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The Best Shillingsworth in Radio

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A Special Effort

"THE same as last year," sez you, as you unfold our Station Finder, presented free with this issue. Yes, very nearly the same! It is because we have been told so many times that our chart was just what the reader wanted that we decided to revise it thoroughly and issue it again this autumn.

In front of me is a letter from a reader who says that "one could not wish for a better chart" than that presented last autumn. "Please forgive the liberty I take," he continues, "when I suggest that at some further date you will print a revised copy. If a station log as good as this could be purchased, I should have been spared this liberty."

There is no liberty. Nothing is more useful than to get letters of appreciation and criticism from readers.

How rapidly I seem to have approached the big issue of the autumn! It has been a very full year; "radio-activity" has been high, and here we find ourselves at the very entrance of another radio season, with everybody's interest all keyed up, the radio trade never more alive than it is at the moment, and the Editor and Staff of "Wireless Magazine" almost on tenter-hooks in their anxiety to provide their public with what it wants.

It is going to be a great season, and, with the help of our readers, with whom I hope always to keep in close touch, this magazine will continue to maintain its lead as not only the foremost of British radio monthlies, but as the most helpful and the most to be desired from all points of view.

In a sense, we entered the portals of the season last month with our series of "Prosperity" sets—three versions of the same basic circuit adapted respectively for batteries, A.C., and D.C. We give this month advice on short-wave working with these sets.

A novelty in many respects is the Calibrator, which is the fulfilment of a suggestion put forward more than

a year ago in our pages, to the effect that a manufacturer should produce a unit with the coils and condensers already matched up and ganged. When the Calibrator is built, all the operator has to do is to make a slight adjustment to the trimmers to allow for stray circuit capacities; there are no ganging troubles, and the scale is calibrated in wavelengths so that you tune in directly to the station you want.

There is a battery radiogram in this issue of the cheap and simple order, embodying tone control and housed in a most attractive table cabinet of an economical type.

I should like to draw attention to some of our lighter and more general features this month, but you will find them quickly enough for yourself. Our menu has been designed on very broad lines.

A technical feature which I must mention is by P. Wilson, who, writing under the title of "Automatic Volume Control," gives us one of the most important articles that has appeared in our pages for some time.

The other Wilson—Whitaker—is talking very wisely this month about the broadcast play. He loves to discuss the technique of the radio play and air his views and criticisms and now, as I write these words, I must indulge in just a gentle "leg-pull." Whitaker-Wilson himself is an author of a new radio play!

Its subject is Sir Christopher Wren and it is to be broadcast on the National chain, between eight and nine o'clock on Thursday evening, October 20. The play is in nine scenes and tells the story of the building of St. Paul's.

I would rather like readers, many of whom are alternately delighted and enraged by Whitaker-Wilson's outpourings, to act themselves as critics on that evening and send us within six days—that is, not later than Wednesday, October 26—from a hundred to a hundred and fifty words of criticism of the Whitaker-Wilson play. I will give a guinea as a prize to the writer of the effort which "gets there." B. E. J.

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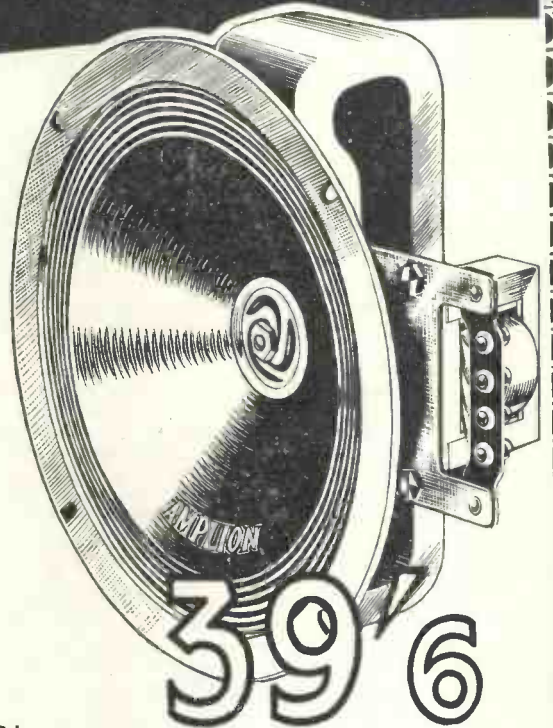
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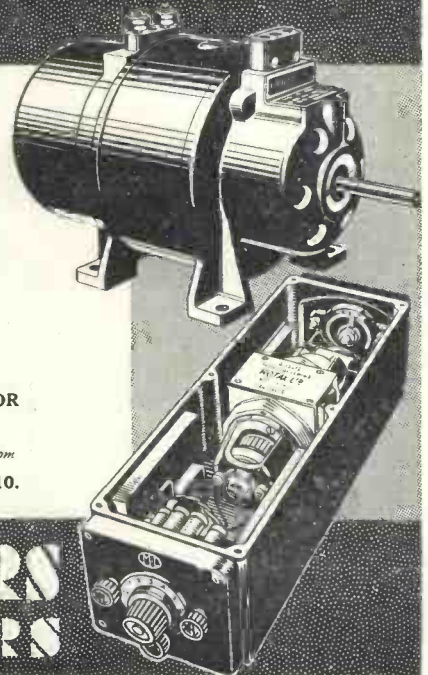
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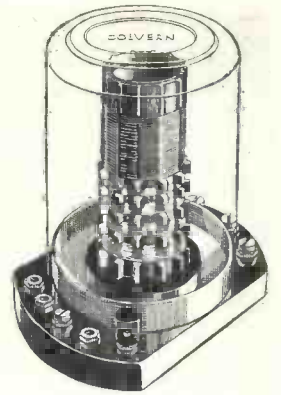
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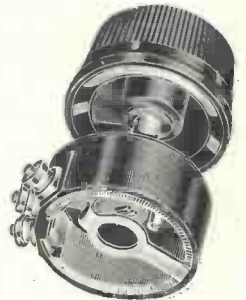
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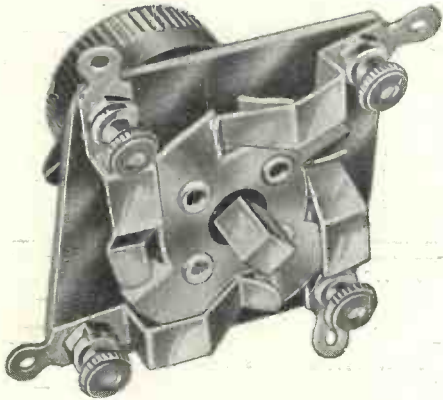


