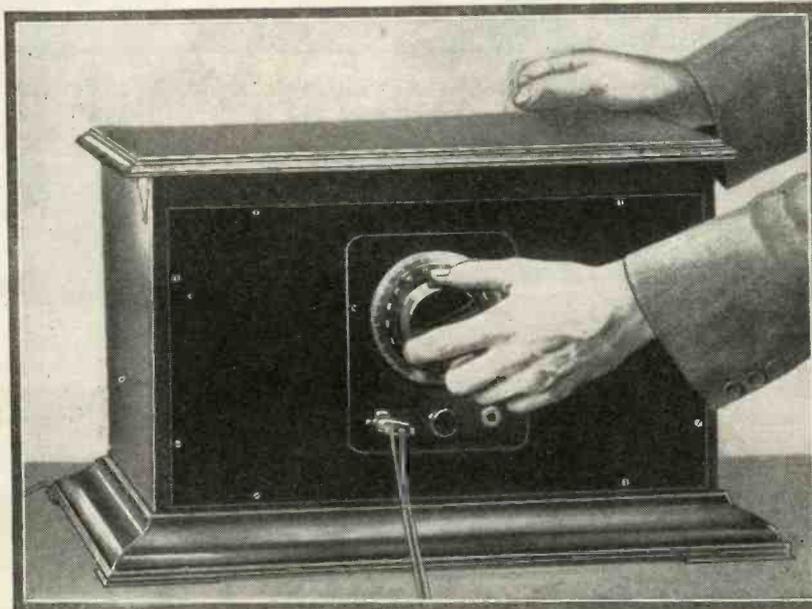
*The set has been specially designed, built and tested for the WIRELESS MAGAZINE by E. Redpath, well known as author of Cassell's handbook "Wireless Telegraphy and Telephony."*

*By changing two coils the set can be quickly adapted for the reception of Daventry and other long-wave broadcasting stations.*

*Moreover, the controls are so simple that the set can be operated efficiently by listeners with no previous experience.*

*We shall be glad to hear from readers who build this set just what results they get—we know that their reports will be good, for this is an especially good set.*

Unit (Peter Curtis, Ltd.) and aperiodic transformer, by Burne-Jones, have been used with good results. As the winding methods differ, however, care must be taken to wire up the valve-holder to correspond with the

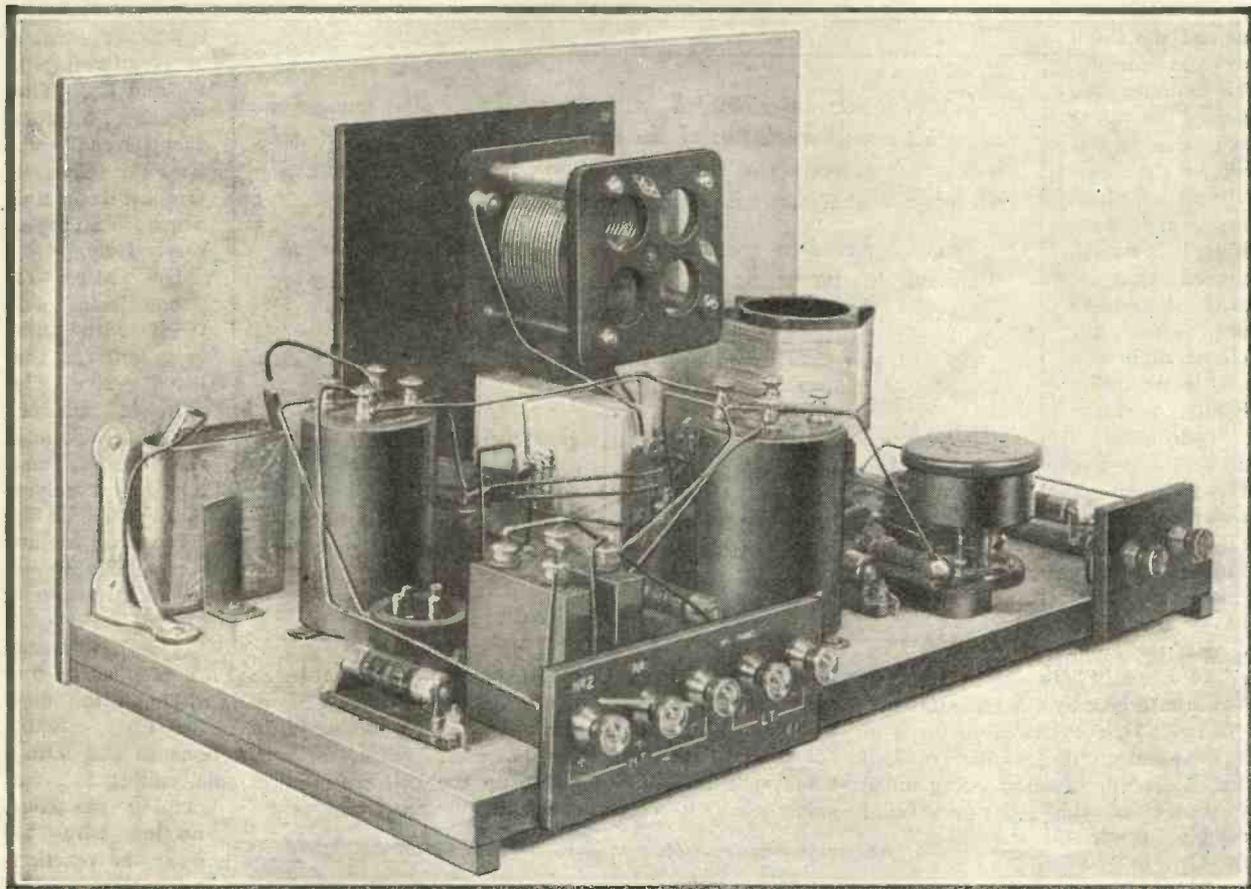


Photograph showing the Controls of the Fireside Four.

makers' diagram of connections.

Condenser  $C_4$  and resistance  $R_5$  are the usual grid condenser and leak (Dubilier), the grid return being made to the positive filament lead.

## The Fireside Four (Continued)



Photograph showing Disposition of the Components of the Fireside Four.

of the H.T. battery and the *negative terminal of the filament battery.*

### Suitable Valves

The valves used in the original receiver, which gave excellent results, were Cleartron CT25 (for H.F. and both L.F. stages) and CT25B for the detector. With this combination it is possible to use up to 80 or 100 volts on the H.F. and detector valves, with consequent increase in volume of sound which may on occasion be required, for instance, when music is needed for dancing or open-air entertainment.

Osram DE8 and DE5 valves were also used with excellent results, the arrangement then being DE8 H.F., DE8 H.F., DE8 L.F., DE5. Increased volume was obtained and a saving of about 25 per cent. in filament current was effected.

For those who wish to use a four-volt accumulator already on hand,

the new Neutron .06-ampere valves (two H.F. and two L.F.) are recommended. Tested in the receiver with appropriate four-volt Amperites, they gave very satisfactory results.

In the following list the components actually used in the original set are specified, but readers who already have components of good quality on hand should experience no difficulty if they are used, or if other well-known makes are substituted for those specified.

In such cases, however, a little extra care in wiring up will be called for, as the shape, size of components and disposition of terminals will probably differ:—

Ebonite panel, 7 in. by 6 in. by  $\frac{3}{8}$  in. (American Hard Rubber Co. or Becol, Trelleborgs.)

Cabinet, with baseboard. (Gilfilan Bros.)

2 terminal panels, one 5-way and one 2-way. (Burne-Jones.)

2 panel brackets. (Burne-Jones.)

.0005-microfarad square-law low-loss variable condenser. (Peto-Scott.)

.0005-microfarad Polar Junior condenser, with small knob instead of usual dial. (Radio Communication Co.)

L.F. transformer, Eureka Concert Grand. (Portable Utilities.)

L.F. transformer, Eureka 2nd stage. (Portable Utilities.)

4 Vibro anti-microphonic valve holders. (Burne-Jones.)

Low-capacity valve holder. (Burne-Jones.)

4 Amperites—type 1A, or according to valves used. (Rothermel Corporation.)

2 .2-microfarad fixed condensers (T.C.C.)

2 .002-microfarad fixed condensers (T.C.C.)

.001-microfarad fixed condenser (T.C.C.)

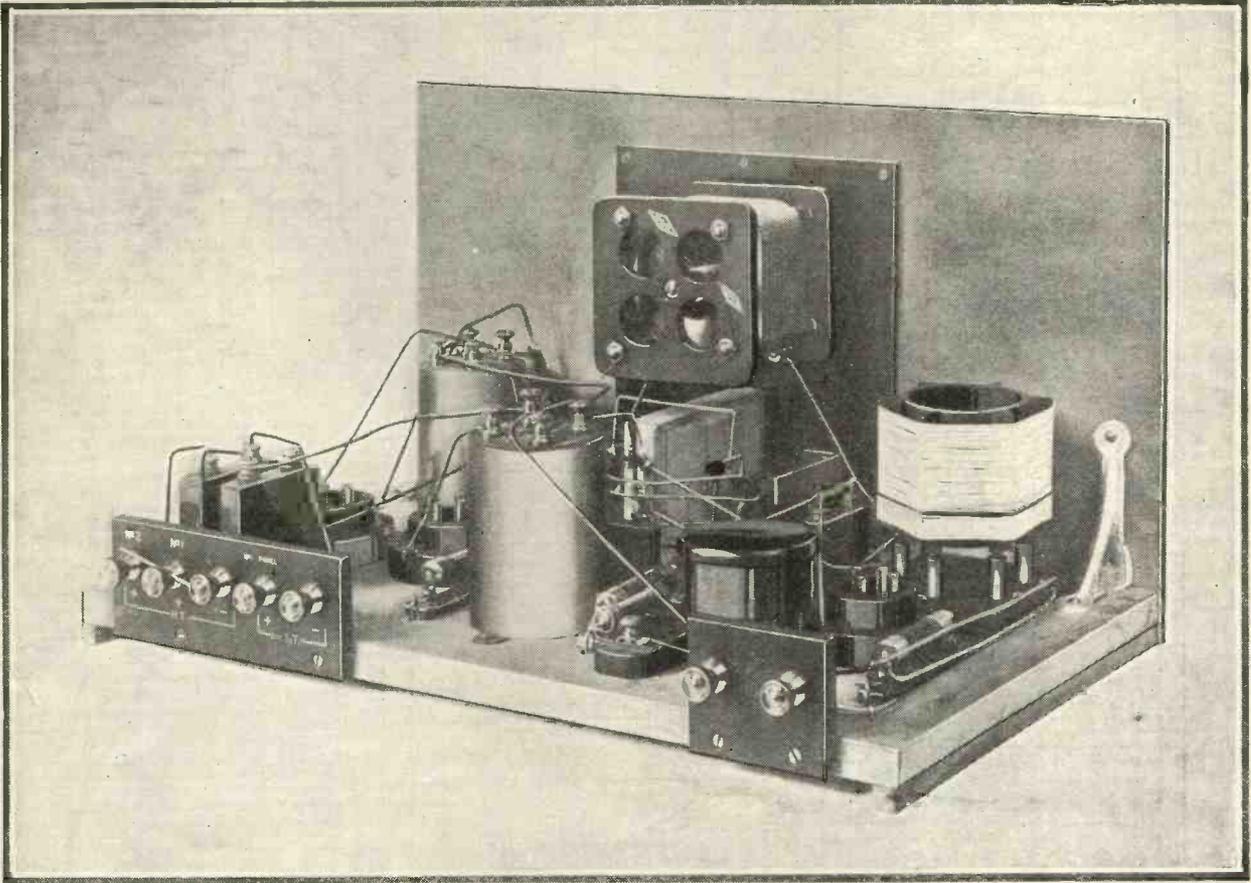
.003-microfarad grid condenser. (Dubilier.)

2-megohm grid leak. (Dubilier.)

Aperiodic H.F. transformer, 250-800 metres. (Peter Curtis.)

Jack No. 3, 4-point, open-circuit, with filament contact. (Formo.)

## A Set Designed by E. Redpath



Another Photograph showing the Disposition of the Components of the Fireside Four.

Jack No. 5, 6-point closed circuit with filament change-over. (Formo.)  
Phone plug. (Formo.)  
 $4\frac{1}{2}$ -volt flashlamp battery.  
Special tuning unit complete. (As advertised.)

or

Ebonite base  $3\frac{1}{2}$  in. by 3 in. by  $\frac{1}{4}$  in.;  
Becol former ( $2\frac{1}{4}$  in. long); 5 each,  
valve sockets and pins (required to  
make the special tuning unit.)  
No. 24-gauge d.s.c. copper wire.  
No. 20-gauge d.s.c. copper wire.  
Glazite for connections.

For the reception of the programmes from Daventry, Radiola and long-wave stations, there will be required, in addition:—

Aperiodic H.F. transformer (long-wave).

Special tuning unit, No. 2 (or materials to make), as follows:—Becol former, 4 in. long; 5 valve pins; No. 28-gauge d.s.c. wire.

### Drilling the Panel

The first operation is to drill the ebonite panel and secure it in place behind the wooden front of the cabinet,

taking care that the 6 in. by  $5\frac{1}{4}$  in. opening in the wood is central relative to the panel.

Then fix in place the two jacks and the Polar condenser and fasten the cabinet front to the wooden baseboard by means of the two aluminium brackets. Do not fix the .0005-microfarad variable condenser at this stage, as it will be rather in the way.

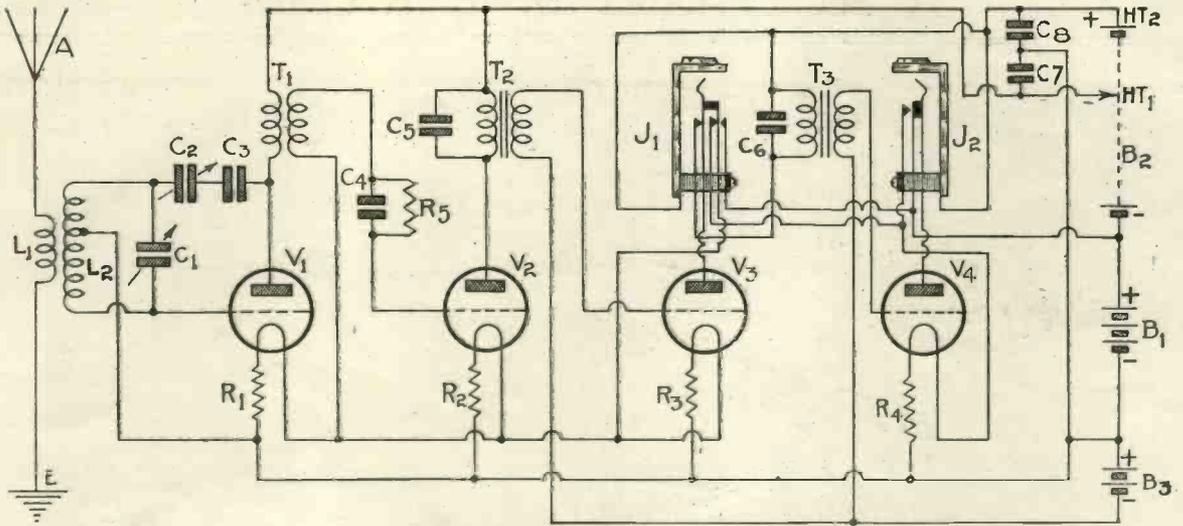
Referring to the photographs and to the wiring diagram, proceed to assemble all other components upon the baseboard. Try them all in place before actually screwing down, especially if any departure is made from the original specification. Omit the first-stage L.F. transformer (in centre of baseboard) and the .002-microfarad fixed condenser immediately behind it until the wiring of the two jacks and the Polar condenser is done.

The disposition of the components is such as to reduce the wiring as much as possible, further simplifica-

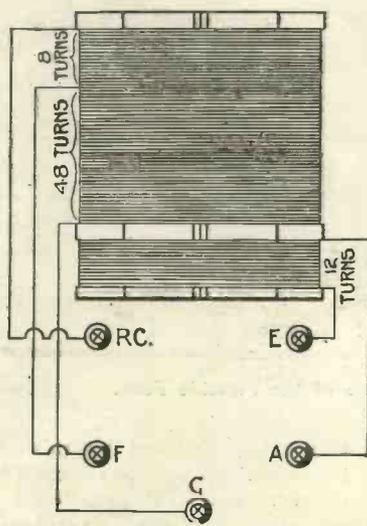
tion being obtained by raising the baseboard  $\frac{3}{8}$  in. clear upon two wooden side runners, each  $\frac{3}{8}$  in. square, and placing several of the filament-circuit connections *beneath* it. These underneath connections are indicated by dotted lines in the wiring diagram.

The filament-lighting circuit, including the wiring beneath the baseboard and the connections to the filament-switching contacts of the two jacks, should be proceeded with first and, on completion, may be tested by inserting valves in the holders and connecting the accumulator battery. Observe that inserting the plug in the jacks causes three or four valves to light up, respectively.

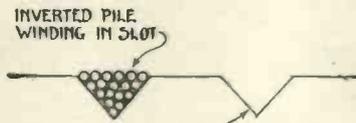
The remaining inter-jack connections should be made next, also those to the reaction condenser and the .0005-microfarad variable condenser, which should be fitted in place at this stage.



Circuit Diagram of the Fireside Four.

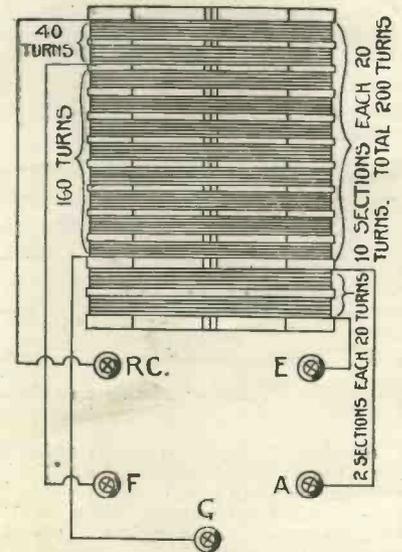


Details of Short-wave Coil.

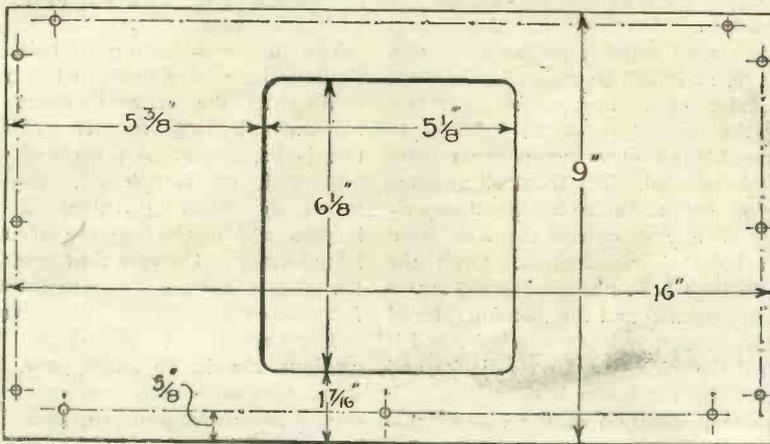


Details of the Winding of the Daventry Coil.

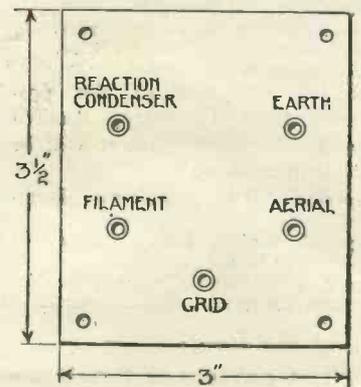
CONSTRUCTIONAL  
DETAILS  
OF THE  
FIRESIDE  
FOUR.



Details of Daventry Coil.

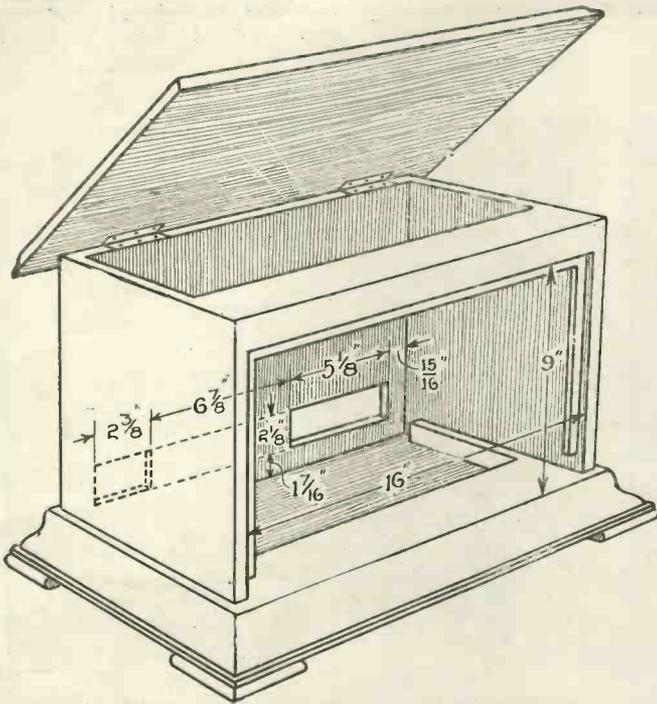


Layout of Front of Set.

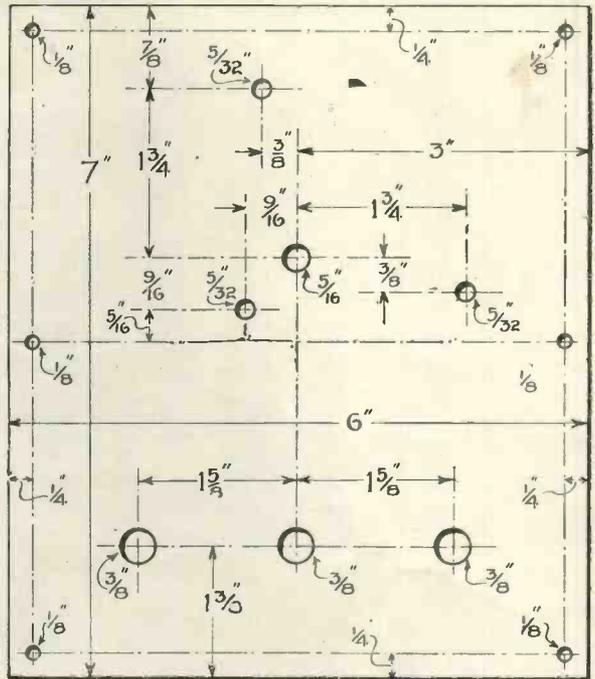


Arrangement of Coil Sockets.

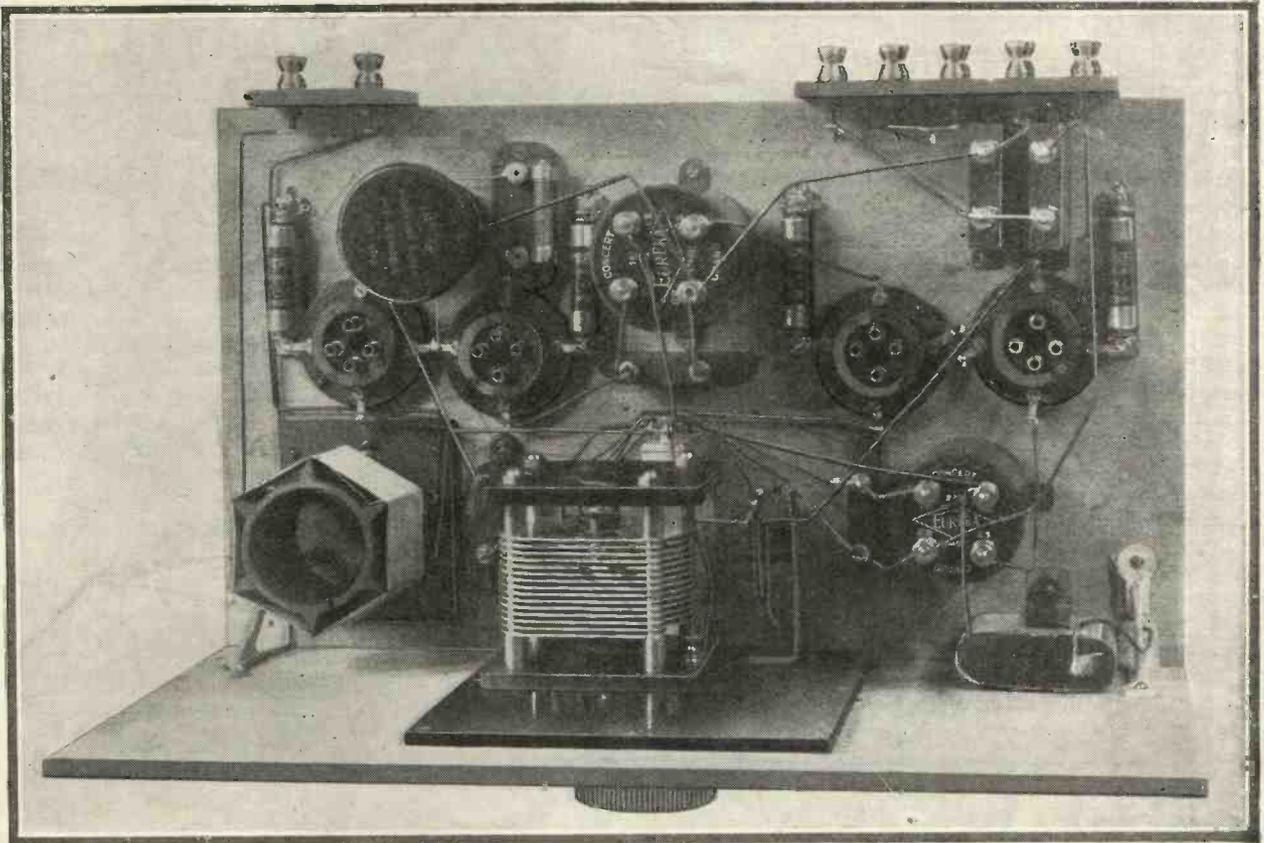
The Fireside Four (Continued)



Dimensions of Cabinet!