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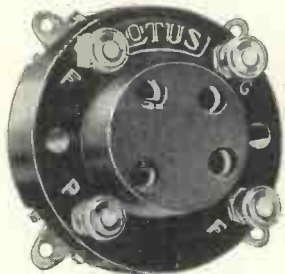
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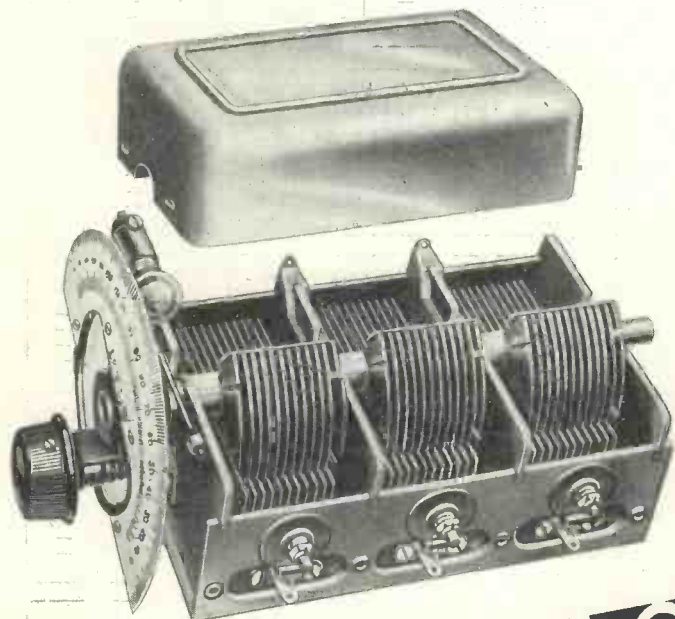
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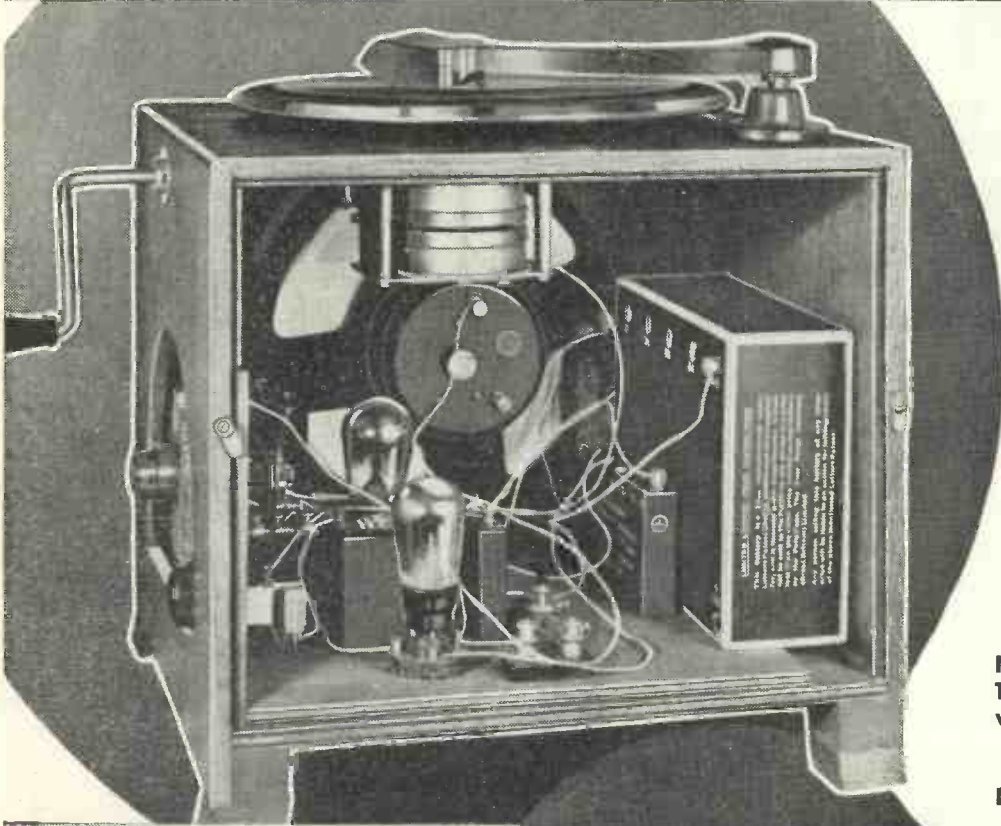
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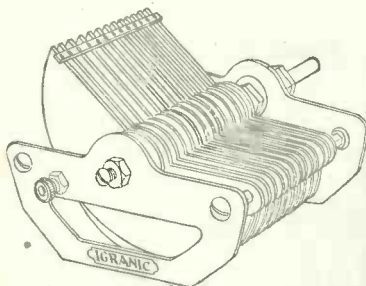
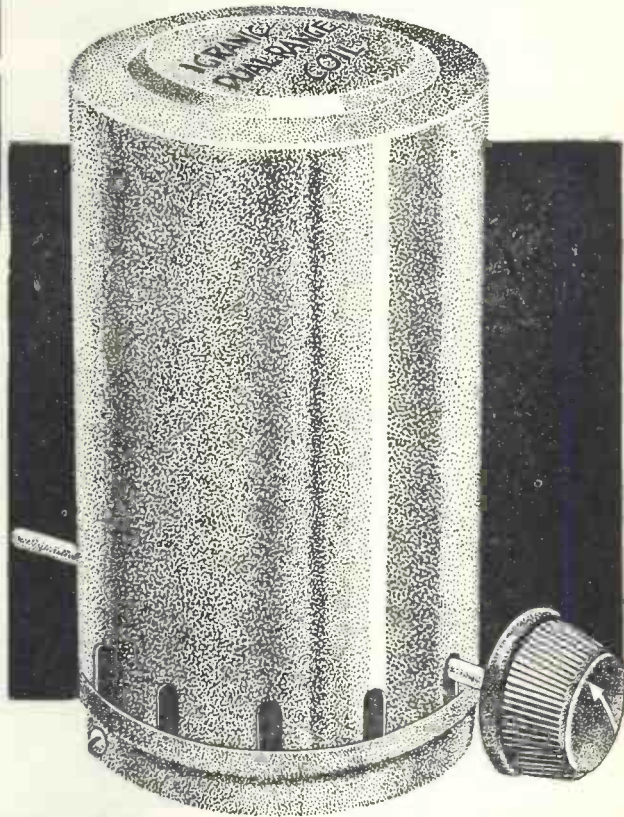
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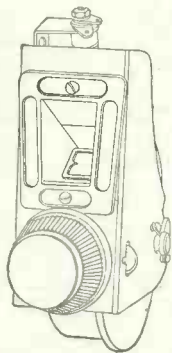
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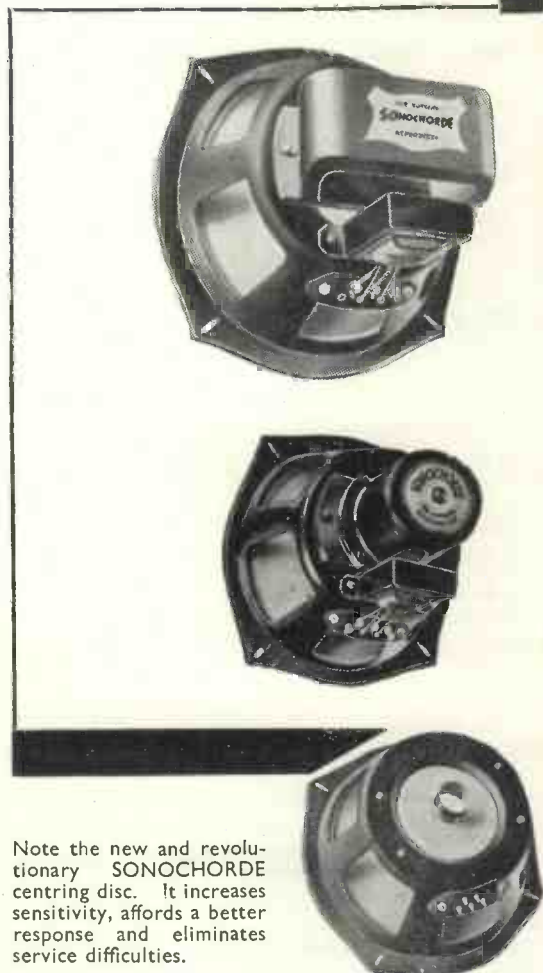
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GUIDE TO THE WORLD'S BROADCASTERS

Specially Compiled for "Wireless Magazine" by JAY COOTE

Metres :		Kilocycles :
13.92	SAXONBURG (W8XK) Pennsylvania, U.S.A.	21,540
19.72		15,210
25.27		11,870
48.86		6,140

Distance from London: Approximately 3,330 miles.
Standard Time: Greenwich Mean Time LESS 5 hours.
Call: "This is W8XK, the Westinghouse Electric short-wave broadcasting station at Saxonburg, calling," or the KDKA call.
 No interval signal, except when relaying N.B.C. programme, in which case similar to WE1 (9.U.)
Standard Transmissions: Relays KDKA, East Pittsburgh and also N.B.C. Blue Network programme from New York, etc.
 G.M.T. daily, 11.30-17.00 (on 13.92 metres); 11.30-22.00 (on 19.72 metres); 20.00-02.00 (on 25.27 metres); 21.00-04.00 (on 48.86 metres).
 The relays from New York are usually carried out at G.M.T. 21.30, 22.45, and at 01.00. Closes down at 04.00 or 04.30 with time signal and good-night greetings.

Metres :		Kilocycles :
14.47	BUENOS AIRES (LSY) Argentine Republic	20,730

Distance from London: Approximately 6,050 miles.
Standard Time: Greenwich Mean Time LESS 4 hours.
Announcer: Man.
Call: "Estacion Radio Nacional or Radio Splendid," according to whichever relay is effected.
Interval Signal: Three oscillating notes.
Standard Transmissions: Daily, G.M.T. 15.00-18.00; 22.00 (Sundays).
 The station is also occasionally used for telephony with Madrid, New York, Rio de Janeiro, etc.

Metres :		Kilocycles :
19.36	JAPAN (J1AA) Japan	15,490
38.07		7,880

Distance from London: Approximately 7,000 miles.
Standard Time: Greenwich Mean Time PLUS 8 hours.
Announcer: Man.
Call: "Here is the Japanese short-wave station at Kemikawoa-Cho-Chiba-Ken," near Tokio.
Standard Transmissions: G.M.T. 10.00-12.00, broadcasts Japanese concerts from JOAK (Tokio) studio. Experimental transmissions are also carried out at irregular times.

Metres :		Kilocycles :
31.58	RIO DE JANEIRO (PRXA) Brazil	9,500

Power : 20 kw.
Distance from London: Approximately 4,975 miles.
Standard Time: Greenwich Mean Time LESS 3 hours.
Announcers: Man and woman.
Call: "This is the Radio Club of Rio de Janeiro," in Portuguese and English. When experimental transmissions are carried out: "Companhia Radio Internacional do Brazil."
Standard Transmissions: G.M.T. 21.30, German concert; 21.15-01.00, Portuguese and English broadcasts.

Metres :		Kilocycles :
265.4	LILLE, P.T.T. France	1,130

Power : 1.3 kw.
Distance from London: Approximately 150 miles.
Standard Time: Greenwich Mean Time (France adopts British Summer Time).
Announcer: Man. French language only used.
Opening Signal: Gramophone record: "Mon p'tit Quinquin."
Call: "Allo! Allo! Ici Radio P.T.T. du Nord à Lille"; between items: "Ici Lille PTT."
Main Daily Programme: G.M.T. 08.00, Esperanto (Sunday); 10.00, gramophone records, 12.00, luncheon hour concert; 20.00, news and main evening entertainment. Occasionally relays Paris (Ecole Supérieure).
 Closes down with usual French good-night greetings followed by "La Marseillaise."

Metres :		Kilocycles :
282.2	LISBON, CT1AA Portugal	1,063

Power : 2 kw.*
Distance from London: Approximately 975 miles.
Standard Time: Greenwich Mean Time.
Announcer: Man.
Call: "Estacao Radio Lisboa." The call and announcements are usually given out in Portuguese, Spanish, French, and English.
Interval Signal: Two notes (G and E).
Standard Transmissions: G.M.T. 21.30-24.00 (Monday, Wednesday, and Saturday).
 Programmes are simultaneously broadcast on 31.25 metres from G.M.T. 21.00-24.00, on Fridays and occasionally on Tuesdays. Closes down with the Portuguese National Anthem and good-night greetings in several languages.
 * A high-power station is in course of construction at Barcarena, near Lisbon.

Metres :		Kilocycles :
286.7	RADIO LYONS France	1,046.4

Power : .7 kw.
Distance from London: Approximately 460 miles.
Standard Time: Greenwich Mean Time (France adopts British Summer Time).
Announcers: Man and woman.
Call: "Hallo! Hallo! Ici Radio Lyon" (phon.: Lee-yon).
Opening Signal: Counting from 300 to 320 in French numerals. No interval signal.
Main Daily Programmes: G.M.T. 12.00, concert and news; 19.45, news, talks; 20.30, main evening entertainment; 22.00, dance music.
 Closes down with the words, "Bonsoir, Mesdemoiselles, Bonsoir, Mesdames, Bonsoir, Messieurs," followed by "La Marseillaise" or by a local patriotic march.