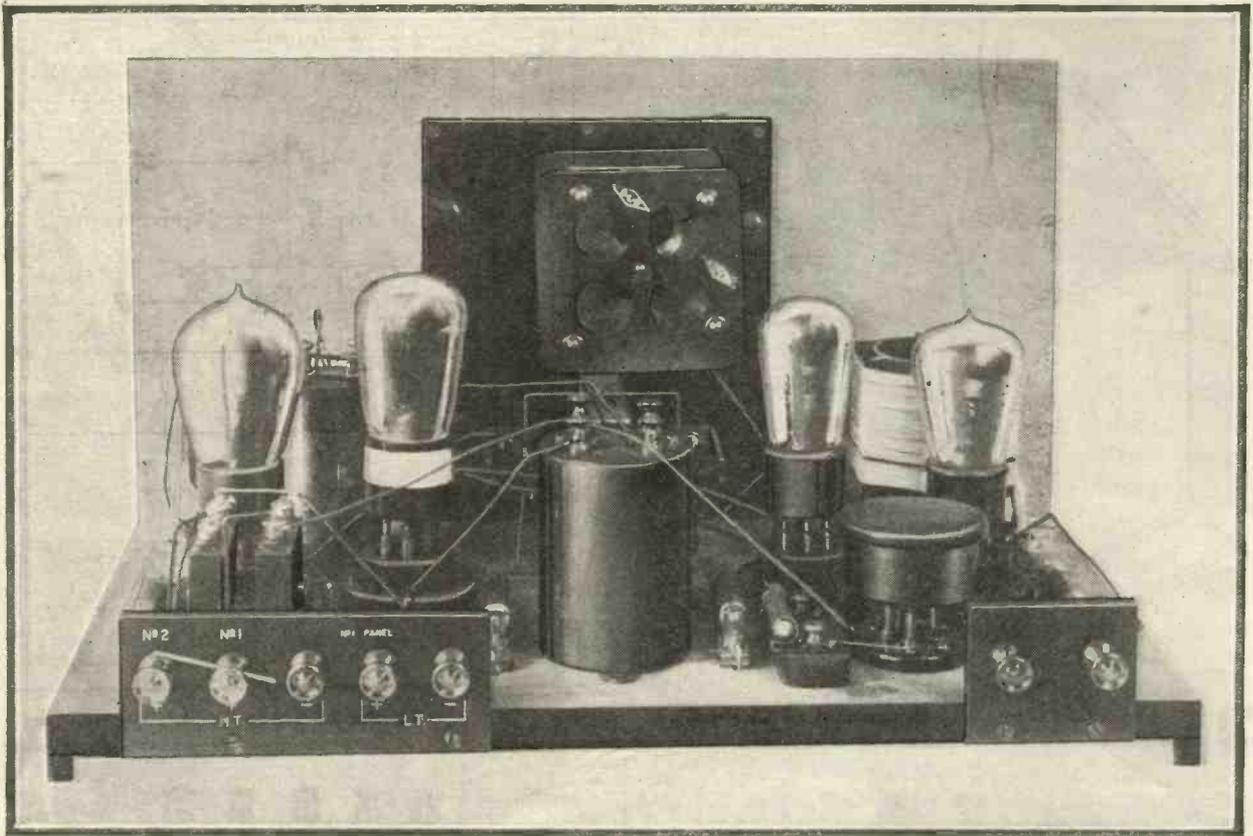


Layout of Front Panel.



Photograph showing Arrangement of Components of the Fireside Four on the Baseboard.

## The Fireside Four (Continued)



Photograph showing the Fireside Four Complete and Ready for Use.

If it is desired to avoid soldering, it will be found that practically all connections, except those to the two jacks, the tuning unit, the holder for the H.F. transformer and the valve holders, may be made by securing the bared and looped end of wire beneath the appropriate terminal upon transformer, variable or fixed condenser, or Amperite.

As mentioned in the list of components, the special tuning units may be purchased complete from some of the advertisers in this magazine, with whom arrangements have been made to supply it for the convenience of those who do not wish to make it themselves.

Full particulars as to the dimensions of base and former, also the number of turns, method of tapping, etc., are given in the diagrams. The turns of the aerial coil and the

**THE HELPING HAND**  
of the WIRELESS MAGAZINE is ever ready to come to your aid when you are in difficulty over any wireless trouble, whether practical or theoretical.

Just write your query out on a piece of paper (write on one side only, please!) and send it, together with the coupon on page iii of the cover and a stamped addressed envelope, to:  
The Editor.

WIRELESS MAGAZINE  
La Belle Sauvage, E.C.4.

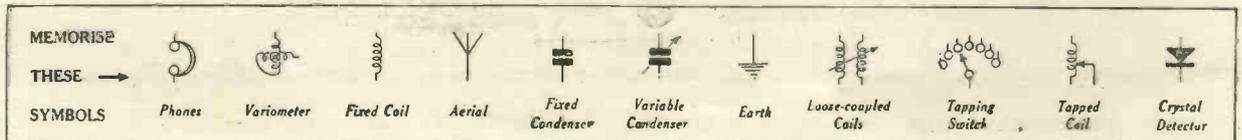
In the ordinary way a reply will be posted to you the same day that we receive your question. Moreover, this special service is **QUITE FREE!**

tapped secondary coil are wound upon the former in the same direction.

For the reception of the long waves—Davenport, Radio-Paris, etc.—a second tuning-unit is required, to be constructed in accordance with the details given. This second unit, together with an aperiodic H.F. transformer to cover the required wavelengths, replace the broadcast-wave unit and transformer in the set when required.

As mentioned at the beginning of this article, the operation of the completed receiver is as simple as possible—certainly simpler than in the case of a gramophone—and the same remark applies to the preliminary testing.

There is always the possibility, however, that an error in wiring-up may have occurred. To make sure



## A Special Four-valver for Family Use

that the error, if one exists, does not cause damage to the valves, connect the filament-lighting accumulator to the H.T. terminals of the set (first to H.T. - and H.T. + No. 1 and then to H.T. - and H.T. + No. 2, in turn), insert the plug in each jack and note that the valves do *not* light up. If they do, there is an error somewhere and the wiring must be carefully checked.

For the benefit of those without any experience of putting a receiving set to work, the operations are summarised, as follows:—

(1) Connect aerial and earth leads, also accumulator wires, to appropriate terminals and insert plug in one of the jacks, temporarily, noting that valves light up. Remove plug and connect H.T. battery leads. Replace plug.

(2) Adjust the volume-control condenser to its minimum value, by rotating the small knob.

(3) Rotate the selector dial until the local station is tuned-in.

(4) Adjust the volume-control knob until the greatest volume of sound, consistent with perfectly clear speech or

music, is emitted by the loud-speaker connected to the plug.

(5) Rotate the selector dial and, if necessary readjust the volume-control knob until at no point on the dial scale does the receiving set oscillate (as evidenced by the reception of carrier waves as varying musical notes or by the peculiar "cluck" heard when the aerial terminal is touched with a moistened finger-tip). After these preliminaries have been

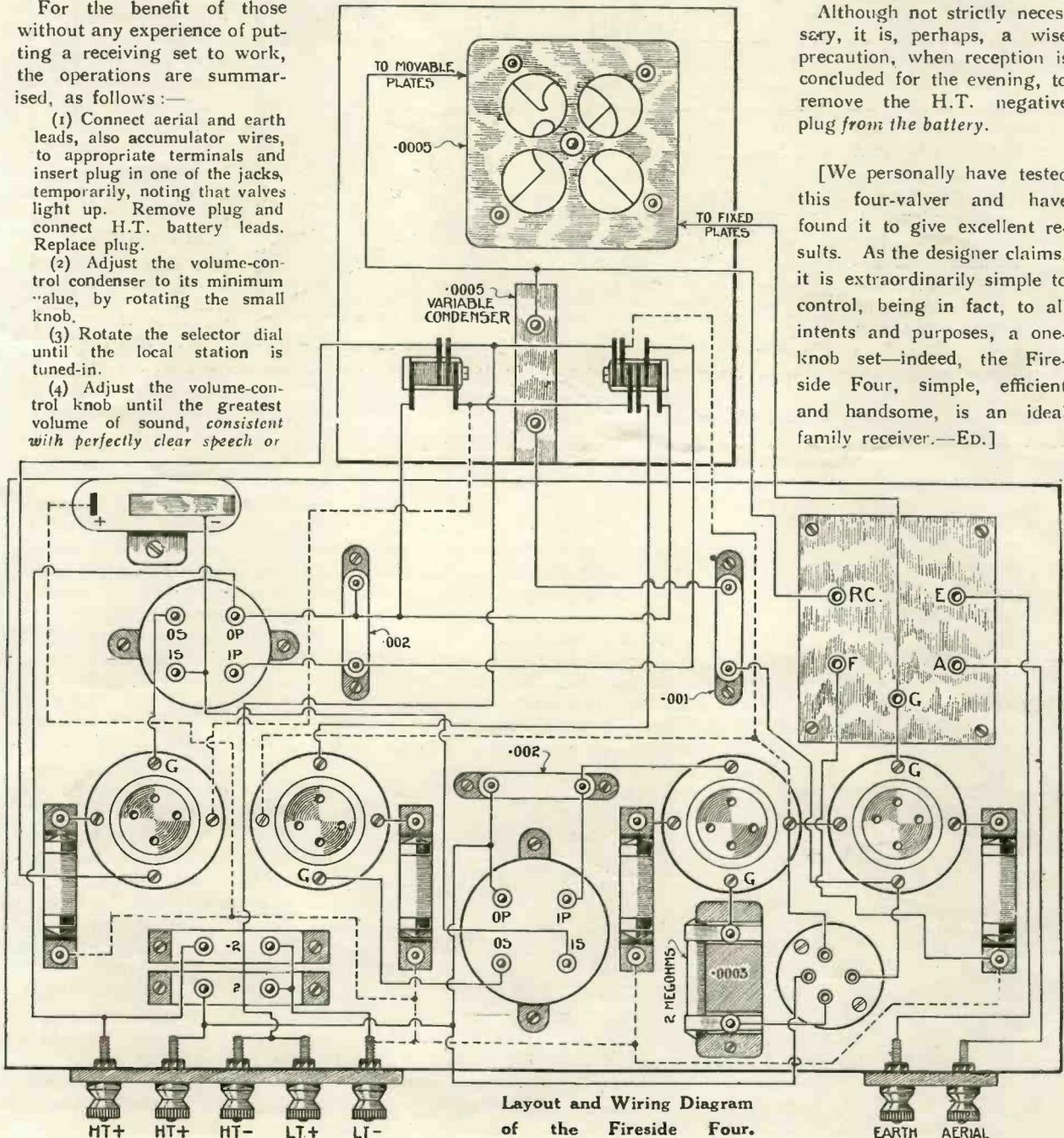
attended to *once*, forget about the volume-control knob altogether. If the local station is too loud, even on three valves, reduce the volume of sound by dis-tuning slightly. The normal operation of the set thus reduces to:—

(1) Plug in the loud-speaker, either for three or four valves.

(2) Rotate the selector dial, unless this is usually left adjusted for reception from your local station.

Although not strictly necessary, it is, perhaps, a wise precaution, when reception is concluded for the evening, to remove the H.T. negative plug from the battery.

[We personally have tested this four-valver and have found it to give excellent results. As the designer claims, it is extraordinarily simple to control, being in fact, to all intents and purposes, a one-knob set—indeed, the Fire-side Four, simple, efficient and handsome, is an ideal family receiver.—Ed.]



Layout and Wiring Diagram of the Fireside Four.

# WRITING A ----- ----- BROADCAST PLAY

An article of particular interest by C. Whitaker-Wilson

PERHAPS it is not untrue to say that the history of drama has made a wider appeal than that of any other form of art, and in regarding the broadcast play as an *addition* to drama rather than as any part of the *evolution* of it, I venture to think I am not far wrong because I cannot persuade myself that the broadcast play is anything other than a mere branch of broadcasting in general.

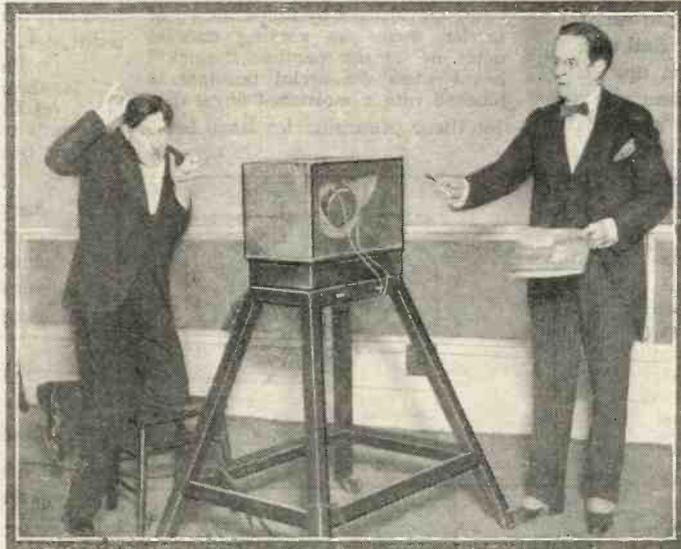
It certainly has nothing to do with the stage. For, since the days when hymns were first sung to the god Dionysus, when Thespis of Icaria toured ancient Greece with a company of players, when Æschylus produced tragedy upon tragedy at the theatre in Athens—since those far-off days the history of the stage has, first and foremost, proved to be one long story of the development of stage production and scenic effect.

## Stage Atmosphere

In fact it is true to say that, on the stage, things were seen before they were heard, because many of the earliest works contained quite a small amount of dialogue only. So the atmosphere of the stage, through all these centuries, has most certainly been established around, through, and by means of *mime and gesticulation*.

Even the early Greek tragedies, many of which contain almost perfect dialogue, depended very largely upon good acting for their attraction to the public of their day; and I am quite persuaded that Euripides stage-managed some excellent productions for the Athenians.

And yet, curiously enough, there are very few stage-directions—as we understand them—in the early works. Even the comedy-writers—Aristophanes, Menander, and Plautus



Mr. Russell Thorndike and Mr. John Foulds broadcasting Edgar Allan Poe's story, "The Tell-tale Heart."

—must have relied upon the producer to some considerable extent. At any rate, they wrote down precious little of the "business" of their plays.

Our own Shakespeare can scarcely be accused of overdoing it in the matter of stage-directions. I imagine that *A Midsummer Night's Dream* would have been less attractive than it was at Drury Lane had the producer relied entirely upon what he found in the copy.

The modern writers, Bernard Shaw particularly, have made the stage-directions an internal part of their script: they read, as often as not, like novels. "In order to make a close guess at his age," says Shaw in one place (I forget where), "one would need to clean him, but he must be something under forty." Nicely put, and quite likely to secure good production in the matter of the appearance of the character.

Now all this points to development of plays from the spectacular side, and I submit that, right from Æschylus down to Shaw and Galsworthy, there is a distinct line of evolution clearly traceable in every particular. This, I repeat, is the history, or part of it, of the stage.

But it has nothing to do with the play broadcast, for the obvious reason that the listener—the *audience*, that is to say (the term for once being properly used)—is not the spectator.

There is, of course, a history attached to the development of dialogue, brief in the telling. From actual verse and metre of the early works it passed through a stage of mere metrical expression until it assumed the present-day language, which latter is the attempt at verisimilitude so much to be commended. So the whole thing, viewed from the evolutionary standpoint, is the his-

tory of an indissoluble combination of sight and sound, the sight unquestionably coming first in importance.

But the broadcast play is another matter altogether. There is no actual development at all. In fact, I am very much inclined to think that the whole thing has been cut in half. You may not see your actors nor yet the scenic representation (so useful in all circumstances) of the environment which is being presented to you.

## Acting or Reading?

For all you know to the contrary they may not be acting at all, but merely reading their parts from a typescript copy. Very probably it is not so, but you would be none the wiser if it were. You are told what you are expected to keep in your mind's eye in the matter of scenery at the beginning, and with this you must be content.

So the first difficulty of the broadcast play is the reception of it. You are, as I say, told of the geographical situation of the environs of the actors, but you yourself may be in very different surroundings. They may be those of your own home.

## Read This Article—You Will Then Better Appreciate Broadcast Plays

Therefore it is not without the confines of probability that you may be trying to conjure up the scene of some incident taking place in Constantinople or Bucharest while the table is being laid or the dog being washed. And neither of these things is going to help you very much.

And so it seems that your chances are rather chequered at the outset. But if you, in your charity, care to find it in your heart to imagine the difficulties from the studio side, you may conclude that theirs is the worst difficulty.

### Plays "Unbroadcastable"?

I am quite aware that many have already given it as their opinion that plays cannot be broadcast at all; but I conceive that to be very destructive criticism indeed. The same might be said of an attempt to broadcast the events at the Wembley Exhibition, or those of a religious service. Criticism which does not make a complete survey of cause and effect is not criticism at all.

The difficulties of rendition are certainly considerable, but I hope to prove that they are not insurmountable. The chief of them, to my way of thinking, lies in avoiding confusion in the mind of the listener in the matter of the identity of the character speaking.

Supposing there are four altogether, two of each sex, it is not always an easy matter for the listener to detect which one is speaking, is spoken to, or is spoken about. The obvious thing is to see that the four voices differ in tone as much as possible. And then it is that one realises how much the eye guides in the matter of reception of a play at a theatre.

With the broadcast play one is virtually blindfolded; there is a total lack of action, and nothing remains but voices. It is not even like a novel, which, admittedly, need not be illustrated to guide the reader because the language carries description along with it. And it is certainly in no way comparable with the cinema, even viewed from the opposite point of view that it is all vision, and that there is no speaking, because words, either of dialogue or description, can be thrown upon the screen. So the actors' difficulties are not negligible.

Now the listener is dependent entirely upon the actors. That, I imagine, will not be controverted. Upon whom are the actors dependent? *Upon the authors, every time.*

The whole secret of the successful broadcast play lies in the writing of it. And here I take the opportunity to give it as my judgment that plays originally intended for and performed upon the play-stage are very rarely suitable for broadcasting purposes.

To begin with, they can only be adaptations with all the "business" left out, and the man who essays to write a play which will stage as well as it will broadcast, and *vice versa*, is going to make a failure of both forms from the very beginning. The argument which I have tried to lay down for evolution alone proves that.

The play must be specially written. Moreover, action, though admittedly unseen, *must be there*—in spirit, at all events. Otherwise there is no play. Naturally, the safest card to play regarding action is to restrict it to that which makes some sort of noise.

If this is not possible the author must say so: in other words, something must be said by one of the characters to cover the situation. And this means quite a separate technique in writing, because most playwrights undoubtedly visualise their scenery and the movements of their characters at the moment of conception. This, in the case of a play for wireless transmission, is likely to prove a stumbling-block. The whole thing must be cast with the one fact in view that the audience is an audience only.

### Identification

The question referred to above, of the difficulty of the identity of the speakers, is best overcome by naming them as often as is possible, and by legislating carefully for their manner of speech.

Distinction in the matter of vocal tone, though absolutely essential, by no means solves the whole problem. To it must be added very great distinctiveness in that of *manner* of speech. All the same, refuge in dialect, more often than not, defeats its own ends. Dialect,

unless very simple, is not at all easy to receive through the ear alone, especially by means of a loud-speaker.

Pace is the safest card to play, and yet too great a variation should be avoided in production, because too slow a pace is one of the most difficult of all methods of speech to follow, and too fast a speed is likely to be missed altogether.

### Unheard Laughter

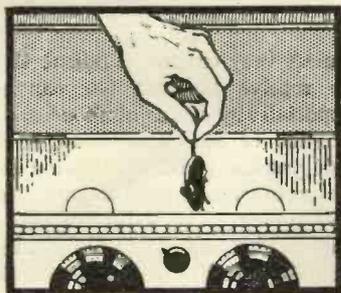
Naturally, an author will play what he considers to be another safe card, that of humour. So long as the production is most carefully watched, this may be indeed good. But it is not always easy to get actors to wait for the laughter *which they cannot hear* to die away before continuing. And, if the joke, for some reason, misses, the space becomes a serious fault. This thought of a joke missing fire brings another thought to my mind of similar character.

Noises in the room where the reception is taking place may be a distraction. Or, of course, atmospherics may interfere. These things are a nuisance, but they must be taken into account.

If I were writing a play for wireless transmission, I think I should take especial care over lines which are particularly important to the play, or even those which contain unusual words. I should get them repeated in some form by one of the other characters.

Repeats need not, they *must* not, be either redundant or boring. In fact the whole situation of writing under restrictions such as I have mentioned calls for the very greatest ingenuity. The very naming of the characters at frequent intervals, the dialogue being turned momentarily into description of small actions or of portions of the scenery—all these things must be done without appearing to do them. Therein lies most of the art.

The dialogue of a broadcast play must be as informative as the descriptive portions of a novel, or as the words thrown upon a cinema screen, but there must be no obvious effort about it. It will be necessary to observe these and many other "rules" until the day comes when television renders the necessity no longer imminent.



# Overhauling Your Set for the Winter

**A**LTHOUGH the fallacy that wireless is a pastime suitable only for the winter months is now completely exploded, autumn still remains the most appropriate time for giving the set its annual overhaul.

One does not usually feel over-energetic during the summer, and the wireless set gets little attention then, being taken out on excursions into the country if it is readily portable, or being made to work a loud-speaker in the garden if it is too cumbersome to be easily carried about.

## Shortening of the Days

But with the shortening of the days and the approach of bad weather one has perforce to spend more time indoors, and some of these leisure hours cannot be better spent than in overhauling the set, incorporating improvements, and generally giving it the attention it really requires to enable it to give of its best for another twelve months.

It is best to begin with the outside work, taking full advantage of what fine weather remains. The aerial supports should be carefully surveyed in order to see whether their height can conveniently be raised by a few feet. It should be remembered that once above the surrounding buildings every foot counts tremendously.

## Examining Supports

Whether or not the supports are to be altered, the means by which they are secured should be carefully examined as they may have to stand up through several severe gales during the winter. The halyards and stays should also be given attention and any rotten or rusted ropes replaced.

The deposit of soot and dirt which is sure to have accumulated on the insulators should be removed and the

aerial wire itself examined for broken strands. A new aerial is advisable if a single strand is broken, as this gives rise to very considerable H.F. losses at a most vital point. The ebonite lead-in insulator ought also to be removed if it shows any signs of having deteriorated owing to the action of the atmosphere.

## THE FATE OF THE OSSI-LATA.

(With apologies.)

*AT his set one winter evening  
Sat the well-known Ossi-lata :  
Turned condenser and reaction,  
And the noise he made was greater  
Than the noise of rushing waters.  
Than a chorus of canaries.  
Then he looked around rejoicing  
(Saying, " Oh, I could with joy sing.")  
Saw his " speaker " (Lissenola),  
Saw his coil holder (Polar),  
Saw his panel (it was Radion),  
Saw his set and said, " I made you."  
Saw his coils (they were Igranic),  
Heard a sound and in a panic  
Tried his battery, high-tension,  
Said a word I will not mention,  
For he found its juice was run out,  
And he knew he would be done out  
Of his nightly oscillation.  
Then towards him came a stranger,  
Ossi-lata smelt the danger ;  
Asked the stranger who he might be.  
" Captain Echersley, they call me."  
Then he bust the set and " speaker,"  
Did a deed that is much greater—  
Slew the awful Ossi-lata.*

W. M. C.

The earth connection should be dug up, if it consists of a hurried plate, in order to see that the joint between it and the earth-lead has not corroded. Consideration should also be given to the question as to the practicability of using a counterpoise instead of a

direct earth connection, as this will greatly reduce the H.F. resistance of the aerial circuit, giving increased range and selectivity.

A counterpoise, to be efficient, must consist of at least double the number of wires contained in the aerial (the more the better), must be erected immediately below the aerial beyond the end of which it should extend a few feet, and it must be very carefully insulated from earth.

## Effective Height

As the effective height of the aerial is reduced when a counterpoise replaces the ordinary earth connection the wires forming the counterpoise should be kept as near to the ground as practicable. If a really good counterpoise is impossible owing to restricted space, etc., stick to the direct earth connection.

Coming to the receiver itself, the first point upon which a decision must be made is what, if any, alterations or additions are to be made to it. Quite likely during the past year one has seen several little gadgets or new components in shop windows, illustrated in wireless periodicals, and fitted to the sets of friends, which one would like to incorporate. It may also be that last winter either the range or volume, or both, were not always quite all that could be desired, in which case it may be decided to add further H.F. and/or L.F. stages.

## Good-quality Components

The alterations and additions to be made must, of course, be decided by the owner of the set, and he should take care to fit good-quality components. The part of the set which is to remain as it was and the old components should, however, be carefully examined for any faults.

The bearings of variable condensers should be looked to, as they

will perhaps have become slightly loose with twelve months of use. After these have been adjusted to the proper degree of tightness it may be found that the moving plates touch the fixed ones during a part of their movement. This can usually be counteracted by loosening the clamping nuts on one side of the fixed plates and tightening those on the other side. Great care must be taken to keep both sets of plates perfectly parallel.

### Cutting Condenser Plates

If the condensers are not of the square-law type the moving plates can be cut to approximately square-law shape. They need not be exactly of this shape, but the nearer they are to it the better. Even if they are cut very roughly indeed tuning will be easier than with semi-circular plates.

The bearings of all other components with rotating parts, such as filament resistances, etc., should be similarly adjusted, and where a moving contact moves along a fine wire winding, as is the case with a potentiometer, the wire should be looked at to see if it is likely soon to be cut through.

Those types of rheostats which vary their resistance by the compression of carbon granules are apt to become inefficient after a time owing to the granules "packing." Every endeavour should be made to loosen them, and this can sometimes be done by unscrewing the knob to its fullest extent and shaking the instrument violently or tapping it on a hard surface.

If crackling noises have been marring reception of late and cannot be traced to a poor connection the primary windings of the L.F. transformers should be tested for continuity. A single cell and a pair of phones should be connected in series and joined across the ends of each

primary winding in turn (after all other connections have been removed) when a click in the phones on making and breaking contact indicates continuity. There should be absolute silence in the phones if the battery and phones are left connected across the winding.

### Soldered Joints

After it has been ascertained that all the components are in really good condition the actual wiring of the set should receive attention. If the various connections are not soldered but are merely clamped beneath terminal nuts these nuts should all be removed and the under surfaces cleaned together with the ends of the wires. If all connections are soldered care should be taken to see that the joints are still good.

In a section through a properly

and the terminal. Then a fairly high resistance exists at the joint.

The first type of joint is by far the stronger and every joint in the set should be capable of withstanding quite a strong pull without coming adrift.

After having made quite sure that the wiring is O.K. all dust and dirt should be removed from both sides of the panel, especially from between terminals, valve legs, etc.; a good method is to wash the panel with methylated spirits or petrol using a camel-hair brush.

### Accessories

After the receiver itself has been attended to the various accessories should next come under notice. If there is any sediment at the bottom of the accumulator the acid should be poured out and all the cells thoroughly rinsed out with distilled water, taking care that no detached portions of metal become wedged in such a position that they "short" the two sets of plates. This will be almost impossible if proper separators are fitted.