Metres :		Kilocycles :
309.5	RADIO VITUS Paris, France	969

Power : 1 kw..
Distance from London: Approximately 214 miles.
Standard Time: Greenwich Mean Time (France adopts British Summer Time).
Call: "Allo! Allo! Ici poste de Montmartre des Emissions Radio Vitus."
Announcer: Man. French language only used.
Opening Signal: The crowing of a cockerel (gramophone record).
Interval Signal: Two notes.
Main Daily Programme: G.M.T. 08.30, gramophone records; 20.30, news and concert; 22.00, dance music.
 The sound portion of television transmissions carried out by Ecole Supérieure (Paris) is broadcast at G.M.T. 15.00 (Monday), 16.00 (Tuesday), 15.45 (Friday).
 Transmissions are simultaneously broadcast on 43.75 metres. Closes down with usual French good-night greetings, followed by the opening signal.

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Or 12 monthly payments of 19/8

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- 1 Set specified valves ... £2 12 6
- 1 Camco Gresham radio-gram cabinet ... 6 6 0
- 1 Rothermel moving-coil D.C. model, 2,500-ohm winding ... 1 5 0
- 1 Garrard induction motor, No. 201, with automatic stop ... 4 17 6
- 1 Marconiphone pick-up ... 2 2 0
- 1 Westinghouse metal rectifier, type H.T.8 ... 18 6

PROSPERITY 3 (BATTERY)

KIT "A"

Author's Kit including foil covered baseboard assembly but less Valves, Cabinet, Pick-up, Motor and Speaker

Cash or C.O.D. **£7:19:0**

Or 12 monthly payments of 14/7

KIT BITS

ESSENTIAL ACCESSORIES

- 1 Set Valves, as specified ... £2 1 0
- 1 Camco Gresham radio-gram cabinet ... 6 6 0
- 1 Rothermel Souchoord, type PMP speaker ... 1 12 6
- 1 Garrard clockwork motor, type No. 30, with 12-in. turntable ... 1 10 0
- 1 Marconiphone pick-up ... 2 2 0
- Pertrix batteries and accumulator as specified ... 2 6 0

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Complete Kit comprising all components, including valves, cabinet, with self-contained speaker. Cash Price, £9/9/0. Balance in 11 monthly payments of 17/6. Send 15/- only

HOW TO BUILD FOUR SHORT-WAVE SETS

Edited and written by G. T. Kelsey, famous short-wave expert. Describes four efficient S.W. sets with full working diagrams and operating notes. Thousands sold at Olympia. Obtainable from all bookstalls and shops, W. H. Smith & Sons, or direct from Peto-Scott. Post Free. 1/-

LISSEN "SKYSCRAPER 3."

Chassis model with (Lissen) S.G., Detector and Pentode valves. Cash Price £4/9/6. Balance in 11 monthly payments of 8/3. Send 8/3 only

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KIT "A"

Author's Kit including Ready Drilled Panel and wooden chassis but less Valves, Cabinet, Speaker, Motor and Pick-up.

Cash or C.O.D. **£3:13:6**

Or 12 monthly payments of 6/9

KIT BITS

ESSENTIAL ACCESSORIES

- 1 Colvern dual-range coil type KGR, without screen and wave-change switch ... 8 6
- 1 Lissen ganged condenser control unit ... 14 6
- 1 Magnum 2,500-ohm variable resistance combined with on-off switch, type 1130 ... 7 0
- 1 Varley Rectatone low-frequency transformer ... 15 0
- 1 Peto-Scott table model cabinet ... 17 6
- 1 Peto-Scott wooden chassis ... 2 6
- 1 Garrard clockwork No. 30 gramophone motor ... 1 5 0
- 1 R. & A. chassis, type 50, loud-speaker ... 15 0
- 1 B.T.H. Minor Pick-up, with volume control ... 1 5 0
- Set specified valves: 1 Mazda HL210 and 1 Mazda P220 ... 15 9

These are the parts the Author used

- 1 R.I. Quad Astatic, type FY2 H.F. choke ... 3 6
 - 1 Colvern dual-range coil, type KGR, without screen and wave-change switch ... 8 6
 - 1 T.C.C. .0002-mfd. fixed condenser, type SP ... 2 4
 - 1 T.C.C. .0002-mfd., type 34 fixed condenser ... 1 6
 - 1 T.C.C. 1-mfd., type 50 fixed condenser ... 2 10
 - 1 Lissen ganged condenser control unit ... 14 6
 - 1 Goltone pre-set .0003-mfd. max. type J ... 1 0
 - 1 Becol 14 in. by 7 in. ebonite panel ... 4 5
 - 2 Lotus four-pin valveholders ... 1 0
 - 5 Belling-Lee marked wander plugs ... 10
 - 2 Belling-Lee marked spade terminals ... 4
 - 1 Lewcos 20,000-ohm spaghetti resistance ... 1 6
 - 1 Dubilier 2-megohm grid leak ... 1 0
 - 1 Magnum 2,500-ohm variable resistance combined with on-off switch, type 1130 ... 7 0
 - Lewcos tinned copper wire for connecting; lengths of oiled cotton sleeving; length of rubber-covered flex and length of Goltone shielded cable for pick-up leads ... 2 0
 - 2 Lissen terminal blocks, marked: A and E, and Pick-up ... 2 0
 - 1 Tunewell gram-radio switch ... 1 9
 - 1 Varley Rectatone L.F. Transformer ... 15 0
 - 1 Peto-Scott wooden chassis ... 2 6
- Kit "A" Cash or C.O.D. **£3 13 6**

CALIBRATOR

These are the parts the Author used

- 1 Slektun standard type H.P. choke ... £ 4 0
 - 1 Tunewell type S20/25 L.F. choke ... 12 6
 - 2 Telsen fixed condensers, .0001-mfd., type W240 ... 2 0
 - 1 Tunewell Radiogram switch ... 1 9
 - 1 Telsen fixed condenser, .0005-mfd., type W244 ... 1 0
 - 2 Telsen fixed condenser, .002-mfd., type W245 ... 2 0
 - 1 Telsen fixed condenser, .006-mfd., type W247 ... 1 3
 - 4 Telsen fixed condensers, 1-mfd., 500-volt test type ... 9 0
 - 1 Telsen fixed condenser, 2-mfd. 500-volt test type ... 3 0
 - 1 Polar variable condenser, compax. .0005-mfd., reaction ... 2 9
 - 3 Eulgin grid-leak holders, type G6 ... 1 6
 - 2 Telsen four-pin valveholders, solid type ... 3 0
 - 8 Belling-Lee marked wander plugs ... 1 4
 - 2 Belling-Lee marked spade terminals ... 1 0
 - 1 Dubilier fixed resistance, 20,000-ohm metallised 1-watt type ... 1 0
 - 1 Dubilier fixed resistance, 30,000-ohm metallised 1-watt type ... 1 0
 - 1 Lissen 5-megohm grid leak ... 6 6
 - 1 Lissen 2-megohm grid leak ... 6 6
 - 1 Lissen 1-megohm grid leak ... 6 6
 - Tinned copper wire for connecting; length of insulated sleeving; length of rubber-covered flex ... 2 0
 - 1 Belling-Lee terminal block ... 8 8
 - 1 Benjamin Transfeeda L.F. transformer ... 11 6
 - 1 British Radiophone Radiopak tuning unit with knob 3 Baseboard, 18 in. by 10 in. ... 0 6
 - 2 Wearite brackets ... 1 6
 - 2 Belling-Lee Loudspeaker Terminals ... 1 0
 - 1 Length of Goltone Shielded Cable ... 9 9
 - 1 2-volt flash lamp bulb ... 6 6
- Kit "A" Cash or C.O.D. **£6 7 7**

KIT "A"

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KIT BITS

ESSENTIAL ACCESSORIES

- 1 Ste nibac radiogram cabinet, model 19, in mahogany ... £ s. d. 4 15 0
- 1 Cabaret double-spring motor ... 1 15 0
- 1 Ormond permanent-magnet moving-coil speaker R.475 ... 1 18 6
- 1 Harlie type 36 pick-up with volume control ... 1 7 6
- Set of 4 valves as specified ... 2 2 6

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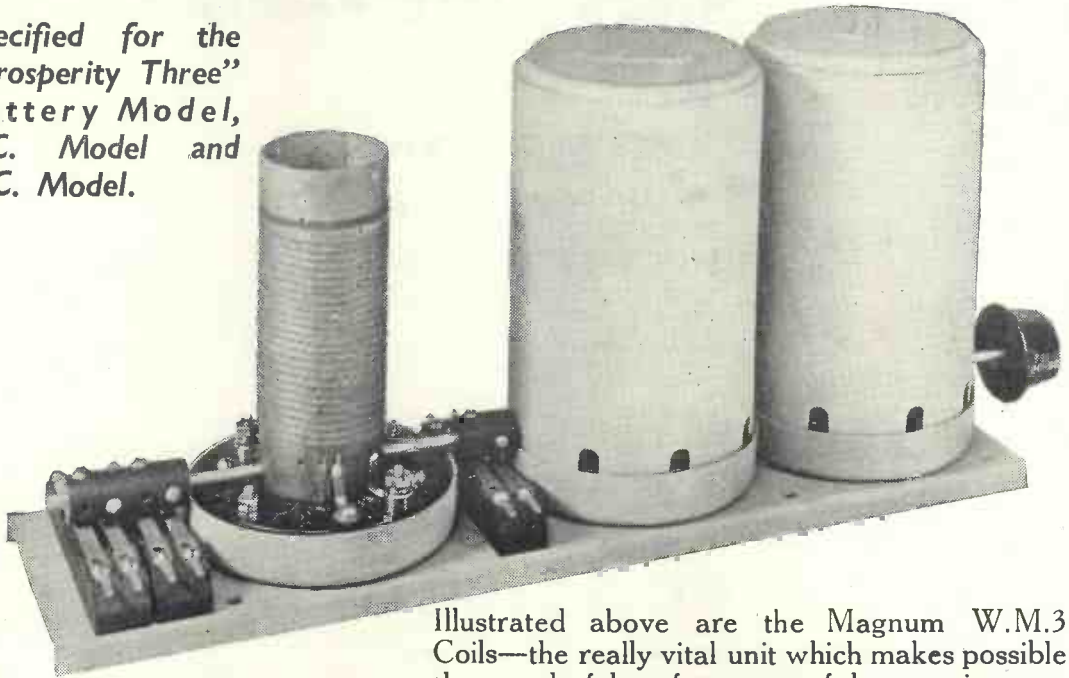
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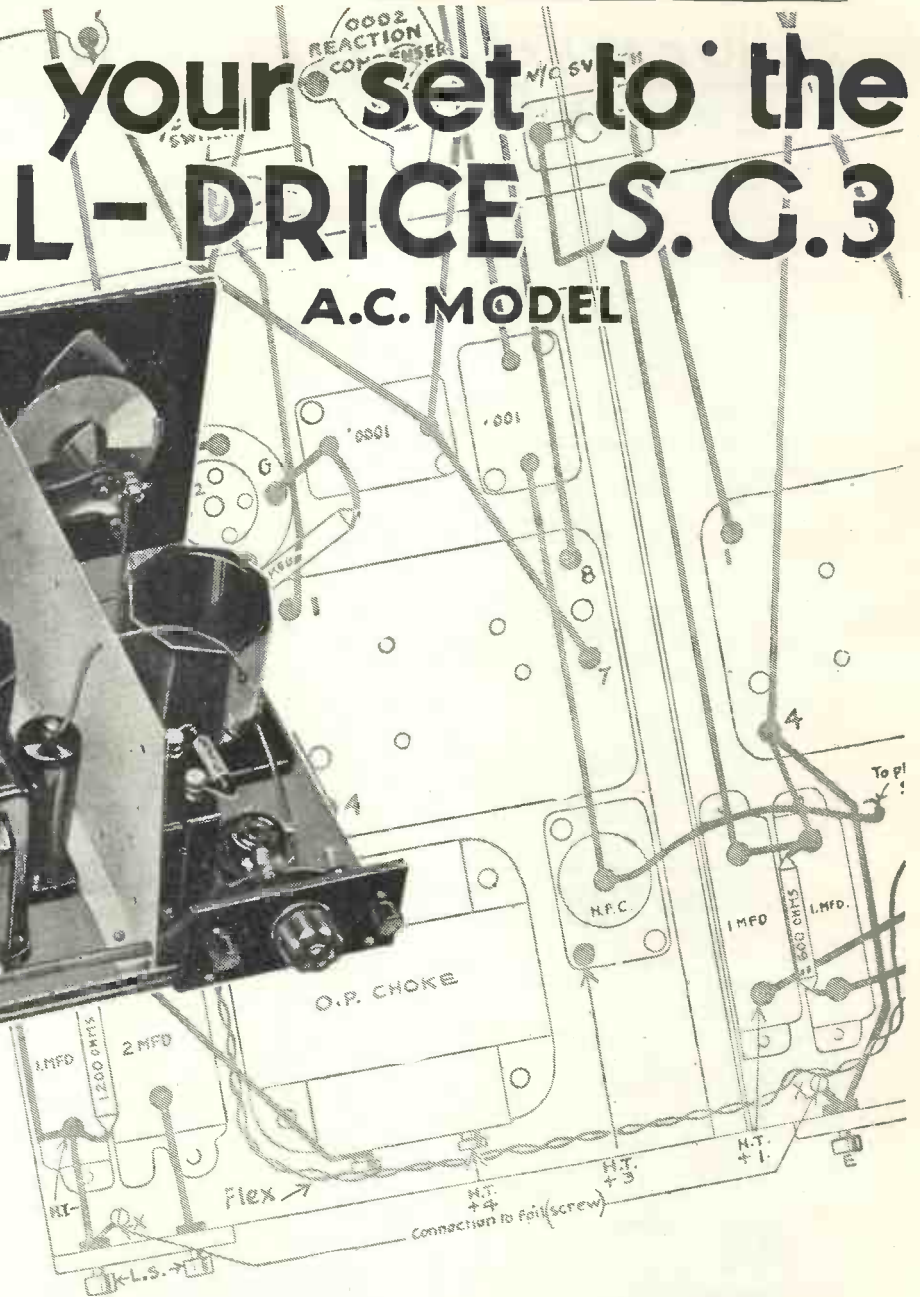
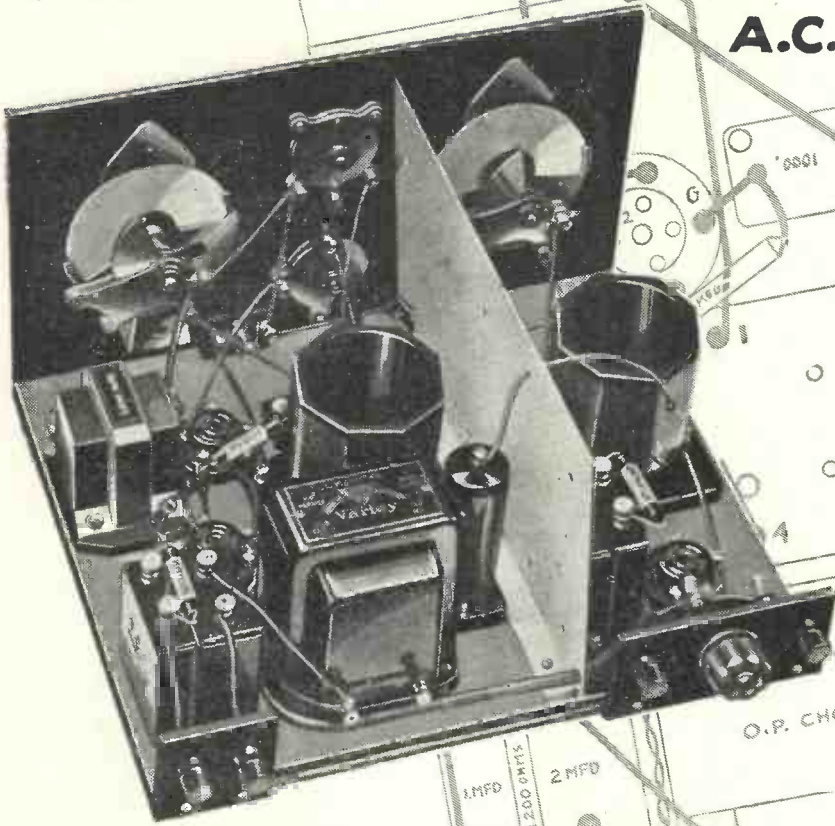
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GUIDE TO WORLD'S BROADCASTERS— Cont.
from p. 276