The cells should preferably be refilled with fresh acid diluted in accordance with the makers' instructions, which vary slightly for different makes.

The H.T. battery should be tested with a high-resistance voltmeter while it is supplying current to the plates of the maximum number of valves used in the set, and after it has been connected up for some time. A test under any other conditions is almost valueless, as a nearly exhausted battery often shows quite a good voltage after it has been out of use for an hour or two when it is first connected up to the set after a short period of disuse.

If given proper attention on the lines suggested above all wireless apparatus, except valves and dry batteries, should last almost indefinitely and give many years of useful service. 5LG.

## 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.*

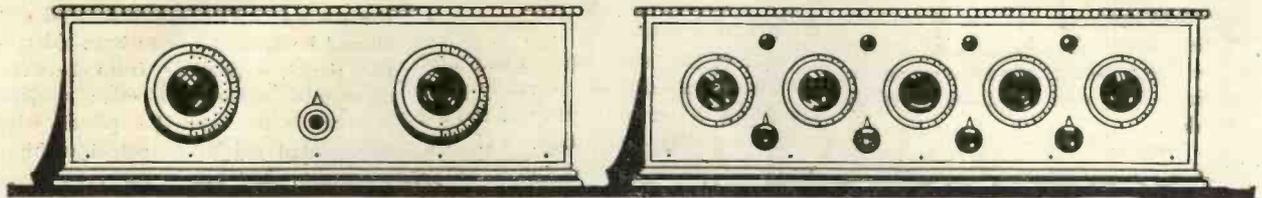
*Moreover, we make no charge whatever—we are glad to do it! Just write your query on one side of a sheet of paper (this small point greatly facilitates the handling of your question) and enclose it, together with the coupon on page iii of the cover and a stamped envelope addressed to yourself for return, in an envelope addressed to The Editor, WIRELESS MAGAZINE, La Belle Sauvage, E.C.4.*

soldered joint between, say, a copper wire and a brass terminal shank, there should be five distinct layers of metal. First the copper of the wire, secondly an alloy of copper and solder, thirdly a thin film of pure solder, fourthly an alloy of solder and brass, and lastly the pure brass of the terminal shank. In this case the metallic circuit is continuous. Often, however, there are only three layers of metal in such a section, the copper and brass of the wire and terminal respectively, and a casing of solder which encloses the ends of both.

In this case there is sure to be a thin film of oxide between the wire and the solder and between the solder

Every Amateur at Some Time or Another Must Answer the Question:

# A FEW KNOBS OR MANY?



FOR a long time I have taken rather a pride in using "variables" at every possible point in my receiving sets. Theoretically this should give one a wonderful degree of control over the performances of the set, for at many points the values of resistance, capacity, voltage and so on are critical to a greater or less extent, and if adjustments can be made results should, on paper anyhow, be better.

## *Bristling with Knobs*

Working on these lines one finds that one's own experimental sets positively bristle with knobs. One of my five-valve receivers had twenty-five controls, for example. Once the rage for variables has gripped you there is hardly any end to what you can do in this way.

You may, for example, provide each of your tuning condensers with a vernier in parallel; you may use variable grid-leaks, and even variable grid condensers, and so on.

In theory this kind of thing is splendid; but when we come to actual practice does it really help? This is rather a difficult question to answer. As an experimenter I want to say "Yes" emphatically, for the set with a large number of variables should be much more flexible than one with few. But somehow or other I find that there lurks in my mind the growing feeling that the majority of the excrescences upon my panels are almost, if not entirely, useless.

When I face the facts I am forced to admit that my reception would not suffer in the least if the greater part of my variables were fixed. This is a sad admission, but in the interests of truth it must be made.

Let us see if we can whittle down the number of variables to the absolute minimum without in any way

impairing the efficiency of the receiving set. We cannot, I think, touch the circuit of the tuner. For selectivity and for long-range work it is practically essential to use a double-circuit tuner with variable coupling between the coils and with a tuning condenser for each.

If we are employing two high-frequency valves we cannot have efficiency unless the anodes of both are tuned; but if we use carefully matched transformers or anode coils we can tune both simultaneously by means of a double condenser, thus saving a knob. There are many excellent types of these condensers now on the market, and I have not found the slightest loss in efficiency by using them.

The high-frequency potentiometer we must retain, for it is one of the most valuable aids to obtaining both stability and selectivity.

But need we have a rheostat for each valve? If the high-frequency valves are of the same type a single rheostat will control both of them without in any way spoiling the working of either. Should the rectifier, as is frequently the case, be a similar valve there is really no reason why its filament also should not be controlled by the same rheostat. Or we can have one rheostat for the high-frequency valve or valves, and one for the rectifier and the first note-magnifier.

The last note-magnifying valve should have a rheostat of its own, in the big set at any rate, for if signal strength and good quality are to be combined it must be a power valve.

We can do away with variable grid leaks and anode resistances without feeling their loss once we have discovered the best values to use. The variable grid-biasing battery, too, is really a superfluity. All makers publish the grid-bias voltage required by their low-frequency

valves with a given plate potential, and we can obtain perfectly good working by making soldered connections to flashlamp batteries.

And what of the number of high-tension positive leads? These again can be reduced without any noticeable falling-off in the set's performances. When a power vlv is used in the last holder it should certainly have a high-tension positive lead of its own, for a very high plate potential is required if it is to give of its best. The remaining valves may, however, be served by a common H.T. + busbar without any marked difference in their performances.

This sounds like rank heresy. I can only say that the proof of this pudding, like that of most others, lies in the eating. Try for yourself the result of reducing your H.T. + leads to the two suggested and see whether you can detect any difference. Though I *hoped* that I would do so, I must confess that when I had made the experiment I could not.

## *No Improvement*

The conclusion to which I am forced, much against my will, is that though it may be handy for the experimenter to be able at times to vary critically the resistance, capacity, or potential at many points, the performances of a set used for broadcast reception are in no way improved by providing it with a great number of variables.

One can, of course, go too far in the opposite direction. It is quite possible to make a set with hardly any variable controls; but here there would be undoubtedly a marked loss in efficiency. The sane attitude seems to be to fit only those variable controls that are absolutely essential and in other cases to find the best average value and to stick to it.

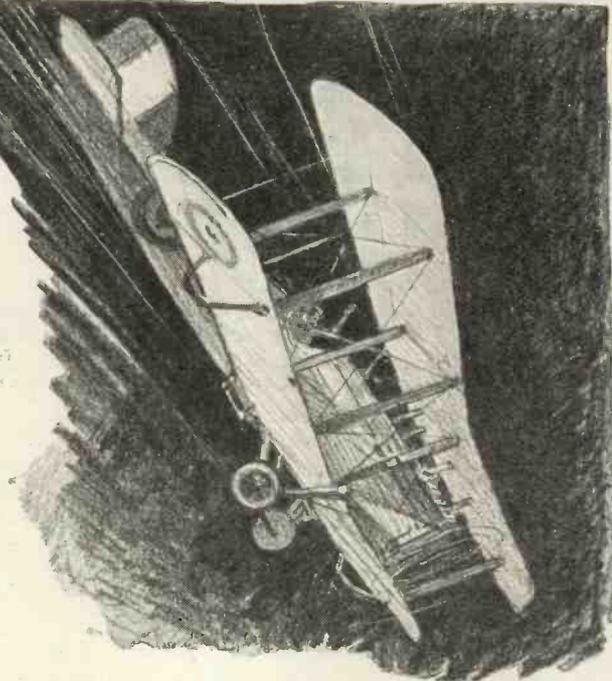
J. H. R.

# CAGED BIRDS

A Wireless Story by  
RALPH STRANGER

Illustrated by LEO CHENEY

"Three of our military machines crashed . . . .  
some foul play is at work."



**P**RECISELY at 11 a.m. Professor Gordon Stone, D.Sc., F.R.S., M.I.E.E, etc, found himself sitting in a room at 10, Downing Street with the Prime Minister and several prominent officials of the War Office and the Admiralty. He had come to discuss certain wireless possibilities of national importance.

Easily the most conspicuous person in the assembly, the professor wore his sixty years well. He was very tall, broad in the shoulders and high of chest. His high forehead, steely-grey penetrating eyes under bushy eyebrows, and a prominent, slightly hooked nose proclaimed a thinker of no mean power, while the jaw of a fighter showed the bulldog tenacity of the man.

A good listener, the professor quickly grasped the point at which his cross-examiners were driving. His answers were short, decisive and clear. He was never at a loss, never hesitating, being the best-informed man in the world on all matters electrical and mechanical, perfectly at home in the domain of physics and pure mathematics.

At the close of the interview Professor Stone informed the assembly that his services and his knowledge were entirely at the disposal of the nation, that his own interests did not matter and danger was of no consequence to an old man ready to meet his Maker. Die he must in any case,

and he would prefer to die in the service of his country.

He made, however, one reservation. Should anything happen to him he would like to have the assurance of the Prime Minister that his only child, his daughter Gladys, would be well looked after. This being arranged satisfactorily, the professor shook hands all round and left Downing Street precisely at noon.

At one o'clock, one hour after the professor's departure, the chief of the Secret Service of an unfriendly nation received a message, in code, stating that Professor Gordon Stone, the well-known British expert in wireless, television and wireless control of machinery at great distances, had been closeted for an hour with the British Prime Minister and the chiefs of the War Office and the Admiralty; that it was very likely that he had been entrusted with some investigations in certain well-known directions, and that it would be a good idea to keep an eye on the activities of the said professor.

At two o'clock four clever, determined men left a foreign capital for London.

At half-past three Professor Stone was warned of the fact by our own Secret Service, and entreated to consent to have an armed guard at his residence and a plain-clothes man as an unobtrusive companion. The

professor politely but firmly refused to be guarded and asked to be left to his own devices.

Next morning the professor was sitting at breakfast with his daughter Gladys and her fiancé—a trusted assistant of Stone's and a rising scientific star.

Gladys, a tall, beautiful girl of nineteen summers, inherited from her father the high forehead and the determined chin. There the likeness ended. The rest was her mother.

John Spearman, an ex-Guards' officer, looked every inch a soldier. Tall, athletic, with strong, intellectual face he looked anything but a scholar. But scholar he was, and a very brilliant one at that. His chief mission in life was to hide the fact that he had gained the V.C. for capturing single-handed an enemy battery.

Professor Stone, in spite of his forbidding appearance, had always been a very tender father. He saw in Gladys the very image of his dead wife and he also loved John as if he were his own son. He knew that after his death Gladys would be quite safe, provided John lived.

The professor's Hampstead home—a modern house—had been built for a definite scientific purpose. Although the outside was commonplace enough, the inside hid a real maze of electrical appliances which served for advanced investigations

into the nature and possibilities of electromagnetic waves, or wireless, as the layman terms them.

There were three distinct installations in the house, apart from the Professor's own generating plant—a transmitting and receiving installation working on very short waves, a television station giving direct vision without photographic processes, and, finally, a distant-control wireless installation working at a definite range of a hundred miles.

Spearman lived on the outskirts of Harwich, in a house belonging to Professor Stone. This house had been built at the same time as the Hampstead home, and was an exact replica of the latter. As a matter of fact, the two houses were two stations, identical in every respect, even to the most minute details. They were situated at an exact distance of a hundred miles from each other, as the crow flies, and while the Professor reigned at Hampstead, John was in full charge of the Harwich station.

That morning John came to the Professor's house in time for breakfast, as he and Gladys had arranged to do some shopping together and see a show in the afternoon.

Breakfast over, the two men retired to the Professor's study, while Gladys busied herself in giving instructions to the cook. Professor Stone waved John to an armchair in front of the fire, and, after two pipes were carefully loaded and well alight, the silence was broken by the elder man.

"How is the station, John; everything working satisfactorily?"

John did not answer at once.

"Yes, sir, all's well, except number 126 control. It is still a bit sticky."

"I cannot understand it," continued John, "I have complete control of your house, except the safe.

... The 126 control won't work two days alike, as if you were changing the wavelength every alternate day."

The Professor laughed heartily.

"Excellent, excellent, my boy, just as I expected. There is no fault, no fault at all with your control. I did change the wavelength every alternate day to see if our apparatus is delicate enough to show a small difference in adjustments."

The Professor became silent for a short while, puffing thoughtfully his pipe, and then resumed again.

"We have succeeded, John, beyond

all our expectations. . . Why, we can talk to each other without the slightest fear of being overheard, thanks to your intermodulator. We can see each other at a distance of a hundred miles without having to mess about with photographs. We can lock and unlock each others doors, control electric lights, set burglar alarms and even fill a hot bath in another town."

Suddenly the Professor's manner changed and he moved his armchair nearer to his assistant.

"Listen, John," he said in a lowered voice, as if afraid of being overheard, "I was ordered yesterday to attend an informal meeting at Downing Street. My services are required by the nation, and we have to solve a very difficult problem.

"I do not want to emphasize the need for secrecy; you are an ex-officer and know how to keep a secret. We must exercise the greatest caution in our work. There are always inquisitive gentlemen who would not hesitate to cut our throats if that would help them to obtain certain papers in my safe.

"The problem is this: a month ago three of our military aeroplanes crashed in Cornwall, one after another, in three successive days. They were the latest, all-steel, experimental machines, carrying our best pilots. The War Office people are suspicious that some foul play is at work. They are almost sure that some powerful station had been sending out electromagnetic waves which caused the disasters. In their opinion this station is to be found abroad.

"The aeroplanes were inspected after the accident. The magneto windings and the wiring of the wireless apparatus are completely burnt out, and all the pilots died from electrocution. There is not the slightest doubt that the cause of the three accidents is identical.

"As the matter stands at present it is up to us to find immediately means for protecting our machines from interfering radiations, and to track the unknown station. The first part of the problem should be easy enough. We can use our shielding system, although I am not sure that it will stand such a severe test without alterations. Still, this is a matter of experiment.

"The second part of the problem is somewhat complicated. We have no clue as to the whereabouts of the interfering station. . . ."

John, who had been listening very attentively, interrupted the professor.

"No direction-finding apparatus will stand such powerful radiations, sir."

The professor smiled. "Yes, John, the man who finds the direction of this station by the usual methods will be as dead as the pilots. . . .

However, there is also another aspect of the situation. I left Downing Street at noon. Two hours after four foreign spies, fully informed of my intended activities, left their lair for London, and there is trouble brewing. I refused to have armed detectives stationed around my house and dogging my footsteps. I think that you and I can deal very effectively ourselves with any number of intruders, eh?"

John smiled lazily and stretched his powerful limbs. "Well, sir, I do not think that we shall have any difficulty with this part of the show. Heaven help the man I lay my hands on in this house! I would just enjoy a good scrap, though these spy-johnnies are not much good with their fists. They go in mostly for automatics."

A frown suddenly crossed John's forehead. "What about Gladys, sir, don't you think we ought to have her out of the way? One never knows how things may shape, and we may not always be handy."

The professor looked keenly at the young man, and what he saw in his face made him glad, although his own face did not show his feelings.

"You are right, my boy," he said, "Gladys must be sent away to her aunt in Edinburgh." Here the professor smiled. "That is if she will go. I shall talk to her presently and you might help me to persuade her that a change of air will do her good."

For a few seconds the two men remained silent, each thinking his own thoughts. Suddenly the professor resumed the conversation.

"Now what shall we do about giving a hearty reception to unwelcome intruders, John, my boy; what do you suggest?"

John pondered heavily for a few minutes.

"I think, sir, that our field of action lies in your study. The chief attraction is your safe, where presumably you keep all your important documents. . . . If the attack takes place at night, as it undoubtedly will, and the attackers pass our outer defences, we shall have to deal with them inside the house.

"What I think is indicated is an arrangement of two statically-charged wire curtains enclosing the portion of the room containing the safe. They can be fixed roller fashion in the ceiling and let down when required. I believe that provision is already made for this, if you remember our early experiments on gravitation; we had two magnetic screens on each side of the room.

"When the wire curtains are down, a wandering spark discharge will provide a ready means of showing the gentlemen the way towards that old chute of yours, opposite the safe. . . ."

The professor's face dissolved itself in a broad grin, which developed into a series of loud chuckles.

"I see your idea. . . . Ha! Ha! Ha! . . . That is a good one! . . . You suggest that we provide a sort of

The professor's face gradually lost its worried look as the scheme became more and more apparent to him, but suddenly a new thought flashed through his mind. "But what the dickens are we going to do with our prisoners once they reach the cellar? We cannot very well risk an underground fight amongst the packing boxes."

John considered the point for a moment.

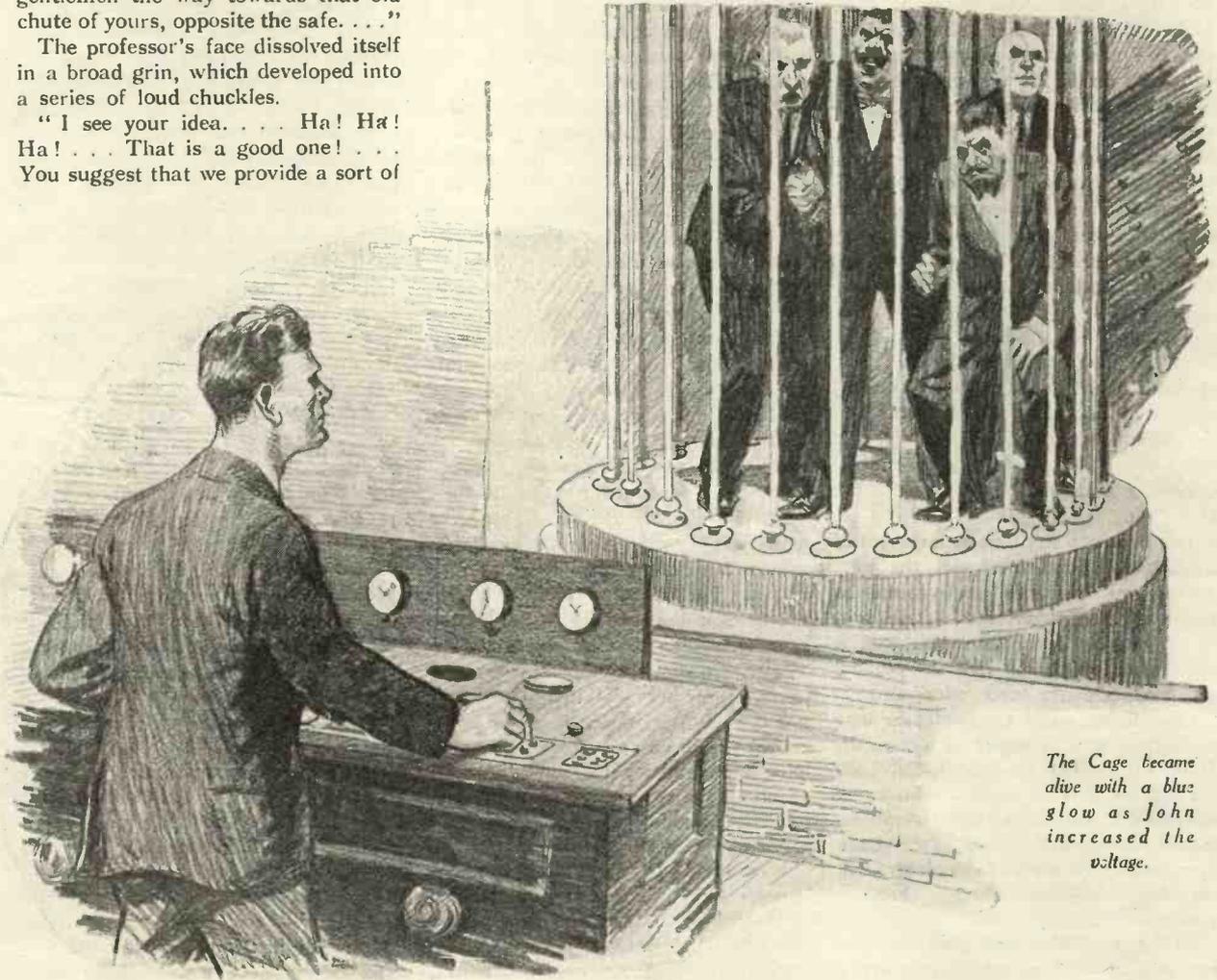
"Why, sir, what is wrong with that old experimental cage of ours? We

I am ready for you. Come and carry my parcels and look like the proverbial diminutive husband of a monstrosly stout lady, *vide Punch*."

John rose with a smile and looked apologetically at the elder man.

The professor laughed.

"There is no help, I suppose. . . . Go you must, since Gladys has made up her mind to kidnap you for the day. Well, go children, and enjoy yourselves while Parker and I will see what can be done about some chutes and birdcages."



*The Cage became alive with a blue glow as John increased the voltage.*

an electric corridor between the safe and the old chute which I use for getting rid of packing boxes.

"Hm! . . . The trap door will have to be controlled electrically. . . . Yes. . . . The chute incline is pretty steep, and if it is well polished and thoroughly greased it will communicate a considerable speed to any foreign body falling upon it. . . . Ha! Ha! Ha! Did I say foreign body? That's rather to the point. . . ."

can replace the wires by steel rods and insulate them from the floor of the cage, which can be well earthed. This, placed upright at the mouth of the chute, with one side arranged mouse-trap fashion, will be rather effective for getting the 'birds' inside the cage."

At that moment Gladys burst into the room, dressed for the street.

"Hello, you men, still gossiping," she cried gaily. "Come along, John!

John understood well the meaning of this last remark. Apparently the professor considered the matter too important to brook delay and was going to start the work on the same day.

"I wish I could give you a hand, sir," started John; but the professor interrupted him in the middle of his sentence. "Off you go, the pair of you; see you at dinner."

While having lunch at the famous

Indian restaurant in Regent Street, John broached the subject of the professor's wish that Gladys should visit her aunt. Gladys was immediately up in arms. She was not going to Edinburgh to hear all day long about a thousand and one complaints of her aunt. She was stopping at Hampstead, and dear old dad could do what he pleased about the matter.

John, knowing his Gladys, did not insist, and changed the conversation.

At dinner that night the professor declared that all arrangements for their next experiment would be completed in a week and John could try out the new distance controls from Harwich in about eight days. The professor failed completely to persuade Gladys to go to Edinburgh. She would not hear of it.

The two men held a hurried consultation after dinner, and decided that the wisest plan would be to explain to Gladys the exact position and warn her against an unpleasant surprise.

This was done, but the girl did not seem to be unduly alarmed. She apparently had great faith in the capabilities of her Hampstead home and the fertile brains of her father and her fiancé.

Next morning John left for Harwich.

For a month nothing of importance happened. John tried out the new system of defences and found it working like clockwork. The professor in the meantime produced a system of shielding British 'planes, and no accidents occurred again.

One night, when the professor was absent on a trial flight in Cornwall, John sat in his Harwich study expecting a call from Gladys, who knew how to operate the wireless telephone installation and the television apparatus. At eleven o'clock the call sounded, and John looked at the television screen.

In front of him appeared the picture of Gladys' boudoir, clear in every detail. He saw Gladys sitting in front of a grate fire with a book in her lap and a box of chocolates beside her. The boudoir control switches could be seen in a neat row under the mantelpiece on which stood a microphone disguised as a clock, and on the floor beside the armchair one could see a small Oriental stand not unlike a Moorish coffee table, which was nothing else but a loud-speaker.

The wall over the mantelpiece was bare, of dull grey colour, in tone with

the quiet furnishings of the room. This served as a television screen.

"Hello, John," came through the loud-speaker in Gladys' low, musical voice. "I want to say good-night, darling, before I go to sleep. . . . Don't work too late, John, dear, and go to bed early. . . . There's a good boy!"

"Right you are, sweetheart," answered John, "don't you miss your beauty sleep; have a good night's rest. I have some work to do, but I won't be late. . . . Good-night, love! . . . By the way, don't forget to connect me to father's study—that will save me manipulating half a dozen handles."

"It shall be done, dear; good-night," said Gladys, and John saw her touching one of the control switches. The screen disappeared from view. John intended to stay up that night in order to keep watch over Gladys and the professor's safe.

He stood up and walked over to the switchboard controlling the Hampstead house. A few adjustments and the professor's study appeared on the screen, John having switched on the lights by wireless means. Everything seemed safe and the lights were switched off again.

John knew that in spite of their inactivity the foreign spies sooner or later were going to make a determined attack on Professor Stone's house. They wanted badly to get at the safe and secure the secret of the new aeroplane shielding system. They were marking time in order to perfect their preparations. There was not the slightest doubt that the spies knew their object would prove a hard nut to crack; they actually knew all about the outer electrical defences, but the inside of the house was a complete mystery to them.

It was not the first time that the famous British scientist had trodden on their toes. His fertile brain caused them a good deal of inconvenience during the war, and only once did they succeed in penetrating inside the house and laying their hands on some important documents. At that time the professor had only a few burglar alarms to protect him from intruders, but after the loss of his designs of a new electric gun he applied all his knowledge and all his ingenuity to make sure that no one could enter his home without his knowledge and go unpunished.

In order to make such protection absolutely accident-proof he arranged

with his assistant that whenever he went away John should keep an all-night watch over the Hampstead residence by means of the television apparatus and act, if necessary, with the help of the distant controls.

For this purpose a special indicator had been installed at Harwich to show the progress of any intruder from room to room without his knowing even the fact that every footstep of his was watched a hundred miles away and recorded on a strip of paper over an elaborate plan of the house.

At two o'clock in the morning the first alarm sounded. John's indicator showed that the front door was being forced at Hampstead. He rapidly switched on to Gladys' bedroom and sounded an alarm. Gladys, awakened, sat up in her bed and picked up a pair of headphones. She listened intently in the darkness, not daring to switch on the light, since John did not do so himself.

"Hello, darling," came John's voice, "don't be alarmed. . . . There is somebody breaking into the house through the front door. . . . Stay in bed whatever happens, you are not in danger. . . . I can deal with them, whoever they are, without the slightest difficulty, and as soon as I cage them safely I will motor down as fast as I can break the speed regulations. Courage, sweetheart!"

Gladys felt reassured by the quiet voice of her future husband and calmed down. Sleep was out of question, and she sat still, keeping her headphones in position, waiting for John to call again.

The indicator merrily danced across the strip of paper in John's study, showing the progress of the intruders. On it went across the hall, into the drawing-room, through the dining-room, into the library, and thence into the study.

John touched a control and the television screen came to life. A beam of light jumped across the picture, as if somebody was taking stock of the surroundings with the help of a powerful electric torch. The beam of light rested on the safe and a faint reflection showed four shadows peering closely at the combination lock. . . . Subdued whispers were heard through the loud-speaker.

John touched two controls practically simultaneously. Up went the lights in the professor's study and down came the wire curtain on each side of the safe, catching the intruders nicely inside. The four

foreigners stepped back in sheer amazement.

"Hands up!" came a brisk command, apparently from nowhere. The four men at the sound of the voice whirled round, whipping out vicious-looking automatics. As soon as they extended their weapons to shoot, things began to happen in a hurry. Four hissing sparks flashed between the wire curtain and the metal muzzles. . . . Four automatics clattered on the floor and were whisked away as if by an invisible hand. Four men were nursing their burnt arms.

A sound of laughter filled the room, chilling the intruders to the marrow . . .

"How is that, gentlemen, for a quiet prelude? . . . Not bad, eh?"

One of the men moved towards the wire curtain. . . .

"No, no, I would not do that if I were you," came the voice; "there is about twenty thousand volts between you and the curtain. . . . Whatever you do, don't touch the wire. It is not pleasant, I can assure you."

"Where the d— are you?" shouted one of the men, shaking with rage.

"What does it matter to you," answered the voice. "If I tell you you would not believe me. . . . All I wish you to realise is that you are entirely in my power and that you are as near death as you ever will be on this side of hell. There is no escape. Get me, Steve?"

Four maddened men hurled themselves against the wire barrier and recoiled with four different oaths. It was their luck that John purposefully exaggerated the voltage, otherwise there would have been four dead men. John, however, had no intention of killing them, not yet, as he pleasantly told them.

A long hissing spark darted across the space between the curtains as John increased the voltage to well over twenty thousand. Another followed it immediately, and another, till a vicious-looking band of fire permanently bridged the space. A strong smell of ozone filled the room and emphasised the fact that electricity was let loose.

The band of fire started suddenly to move slowly towards the spies, who, trembling with rage and fear, retreated between the two wire curtains. They had no choice but to retreat along the narrow corridor,

always expecting another series of sparks in their rear. They started to lose their heads.

"Hi, you, what's your name?" shouted their leader. "Can we not come to terms?"

There was no reply. . . . Step by step John was forcing them towards the trap-door till all the men stood squarely on it. Another band of fire appeared behind the spies, who could not now budge an inch.

John could not resist the humour of the situation, and sent across space an exultant shout: "Check and mate!" Before his voice died down the floor gave way under the feet of the four pawns and down the chute they went in a writhing mass of arms and legs.

John touched a control and the screen showed now the illuminated cellar with the four prisoners safely caught inside the electrified cage. John gradually increased the voltage till the solid steel bars started to glow faintly, in spite of the bright illumination.

The same haunting voice came to the men's ears: "And how is that, gentlemen, for a night's lodging? . . . Not very comfortable, I am afraid, but still it serves its purpose. . . . Now let us talk about your future. It is not very bright unless you see reason, and see it quickly.

"Please understand that you cannot pull the tail of the old British lion, however sleepy it may seem, without getting hurt. . . .

"I am acting with the full consent of the British Government," bluffed John, "and your deaths are of no consequence. There will be no inquest, no inquiry, and no burial. . . . I am afraid that if I have to resort to electrocution, with the present strength of current, there will be nothing left to bury. And what's more, you won't be even posted missing, that is, not officially. . . . Your own Government will repudiate your existence."

John's voice suddenly became menacing: "Where is the station that interferes with our aeroplanes?"

There was an ominous silence. . . . John could hear the heavy breathing of the trapped men. He touched two controls and the cellar lights went out, while the cage became alive with an intensified blue glow as John increased the voltage. This blue glow is known amongst the engineers as "brush discharge," and takes place at very high voltages.

The terror-stricken spies huddled

themselves together in the centre of the cage.

"Where is that station?" menaced once more the voice of the invisible torturer. . . .

One of the spies, his nerves going to pieces, hoarsely shouted the name of a certain well-known locality abroad before his comrades could stop him. From the string of oaths that fell on the unfortunate man, John knew that he had told the truth.

"Stop that noise," ordered John; "the man saved your lives, you fools. . . . You are safe enough now, if you behave yourselves, but don't touch the bars if you want to live."

Switching on the lights once more, John carefully inspected the temporary abode of his prisoners and left them to spend the rest of the night in darkness the best they could.

John's next call was to Gladys. He reassured the girl and told her briefly of the night's happenings. He promised to start for Hampstead straight away.

The professor returned home just before breakfast, having travelled by aeroplane immediately he received John's wireless report from the Hampstead station. After breakfast the startling news was communicated to Scotland Yard, and a few police officers came over in a car to collect the valuable "foreign birds," as the officer in charge put it.

In a fortnight's time the following piece of information appeared in *The Times*—

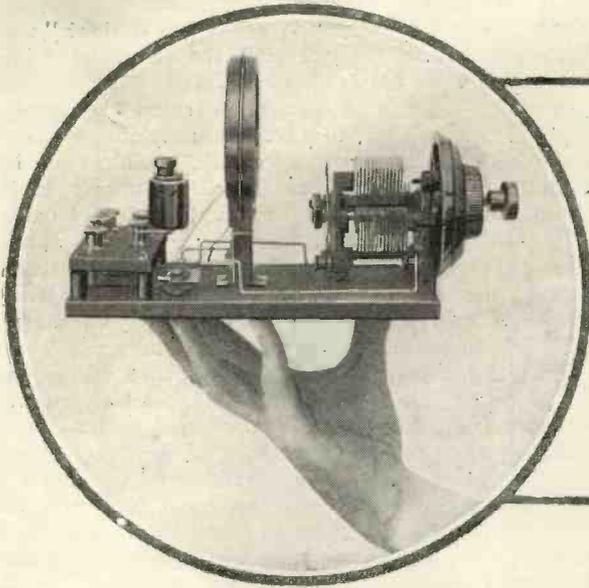
The powerful wireless station at N—, belonging to the — military authorities, was completely destroyed by fire last night.

The cause of the fire is a mystery, but the engineers suggest that it might have been caused by a short-circuit. The damage is estimated at half a million pounds sterling.

A responsible Government official told our correspondent that the loss is irreparable, as the station cannot be rebuilt for a number of years to come.

Professor Stone, after reading aloud the news, looked significantly at John and said: "Rather sad, is it not? It may be the act of God; on the other hand, it may be just a regrettable accident. I am personally inclined to think that the old lion is not as old as some people try to make out it is. . . ."

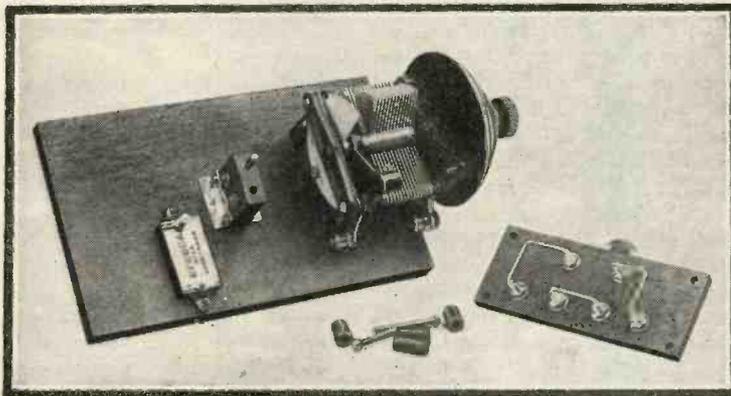
John did not hear the professor's words; how could he, when the sun caught a golden curl and made it shine with a thousand tiny sparkles? No, John did not hear a word!



## A Novel — Quick-assembly Crystal Set

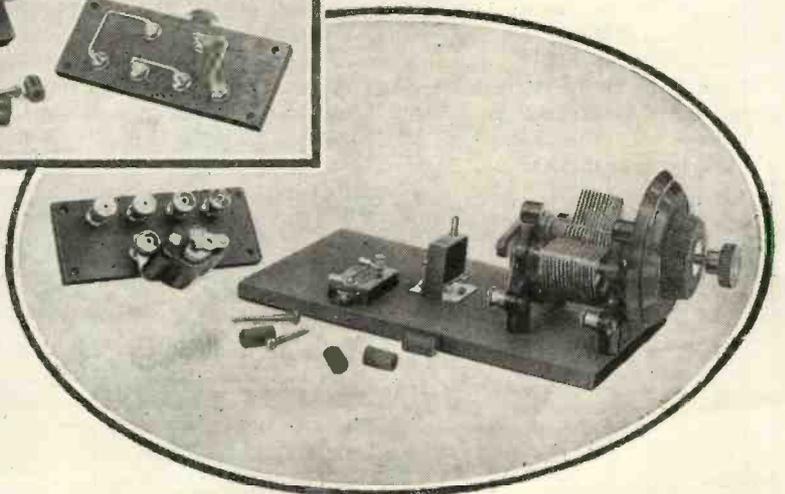
*Easily adaptable for reception over any desired band of wavelengths, this crystal set is just the thing for the enthusiast who wants to build an efficient and satisfactory receiver in the shortest possible time. The components used in its construction are of good quality and of up-to-date design.*

*No lengthy description is needed, for the photographs show clearly all the details of the set. The actual sequence of wiring is further shown by the wiring diagram on the opposite page.*



*First fix the components to the baseboard as shown above, and then prepare the terminal panel. The positions of the holes in the latter can be seen from the photographs.*

*It will be seen from the photographs that the Cymosite crystal detector is held in position by two terminal nuts.*



### LIST OF COMPONENTS NEEDED FOR THE CON- STRUCTION OF THIS SET.

Semi-permanent crystal detector  
(Cymosite).

0005-microfarad variable con-  
denser with vernier (Dubilier).

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

Single coil socket (Magnum or  
Athol, Bretwood).

40-turn Xlloss coil (Igranic).

6 terminals (Eastick or Belling  
& Lee).

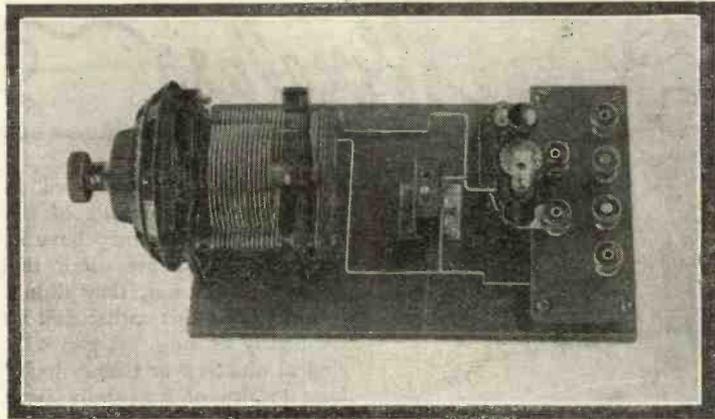
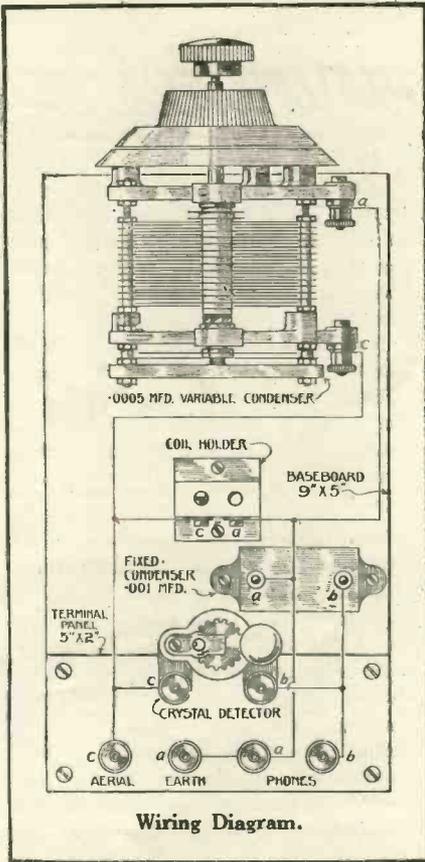
Baseboard, 9 in. by 5 in. by  $\frac{3}{8}$  in.

Ebonite strips, 5 in. by 2 in. by  
 $\frac{1}{4}$  in.

4 pieces ebonite tube  $\frac{3}{8}$  in. long.

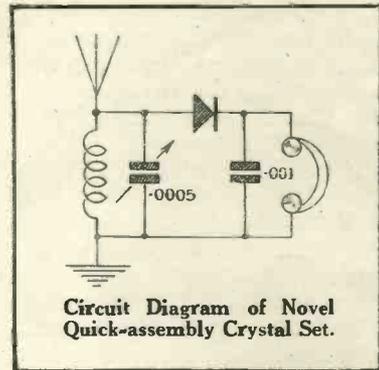
4 wood screws.

Quantity of wire for connecting  
up.



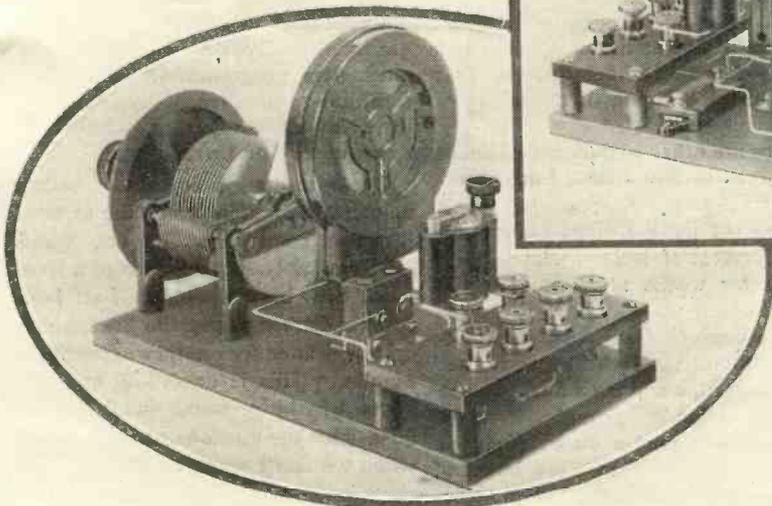
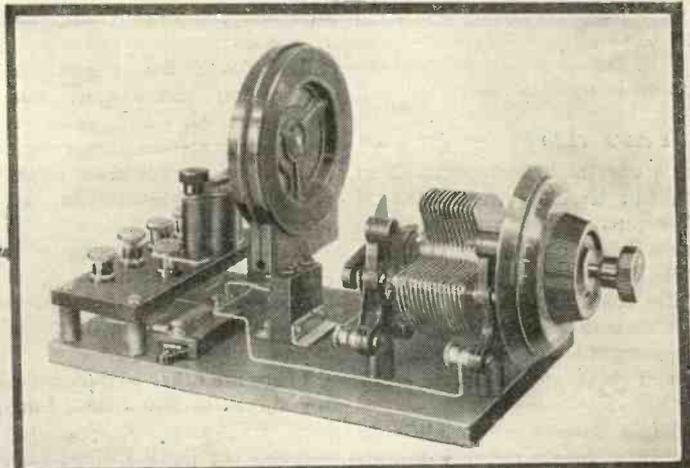
Into the coil holder should be plugged a coil suitable for receiving (in conjunction with the variable condenser on the desired band of wavelengths. That indicated in the list of components (a 40-turn coil) is suitable for the reception of 2 L O.

A glance at the manufacturer's list will soon show the proper size of coil to use.



The relative positions of the components are clearly indicated by the above wiring diagram. The small letters indicate the order in which wiring should be carried out.

All those points marked a should first be wired together with one wire or as few wires as possible, then all those marked b, and so on.



These photographs show the set finished and ready for use. The crystal detector adjusts itself automatically when the small knob is rotated. Broadcasting is then tuned in by rotating the condenser dial.



# Wireless Femininities

IT was pointed out by an educational expert the other day that listening-in is proving the long looked-for link to bind together the members of a family in a common amusement, and stem the modern tendency (which for some reason is considered so pernicious) of young people seeking their pastimes outside the home.

Well, doubtless wireless does do this to a large extent. But why should it be thought so extremely desirable by many people that young men and maidens should spend all their evening under the family roof-tree? And why should they be so certain that this was always done in the good old days a generation or two ago?

(The good old days, by the way, are generally precisely dated as being exactly when the complainant was the age the young person complained to or about is now!)

## Fifty Years Ago

There's one important point about this "youth should amuse itself at home" campaign which seems to be universally overlooked. And that is this. If listening-in had been in vogue fifty years ago, the majority of people in their twenties wouldn't have been donning phones in the august presence of papa and mamma every evening.

No, they'd have been tuning-in in a room with furniture still brand-new and with ears divided between the programme and the possible wailing of an even brand-newer infant overhead.

For in 1870 or 1880 marriage came far earlier to almost everyone and far more certainly to girls, who weren't in the hopeless majority they are now. By five-and-twenty nearly all the young people of a household

were married and removed in this way from the parental roof.

So, though they may have amused themselves at home more than the present generation, they didn't have to indulge in this rather dull pastime for nearly as long. A girl who married at nineteen or twenty hadn't had long to tire of parentally supervised amusements.

And surely an important reason why our young people, who often go on living at home till well past thirty, spend so much leisure away from the family roof is that, consciously or unconsciously, they're seeking marriage mates.

Many though the advantages of wireless, I'm afraid it will hardly prove an efficient matrimonial agent.

\* \* \* \* \*

## News Once a Week

A friend of mine lately returned from an unconventional holiday on an island twenty miles from the English mainland—I'm requested not to be more precise than this, as at present this sea-girt fastness is, almost incredibly, free of char-a-bancs and trippers.

The island has a post and newspapers only once a week—not always as often when winter gales blow, and it struck my friend what an absolute boon wireless would be to the small group of inhabitants in their grey stone cottages.

Especially in the case of news—for think of not knowing what has happened, not even being aware that the sales have begun, till a week after it has happened.

There are other islands dotted about our shores in like case. Lady Aberdeen was recently appealing for a wireless set for the district nurse on a lonely West of Ireland island, often cut off for weeks at a time in the winter.

There are other such isolated fastnesses among the Hebrides and other Scottish groups and even Sark, in the Channel Islands, though it isn't limited to one post a week, ought to welcome heartily a wireless installation in every house.

I was much interested in hearing from a photographer who specialises in charming child studies that he gets many of his most delightful portraits, grave or gay, mischievous or wistful, with the help of radio.

Nowadays no up-to-date photographer "poses" children, but supplies fascinating things with which they amuse themselves, while he follows them round with the camera, making exposures at delightful moments.

This particular portrait man finds that nothing equals listening-in for producing a rapid series of charming expressions in a child's face. During the progress of a story told in the broadcast studio he, in his own studio, can generally get half a dozen varying and characteristic photographs of a small listener-in. When possible his appointments with young sitters are made to coincide with the Children's Corner hour, and the results certainly justify his method.

Parents who want jolly snapshots of their children might utilise the still long evenings and an outdoor radio set to do the same thing.

\* \* \* \* \*

## Haphazard Programmes

I think most of us will agree with the proposal, which seems to be gaining strength in various quarters, that the B.B.C. should try satisfying all tastes by devoting entire evenings on different days to different types of programme or by providing plenty of alternative programmes, rather than continuing the present system of a little bit of everything within the space of two or three hours.

These scrappy programmes satisfy neither the highbrow nor the lover of jazz and comedians. No one wants to listen for twenty minutes to a liked item, then hang up for half an hour and remember to put the headphones on again later for another appreciated number. This is unsettling and prevents anything worth while being done with the portions of the evening when we don't want to listen-in.

A. M. M.

# THE HYPNOPHONE! :: *The story of a special set!*

MR. BINKS was irritable. Everything had gone wrong that morning. To begin with he couldn't get a corner seat in the train, and then had found himself wedged next to his neighbour Thomson, an awful bore, who took all the time



"My dear sir."

to Victoria relating how he had got Madrid on a piece of tin and a boot-lace (or so it seemed to Binks), while all the time, he (Binks) was longing to relate his adventures with an H.T. battery (cracked).

His mail had brought him none of the letters he had hoped to see, and many of those whose absence makes the heart grow fonder. Therefore, when the office boy put his head in to ask if he would see a Mr. Snoop ("Says he's a traveller, sir"), Mr. Binks fairly jumped.

"No, I won't," he snapped. "Send him away, Spry, and don't you—"

"My dear sir," said an unctuous voice at the back, "this is indeed a pleasure. Close the door after you, Spry."

Mr. Binks gazed upwards with gathering amazement and rage. He saw a tall man with a black moustache and a mysterious-looking attaché case which he placed with great care on the desk, then turned and gently expelled the gaping office boy.

"Look here," said Mr. Binks heatedly. "If you think my office—"

"Not at all, my dear sir," said the stranger with the gesture as of waving away an apology. "Your natural heat shows you to be a man of forceful personality, in fact if I may say so, dominating, my dear sir—dominating."

"Now my object, sir, is to interest you in a matter which to a man of your bearing and ability will have a peculiar and special value. I have come to show you a way, sir, in which all those gifts

which have been so generously granted to you by nature will have a fuller and wider scope. Nay, your business and the power of your personality will be such that in the City the mention of your name will engender respect and fear.

Mr. Binks looked up. "I tell you I'm busy. Can't—"

"Quite so, my dear sir. I will be brief. You are aware, then, that in business as in all other walks of life the prizes go to the man whose will controls others, whose personality dominates. This quality is sometimes called animal magnetism and, in its greater degree, hypnotism. Imagine, therefore, my dear sir, the power in the hands of one whose will controls the movements of others. In business, for instance, you want a contract or order from some man or other. Your will dominates his. *YOU* get the order. In social—"

"Are you trying to sell me a book on hypnotism?" said Mr. Binks ominously.

His visitor looked pained. "Sir, I should never try to sell you or anyone else a book on hypnotism. For one thing you have neither the time nor inclination for study—and another point is that I doubt if in business you could induce a possible client to sit down while you made, or attempted to make, mesmeric passes before him. Or whether he would consent to stare unblinkingly at a shining object while you attempted to put him to sleep. No, sir."

He paused to shake his head. "But if the whole power were put



"Certainly, sir."

in o your hands ready-made so to speak . . . I believe, sir, you are a well-known wireless amateur."

Mr. Binks started. He was the oscillator-de-luxe of his suburb and a subscriber to numerous wireless periodicals, but so far fame had not

come to him. He tried to look guilty.

"Then I see that I can gloss over many technical details in explaining the process of wireless transmission of energy. Supposing now I were to tell you," continued the stranger,



"Animal Magnetism."

leaning forward and placing his hand on Mr. Binks' knee. "Supposing I showed you a way by which you could transmit *your* energy or will to any individual whom you wished to influence—what would you say?"

"Bosh!" said Mr. Binks promptly.

The stranger opened his case and produced a box with a hinged lid. This he opened and displayed to Mr. Binks something resembling a wireless receiver, the principal objects on the set being two large knobs and a pointer.

"This," said the whiskered one with a flourish, "is the celebrated Hypnophone. It acts on the principle of a wireless transmitter. By pressing on this knob here you produce an electric current, and by holding the other knob in your left hand the current goes through your body (quite a slight current) and you instantly become magnetised.

"By moving this pointer towards the person you wish to hypnotise, and taking your left hand away, the current will now be directed towards your subject. Fix your will on what you wish him to do. The current bearing your magnetic influence will reach him in continuous strength, which closes around and presses upon him until he is completely magnetised by you through the Hypnophone.

"Your thoughts, willed by you, travel on that current. His brain will gradually receive the message and he cannot but obey. And all this power can be yours, my dear sir, for the modest sum of two guineas. Think of it. Two guineas for—"

## The Hypnophone! (Continued)

Mr. Binks looked meaningly at the clock and then at his mail.

Mr. Snoop hurried on. "I have here many testimonials from delighted clients. Here is one signed W. Bitten. It runs 'Señor Marconi has never invented anything like this.' And another, 'Since seeing the Hypnophone my wife has stated that her one desire is to meet you in the flesh.'

"Now, sir, I do not ask you to purchase without a trial and therefore, my dear sir, I will ask you to take the Hypnophone—and with it in your hand—according to my directions—'will' me to do anything you like. If I fail to obey you instantly then my Hypnophone is indeed of no use to do the things

that I have claimed it will do."

Mr. Binks looked up with a malevolent twinkle. He thought of a way to get rid of this pest.

"You say I can will you to obey my wish?"

"Undoubtedly," said the stranger. "With my Hypnophone you can force me to obey you without question."

Mr. Binks without a word took up the box, and after receiving a second instruction from the inventor, pressed the knob, held the other, moved the pointer and pressed again, his brows knit with the effort of will power.

The stranger gazed at him placidly, then gave a slight start, dropped his eyes, lifted them again with an appealing look, then in a quiet

tone quite unlike his previous confident voice, said, "Certainly sir, yes sir."

He reached out his hand for the Hypnophone, took up his hat and made slowly for the door.

He had turned the handle and was going out when Mr. Binks, who had been gazing dumfoundedly, recovered his speech.

"Stop a minute. How much did you say you wanted for that arrangement of yours?"

The Hypnophone changed hands. Mr. Snoop passed quietly down the stairs, a bland and satisfied smile on his countenance, and murmuring cryptically as he went, "Funny how the same idea gets 'em all."

W.E.D.

### TUNING THE WAVETRAP

MANY people have recently fixed up wavetraps in a desperate hope of cutting out the local station, after reading briefly about the principles involved and the simplicity with which the addition may be rigged up. It seems an ideal way out of the trouble. Unfortunately many are finding that a wavetraps brings along troubles of its own.

#### Second Tuned Circuit

The majority of people who are experiencing difficulty in this direction are those to whom the introduction of a wavetraps means the addition of a second tuned circuit for the first time.

#### Distant Stations

From the theoretical point of view it might appear that all one has to do is to tune the wavetraps until the local station is no longer heard and then to tune in distant stations, at will. The first part of the operation is quite easy, but as soon as the tuning of the aerial circuit is altered, back comes the local station.

What these people have got to realise is a point well understood by those who have previously used loose-coupling, a tuned-anode circuit,

or any other arrangement in which there are two or more tuned circuits coupled together in the same way. This is that, under such conditions, altering the tuning of one of the circuits affects the tuning of the other.

The only way to operate a wavetraps satisfactorily is to set it as described above and then to alter the aerial tuning, at the same time re-adjusting the wavetraps condenser so as to keep out the local station. In other words, both hands should be used and the two condensers adjusted simultaneously. J.F.J.

*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 send 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.A.*

### SMOOTHING CONDENSERS

WHEN the H.T. current for a valve set is derived directly from the mains several large fixed condensers are required for smoothing purposes. The Mansbridge type of condenser is that most frequently used for this purpose, and these may be trusted to handle safely a steady current at up to 200 or 300 volts potential.