Metres: 332.2 **MILAN** **Kilocycles:**
Power: 7 kw. *Italy* **902.9**

Distance from London: Approximately 600 miles.
Standard Time: Central European (coincides with B.S.T.).
Announcer: Woman.
Call: "Ente Italiano Audizioni Radiofoniche," abbreviated to E.I.A.R. (phon.: "Eh-yah"), "Radio Milano, Torino, Genova, Firenze, Bolzano e Trieste." Between items: "Eh-yah, Radio Alt'Italia" (phon.: "Ee-tar-l-e-ya").
Opening Signal: Carillon (E, G sharp, F sharp, B, E, G sharp, F sharp).
Interval Signal: Nightingale (*vide* Turin). Usually closes down with the opening call, followed by the words "Fine delle trasmissioni; Signori, Buona Notte." The Royal Anthem ("Marcia Reale") and the (Fascist Hymn, Giovinezza") are regularly played.
Associated Transmitters: Trieste, 247.7 metres (1,211 kilocycles), 10 kilowatts; Turin, 273.7 metres (1,096 kilocycles), 7 kilowatts; Genoa, 312.8 metres (960 kilocycles), 10 kilowatts; Bolzano, 368.1 metres (815 kilocycles), 1 kilowatt; and Florence, 500.8 metres (599 kilocycles), 20 kilowatts.

Metres: 363.3 **ALGIERS** **Kilocycles:**
Power: **13 kw.** *Algeria, North Africa* **825.3**

Distance from London: Approximately 1,042 miles.
Standard Time: Greenwich Mean Time.
Announcers: Man and woman.
Opening Call: "Allo! Allo! Ici le poste de radiodiffusion du Gouvernement Gⁿral des P.T.T. d'Alger." Between items: "Ici PTT Alger" (phon.: "Pay-tay-tay, Al-jay").
Announcements are made in both French and Arabic.
Interval Signal: Gong.
Standard Transmissions: G.M.T. 18.00, talks, dance music, concert; 18.55, time signal; 19.00, main evening entertainment; 20.00, Oriental music (Tuesday); 20.45, dance music or relay of open-air concert.
Closes down with usual French good-night greetings, followed by "La Marseillaise."

Metres: 364.1 **BERGEN** **Kilocycles:**
Power: 1 kw.* *Norway* **824**

Distance from London: Approximately 647 miles.
Standard Time: Central European (coincides with British Summer Time).
Announcer: Man.
Call: "Dette er Bergen Kringcaster"; between items, "Bergen her."
Main Daily Programme: G.M.T. 09.30, sacred service (Sunday); 19.00, main evening entertainment; 21.00, news, dance music. Frequently relays Oslo and also foreign broadcasts.
Closes down with the words, "Bergen Kringeaster lukker ni for iaften," or "Vor utsending for iaften er hermed shet, Godnat, Godnat," followed by the Norwegian National Anthem.
* A new high-power station is in course of construction.

Metres: 411.2 **MADRID (EAJ 7)** **Kilocycles:**
Power: **1.3 kw.*** *Spain* **729.5**

Distance from London: Approximately 802 miles.
Standard Time: Greenwich Mean Time.
Announcer: Man.
Language: Spanish only.
Call: EAJ 7 (phon.: "Ay-ah rhot a see-yet-ay Oo-nee-own rah-dee-owe Madrid.")
No special interval signal.
Main Daily Programme: G.M.T. 08.00, news; 14.30, concert; 22.00, late concert. Usually closes down between 00.30 and 01.00.
Time signal and chimes (four notes rising), relayed from Home Office Buildings at 13.00, 19.00, 22.00, and 24.00, followed by correction, namely, a series of long buzzes with one dot to indicate the last second of the second minute past the hour.
Good-Night Greetings: "Buenas Noches, Señores; hasta mañana" (until to-morrow), concluding with the "Song of Riego."
* A super-power station is under consideration.