#### Dielectric Puncture

However, there is a great risk of the dielectric being punctured should the current drawn from the mains be suddenly switched on or off. In order to avoid this danger it is advisable to close the H.T. switch before turning on the filament current, which latter should be done gradually.

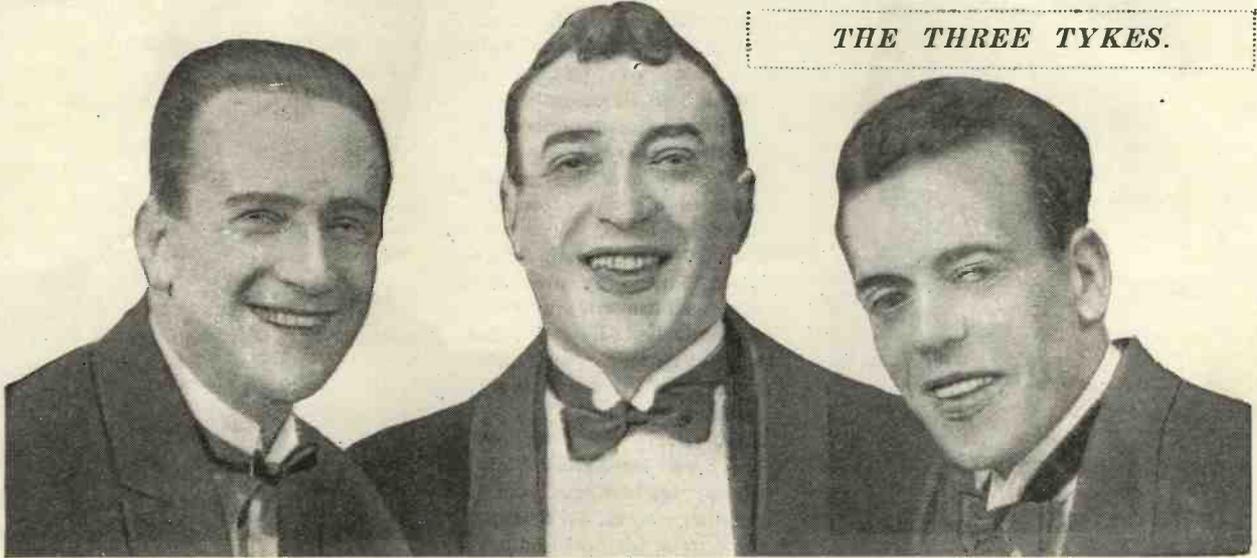
#### Switching Off

When switching off, the filament current should be turned off slowly before breaking the H.T. circuit. In this way sudden changes in the H.T. current are avoided and so high potentials are not produced by the inductance of the choke coils used in conjunction with the condensers.

S.P.T.

# Broadcast Music of the Month

## THE THREE TYKES.



**A**UGUST is pre-eminently the month of holidays, and though as a nation we are supposed to "take our pleasures sadly," there is always considerable latitude allowed in the making up of entertainment projects everywhere.

The B.B.C. have distinguished the month by staging what might be termed "stunts," beginning with the "Benkoldy" revels of August 2, the radio play *Force, Wits, and a Woman*.

Miss Maud McCarthy.



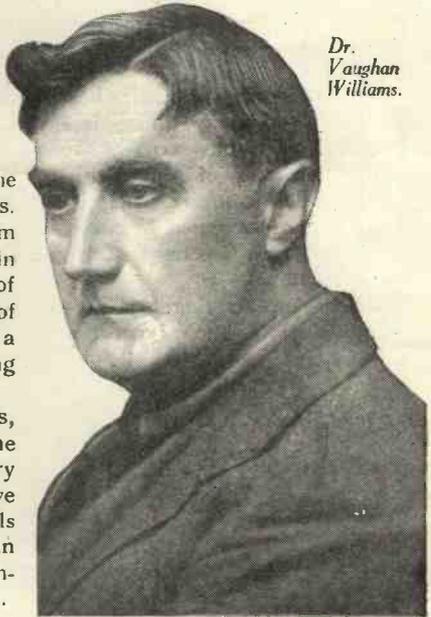
based on the times of Cromwell, which has been performed now nearly a dozen times round the various stations. Its chief charm seems to lie in the hearing of the clop-clop of horses' hoofs on a remarkably long journey.

Lovers of bells, though really one set of bells is very like another, have heard the Bells of Croyland again and the Loughborough Carillon.

One of the most popular stunts will be the listening-in to the opening ceremony of the City and South London Tube Railway.

On the musical side not long ago was heard Miss Maud McCarthy, or Mrs. J. C. Foulds as she is in private life, in a special recital of Hindoo music with her own special instrument and accompaniments.

With the establishment of a special commission on pronunciation, a step further should be taken by making singers get the correct method of singing before the microphone. It is surprising how many mistakes are made even by the most practised singers, the results being imperfect diction and failure to understand the words. There are, however, several artists who, by



Dr. Vaughan Williams.

L. Enarr.

## Broadcast Music of the Month (Continued)



Miss  
Esther  
Coleman.

may be regarded as pioneers of microphone singing. The Quartet has already appeared at 2LO and several stations, and will continue to be heard throughout the month.

Mabel Constanduros is another artist who is able to "carry over" by sheer force of diction, especially in her sketches.

Effie Mann and Margaret Thackeray are also two well-known singers—particularly Miss Mann, who has made a long and strenuous study of every form of vocal art.

At nearly every station has been heard Roy Henderson, the brilliant young Scottish singer, who from the time of his first London



Mr.  
Roy  
Henderson.

recital has created a most favourable impression. Indeed, so successful have proved his methods and choice of songs that a well-known gramophone company has again devoted many records to him.

Touring the stations have been the members of the British National Opera and Old Vic. companies, amongst the artists being May Blyth, Constance Willis, Gertrude Johnson, Norman Allin, Harold Williams (the latter in a programme of his own country's songs—Australian Bush Songs), Sydney Russell, Frederic Collier, and Herbert Thorpe of the Old Vic.

Of the ballad type there are few to equal Carmen Hill, Olive Sturgess, John Turner, and Laurence Macaulay.



(LEFT).—

Miss  
Margaret  
Thackeray,  
a well-known  
broadcast  
singer.

All these artists therefore are not only distinguished for their concert work, but

Pianists usually lead the instrumentalists, and amongst the famous classical players may be mentioned the Belgian artist, Arthur de Greef, who came to us first in the war time and has remained a familiar name at Queen's Hall ever since, Gertrude Peppercorn, one of the best known of women pianists, Edward Isaacs,



Dr. Richard Terry.



Miss D. Moggeridge.



Mr. A. C. Mackenzie.



Mr. L. Macaulay.

## An Illustrated Feature by Studius

Mr. Russell Thorndike



the Manchester player, and Dorothy Moggeridge.

The violin and 'cello have been close rivals, led by Albert Sammons, the famous English player at 2LO and in the provinces, Wolfe Wolfinson, the South African violinist, Harold Fairhurst, Rita Bamberg, Cedric Sharpe, the English 'cellist, May Mukle, John Dickson, Beatrice Eveline, and Carl Fuchs, of the Halle Orchestra.

The entertainers are perhaps the bright lights of our programmes, and we have learned to look for the best in the revues *Tune In* at 2LO, *No Option* at Manchester, the individual artists such as Middleton Woods, Louis Hertel, Thornley Dodge, Tom Stuart, and a Yorkshire combination heard a little time back, The Three Tykes.

The relays of the seaside entertainments are favoured by many people as recalling memories past, or even joys to come, and, apart from the ever-welcome solos of Albert Sandler at Eastbourne, many of the other resorts have contributed well-known concert parties and pier entertainments.

The thought of the sea will also recall the many enjoyable sea shanties which have been heard owing to the energies of Sir Richard Terry, who has given many preliminary talks to the special recitals of the songs so ably collected by him. These have been rendered by many singers, including Harold Williams, the Australian member of the B.N.O.C.

Amongst the conductors who have wielded the baton, one might say unheard and unseen, may be mentioned Dr. Vaughan Williams, one of the best known now of our modern British composers, Dr. Adrian Boult, and Sir Landon Ronald, who took up the cudgels of classical music as against the jazz beloved of Mr. Jack Hylton.

One would like to have still less talks, and far more popular music which falls neither under the category of classic nor jazz, and the ideal programme might yet be devised.

STUDIUS.

Miss Mabel Constanduros.



Mr. J. B. Dickson.



Mr. Tom Stuart.



M. A. de Greef.



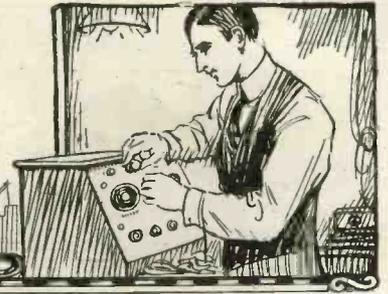
Mr. Herbert Thorpe.

—(RIGHT).

Miss Effie Mann, a well-known broadcast soprano.



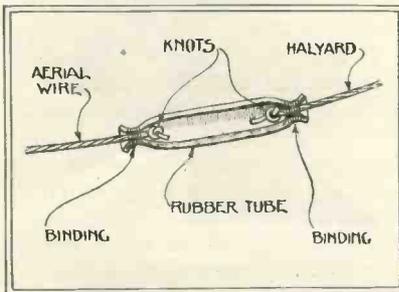
# Gadgets, Hints and Tips



## Improvised Aerial Insulator

ON occasions when a temporary aerial has to be used, the insulator illustrated will enable efficient results to be obtained.

A short length of rubber tubing,



Improvised Aerial Insulator.

such as that obtained from an old cycle inner tube, is used, the halyard and aerial wire being secured one at each end as shown. S. B. P.

## Testing Loud-speakers

WHEN in doubt as to which of two loud-speakers is the better to use for any particular broadcast item, the switching arrangement shown will be found useful.

Two loud-speakers are connected in series with the output terminals

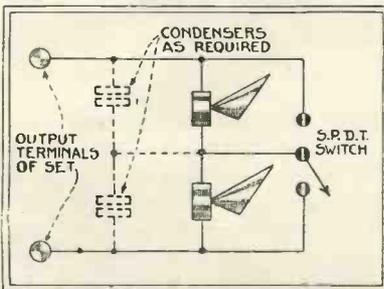


Diagram of Connections.

of the set, and fixed condensers of suitable values are connected across each loud-speaker.

By arranging the single-pole change-over switch as shown, either of the loud-speakers can be short-circuited at will. J. L.

## Preventing H.T. Short-circuits

WHEN using a Reinartz type of valve circuit, care should be taken to select a variable condenser, for the reaction control, whose insulation between fixed and moving plates is above suspicion.

Any accidental short-circuit of these plates would, in turn, short-circuit the high-tension battery.

This will be at once apparent from a study of any Reinartz circuit diagram. To prevent the possibility of such a calamity, a mica fixed condenser of good quality, .001 microfarad in value, should be connected in series with the variable reaction condenser.

The value of the variable condenser will be reduced, since when two condensers are connected in series the total capacity is less than either of the individual capacities.

As long as the value of the fixed condenser is not much less than .001 microfarad, it will not affect the working of the variable condenser, as the latter value is never very critical in regard to value.

N. B. P.

## Unobtrusive Indoor Aerials

INDOOR aerials are usually disfiguring to the room in which they are erected. This difficulty in the case of a short aerial can be almost entirely obviated by the use of a fine gauge of silk-covered wire, say No. 30 gauge.

The length of the aerial need not exceed 30ft., so that in a large room a single span stretched diagonally across it will be all that is required.

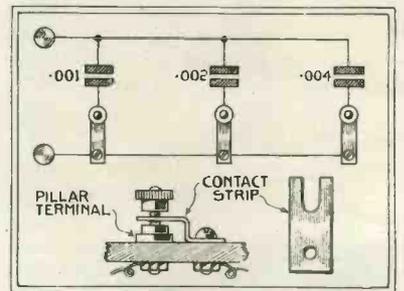
Unless one looks carefully at the ceiling, it is hard to tell whether there is an aerial wire there or not.

The difference in signal strength when such a wire is used and a thick one, of, say, 7/22's, is so slight that the advantage gained in appearance heavily outweighs the disadvantage of a slight loss of signal strength. J. M. D.

## Loud-speaker Condensers

A SIMPLE scheme for finding the correct value of the condenser across a loud-speaker is shown in the accompanying drawings.

Three fixed condensers are so con-



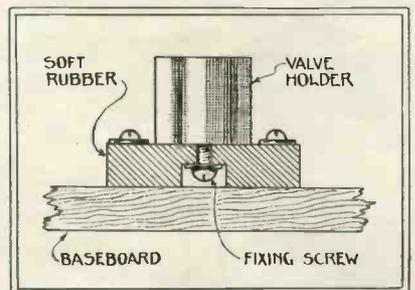
Details of Switching.

nected that when required either one, two, or three, or any combination of the condensers, may be used.

To do this the three small switches seen in the wiring diagram must be assembled. A shaped piece of brass strip, with two right-angled bends in it, a pillar terminal, and a small nut and bolt, are required for each switch. L. R. M.

## Anti-microphonic Valve Holder

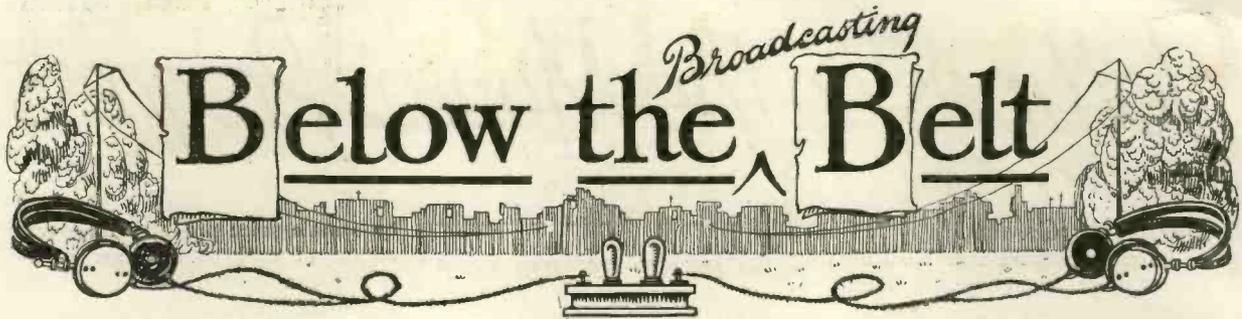
SHOWN in the sketch is a simple means of converting an ordinary



Arrangement of Valve Holder.

valve holder into an anti-microphonic one.

A small square of soft rubber sponge is used as a resilient base for the solid valve holder, the latter being secured to the former by means of a bolt. T. M. D.



**M**OST amateur transmitters of any reputation are, I suppose, frequently asked the question which is often addressed to me: "Why is it that whilst you amateurs can cover enormous distances on very low power on short wavelengths, the commercial stations use big power for what are, after all, comparatively short distances?"

#### *Maximum Service*

The answer is a simple one. The commercial station has to carry out a service for the maximum number of hours each day, and keep it up, day in and day out, from one year's end to another. The amateur, on the short waves, seizes on favourable conditions of the ether for his astounding performances.

The undependability of short-wave work on low power has been brought home to me very forcibly during the last two months. I have been carrying out some regular tests with three Continental stations, one in Belgium, one in France, and one in Germany.

The power I am allowed to use is 50 watts input; actually I use about 30 watts. This is considerably more than the average amateur station, but not so much as the big amateur stations, and microscopic when compared with the power of a commercial land station.

#### *Daylight Working*

I have not been able to maintain a regular daylight schedule with any of the stations with which I have been testing. On some days working has been easy, signals have been loud and clear in both directions, and messages have passed with the utmost facility. On other days signals would be very weak in one direction and fairly strong in the other. On yet other days signals were so weak that it was impossible to work in either direction.

That sort of thing, whilst extremely interesting to the amateur,

*Low Power and Short Wavelengths : Tests with Continental Stations : Erratic Daylight Working : Amateur Transmitters and Broadcast Receivers.*

and well worth investigating in order to find out the cause, if possible, is no good at all to a commercial station.

The conditions are similarly erratic for night-time working with America. On some nights conditions are so good that it is possible to maintain communication with ridiculously low power. Messages have been exchanged on powers as low as two watts. On other nights even the powerful American short-wave stations hardly get through at all, and amateurs simply go to bed disgusted. That, then, is the reason why the big commercial stations stick to the long waves and, more or less, neglect the short waves.

Recently there has been a great amount of talk and correspondence in some daily papers about the interference caused by amateur transmitters with the reception of broadcast programmes. Some people have gone so far as to say that the amateur transmitter should be abolished, overlooking the fact that many amateur stations are doing really good and useful work, and that it was at the instance of the amateurs that broadcasting was first started in this country.

The complaints have been very carefully investigated, and most of them boil down to this: interference from a station working efficiently on 45 metres is only caused to broadcast receiving stations very close to the transmitter, if the broadcast receiver

is a reasonably good one. On the other hand, some receivers are so inefficient that when they are tuned-in to Daventry they will pick up signals from a 45-metre station situated several miles away.

#### *Friendly Relations*

Complaints due to these inefficient receivers are gradually being done away with by the transmitting amateur getting into friendly relations with the complainer and helping him to alter his receiver to make it selective.

There has, however, been another class of complaint coming from Midland and northern districts. This was to the effect that some amateur telephony stations, supposed to be working on 440 metres, were on Sundays working on anything between 300 and 500 metres, and were considerably distressing the local broadcast receivers who like to search sound for Continental stations on Sundays when the B.B.C. is not working.

Now this complaint pointed to a direct breach of the terms of the licence on the part of some transmitters, and unfortunately the complaints were discovered to be well-founded.

#### *Withdrawing Licences*

The Post Office is in a position to check the evil by taking away the licence of any offending station. But the Post Office had done nothing and so the Transmitter and Relay Section of the Radio Society of Great Britain has taken the matter up in an energetic fashion. It is possible that as a result of their action the 440-metre wavelength will be given up by amateurs.

It is now of little use for experimental work and since it is liable to be abused and to cause annoyance to the broadcast listener, the very best thing that could happen is that the amateur should drop it altogether.

5 Y M

# Notings on the Month's Progress

## Radio for the Garden

IN the pre-broadcast era, horticulturists were dependent for their best efforts mainly upon ground manures and the "gentle rain from Heaven," although the more scientific among them knew that treatment by high-frequency electricity was capable of producing some extraordinary results in the way of stimulating growth.

It has been left to a Nottingham amateur to appreciate the fact that much of the high-frequency energy distributed from our broadcast centres escapes the aerial network and presumably goes to waste. He therefore proposes to utilise this leakage to stimulate the growth of his garden produce.

Insulated wire collectors are spread over the growing plants, and the high-frequency currents induced therein by popular jazz bands and other broadcast items are apparently re-radiated for the benefit of his cucumber and tomato plants.

In the case of peas and beans or other climbers it is suggested that they might be persuaded to act as earth-leads for the insulated collecting wires, and so enjoy direct high-frequency treatment!

## Fading due to Polarisation

Mr. E. F. W. Alexanderson divides the waves sent out from a radiating aerial into earth-bound waves, which are guided by proximity to the conducting surface of the earth, and high-angle or space waves, which are guided by refraction in an ionised layer in the upper atmosphere. Broadcast reception depends upon the earth-bound wave for near stations, and on the space wave for distant stations.

It is calculated that at a distance of 100 miles, with a 300-metre wavelength, the intensities of the two waves are approximately equal.

In the case of 50-metre transmission it appears that the plane of polarisation of the space wave is twisted through 30 degrees at a distance of only 10 miles from the radiating aerial

## A SURVEY OF RECENT DEVELOPMENTS

Sixty miles from the station the "twist" would therefore amount to 180°, at which point interference with the earth-bound wave would result in a complete "wipe out" of the signal, as the two waves are then in complete phase opposition. This affords an interesting insight into "fading" and the existence of so-called "blind spots" in reception.

## Perfect Receiver

The *Radio News* of America recently offered a thousand-dollar prize for the best definition of the ideal receiving set, from the point of view of the general broadcast listener. The favourite type of set as analysed from the replies of nearly twenty thousand competitors was as follows:—

"A single tuning control set, in cabinet form, with a built-in loop aerial and enclosed loud-speaker, having a sloping panel and two subordinate controls, one to change the directional plane of the loop-aerial and the other to regulate volume."

The use of a frame aerial sufficiently small to be contained within the cabinet necessarily sets a somewhat high standard in cost, as at least five or six valves would be required to give adequate strength of reception on long-distance work.

Otherwise, the specification conforms very closely to what most listeners over here would regard as a reasonable aspiration, and one not unlikely to be fulfilled in the near future, judging by the present rate of progress in receiver design.

## Sound-wave Energy

In the course of an interesting paper recently contributed to the Institute of Electric Engineers by members of the research staff of the G.P.O., it was stated that with a normal voice the average speech energy entering a telephone transmitter is about 100 ergs per second.

A series of vowel sounds intoned

by a male voice produced an average output of only 56 ergs per second, whilst in a similar test with a female voice this figure sank to 40 ergs per second. The consonants, therefore, clearly carry the bulk of the sound energy concerned in speech.

The threshold or limit of audibility is known to vary with the frequency of the sound. An acoustical pressure of 0.15 dyne per square centimetre is necessary to ensure the audibility of a vibration at 60 cycles per second, though a high-pitched note at a frequency of 1,000 can be heard when the energy content is reduced a hundred and fifty times. Between 1,000 and 4,000 cycles the energy necessary to ensure audibility remains practically constant.

The entire range of frequency used in ordinary speech varies from 100 to about 6,000 cycles per second. Of these the band above 2,500 can be eliminated without affecting the intelligibility of the transmitted words, although the frequencies up to 5,000 are necessary in order to preserve the full timbre of tonal quality.

## Listening to the Nerves

Dr. Adrian, F.R.S., of Cambridge University, is responsible for an interesting application of wireless technique to research in neurology. It has been known for some time that the passage of any nervous impulse causes an electrical disturbance to travel along the nerve.

By employing a three-valve amplifier, Dr. Adrian has made it possible for the first time to record the effect of stimulating a sense organ connected to the brain by a single nerve fibre. The single-point contact was secured by stretching the muscle in a frog's leg, and it was found that the frequency of the transmitted impulses varied in a rhythmic manner as the stretching tension was increased.

The result is interesting, as indicating the possibility of analysing the main types of messages carried by the nervous system, and so securing a further insight into the mechanism of the brain. B. A. R.

*A Feature Supplied by the Officials at Savoy Hill*

# What the B.B.C. Is Doing

WE came in for a good deal of criticism last month, as the result of our decision to standardise the pronunciation of the King's English for the use of announcers. Ever since broadcasting started, the responsibility of introducing a standard pronunciation, for the announcers' guidance, if not for the education of listeners at large, has been a paramount question at Savoy Hill.

## "Pour" and "Paw"

As Mr. Lloyd James, Lecturer on Phonetics in the School of Oriental Studies, told us in a broadcast talk some months ago, millions of people pronounce the word "pour" exactly like "paw," and will say "Paw it out" when they mean "pour it out."

The majority make no distinctions in the hundreds of words in our language containing the group "wh." Professor Wyld, in his "History of Modern Colloquial English," observed that in the South and Midlands no distinction is made between "whine" and "wine." Those of us who say "wen," "wich," and "wot" will not confess to a vulgarity; we merely speak the language of the South in which we have been nurtured, and we are inclined to regard speakers who are not restrained by our own custom as having been subjected to Scotch or Irish influence.

On the other hand, we have a large number of people despising Cockneys for saying "tyble" when they mean "table," and "Ow, naow!" when they mean "Oh, no!" and expressing themselves unashamedly and pretentiously in the terms "teeble" and "Ooo, noo!"

A broadcast speaker, in criticising common pronunciation, once said that the English people of the South were too lazy to pronounce their "r's," and had become so accustomed to eluding them that they had the utmost difficulty in pronouncing them at all. As showing the lack of unanimity on this point, another language expert, also in a broadcast talk, remarked that the people of the South introduced "r's" on any pre-

text; and invariably referred, for example, to "vanillar" ice.

But we must emphasise that we do not seek to dictate to listeners on forms of pronunciation; the South, it is recognised, will favour "tarsk" for task, and the North will favour the short "a" in the same word, whatever our announcers may say.

Our Advisory Committee on pronunciation, which is composed of such eminent men as Dr. Robert Bridges, the Poet Laureate, Mr. George Bernard Shaw, Sir Johnston Forbes-Robertson (one of the most distinguished speakers on the British stage), Professor Daniel Jones, of London University, and a well-known lexicographer, Mr. Logan Pearsall-Smith, of the Society for Pure English, and Mr. Lloyd James, has rarely attempted to prevent confusion by recommending uniform and logically sound pronunciation of such words as the announcers themselves submitted, which listeners challenged as doubtful, or which were submitted as examples of the kind of difficulty that may arise.

No one, however, can gainsay the influence which the example now being set in broadcast speech is likely to have on the pronunciation of our complex language; and that being so, certainly no harm will ensue if this pronunciation becomes more or less the general standard.

## *Exclusive Wavelengths*

In the second week of September we shall experience the first-fruits of the protracted discussions which have been going on at Geneva during the past eighteen months, in the endeavour to solve Europe's wavelength troubles. Congestion of the ether is a malady common to all parts of the world where broadcasting is conducted on a large scale; Europe furnishes, perhaps, the worst area of all.

Stations have sprung up, figuratively, like mushrooms in a night, and no diminution of this activity is in prospect. Unofficial but comparatively reliable information is to the effect that fifty stations will be erected in Russia alone by January 1929. The Latin and Scandinavian countries are

all showing the same feverish energy.

Geneva's policy of allocating exclusive wavelengths is therefore a timely effort to "stop the rot" that is threatening European broadcasting. Nine or ten wavelengths will be allocated to Great Britain, and these will be a preserve on which no other country that is conscious of its moral obligations to preserve the integrity of broadcasting may poach.

## *Other Countries*

The exclusive wavelengths will not run consecutively, but will be spread about within the authorised wave-band, and other countries' exclusive wavelengths will be sandwiched in between those of Great Britain. The scheme will be utilised by us as the initial step towards a plan for moving stations from their present sites and erecting higher-power stations outside the big cities.

This is a step which Germany is already adopting, and we have sufficient evidence in our possession to indicate that the development is a wise one. With regional stations operating on, say, ten kilowatts, the local station, if left within the big city, would blanket any alternative programme, even if it were transmitted on an exclusive wavelength; hence the certainty that the stations of the future will not be in the centre of big towns, but separated from them by five or more miles.

Such a scheme will be developed gradually; and will materialise in the order first of the definitely satisfactory working of the existing stations on their exclusive and common wavelengths; secondly, of the probable removal of three or four main stations from the densely populated areas in which they at present function; and, concurrently, of the development of a scheme of regular alternative programmes.

What part Daventry will play in this scheme has not been determined at the moment; but the future of this, the first high-power station that the world ever saw, will assuredly maintain our original intention to make 5XX an indispensable link in international broadcasting.

# Continental Notes

∴ Collected by  
∴ JAY COOTE

IF, as I expect, the search for distant and low-power stations fascinates you as much as it does me, you may be pleased to learn that two continental radio clubs have put up small transmitters with a view to the nightly broadcast of concerts and entertainments. Radio Beziars is installed in the department of Herault, about fifty miles south-west of Montpellier (France). Its advertised wavelength is 95 metres, and it transmits with a power of 100 watts.

## Good Distance Away

Although the distance from London is a good one, and the signals comparatively weak, the geographical situation of the transmitter on the top of a high hill may considerably add to its range, and it will be interesting to know whether the broadcast is picked up in the British Isles.

The other new station is that put up by a small group of enthusiasts at Strasburg, also in France. Here, again, the power is but a low one, namely 120 watts; concerts are broadcast twice weekly, on Tuesdays and Thursdays, at 9.30 P.M. on a wavelength of 205 metres.

For some time past it has been rumoured that P T T, Paris, intended to install a relay in that city, but apparently its inhabitants are showing impatience at the delay, and have forestalled the project by a little toy of their own!

\* \* \*

Wireless amateurs interested in the capture of foreign transmissions will be pleased to learn that the German stations, in response to the applications of local listeners, have agreed to close down early on certain nights during the week. Curiously enough, according to the technical papers in that country, this period is termed a "broadcast silence."

## D X Fiends

In order to give the local D X fiends an opportunity of ascertaining what other foreign stations are putting through the ether, 10.30 P.M. is fixed as the time at which, according to a rota, the German stations are to go off the air. You will now find that on Mondays the Hamburg and Breslau group close down at that

time; on Tuesdays the Berlin and Münster main and relay stations; Wednesday is reserved to Frankfort-on-Main and Cassel; Thursday is booked by Leipzig, Dresden, and Königsberg, and Friday sees an early end to the Munich, Nuremberg, and Stuttgart programmes.

The new scheme is meeting with general approval, and there is a possibility that during these next months the silent period may be extended to a further night weekly. Cannot such a scheme be adopted by the B.B.C. main and relay transmitters?

\* \* \*

It is almost impossible nowadays to twirl the condensers of a wireless receiver at any time during the twenty-four hours without picking up something or other. I make no reference to those aggressive dots and dashes which on all occasions do their best to shatter our ear-drums, but to telephony.

If you will tune-in to just above the Hilversum wavelength on any day at 13.00 B.S.T. you should hear: "Allo! Allo! Poste Radio-téléphonique de Bruxelles."

## Haeren

This is the Belgian Government station at Haeren, and for about ten minutes you will be given a weather forecast, first in the French language, followed by: "Allo! Allo! Hier Radio-téléphonie van Brussel," and the same bulletin in Flemish. The announcer's enunciation is particularly clear.

It is true that the broadcast is not of thrilling interest, but it helps one to calibrate a receiver, and adds to the number of stations logged.

\* \* \*

The sooner regulations are enforced by which the foreign broadcasters are mechanically compelled to stick to their allotted wavelengths, the sooner shall I, in keeping with many thousands of other listeners, be better satisfied. Although for some little time there was apparently a certain improvement, for the present some of the foreign transmitters deviate to quite a large amount from the righteous path.

Of these, in this respect, one French station is a particularly bad sinner,

and on many nights considerably interferes with the Rome, Stockholm and Berne transmissions; in fact, on some occasions it is not possible to hold any of these programmes for any length of time.

\* \* \* \* \*

## Impossibilities

Like King Charles's head, radio will keep cropping up. To use an Irishism, even with a super-het one cannot achieve impossibilities. As it is, the broadcasting band is pretty badly congested, but when a station hangs over in festoons to the extent of 5 to 7 metres on each side of its proper seat in the ether, the problem is one which drives the ordinary listener to distraction.

The opinion expressed by a colleague that I am using *Too-louse* a coupling did not help me out of the difficulty!

\* \* \* \* \*

For some little time past the Free City of Danzig has been anxious to possess a broadcasting transmitter of its own, as up to the present it has been dependent for its radio programmes on either the Königsberg or Warsaw station. Danzig, although but of comparatively small dimensions, is a city with a history, and has been known throughout the ages as the Queen of the Baltic.

And Danzig is ambitious! It is more than likely that towards the end of this year the transmitter may materialise, but in the meantime, in order to prove that the City possesses artistic elements and that its voice may be worth hearing, one or two relays *via* the Königsberg station are to be made from Zoppot, the "Brighton" of the Danziger Bucht.

## From the Zoppot Kursaal

Zoppot possesses a Kursaal, and to its beach, during the summer, flock thousands of citizens from all parts of Germany. In most years, during the season, some of the best opera singers are engaged for concerts and operatic performances; a speciality is also made of spectacular open-air shows. The stage on these occasions is set in a valley flanked by small hills, on the slopes of which will be found many thousand spectators.

# A Micrometer Crystal Detector

IT is strange that the problem of designing a micrometer crystal detector enabling the point of the catwhisker to visit every part of the face of a crystal by micrometer adjustment, has not, in the writer's opinion, been solved in a satisfactory manner. The problem is simple.

Take the case of a crystal face  $\frac{3}{8}$  in. diameter fixed into a vertical plane. It is required to provide movements in two planes at right angles to each other.

The movement in the first plane is one to enable the point of the catwhisker to approach and retire from the face of the crystal; it is a movement along a horizontal line, controlled by direct micrometer action, see Fig. 1.

The movement or combination of movements in the second plane at right angles to the horizontal line of the first movement is to enable the point of the catwhisker to visit in turn each point of the crystal within a circle of  $\frac{3}{8}$  in. diameter, and these movements must be controlled by direct micrometer action.

The movement in the first plane has been satisfactorily solved, but generally with the aid of a spring, which in itself is a source of weakness. An improved method will be suggested in the design which is dealt with later.

The movements in the second plane, which is parallel to the face of the crystal (Fig. 1), may be obtained (a) by horizontal or vertical movements along straight lines (Fig. 2), the action being controlled by racks and pinions, like the stage micrometer of a microscope, but this would involve mechanism that is not very suitable for our purpose and would be expensive; (b) by circular movements (Fig. 3) which can be obtained without difficulty by two rotating parts—an ebonite disc "A" and a metal gudgeon "B" (Figs. 4 and 5).

Consider first the disc "A." Its

rotation round the horizontal axis through the centre of the crystal will enable the gudgeon "B" to roll round the central horizontal axis; to obtain this, the axis of "B" must be eccentric to that of "A" and not concentric, and the distance between the two axes must be half the radius of the crystal, that is, half three

ever it was desired to change it.

If, however, the point of the catwhisker is fixed at approximately  $\frac{3}{32}$  in. from the central line of its axis (it need not be exact, but should be rather more than less) and the gudgeon is rotated by the tread, the required field of movement is obtained. (Fig. 4).

To sum up: The movement of the point of the catwhisker in the first plane (Fig. 1) is along a horizontal axis directly towards or away from the face of the crystal and is regulated by direct micrometer action.

The movement in the second place (Fig. 4) is obtained by rotating a disc "A" round the horizontal axis passing through the centre of the crystal. This disc carries round the gudgeon "B"

with its axis at a distance of  $\frac{3}{32}$  in. from the axis of "A."

The gudgeon "B" carries the spindle of the catwhisker passing through the central axis of "B."

The point of the catwhisker is set at a distance of  $\frac{3}{32}$  in. from the centre line of the spindle, and the gudgeon is rotated by the tread.

It should be mentioned that instead of rotating disc "A," the crystal box might be rotated, but this has the disadvantage of requiring the use of both hands.

A design for a micrometer crystal detector on these lines can now be considered. The following conditions are to be borne in mind: No springs should be used, as they are a source of trouble; no lock nuts should be used, as they are so often found locked when one would like them to be free and vice versa; the rotating parts "A" and "B" should not be worked by screw threads, as that involves travel.

Figures 4 and 5 explain the design that is proposed.

The movement in the first plane—a direct travel forwards and backwards of about  $\frac{3}{8}$  in.—is obtained by (Continued in third column of next page.)

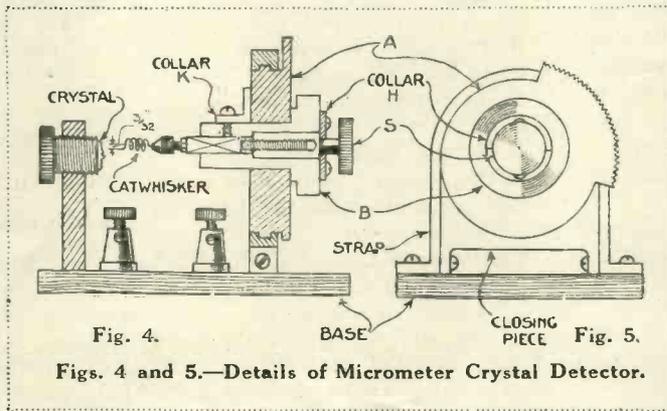


Fig. 4. Fig. 5. Figs. 4 and 5.—Details of Micrometer Crystal Detector.

sixteenths of an inch, which is three thirty-secondths of an inch.

To enable the point of the catwhisker to travel round its small circle (Fig. 3), the same principle of

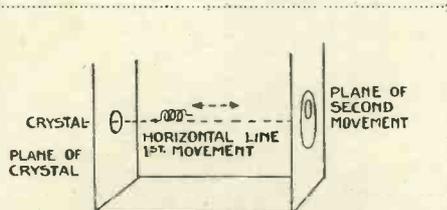


Fig. 1.—Movements of Catwhisker.

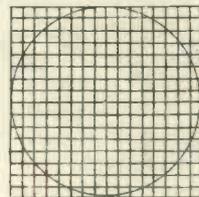


Fig. 2.—Horizontal and Vertical Movement.

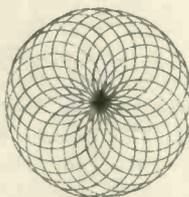


Fig. 3.—Circular Movement of Catwhisker.

eccentric movement might be adopted, but it would be necessary to adjust the catwhisker exactly on the central line of its axis—which would be a tiresome adjustment to make—when-

# The Institute of Advanced Listeners

## EXAMINATION PAPER.

### Preliminary.

Time allowed  $3\frac{1}{2}$  Hours. At least six questions must be attempted. Full marks can be obtained with five questions alone. Either side of the paper may be used, but not both.

1. If you constructed a crystal receiver on such a scale that you were compelled by lack of space to divide it into two parts, viz., the inductance, and the telephones and detector, and had to keep the former in the garden—

(i) Would the reception be better, or worse, than with an ordinary arrangement?

(ii) Would any difference be noticed in the quality of the signals if a pair of starlings built a nest within the coil?

(iii) State in simple language what effect the electromagnetic field of the coil would have upon—

(A) The eggs laid by the bird.

(B) The young starlings when hatched.

2. Define the term "mixed reception" and also say whether it could be used in connection with a description of any of the following events:—

A. The leading-in of the winner of a popular horse race.

B. The leading-in of an aerial, the free end of which was attached to the house-lighting supply cable.

C. A speech by the Postmaster-General in the House of Commons announcing the abolition of wireless licences.

D. A loud-speaker demonstration at a chess match.

Select at least two of these events and write a short account of each one chosen, in which you are required to employ the term to show you understand its meaning.

3. It is estimated that 74,592 mahogany butlers' trays have been cut up by amateurs for the purpose of making wireless cabinets.

1. State why this is.

2. Give your opinion, in a few words, as to what has become of the butlers.

4. What do you mean by the straight part of a curve?

Illustrate your answer with at least

two curves which have this characteristic.

5. Assuming that you were given a wireless receiving set on which there were a number of terminals, one of which was marked "earth," state how you would proceed to make the necessary connection for this terminal to obtain signals:—

A. If you were in an aeroplane 2,000 ft. above Wigan.

B. In a yacht off Southend.

C. In a lunatic asylum.

D. In a monastery garden.

6. State what you know about The Wireless League.

In your answer compare its fundamental structure with the following organisations:—

The Primrose League. The League of Young Liberals. The League of Nations.

7. A crystal detector is composed of two essential parts in its commonest form. One is the crystal, the other the catwhisker.

A. What is the function of the latter, and to whom is the scientific world indebted for the name?

B. Give your opinion of the state of advancement in the knowledge of wireless telegraphy of an amateur who is found cutting up his gold spectacle frames in order to manufacture catwhiskers therefrom. Assume that he has but one pair, and condense your answer as much as possible.

C. What is an amateur, and why?

8. The total receipts during the last year on account of wireless receiving licences were £613,309, of which £472,102 was payable to the British Broadcasting Company by monthly instalments in arrear. Assuming that the value of each programme is one-third of a penny, how many could you buy with one of these instalments, and what would you do with them when you had bought them?

9. What do you know about continuous waves?

Embellish your answer with sketches of those likely to be met with at Blackpool, Margate, and Lea Bridge, and indicate any other varieties you may happen to know of.

10. Say what you know about the

following well-known experimenters. Illustrate your remarks with a sketch of the characteristic curve of each:—

1. Mr. Ohm.

2. John Henry.

3. George Washington.

4. Dan Godfrey, Junr.

5. Wireless Willie.

6. Mr. Telefunken.

7. The Selma Four (see footnote \*).

8. The Examiner. (Your remarks may be confined to two words.)

(\* One will be sufficient.)

## A Micrometer Crystal Detector (Continued from preceding page.)

rotating the female part of the spindle "S," which causes the male part of the spindle carrying the catwhisker to advance or retire. The end part of the spindle carrying the catwhisker is threaded to work in the female screw of "S."

The female part of the spindle is prevented from drawing out by a collar "H" fixed on to the gudgeon by two screws. The knob is placed on last and secured by a grub screw or cotter.

The spindle carrying the catwhiske is square in section for about  $\frac{1}{2}$  in. to prevent its rotating and in order to give a true travel.

This combined male and female spindle "S" is carried in a metal gudgeon "B" which can be rotated by the tread, and is kept in place by a collar at "K" fastened by screws to the gudgeon. The axis of the gudgeon is  $\frac{3}{8}$  in. from the central axis of the crystal which is also the axis of the ebonite disc "A."

The ebonite disc "A" has a projecting disc with a milled edge to form a wheel for rotating the disc. The disc "A" is held in position by a metal strap which is fastened by screws to the base board, and it has a closing piece to prevent the disc from falling out.

The crystal should be held in its box by a screwed plug, the end of the plug being convex or coned, no springs or other gadgets being necessary.

E.S.T.

## Result of Componigraphs Competition

THE first six correct solutions to the Componigraphs Competition in the June issue of the WIRELESS MAGAZINE opened were sent by the following readers:—

- G. T. Drury,  
5, Gladys Villas,  
Brecon Street,  
Holderness Road,  
Hull.
- V. G. Hussey,  
73, Whitley Street,  
Reading,  
Berks.
- F. Parnell,  
20, Broad Green Avenue,  
West Croydon.
- S. A. Scott,  
Glastonbury,  
North Hill,  
Highgate, N.6.
- T. E. Simpson,  
60, Glebe Road,  
Middlesbrough.
- C. R. Woolmer,  
147, Winchester Road,  
Brislington,  
Bristol.

If these readers will each select one guinea's worth of components from advertisers in the WIRELESS MAGAZINE and send us their lists we shall be glad to send them their prizes at the earliest opportunity.

## Making a Low-loss Lead-in Tube

IN spite of recent efforts to design low-loss components for every part of the set where H.F. currents have to be dealt with, few attempts appear to have been made to produce a really efficient low-loss lead-in insulator.

The short ebonite tube, with a screwed brass rod running through its centre, which was "good enough" a few years ago, is still in use in the

great majority of broadcast receiving installations.

### Far from Good

This type of lead-in insulator is far from good. In the first place the insulating properties of ebonite can deteriorate fairly rapidly when this material is exposed to the weather, as is the case with a portion of the lead-in tube. Secondly the connections to the brass rod, made by clamping wires under terminal nuts, provide opportunity for the setting up of two poor joints in the aerial system.

### THE HELPING HAND

of the WIRELESS MAGAZINE is ever ready to come to your aid when you are in difficulty over any wireless trouble, whether practical or theoretical.

Just write your query out on a piece of paper (write on one side only, please!) and send it, together with the coupon on page iii of the cover and a stamped addressed envelope to:

The Editor,

WIRELESS MAGAZINE,

La Belle Sauvage, E.C.4.

In the ordinary way a reply will be posted to you the same day that we receive your question. Moreover, this special service is

**QUITE FREE!**

### Glass Tubes

Both these disadvantages can be overcome by using a length of glass tube instead of the usual ebonite tube, and running the down-lead from the aerial, in one continuous length, straight through the glass tube to the aerial terminal of the set.

### Sloping Downwards

When this is done the hole which must be drilled in the window frame for the tube should slope downwards slightly, so that the outside end of the tube is a little lower than the inside end. This will prevent water running down the wire and through the tube into the house in rainy weather.

F. C. N.

SOME people are born to greatness. Others become wireless club secretaries of their own accord.

LOUD-SPEAKERS are being fitted in taxi-cabs in Paris. If the Paris drivers are like ours, they will bring the instruments into use immediately on being tendered the exact fare.

## Catalogues and Pamphlets

Copies of the catalogues and pamphlets mentioned below can be obtained post free if the WIRELESS MAGAZINE is mentioned.

A NUMBER of new Magnum products, including screened coils, resistors and tapped H.F. chokes, are the subject of a folder issued by Burne-Jones & Co., Ltd., of 296, Borough High Street, S.E.1.

From the Igranic Electric Co., Ltd., of 147, Queen Victoria Street, E.C., we have received a leaflet dealing with the Igranic six-valve super-het receiver.

A folder received from the M.A.P. Co., of 246, Gt. Lister St., Birmingham, gives details of new component parts.

Polar sets and components are fully described and illustrated in a booklet that can be obtained from the Radio Communication Co., Ltd., of Barnes, S.W.13.

All kinds of sets and components are the subject of a 68-page catalogue issued by Electradix Radios, of 218, Upper Thames Street, E.C.4.

Full constructional details for building a seven-valve super-het set with MH components are given in a 24-page booklet supplied by L. McMichael, Ltd., of Hastings House, Norfolk Street, Strand, W.C.2.

The Elven H.T.-from-the-mains unit is the subject of a leaflet received from Wright & Weaire, Ltd., of 740, High Road, Tottenham, N.17. Another folder issued by the same firm gives particulars of Wearite components.

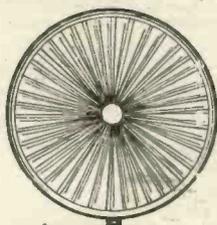
Lion accumulators and carrying cases are described in folders published by the Foolprufe Patent Accumulator Co., Ltd., of Market Harborough.

A new form of aerial insulator known as the Sarbolt is the subject of a folder sent us by the Hatton Supply Co., of Hatton, Middlesex.

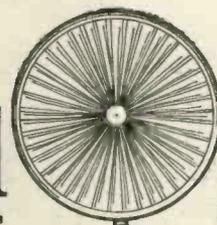
Valve sets are the subject of a 12-page catalogue issued by C. S. Dunham, of 2A, Elm Park, Brixton Hill, S.W.2.

Cabinets for wireless sets are now being made by the Enterprise Manufacturing Co., Ltd., of Grape Street, Shaftesbury Avenue, W.C.2.

## A Selection of Solutions to Readers' Difficulties



# Questions Simply Answered



### Use of Grid Bias

**Q.**—By incorporating grid bias and adding extra H.T. to the amplifying valves in my set, shall I get an increase in volume from the loud-speaker?—T. A. (Liverpool).

**A.**—The addition of grid bias and extra H.T. into the amplifying portion of the receiver does not necessarily make for stronger signals. Grid bias shifts the operating point of the valve's characteristic, and therefore assists the valve in dealing with stronger signals without distortion.

Additional H.T. is only employed to assist the valve to function more as a power amplifying valve than as an ordinary L.F. valve.

To obtain greater volume, suitable power valves should be employed.—L. A. C.

### L. F. Amplifier

**Q.**—If I add a low-frequency amplifier to my crystal receiver will this increase the range of reception?—S. A. (Surrey).

**A.**—Adding a low-frequency amplifier to an existing receiver does not increase the range over which signals can be received in the same way as an H.F. valve, but owing to the magnification of very weak impulses received by the detector, signals are made audible that would otherwise not be heard in the phones when connected to the unaided rectifier.

In this way, then, an L.F. amplifier may be assumed to increase the normal range of a receiver.—J. F. M.

### Sulphated Accumulator

**Q.**—Can you suggest how I can remove the white sulphate that has formed upon the plates of my accumulator, and also tell me the cause of such sulphation?—W. T. (Swansea).

**A.**—Provided that the trouble has not gone too far it may be remedied by continuous slow charging and discharging. If this does not cause the sulphate to drop off, then it is necessary to scrub the plates with hot soda water. Should this not effect the desired result then we are afraid that the cells are beyond repair.

Sulphation is generally caused by discharging at too high or too low a rate, and it should be arranged as far as possible that any accumulator is discharged at the same or nearly the same rate at which it is charged.

Letting the cells stand in a discharged state will cause them to sulphate quicker than anything else.—L. A. C.

## 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 send 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.*

### Oscillation in Reflex Set

**Q.**—I am troubled with my single-valve reflex set bursting into oscillation when I am adjusting the catwhisker. This occurs even though the reaction coil has first been adjusted so that the set is perfectly stable. Can you suggest the cause?—E. R. (Glasgow).

**A.**—The amount of reaction necessary to set up self-oscillation is dependent upon the damping present in the circuits concerned. If, with a given amount of damping, the reaction coil be adjusted so that the set is just short of the oscillation point, and the damping is then reduced, it is only to be expected that the set will oscillate.

That is exactly what you are doing. In your particular set the damping is largely determined by the resistance of the crystal contact, which will vary when the catwhisker setting is altered. The obvious remedy is to employ the reverse procedure to that you use at present. That is to say, you should first adjust the catwhisker to the most sensitive spot that can be found, and after that adjust the reaction coupling.—K. M. P.

### Exhausted H.T. Battery

**Q.**—How can I tell when the H.T. battery is exhausted and requires to be renewed?—K. C. (Durham).

**A.**—The usual symptoms which indicate the failing of the component mentioned are that signal strength gets gradually poorer and poorer while it becomes increasingly difficult to obtain a proper reaction effect. Crackling noises usually make themselves heard in the phones and loud-speaker, while distortion will also probably occur. It may also be noticed that the set works fairly well when first switched on, but that signals fade considerably after a few minutes.—J. N. P.

### Home-made H.T. Accumulator

**Q.**—I have built a home-made H.T. accumulator, using ordinary commercial lead for the plates. Although the positive plates have turned chocolate-brown in colour the negative plates remain a dirty black instead of a slate-grey and the cells refuse to hold their charge. Can you explain this and suggest what can be done to remedy the trouble?—D. F. (Fife).

**A.**—Ordinary sheet lead is not the correct material to use for the plates of an accumulator, but as the cells are of the home-made variety there is not much help for this. The only way in which the plates may be correctly formed with this material is to charge and discharge the cells continuously until the negative plates turn the required colour; it will then be found that the cells will retain their charge.—F. O. S.

### Which Main is Earthed?

**Q.**—What procedure should I adopt to find out which of the mains of my D.C. lighting system is earthed?—T. K. (Middlesex).

**A.**—Obtain a lamp fitting and attach to it a suitable length of flexible wire.

Insert one of the normal house lamps in the holder and carry out the following tests:—Connect one wire to one house fuse and the other wire to any convenient "earth." Repeat the procedure with the other house main and earth. The lamp will light at full brilliancy when connected up in one position, whilst no light will be observed in the other position.

The main to which the wire is connected when no light appears is that which is earthed.—L. A. C.

(More questions answered on page 182.)

# 1925-1926

## CLEARTRON'S POLICY = 'POPULAR PRICES FOR QUALITY VALVES'

CLEARTRON STANDARD VALVES—  
C.T.08, C.T.15, C.T.25 and C.T.25B, at  
12/6 and 15/-, have made CLEARTRON'S  
name in the Wireless Trade.

CLEARTRON'S new 1926/27 models with NEW filaments,  
INCREASED electronic emission, HIGHER vacuum and  
LONGER life

Give "Last word" satisfaction and are always backed by  
CLEARTRON'S IRONCLAD GUARANTEE.

*America's Foremost Valve made in Britain's Newest Factory.*  
Cleartron's new Aston Works, in addition to the Cumberland Street  
Works, Birmingham, will be in full operation by September 15th.

Send for new season's catalogue with full technical data, etc.

### CLEARTRON RADIO LIMITED

ONE CHARING CROSS, LONDON, S.W.1.

(Works : Birmingham.)

Telephone : Regent 2231-2.

Telegrams : "Cleartron, Westrand, London."



See us at Stands 135, 102, 46

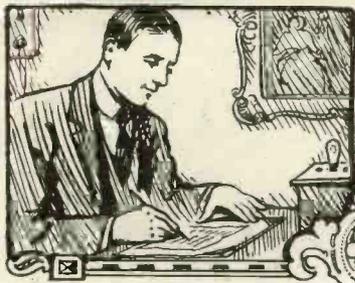


National Radio Exhibition



CT.54

In writing to advertisers, please say you saw the advertisement in the WIRELESS MAGAZINE.



# What the Reader Thinks

Our readers contribute items of interest to every listener

## Birds on Aerials

To the Editor, "Wireless Magazine."

SIR,—May I differ with "Halyard" in the statement which he makes that only swallows perch on aerials?

On my aerial wire, which is the usual 7/22's, swallows, several sparrows, a blackbird, and last, but not least, a full-grown barn owl, have been seen at frequent intervals.

Other people have seen yellow-hammers and a starling using the aerial. From what I have seen, a good many of the feathered fraternity can make use of a part of this modern invention.—G. B. ROSS (Bewlie Lilliesleaf).

## Mysterious Conversations

SIR,—On reading the letter of H. W. Whiteside in the "W.M." for July it appears to me that the mysterious conversations he is hearing can be explained in this way.