Metres: 430.4 **BELGRADE** **Kilocycles:**
Power: 2.5 kw. *Jugoslavia* **697**

Distance from London: Approximately 1,055 miles.
Standard Time: Central European (coincides with British Summer Time).
Announcer: Woman.
Call: "Hallo! Hallo! Radio Beograd" (Phon.: "Bay-owe-grad").
Interval Signal: Slow beating-metronome (one stroke per second).
Main Daily Programme: G.M.T. 08.00, relay of sacred service (Sunday); 10.20, 14.00, gramophone records; 16.45, concert; 18.25, time signal; 19.00, main evening entertainment; 21.30, news, dance music.
Closes down with the words, "Radio Beograd zeli svima svojim slusaocima, laku noc" (Belgrade wishes all its listeners good night); "Ne zaboravite da spojite antenu sa zemljom" (Do not forget to earth your aerial), followed (if at full hour) by clock chimes and carillon; alternately by National Anthem (gramophone record).
Associated Transmitters with which Programmes are Exchanged: Zagreb, 307.1 metres (977 kilocycles), 0.7 kilowatt; Ljubljana, 574.7 metres (522 kilocycles), 2.5 kilowatts.

Metres: 550 **BUDAPEST** **Kilocycles:**
Power: 18.5 kw.* *Hungary* **545**

Distance from London: Approximately 902 miles.
Standard Time: Central European (coincides with British Summer Time).
Announcers: Man and woman.
Call: "Hallo! itt Radio Budapest" (phon.: "Booda-pescht").
Announcements are frequently given in the French, German, and English languages, as well as Magyar languages.
Interval Signal: Musical box (G sharp, B, A, B, G sharp repeated).
Main Daily Programme: G.M.T. 08.00, news 09.00, relay of sacred service (Sunday); weather, news; 13.00, gramophone records; 14.45, talks; 15.15, concert; 18.45, talks, cabaret; 19.35, main evening entertainment; 22.00, gipsy orchestra (usually relayed).
Closes down with good-night greetings in various European languages.
Relays: Csepel, 208.5 metres (1,438.4 kilocycles); Magyarovar, 210 metres (1,430 kilocycles).
* A super-power station is under consideration.

Metres: 1,071.2 **SCHEVENINGEN-HAVEN** **Kilo-**
Power: 5 kw. *Holland* **cycles:**
280

Distance from London: Approximately 200 miles.
Standard Time: Amsterdam (G.M.T. or B.S.T. plus 20 minutes).
Announcer: Woman.
Language: Dutch only.
Opening Signal: Hooter or time signal (chimes).
Call: "Hier de Zakelijke Omroep te Scheveningen-Haven" (phon.: "Skay-ven-ingen-Har-ven").
Daily Transmissions: Weather reports, news bulletins, stock exchange and commercial market quotations. No entertainments are transmitted.
Operates throughout day from G.M.T. 07.40 until 17.40; on Saturdays until 13.40. Does not broadcast on Sundays or Holy Days.

Metres: 1,796 **LAHTI** **Kilocycles:**
Power: 54 kw. *Finland* **167**

Distance from London: Approximately 1,130 miles.
Standard Time: Eastern European (G.M.T. plus 2 hours).
Announcers: Man and woman.
Call (for Finnish transmissions): "Huomio! Huomio! taala Suomen yleisradio Helsinki-Lahti"; (for Swedish broadcasts): "Giv Akt! Giv Akt! her Finlandsrundradio Helsingfors-Lahti."
No special interval signal. At G.M.T. 17.00 (time signal), one stroke on a deep-toned bell.
Main Daily Programme: Relays broadcasts from Helsinki. G.M.T. 08.00, sacred service (Sunday); 10.05, concert; 17.25, concert, talks; 19.20, main evening entertainment; 19.45, news (Finnish and Swedish); 20.15, concert.
Closes down with the words, "Toivotan kaikille -en God nat!"
Relays: Pori, 213 metres (1,373 kilocycles) Turku, 246 metres (1,220 kilocycles); Viipuri (13.2 kilowatts) and Tampere (1 kilowatt), 291 metres (1,031 kilocycles); Pietarsaari, 293 metres (1,022 kilocycles) and Helsinki, 368.1 metres (815 kilocycles), 13.2 kilowatts.

Look out for another fine issue of "Wireless Magazine" on Friday, October 21. It will contain all the regular features and many other articles of importance to every listener. To make certain of getting a copy, order from your newsagent in advance

● IF YOU WANT A SET

which can be carried from room to room in your home; a set with ample selectivity and sensitivity for modern conditions; WITH A SELF-CONTAINED AERIAL SYSTEM and a built-in moving coil speaker; a Pye quality product built in the Pye technique, in a beautiful modern polished walnut cabinet . . .

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"MM" All-mains Moving-coil Receiver. It costs only 17 gns., or 32/- for the first payment. Pye Receivers are built with PRECISION, to give you maximum selectivity; RANGE, to seek your stations where you will; FIDELITY, to give you a faithful rendering of both speech and music.

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NEW TELSEN AJAX 3. Complete Set of parts for Det.; 2 L.F. Receiver, less Valves. Cash Price, £3/1/6. And 11 monthly payments of 5/8. **With 5/8 order**

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When you discard a run down H. T. Dry Battery you are throwing away power. Due to self-discharge the voltage of a Dry Battery continuously falls. Nothing can stop it. Finally it is too weak to work your Set *but there is still power left in it*—power you cannot use—waste! The Lively 'O' H.T. Accumulator is waste-proof. Its famous "air-spaced" construction prevents self-discharge. It is full of life right up to the time when it needs recharging.

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For only a few shillings—much less than the cost of a new H. T. Dry Battery—the Lively 'O' Accumulator can be recharged—made like new again—full of life and energy, ready to run your Set for another three or four months.

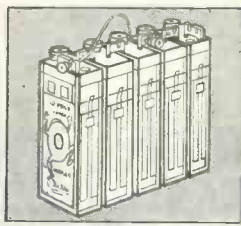
IT LASTS FOR YEARS

Provided it is charged every three or four months the Lively 'O' Accumulator will last for years. It is definitely the most economical H. T. supply you can use. Every Wireless Dealer sells it in convenient 10 volt units.