If H. W. Whiteside will find out if anyone living near him possesses a crystal receiver he may find that this is the cause of his trouble. I myself possess a one-valver and have had the same trouble, which was traced to a near-by house.

They have only to connect up their crystal set in the usual way, and everything they say "comes through" to us. There is no connection between the two sets.—R. A. WALKER (Swansea).

SIR,—With reference to Mr. Whiteside's letter in the July number of the WIRELESS MAGAZINE, he may be interested to know that almost every night I can hear distant conversations going on.

I am situated about half a mile from a post office, but my aerial runs almost parallel to two telephone wires, and sometimes I am able to pick up fragments of conversations.—T. SELLAR (Edinburgh).

## Crystal Reception

SIR,—I have logged on a crystal set tuned by a series-parallel variometer, Birmingham (80 miles) and London (30 miles), at good strength. Daventry (85 miles) had to be de-tuned. I have also heard plenty of ships' morse. Birmingham, I might add, is at fair phone strength.—J. HEARN (Luton).

## VALVES FOR LETTERS!

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 an Osram R 5v valve; next month's writers will be sent a Cleartron valve each.

## A Record?

SIR,—While experimenting with a new panel for my crystal set I was surprised to receive Daventry quite clearly without either coil or condenser, the aerial, earth, phones, and crystal all being in parallel!

I obtained the same result by connecting them all direct to the crystal.

This surely constitutes the extreme limit of simplicity in reception?—J. C. WELLS (Northampton).

## IF YOU WANT TO BUY A SET

and know nothing of wireless, let us help you to choose it. With our special experience we are able to advise as to which are the best types of sets for use in any particular circumstances.

Tell us how much, roughly, you wish to spend, where you are situated, what stations you wish to receive (whether only the local station or others as well), whether you intend to use headphones or a loud-speaker, and we will advise you as to the general lines of sets that will answer your purpose.

Send your enquiry with coupon (page iii of cover) and stamped addressed envelope to "Buyers' Advice Bureau," WIRELESS MAGAZINE, La Belle Sauvage, London, E.C.A.

## From a Bird Sanctuary

SIR,—Among the many interesting stunt broadcasts that the B.B.C. has given us, the most popular seems to be the song of the Surrey nightingale. If listeners are so pleased with a bird solo, presumably they would be even better pleased with a bird chorus, such as might be heard if the B.B.C. could place a microphone in a bird sanctuary.

Some expert ornithologist might be persuaded to listen to the transmission and play the part of announcer to this bird concert, telling listeners the name of each bird "artist" as he heard its song or call note. (His remarks, of course, would have to be made into a separate microphone and superimposed on the outside transmission.)

At all events, there would be much less uncertainty about broadcasting the sounds in a bird sanctuary than in trying to transmit the vocal efforts of a single bird such as the nightingale.—W. OLIVER (Wandsworth).

## Noisy Motor Cars!

SIR,—I have been very puzzled lately by curious noises which can be heard in the phones now and then when I switch on the valves. They resemble a working drill, and sometimes they are quite loud and sometimes very faint. The sounds can still be heard when the aerial coil is taken out, and also on any reading of the condenser—they refuse to be cut out; but there's one consolation, they are not frequent.

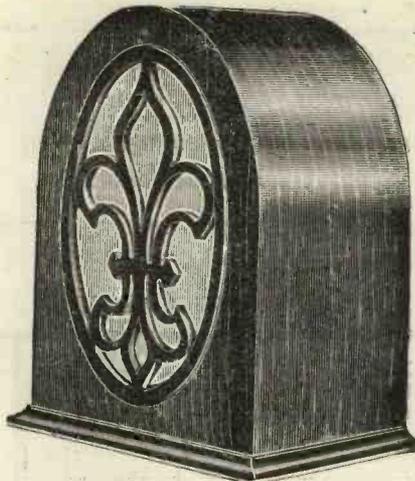
One day I heard the noise fairly loudly in the phones; it was accompanied by a sound I had not noticed before, the toot-toot of a motor-car horn, and on glancing out of the window I saw that a car had just passed by.

I had at last found the solution—the driver of the car, on pressing the electric horn, closed the circuit, thus producing weak electric waves, which were very damp. My aerial on picking them up passed them to earth via my set.—W. H. EDMUNDS (Seven Kings).

H. Whiteside, jun., of P.O. Barkway, Hertfordshire, offers Nos. 2-18 of the WIRELESS MAGAZINE to the first reader sending 1s. 9d. to cover postage.

Two double-sided morse gramophone records will be given by B. Dunn, of Lilystone Hall, Stock, Essex, to any reader who will defray the cost of postage.

## A REMARKABLE CONE SPEAKER



### THE BRANDES "ELLIPTICONE"

(Trade Mark)

The new Brandes Cone is of beautiful and distinctive design. The sound passage is effectively concealed in a handsome case finely finished in dark walnut. The large vibrating area of the cone, together with a driving unit of special design, bring pleasing and natural tone with plenty of power, the wonderful depth and quality of which is hard to realize until actually heard. The magnets in the cone unit are very large. There is no diaphragm but a small armature which, reacting to the faintest impulse, faithfully reproduces extremely low and high tones. This armature is actuated on the "push-pull" principle which makes for greater quality and volume. Height 13 $\frac{1}{4}$ , depth 7 $\frac{1}{4}$ , width 10 $\frac{1}{2}$ .

£5 10 0

#### OTHER NEW PRODUCTS

*particulars of which will be announced shortly :*

The Table Cone - - - (a new cone)

The Brandeset II. - - (2-valve set)

The Brandeset III. - - (3-valve set)

#### OUR PRESENT SUCCESSES

*with one price reduction :*

The Brandola - - - (reduced to 75/-)

The Table-Talker 30/-, Telephones 20/-

Audio Transformer (1st & 2nd stage) 17/6

*From any reputable Dealer.*

# Brandes

BRANDES LIMITED, 296, REGENT STREET, W.1.

# THE WORLD'S BROADCASTING

A Guide to the Principal European and American Stations.

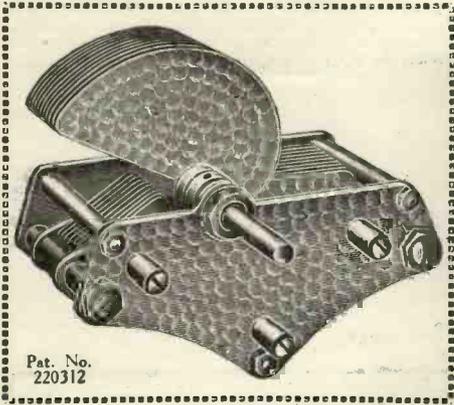
## The New Wavelengths.

When consulting this list of broadcasting stations—which has been specially prepared by the WIRELESS MAGAZINE from authoritative information—it should be noted that the new wavelengths do not come into use until September 15. Until that date, therefore, the old wavelengths that are given in the last column should be followed.

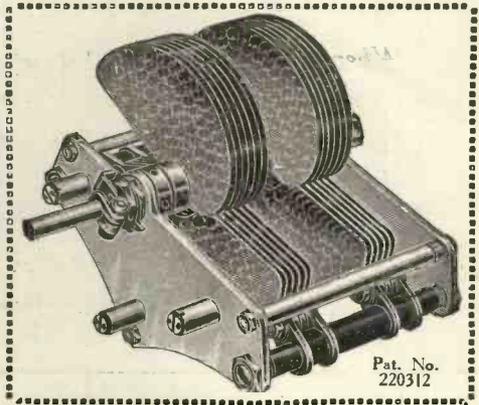
Kovno (given as 219 metres) may work on 344.8 metres; Leningrad (given as 223.9 and 940 metres) may work only on 434.8 metres; and Helsingfors (given as 240 metres) may work on 375 metres.

New Wave-length in Metres.	Station.	Call Sign.	Old Wave-length in Metres.	New Wave-length in Metres.	Station.	Call Sign.	Old Wave-length in Metres.	New Wave-length in Metres.	Station.	Call Sign.	Old Wave-length in Metres.
201.3	Karlsrona ...	SMSM	196		Carthagen	—	330	416.7	Stockholm ...	SASA	428
204.1	Gefle .....	—	208		Jyvaskyla ...	—	301.5	422.6	Rome .....	IRO	425
211.9	Kiev .....	—	281.9		Leeds .....	2LS	321.5	428.6	Hamburg .....	—	392.5
217.4	Luxemburg ...	LOAA	1,200	303	Münster .....	—	410	434.8	Bilbao .....	EAJ9	415
219	Kovno .....	—	—	306.1	Bournemouth ...	6BM	386	441.2	Brunn .....	OKB	521
222.2	Strasbourg ...	—	205	309.3	Marseilles ...	PTT	351	447.8	Paris .....	FPTT	458
223.9	Leningrad ...	—	940	312.5	Newcastle-on-Tyne	5NO	404	454.3	New York ...	WJZ	—
225.6	Belgrade .....	HFF	1,650		Milan .....	—	320	454.5	Boden .....	SASE	1,200
229	Malmö .....	SASC	270	315.8	Dublin .....	2RN	397	461.5	Bergen .....	—	357
238.1	Bordeaux ...	PTT	411	319.1	Mount Prospect	WJAZ	—	468.8	Elberfeld ...	—	259
240	Helsingfors ...	—	318	322.4	Leipzig .....	—	452	476.2	Lyons .....	PTT	480
241.9	Königsberg ...	—	462	322.6	Belfast .....	2BE	440	483.9	Berlin .....	—	504
245.9	Toulouse ...	PTT	260	326.1	Nuremberg ...	—	340	491.5	New York ...	WEAF	—
250	Gleititz .....	—	251	329.7	Springfield ...	WBZ	—	491.8	Aberdeen ...	2BD	496
252.1	Stettin .....	—	241	331.3	Reykjavik ...	—	327	500	Birmingham	5IT	479
254.2	Montpellier ...	—	238	333.3	Copenhagen ...	—	347.5	508.5	Zurich .....	—	513
254.2	Kiel .....	—	234.5	337	Paris .....	Petit Parisien	333	517.2	Helsingfors ...	—	522
260.9	Gothenburg ...	SASB	290	340.9	Seville .....	EAJ5	357	526.3	Antwerp .....	—	265
265.5	Brussels .....	—	486		Prague .....	—	368	535.7	Vienna .....	—	582.5
272.7	Norrköping ...	SMVV	260	344.8	Cardiff .....	5WA	353	545.6	Riga .....	—	480
275.2	San Sebastian	EAJ8	343	348.9	Breslau .....	—	418	555.6	Munich .....	—	485
275.2	Cassel .....	—	273	353	Oakland .....	KGO	—	566	Sundsvall ...	SASD	545
275.2	Zagreb .....	—	350	357.1	London .....	2LO	363.5	577	Buda Pesth ...	—	560
275.2	Madrid (F) ...	EAJ4	340	361.2	Graz .....	—	402	588.2	Orebro .....	—	237
277.8	Angers .....	—	275	361.4	Oslo .....	—	382	720	Berlin .....	—	571
277.8	Seville .....	EAJ17	300	365.8	Madrid .....	EAJ7	373	760	Madrid .....	EAJ6	392
277.8	Barcelona ...	EAJ13	462	370.4	Schenectady ..	WGY	—	810	Linköping ...	—	467
277.8	Caen .....	—	332	375	Troy .....	WHAZ	—	850	Vienna .....	—	531
280.4	Barcelona ...	EAJ1	324	379.5	Stuttgart .....	—	446	940	Ostersund ...	—	720
283	Dortmund ...	—	283		Manchester ...	2ZY	378	1,000	Geneva .....	HB1	760
285.7	Reval .....	—	350	379.7	Radio Toulouse	—	430	1,060	Odense .....	—	810
288.5	Edinburgh ...	2EH	324.5	384.6	Frankfort-on-Main	—	470	1,150	Lausanne ...	HB2	850
288.5	Hull .....	6KH	335.5	389.6	Bremen .....	—	279	1,300	Leningrad ...	—	—
288.5	Plymouth ...	5PY	338	394.7	Aalesund ...	—	279	1,350	Basle .....	—	1,000
288.5	Nottingham ...	5NG	323.5		Koszice .....	—	2,020	1,450	Moscow .....	Popoff	1,010
288.5	Sheffield ...	6FL	301	400	Warsaw .....	—	480	1,600	Hilversum ...	HDO	1,060
288.5	Stoke-on-Trent	6ST	306		Falun .....	SMZK	370	1,750	Ryvang .....	—	1,150
288.5	Liverpool ...	6LV	318		Cadiz .....	EAJ3	355	1,800	Sorö .....	—	1,150
288.5	Swansea ...	5SX	482		Mont de Marsan	—	390	1,800	Berlin .....	LP	1,300
288.5	Dundee .....	2DE	330.5		Newark .....	WOR	—	2,125	Karlsborg ...	SAJ	1,350
291.3	Lyons .....	Radio	280		New York ...	WJY	—	2,650	Moscow ...	RDW	1,450
294.1	Liege .....	—	280		Glasgow .....	5SC	422	—	Daventry ...	5XX	1,600
294.1	Bilbao .....	EAJ11	418		Berne .....	—	435	—	Paris .....	SFR	1,750
294.1	Trollaattan ...	SMXQ	345	405.2	Minneapolis ...	WCCO	—	—	Norddeich ...	KAV	1,800
294.1	Bradford ...	2LS	310						Amsterdam ...	PCFF	2,125
294.1	Dresden ...	—	294	405.4					Paris .....	FL	2,650
297	Agen .....	—	318	411							
297	Hanover .....	—	297	416.4							

# IGRANIC VARIABLE CONDENSERS MEET EVERY NEED.



Whenever you require variable condensers select them from the Igranic range. Igranic Variable Condensers are used so often in receivers described in the leading radio journals that they have earned the reputation of being "the choice of experts."



**IGRANIC VARIABLE CONDENSER. LOW LOSS—SQUARE LAW.**

The outstanding features of Igranic Variable Condensers are: extremely low losses, accurate square law characteristic, positive electrical connection to moving plates, combined ball and friction thrust bearings, aluminium end plates, accurate rating capacities with extremely low minimum, best possible workmanship.

Prices (as illustrated): '00015 mfd., 17/-, '0003 mfd., 18/6. '0005 mfd., 21/6. '001 mfd., 25/-.

**IGRANIC DUAL VARIABLE CONDENSER. LOW LOSS—SQUARE LAW.**

Similar in general design to the single pattern. Particularly suitable for tuning two oscillatory circuits simultaneously, as in the "ELSTREE 6," for use in which the Igranic Dual Condenser is approved by Radio Press Laboratories, Elstree. The two sections are closely matched.

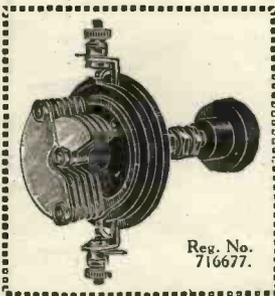
(These condensers and the single pattern are supplied without knob and dial so that the purchaser may fit the type best suited to his requirements. For complete range of knobs and dials, see the Igranic Catalogue.)

Prices (as illustrated): '0003 mfd. (each section), 22/6 '0005 mfd. " " 27/-

## THE IGRANIC-PACENT STRAIGHT LINE FREQUENCY CONDENSERS.

High-grade condensers having extremely low losses and accurate straight line frequency characteristic.

Prices: '00035 mfd., 14/6. '0005 mfd., 18/6.



**IGRANIC MICRO CONDENSER.**

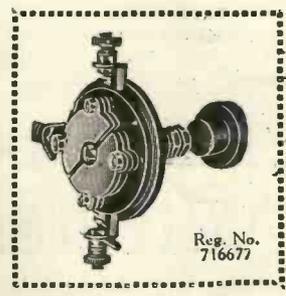
A miniature variable condenser having stout brass plates protected by a moulded cover. Hand capacity effects rendered negligible by adequate spacing between vanes and control knob. Maximum capacity '00004 mfd.; extremely small minimum. Single hole fixing.

Price (as illustrated) 5/6

**IGRANIC VERNIER BALANCING CONDENSER.**

Suitable for balancing out slight differences of capacity in two oscillatory circuits tuned by a Dual Condenser. Similar in general design to the Igranic Micro Condenser. Moulded cover protects plates. Single hole fixing.

Price (as illustrated) 5/6.



**SEE OUR ENTIRE RANGE OF COMPONENTS AT OLYMPIA EXHIBITION, SEPTEMBER 4th to 18th, STANDS Nos. 72 and 73.**

HAVE YOU HAD YOUR COPY OF THE NEW IGRANIC CATALOGUE?



SEND FOR LIST No. J89.

149, Queen Victoria St., LONDON.

Works: BEDFORD.

In writing to advertisers, please say you saw the advertisement in the WIRELESS MAGAZINE.

## Build the "FIRESIDE FOUR,"

Designed by Mr. E. Redpath,  
and described in this issue.

	£	s.	d.
1 Ebonite Panel, 7in. X 6in. X ½ in.	0	2	5
1 Cabinet with baseboard	1	10	0
1 Burne-Jones 5-way Terminal Panel	0	2	6
1 " " 2-way	0	1	0
2 " " Panel Brackets	0	1	6
1 Peto-Scott Var. S.L.F. Condenser '0005	0	15	0
1 Polar Junior Condenser	0	6	6
1 Concert Grand L.F. Transformer	1	5	0
1 Second Stage L.F. Transformer	1	1	0
4 Burne-Jones Vibro Valve Holders	1	0	0
1 Burne-Jones Anti-Capacity Valve Holder	0	1	6
4 Amperites	1	0	0
2 T.C.C. Condensers 0.2 mfd.	0	5	4
2 T.C.C. " 0.002 mfd.	0	4	8
1 T.C.C. Condenser 0.001 mfd.	0	2	4
1 Dubilier '0003 Condenser and Grid Lcak, 2 meg.	0	5	0
1 Aperiodic H.F. Transformer	0	10	0
1 6 Point Jack with filament change over	0	4	0
1 4 Point Jack with filament contact	0	3	9
1 Plug to suit Jack	0	1	6
1 Battery, 4½ volts	0	0	6
1 Redpath Aerial Tuning Unit B.B.C.	0	10	0
1 Redpath " " Daventry	0	12	6
1 Base for above	0	2	6
1 Glazite	0	1	6
	£10	10	0

The above Set can be supplied Wired and Tested at £13 0 0  
Plus Royalties £2 10 0

Any of the above parts supplied separately as desired. Carriage and Packing free on orders value £2 and over.

We specialize in Components for all sets and apparatus described in "Wireless Magazine" and allied publications. Lists on application.

Note New Address:—

**OMNORA LTD.,**  
Wireless Specialists,  
258, New Cross Road, London, S.E.14.  
Telephone, New Cross 1273.

**REQUIRED.** Capable, trustworthy men with spare time who wish to substantially increase income where we are not fully represented. Applicants must have practical knowledge of installation of Set and Aerial, be Householders or live with parents, and be able to give references; state age and experience. Address Dept. 29, General Radio Company Limited, Radio House, Regent Street, London, W.1

## Talks about Wireless

by  
SIR OLIVER LODGE

"A book simply written and popularly presented by one of the foremost minds of the day; both beginners and advanced students all the world over will eagerly peruse this book."—*Daily Graphic*.

Illustrated, Cloth, 5s. net.

Cassell's London



In writing to advertisers, please say you saw the advertisement in the WIRELESS MAGAZINE.

## THE INTERNATIONAL SET COMPETITION

BY the time this issue of the WIRELESS MAGAZINE is in the reader's hands the nineteen sets selected from the British Elimination Competition for international competition at the Third Radio World's Fair, New Madison Square Garden, New York (September 13 to 18), will have been despatched to the United States.

The judges' task in selecting the chosen sets was no easy one. Of course, there were the inevitable half-dozen or so that had to go—and there were also the half-dozen or so that really could not go. Between the two extremes were a large number of sets that needed very careful consideration.

In the end the judges (the Editor of the WIRELESS MAGAZINE; the "W.M." Technical Adviser, Dr. Sydney Brydon, D.Sc., M.I.E.E.; and the "W.M." Technical Staff) decided that nineteen sets should be sent for competition in America. The successful competitors are:—

J. L. Blanks,

104, Humberstone Road,  
Plaistow.

H. P. Booker,

16, Newcombe Road,  
St. James,  
Northampton.

H. Budd,

102, St. John's Park,  
Blackheath, S.E.3.

E. Collins,

27½, Wellclose Square, E.1.

W. Dorling,

70, Finlay Street,  
Fulham, S.W.6.

E. Emmons,

The Copse,  
Hamble,  
Southampton.

W. H. Farley,

56, Lillian Road,  
Barnes, S.W.13.

F. Fisher,

67, Edenbridge Road,  
Bush Hill Park, N.

W. Fricker,

7, Red Rice Estate,  
Nr. Andover.

F. Fry,

293, Wandsworth Road, S.W.8.

S. Green,

157, Wigan Road,  
Westhoughton,  
Nr. Bolton,  
Lancs.

S. R. Heath,

Bracknell,  
Bristol Road,  
Sherborne.

J. E. Llewellyn,

Elmsfield,  
Baldock Road,  
Letchworth.

K. Loweth,

51, Bedford Road,  
Clapham, S.W.4.

G. P. Searle,

Bella Vista,  
King's Road,  
Paignton.

G. Todd,

New Pavement,  
Pocklington,  
E. Yorks.

H. Warren,

Slades,  
St. Austell,  
Cornwall.

H. Wilkinson,

5, Morris Grove,  
Kirkstall,  
Nr. Leeds.

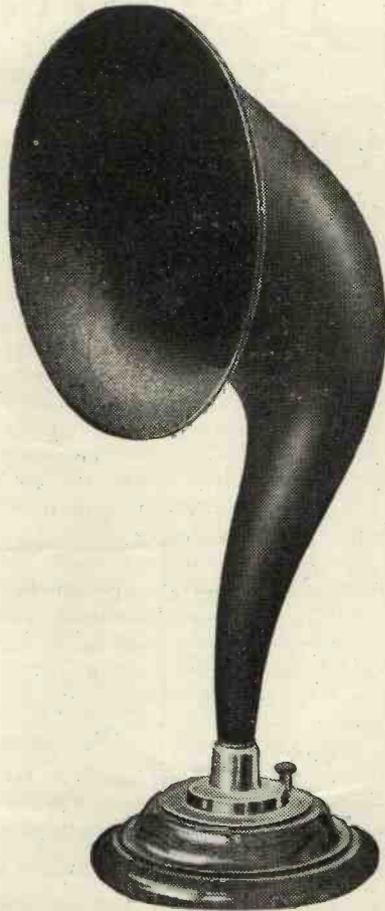
R. Stuart Wortley, Junr.,

Highcroft,  
Claverdon,  
Warwick.

The sets made by these competitors will compete at the New York show with American and possibly other European amateur-built receivers. Afterwards they will be exhibited at the fifth Annual Chicago Radio Show in the Coliseum, Chicago (October 11 to 17).

In due course each of the above-mentioned competitors will receive from the WIRELESS MAGAZINE and *Amateur Wireless* a bronze medal in addition to a certificate from the organisers of the New York exhibition.

Moreover, should one of the nineteen sets sent by us win the international prize (which will probably take the form of a cup), we shall award the competitor a specially-struck gold medal.



## A SUBSTANTIAL BRANDES PRICE REDUCTION

*The Brandola now seventy-five shillings!*

With the addition of many new instruments to the Brandes range, including two Cabinet Cone Speakers, it is found possible substantially to reduce the price of the Brandola horn-type speaker. Still one of the most efficient and perfectly-developed examples among the Brandes loud speakers, it represents high-class workmanship at moderate cost. A large diaphragm gives new rounded fullness to the lower tones and new clarified lightness to the high, with luxuriant depth to both. Superbly designed and finished. Height 26", neutral brown finish, walnut plinth with nickel-plated fittings. Thumbscrew adjustment to diaphragm.

**75/-**

*From any reputable Dealer.*

# Brandes

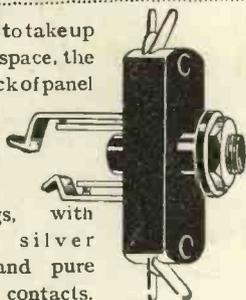
BRANDES LIMITED, 296, REGENT STREET, W.1.  
WORKS: SLOUGH.

Stand 84. Olympia Radio Exhibition

The name 'LOTUS' is your guarantee of sound results and solid satisfaction.

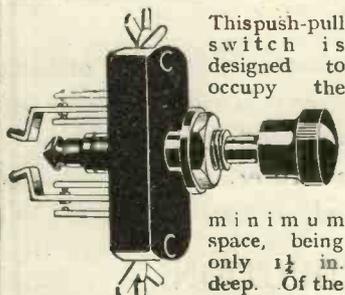
**The 'LOTUS' JACK**

Designed to take up the least space, the depth back of panel being 1½ in. Made from best Bakelite mouldings, with nickel silver springs and pure silver contacts. One-hole fixing. Soldering contacts can be brought into any position.



Prices  
No. 3, as illustrated 2/6  
others from 2/- to 3/-

**The 'LOTUS' Jack Switches**

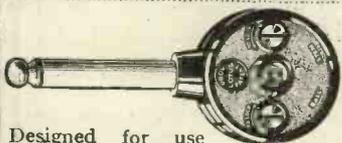


This push-pull switch is designed to occupy the

minimum space, being only 1½ in. deep. Of the finest Bakelite, it has nickel silver springs and contacts of pure silver. can be made

Prices  
No. 9, as illustrated 4/-  
others from 2/9  
Soldering contacts to suit any wiring.

**The 'LOTUS' JACK PLUG**



Designed for use with Lotus Jacks. Made from best Bakelite mouldings and nickel plated brass. To fix, the wires are placed in slots and gripped in position by a turn of the screw cams.

Made by the makers of the famed 'LOTUS' Vernier Coil Holders and 'LOTUS' Buoyancy Valve Holders

Garnett, Whiteley & Co., Ltd.,  
LOTUS Works,  
Broadgreen Road, Liverpool

Price  
2/-

**DOMINION WIRELESS**

ASKED to place in order of popularity thirty-one types of broadcast matter, the readers of an Australian newspaper voted as follows:—

Religious services, band music, public concerts, popular orchestral items, old-time programmes, popular instrumental items, news, classical instrumental items, classical orchestral items, Children's Hour, educational talks, sacred vocal items, short plays and sketches, organ recitals, humorous recitations, musical-comedy items, operatic items, humorous vocal items, ballads, classical vocal items, talks on books, topical talks, dramatic theatrical items, dramatic recitations, vaudeville theatrical items, dance music, talks on hobbies, household hints, sporting results, athletic talks, and fashion talks.

Some confusion of thought seems to exist over the arrangement of Australian call signs, but the system is really quite simple. The continent is divided into six territories, and each territory has a different prefix number, thus:—

- New South Wales ..... 2
- Victoria ..... 3
- Queensland ..... 4
- South Australia ..... 5
- West Australia ..... 6
- Tasmania ..... 7

At the present time there are twenty-one broadcasting stations operating in Australia. They are distributed in the territories as follows:—

- New South Wales.
- 2BL Sydney \* ..... 353 m.
  - 2FC Sydney \* ..... 1,100 m.
  - 2HD Newcastle ..... 288 m.
  - 2UE Randurck .... 297 m.
  - 2BE Sydney ..... 326 m.

- 2UW Northbridge ... 263 m.
- 2KY Sydney \* ..... 280 m.

Victoria.

- 3LO Melbourne \* ... 371 m.
- 3AR Melbourne \* ... 484 m.
- 3WR Melbourne ... 303 m.
- 3EO Mildura ..... 286 m.
- 3UZ Melbourne ... 319 m.

Queensland.

- 4QG Brisbane \* ... 385 m.
- 4MB Brisbane ..... 337 m.
- 4RN Rockhampton . 323 m.
- 4CM Brisbane ..... 278 m.

- 4GR Toowoomba 294 m.

South Australia.

- 5CL Adelaide \* 395 m.
- 5DN Parkside \* 313 m.

Western Australia.

- 6WF Perth \* 1,250 m.

Tasmania.

- 7ZL Hobart \* 417 m.

(The principal stations are marked thus:—\*)

Relays from theatres are either

more popular or more easily arranged in Australia than they are in England. Between January 1 and April 20 no less than sixteen relays were made from theatres by Australian broadcasting stations. A record number, surely?

We who live in England and have a multitude of European broadcasting stations literally at our finger-tips (we can get them by the mere turn of a dial) find it difficult to realise what a boon even one broadcast programme is to a resident in a lonely colony.

A correspondent writes enthusiastically from Pietermaritzburg (Natal) to say that he can receive Johannesburg, Cape Town and Durban. He has heard WGY and KDKA relayed from the last station. BM/PRESS.

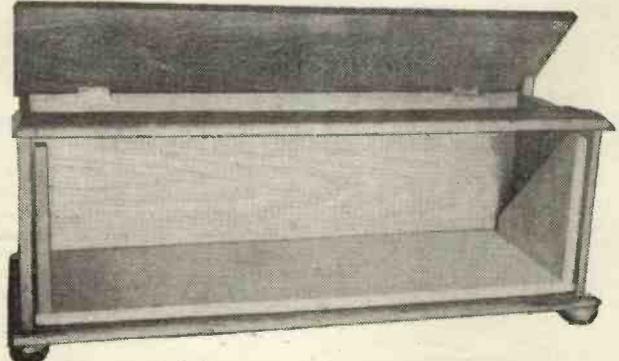
You don't know to where that connection should go or why your set works well one day and badly the next? Well, why worry? We keep a staff specially to solve such problems as yours. Let them have your queries. Replies to queries of general interest are published each month but every querist is answered direct by post. Please observe the following conditions: Ask one question at a time; write on one side of the paper only; attach to your query the coupon on cover iii, and send it with a stamped addressed reply envelope to: The Editor, WIRELESS MAGAZINE, La Belle Sauvage, E.C.A.

In writing to advertisers, please say you saw the advertisement in the WIRELESS MAGAZINE.

# CAXTON 4-VALVE CABINET

Made for Sets, "As good as money can buy,"  
 "Harmony Four Receiver," "The Melody Three"

Special Cabinets made to Customer's measurements. Prices quoted.



- Cash with Order. Fumed Oak ... £1 5 0
  - Dark or Jacobean Oak ... £1 10 0
  - Real Mahogany ... £1 14 0
- Detachable 7" deep Base Board to mount 21" by 7" panel to slide out of Cabinet front.  
 Also supplied at 10/- extra with two beaded front doors placed 2 ins. in front of the enclosed panel.

**Ebonite or Radion Panels** Supplied and perfectly Fitted at low extra cost.  
 All Polished with the new enamel that gives a glass hard surface that cannot be soiled or scratched. **SENT FREE.**—Catalogue of standard Wireless Cabinets in various sizes and woods.  
*Packed and delivered free in U.K. No. C3*

**CAXTON WOOD TURNERY CO., Market Harborough**

=====

A NEW "AMATEUR MECHANIC" HANDBOOK.

## Electrical Toys and Tricks

By A. FREDERICK COLLINS

A WONDERFUL book to place in the hands of any youth whose bent is in the direction of electricity, particularly as applied to toys, tricks, and experiments of an entertaining kind. The chapters deal with experiments in static electricity; wireless toys and experiments; tricks in electro-magnetism; the telephone and telegraph; magnetic toys; microphones, and a wide variety of electrical toys. *Profusely illustrated.* **2/- net.**

CASELL'S, LONDON, E. C. 4.

=====



Ask your Dealer for the



### BECOL FORMER

**THE FORMER OF THE FUTURE**  
 LOW LOSS. Size 3" diameter to outside of wings. Made from the famous BECOL EBONITE. Specially designed for low loss. Large air space between wings. Easy winding. Thoroughly dependable and British made. From all dealers, in 6-inch lengths ... **3/-**

**THE BRITISH EBONITE CO., LTD., Hanwell, London, W.7.**  
 RODS, TUBES, SHEETS, PANELS, MOULDINGS, ETC.



One of the most interesting features of the great Radio Exhibition, which opens at Olympia on September the 4th, will be, without doubt, the reproduction of the 2 LO Studio. During the run of the Exhibition broadcasting will be done by the B.B.C. from this studio, so that you may actually see your favourite artists before the microphone.

For the first time in the history of British Radio it has been possible to arrange an exhibition that will be *complete*. No British manufacturer of standing but will be represented, so that within the New Hall, Olympia, will be found everything that is worth while in Radio.

All lovers of wireless should set aside at least one day for a visit. Each exhibit will have something of interest for them—something new, distinctive or novel. The great strike demonstrated the fact quite plainly that wireless—simplified as it is—is still the eighth wonder of the world. You cannot afford to be absent from its first really complete manifestation.

THE NATIONAL

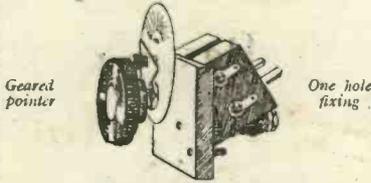
# RADIO EXHIBITION

NEW HALL OLYMPIA

10.30 A.M. TO 10 P.M.  
 ADMISSION INCLUSIVE 1/6

In writing to advertisers, please say you saw the advertisement in the WIRELESS MAGAZINE.

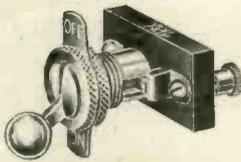
## - a coil holder that does more



IT will do more than hold coils; it will give you perfect control of your coil adjustments, and a visible indication in front of the panel of the exact movement. Patent app. for. 5/6

**TRIX**

Lever pattern switch is one hole fixing, and it has an on-off indicating plate. No. 264. 1/6. Also push-pull switches, one two, and five way.



Manufactured by ERIC J. LEVER, 33, Clerkenwell Green, London, E.C.1, and Branches.

**TRIX**

### THE WET H.T. BATTERY

All British Made Leclanche Cells.  
 Glass Cells, 2 1/2 x 1 1/2 round or square..... 1/- per doz.  
 " " 2 1/2 x 1 1/2 round only..... 1/9 " "  
 " " 2 1/2 x 1 1/2 waxed to prevent creep 1/3 " "  
 " " 2 1/2 x 1 1/2 " " " " " " 2/1 " "  
 Special Zincs for large size jars..... 1/- " "  
 " " " " " " " " " " " " 1/6 " "  
 Sizes..... 1/3 " "  
 Packing and Carriage Extra. Instructions for making sent free on receipt of stamped envelope.  
**THE ETON GLASS BATTERY COMPANY,**  
 46, St. Mary's Road, Leyton, E.10.

### BUILD YOUR OWN LOUDSPEAKER

With the LISSEOLA, BROWN A, or an adjustable Earpiece, and our perfectly made highly finished Specialties, you can easily construct a handsome Hornless Paper diaphragm-type Loudspeaker, or any other approved type. You will obtain volume with unsurpassed tonal quality.

Prices, Particulars and Diagrams for stamp.  
**GOODMAN'S, 27, Farringdon St., E.C.4.**  
 Also obtainable from Spencers Stores, 4/5, Macon Ave., E.O.2.

## The Story of Broadcasting

by A. R. BURROWS

Cassell's

3/6 net.

If you can't sell it elsewhere, sell it through  
**THE BAZAAR**

Link House, 54, Fetter Lane, London, E.C.4.

## More Questions Simply Answered (Continued from page 172)

### Crystals Requiring Added Potentials

**Q.**—What crystals or crystal combinations require an added potential for efficient rectification?—F. H. (Manchester).

**A.**—Carborundum used with a steel-point contact, tellurium and zincite, silicon and carborundum and silicon used with a steel-point contact. The amount of applied potential varies considerably, so that the best voltage for the different combinations should be found by experiment.—T. M. B.

### Use of a Milliammeter

**Q.**—I have often seen receivers in which various measuring instruments have been incorporated, for instance, a milliammeter, but I do not fully understand the use for such an instrument, and in what part of the circuit it should be connected. Can you please assist me?—H. G. (Putney).

**A.**—The general use of a milliammeter in any valve receiver is to denote when distortion is taking place in the L.F. amplifier. For this purpose the milliammeter may be connected in the plate circuit of the last valve, and provided that the needle remains practically stationary when telephony is being received no distortion will occur. Should the needle flicker to either one side or the other, then it denotes that distortion is present.

Many amateurs use a milliammeter to determine the total current output from their H.T. battery, and for this purpose the milliammeter should be connected between the negative H.T. terminal and the L.T. supply. In this position it will register the total H.T. current consumed by the valves.—P. S. M.

### Applying Potentials to Crystals

**Q.**—I understand that by applying a certain potential to a crystal greater signal strength is obtained. Is this actually the case, and by what means is the potential added?—F. H. (Manchester).

**A.**—The application of an extra potential to a crystal does not make for louder signals, but merely causes the crystal to rectify more efficiently. Such potentials are only added to certain types of crystal, such as carborundum, etc. These crystals will not rectify correctly without this applied potential and therefore it is essential to employ such.

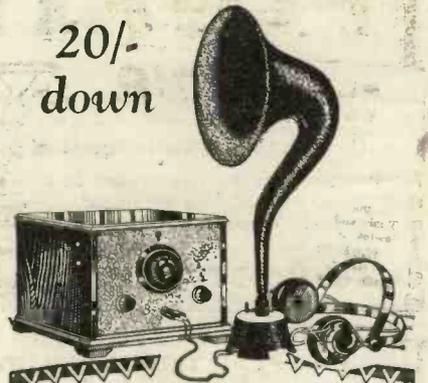
The general method is to use a 3 or 4 1/2-volt dry-cell battery with a 300-ohm potentiometer connected across it. The lead from the crystal detector that would normally join the phones is connected to the sliding contact of the potentiometer, whilst one side of the latter is joined to the phone terminal already disconnected from the detector.—I. A. C.

### Artificial Aerial

**Q.**—What constitutes an artificial aerial as approved by the Postmaster-General for a transmitting permit?—W. E. R. (Portsmouth).

**A.**—An artificial aerial is one that is non-radiating or as nearly non-radiating as possible. A small frame aerial is not assumed to be non-radiating, so that an inductance coil of any other description may be used provided that the maximum area formed by the turns does not exceed three square feet. The entire "aerial" system should possess capacity and resistance in addition to the inductance of the tuning coil. No oscillator should be made to earth the oscillatory system of the transmitter.—J. H. L.

20/- down



## Great New Wireless Offer

Our wonderful 2-valve set with loud speaker and headphones installed free in your own home—anywhere—by our own Installation Engineers for £12 cash; or £1 down and 20/- a month for twelve months only. And we guarantee satisfaction.

There is nothing else to buy—the set is complete with all accessories.

When our Engineers have installed the set just switch on and enjoy perfect and powerful loud-speaker reception. You are also entitled to two free calls from our Engineers after the set is working.

The General Radio set is British made, unsurpassed in efficiency and purity of tone. It has no superfluous controls and is as easy to work as turning on the light.

Send a postcard to-day for free illustrated catalogue No. 54 and full particulars of this offer—also a special additional offer to owners of crystal sets.

**General Radio**  
 GENERAL RADIO CO. LTD  
 RADIO HOUSE  
 235 Regent Street, W1



# The secret of success in soldering- FLUXITE

## FLUXITE 7/6 SOLDERING SET—complete

All Hardware and Ironmongery Stores sell FLUXITE in tins, price 8d., 1/4 and 2/8.

Another use for Fluxite—Hardening Tools and Case Hardening. Ask for leaflet on improved methods.

FLUXITE Ltd.  
(Dept. 392).  
Bolton Works, S.E.16.



## For greater range!

The plates of the "Peerless" RESICON CONDENSERS are shaped to give uniform tuning over the whole scale, in both aerial and anode circuits, and the minimum capacity is so low that you can tune over a greater range with a given inductance than with many condensers having double the stated capacity. It is a precision instrument designed for efficiency, both mechanically and electrically—the electrical loss being exceedingly low. Specially constructed so that no side strains are set up—the alignment of the frames is perfect. The moving plates revolve with perfect freedom and without backlash. For Super Heterodyne receivers the RESICON is ideal. It can be operated so finely that a vernier is almost unnecessary. One  $\frac{1}{16}$ " hole only needed for fitting to panel.



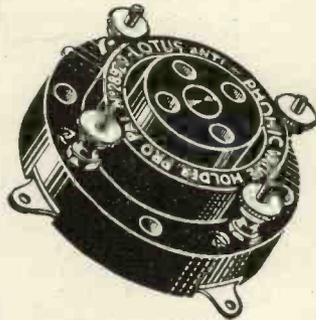
Reg. Trade Mark 457357.

## "Peerless" RESICON Condensers.

Capacity.	Price complete with Dial.	Price complete with Dial and Vernier.
·00025	15/-	17/6
·0003	16/6	19/-
·0005	18/-	20/6

From all dealers or direct

The Bedford Electrical & Radio Co., Ltd.  
22, Campbell Road, Bedford.



It will Pay You to see this Exhibit !

Visit Stand No. 84 at the National Radio Exhibition—see the "Lotus" Valve Holders and learn just how and why they excel in absorbing shock, protecting the valves and eliminating all microphonic noises.

Rigorous tests at the factory ensure that "Lotus" Valve Holders will give entire satisfaction under any conditions. That is why you should insist on them for your set.

Valve sockets and springs locked together by a mechanical process, making a definite and permanent connection. Bakelite mouldings, nickel silver springs and phosphor bronze valve sockets, nickel plated.

2/6 With terminals.

2/3 Without terminals.

# LOTUS

BUOYANCY

## VALVE HOLDER

ANTI-MICROPHONIC

Made by the makers of the famous Lotus Vernier Coil Holder.  
GARNETT WHITELEY & CO., LTD.,  
Lotus Works, Broadgreen Road, LIVERPOOL

In writing to advertisers, please say you saw the advertisement in the WIRELESS MAGAZINE.

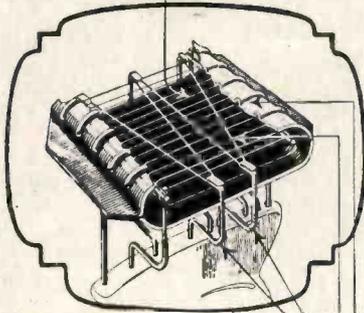
# The "Wireless Magazine" Buyers' Guide

(Numbers in brackets indicate issue in which advertisement appeared.)

Accumulators and Batteries		PAGE	Components (continued)		PAGE	Phones		PAGE
Dubilier Condenser Co., Ltd.	(No. 18) Cover ii		Goodman's	(No. 20) 182	Brandes, Ltd.	(No. 13) 75		
Eton Glass Batteries	(No. 20) 182		Grafton Electric Co.	(No. 17) 518	J. Miller	(No. 15) 304		
General Electric Co., Ltd.	(No. 12) 658		F. Hodgson & Sons	(No. 16) 315	<b>Repairs</b>			
Rotax (Motor Accessories) Ltd.	(No. 12) 663		Igranic Electric Co., Ltd.	(No. 20) 177	J. W. Miller	(No. 17) 518		
Siemens Bros. & Co., Ltd.	(No. 12) 654		Eric J. Lever	(No. 20) 182	<b>Sets (Crystal)</b>			
Tungstone Accumulator Co., Ltd.	(No. 20) Cover ii		Lissen, Ltd.	(No. 17) 516	Belling & Lee, Ltd.	(No. 12) 556		
C. A. Vandervell & Co.	(No. 18) 524		Omnora, Ltd.	(No. 19) 85	Lissen, Ltd.	(No. 16) 393		
<b>Battery Chargers</b>			Peranne & Co., Ltd.	(No. 14) 207	<b>Sets (Valve)</b>			
Philips Lamps, Ltd.	(No. 12) 633		Peto-Scott Co., Ltd.	(No. 13) 3	Belling & Lee, Ltd.	(No. 12) 556		
<b>Books and Publications</b>			Philips Lamps, Ltd.	(No. 12) 633	British L. M. Ericsson Mfg. Co., Ltd.	(No. 14) 106		
Cassell & Co., Ltd.	(No. 19) 90		Rotax (Motor Accessories), Ltd.	(No. 13) 85	Fellows Magneto Co., Ltd.	(No. 15) 299		
Bazaar, Exchange & Mart	(No. 18) 614		Sterling Telephone & Electric Co., Ltd.	(No. 13) 6	De Leeuw & Co., Ltd.	(No. 14) 107		
Foyle's	(No. 14) 200		Ward & Goldstone, Ltd.	(No. 15) 305	Peto-Scott Co., Ltd.	(No. 12) 653		
<b>Cabinets</b>			Wates Bros., Ltd.	(No. 15) 213	Radio Communication Co., Ltd.	(No. 14) 197		
Caxton Wood Turnery Co.	(No. 20) 181		<b>Condensers</b>			Radio Instruments, Ltd.	(No. 12) 657	
Hobbies, Ltd.	(No. 12) 659		Dubilier Condenser Co., Ltd.	(No. 20) 89	A. J. Stevens (1914), Ltd.	(No. 15) 214		
Makerimport Co.	(No. 16) 414		General Electric Co., Ltd.	(No. 13) 95	<b>Soldering Flux</b>			
Pickett Bros.	(No. 12) 648		Igranic Electric Co., Ltd.	(No. 12) 637	Fluxite, Ltd.	(No. 20) 183		
<b>Coils and Coil Holders</b>			Ormond Engineering Co., Ltd.	(No. 16) 145	<b>Terminals</b>			
Athol Engineering Co.	(No. 15) 303		Telegraph Condenser Co., Ltd.	(No. 15) 305	Autoveyors, Ltd.	(No. 13) 3		
Falk, Stadelmann & Co., Ltd.	(No. 12) 661		<b>Crystals and Detectors</b>			Belling & Lee, Ltd.	(No. 20) 91	
Garnett, Whiteley & Co., Ltd.	(No. 20) 91		Eric J. Lever	(No. 12) 66n	J. J. Eastick & Sons	(No. 19) 86		
Igranic Electric Co., Ltd.	(No. 18) 611		Tungstalite, Ltd.	(No. 16) 318	<b>Transformers</b>			
Eric J. Lever	(No. 18) 614		<b>Distant-control Systems</b>			Brandes, Ltd.	(No. 12) 627	
Lindalls, Ltd.	(No. 14) 187		Lissen, Ltd.	(No. 12) 625	British Thomson-Houston Co., Ltd.	(No. 16) 317		
Lissen, Ltd.	(No. 16) 393		Radio Communication Co., Ltd.	(No. 12) 655	Falk, Stadelmann & Co., Ltd.	(No. 12) 661		
London & Provincial Radio Co., Ltd.	(No. 12) 648		<b>Ebonite</b>			Ferranti, Ltd.	(No. 20) 91	
<b>Components</b>			American Hard Rubber Co. (Britain), Ltd.	(No. 16) 318	Igranic Electric Co., Ltd.	(No. 16) 407		
Athol Engineering Co.	(No. 13) 103		British Ebonite Co., Ltd.	(No. 20) 181	Portable Utilities Co., Ltd.	(No. 14) 203		
Autoveyors, Ltd.	(No. 12) 658		Paragon Rubber Manufacturing Co.	(No. 17) 512	Radio Instruments, Ltd.	(No. 15) 291		
Bedford Radio Co.	(No. 20) 183		Trelleborgs Ebonite Works, Ltd.	(No. 19) 85	<b>Valves</b>			
Belling & Lee, Ltd.	(No. 15) 211		<b>Loud-speakers</b>			British Thomson-Houston Co., Ltd.	(No. 18) 523	
A. Black	(No. 15) 304		Brandes, Ltd.	(No. 20) 175	Cleartron Radio, Ltd.	(No. 20) 173		
Brandes, Ltd.	(No. 16) 395		S. G. Brown, Ltd.	(No. 13) 297	A. C. Cossor, Ltd.	(No. 19) 81		
British L. M. Ericsson Mfg. Co., Ltd.	(No. 12) 557		Cleartron Radio, Ltd.	(No. 12) 647	Edison Swan Electric Co., Ltd.	(No. 14) 193		
B.T.H. Co., Ltd.	(No. 17) 421		Fellows Magneto Co., Ltd.	(No. 12) 643	Electron Co., Ltd.	(No. 13) 303		
A. F. Bulgin & Co.	(No. 16) 414		Fuller's United Electric Works, Ltd.	(No. 12) 650	General Electric Co., Ltd.	(No. 17) 409		
Burne-Jones & Co., Ltd.	(No. 19) 3		Alfred Graham & Co.	(No. 20) 89	Kennett's Wireless Stores	(No. 18) 614		
A. H. Clackson, Ltd.	(No. 14) 207		Lissen, Ltd.	(No. 16) 403	Marconiphone Co., Ltd.	(No. 12) 558		
Will Day, Ltd.	(No. 17) 422		Sterling Telephone & Electric Co., Ltd.	(No. 14) 110	Mullard Wireless Service Co., Ltd.	(No. 20) Cover iii		
Dubilier Condenser Co. (1925), Ltd.	(No. 19) 1		<b>Miscellaneous</b>			<b>Wavemeters</b>		
Energo Products, Ltd.	(No. 14) 202		Bennett College	(No. 17) 421	Goodchild & Partners, Ltd.	(No. 12) 661		
Falk, Stadelmann & Co., Ltd.	(No. 13) 3		A. Black	(No. 19) 86				
Fellows Magneto Co., Ltd.	(No. 16) 405		F. Hodgson & Sons	(No. 18) 613				
Garnett, Whiteley & Co., Ltd.	(No. 20) 180		Lustrolux, Ltd.	(No. 19) 3				
General Electric Co., Ltd.	(No. 14) 179		John Player & Son, Ltd.	(No. 20) Cover iv				
General Radio Co., Ltd.	(No. 20) 182							

# LOOK

Grid with two supports



5 resilient filament supports keeping filament in permanent alignment.

Filament two complete loops.

Anode (with two supports) cut away to show filament and grid.

It is the filament that counts and this is what you pay for.

For 4-volt accumulator or 3 dry cells  
 THE P.M.3. (General Purpose) 0.1 amp. 16/6  
 THE P.M.4 (Power) 0.1 amp. 22/6  
 For 6-volt accumulator or 4 dry cells  
 THE P.M.5 (General Purpose) 0.1 amp. 22/6  
 THE P.M.6 (Power) 0.1 amp. 22/6  
 For 2-volt accumulator  
 THE P.M.1 H.F. 0.1 amp. 15/6  
 THE P.M.1 L.F. 0.1 amp. 15/6  
 THE P.M.2 (Power) 0.15 amp. 18/6  
 These prices do not apply in Irish Free State

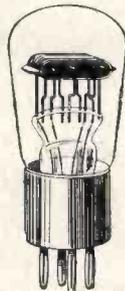


ADVT. THE MULLARD WIRELESS SERVICE CO., LTD., MULLARD HOUSE, DENMARK STREET, LONDON, W.C.2.

at this P.M. Filament and you will understand why P.M. Valves are the best value on the market.

## THESE

seven P.M. advantages reduce your maintenance costs and give you better results.—



- 1 **GREATER EMISSION SERVICE.** P.M. Filaments have up to 5½ times greater emission surface than ordinary filaments ensuring a much wider range of power for economical operation; in fact, these new filaments are so conservatively rated that they give ample results at lower voltages than marked and will stand up to a reasonable overload.
- 2 **LONGER VALVE LIFE.** The special alloy of rare metals that forms the heavy covering of P.M. Filaments is prepared by a patented process that secures a copious flow of electrons and the operating temperature is so low that this precious alloy cannot be discharged, a definite proof of long useful life.
- 3 **UNBREAKABLE FILAMENT.** P.M. Filaments are longer than ordinary filaments, and retain their ductility even after 1,000 hours life, so that it is possible to tie them in a knot. At no time does the low operating temperature cause sag, and these filaments are specially set round the five strong resilient hooks so that they are free from tension and cannot be broken except by the very roughest handling.
- 4 **NO VISIBLE GLOW.** The extreme economy in heat of P.M. Filaments can be judged by the fact that no sign of glow can be discerned during operation.
- 5 **REDUCED CURRENT CONSUMPTION.** P.M. Filaments only require one-tenth ampere filament current, giving up to seven times the life of each accumulator charge, a reduction to one-seventh in your cost of accumulator maintenance.
- 6 **NO MICROPHONIC NOISES.** The unique method of mounting the filament within the field of the grid and anode, so that the filament lies without tension or sag in its correct position, and all the electrons are utilised and controlled, completely eliminates all microphonic noises, leaving an effective background of silence to emphasise faithful reception.
- 7 **MAJESTIC VOLUME.** Every P.M. Valve is a master valve in its own class, designed to give you

Perfect Radio Reception

ASK YOUR DEALER FOR THE VALVES WITH THE P.M. FILAMENT

# Mullard

## THE MASTER VALVE

In writing to advertisers, please say you saw the advertisement in the WIRELESS MAGAZINE.

PLAYER'S MEDIUM NAVY CUT CIGARETTES. With or without Cork Tips.



*“Everybody Calling”*  
FOR

**PLAYER'S**  
**Navy Cut**  
**Tobacco & Cigarettes**

MANUFACTURED ONLY FROM



OLD VIRGINIA TOBACCO

REGD. NO. 154011.