TWO TYPES:

Standard 10 volt unit capacity 2,750 milliamps **5/6**
Extra large capacity 5,500 milliamps (10 volt unit) **6/9**

The
Lively 'O'
H.T. ACCUMULATOR



PUT THE LIVELY 'O' INTO YOUR RADIO

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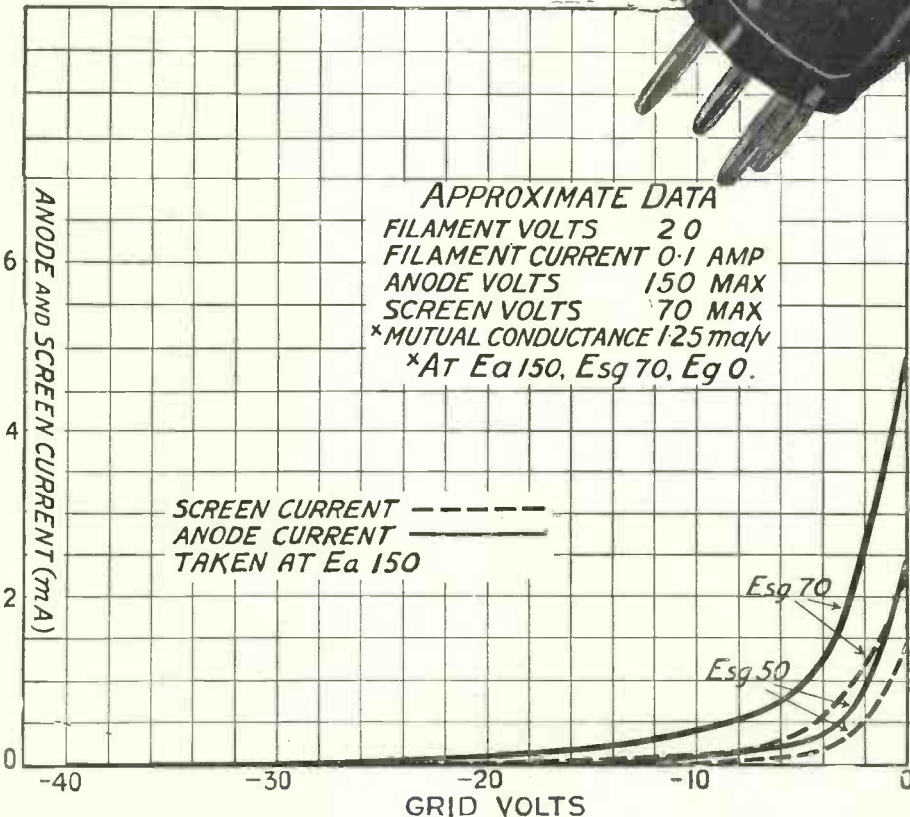
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A new Variable-MU Valve for Battery Receivers V.S.2

VS2 is the latest link in the long chain of Marconi developments in valve technique. It combines the high mutual conductance of 1.25 MA per volt with the typical advantages of the Variable-Mu valve, providing long range, improved selectivity and quality of reproduction and, if desired, a smooth and entirely distortionless control of volume.

If your receiver was designed for an ordinary S.G. valve, Marconi VS2 will give a far better all-round performance. If you are building a new set incorporate VS2 and the necessary grid bias circuit from the start and obtain the perfect volume control **Price** which only a Variable-Mu valve will give. **16/6**



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- *VS2 Variable-Mu Screen Grid 16/6
- *S22 Screen Grid (Single stages) 16/6
- *S21 Screen Grid (Multi stages) 16/6
- *H2 High Magnification . . . 7/-
- *HL2 Medium Magnification . . 7/-
- HL210 Medium Magnification . . 7/-
- LP2 Power 8/9
- P2 Super Power 12/-
- PT2 Pentode 17/6
- DG2 Double Grid 20/-

* Available metallized if desired

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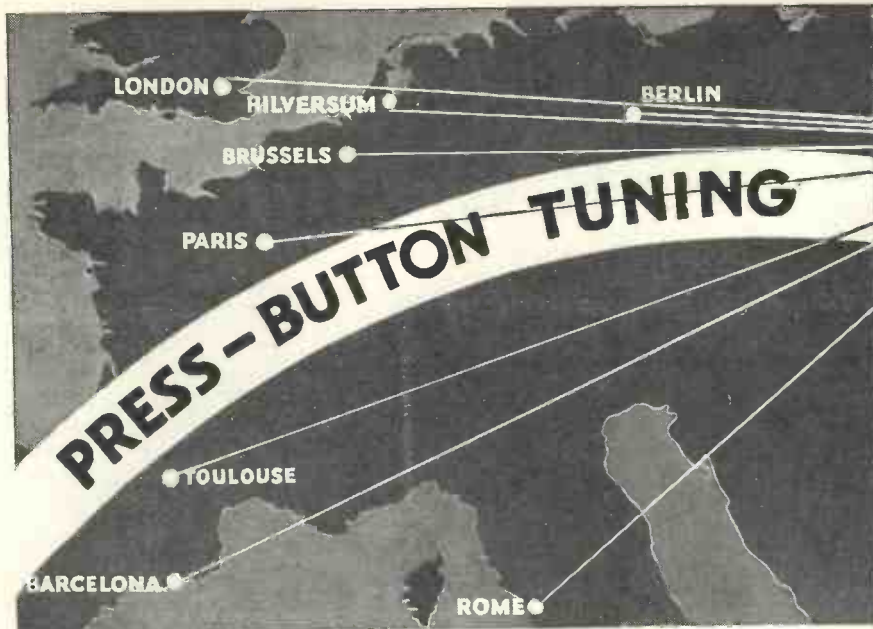
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WORLD'S BROADCAST WAVELENGTHS



Wave-length	Name of Station	Dial Readings	Country	Wave-length	Name of Station	Dial Readings	Country
7.1	La Turbie ..		France	30.3	Prangins (Radio Nations) ..		Switzerland
9.8	Coltano IAG ..		Italy	30.4	Madrid EAQ ..		Spain
9.96	Golfe Aranci ..		Sardinia	30.57	Buenos Aires LQE ..		Argentina
13.92	Saxonburg W8XK ..		United States	30.64	Rugby GBW ..		Great Britain
14.0	Lawrenceville, N.J., WLO ..		United States	30.77	Rocky Point WEL.WNC ..		United States
14.27	Buenos Aires LSL ..		Argentina	30.94	Buenos Aires LQA ..		Argentina
14.28	Podebrady, OKI ..		Czecho-Slovakia	31.25	Lisbon CTIAA ..		Portugal
14.47	Buenos Aires LSY ..		Argentina		Philadelphia ..		United States
14.60	Malabar PMB ..		Java	31.28	Sydney VK2ME ..		New South Wales
14.83	Nauen DGW ..		Germany		Melbourne VK3ME ..		Victoria
15.14	Deal Beach WM1 ..		United States	31.315	Prangins (Radio Nations) ..		Switzerland
15.20	Ruyssedele ORA ..		Belgium		Springfield WIXAZ ..		United States
15.198	Aranjuez EAQ ..		Spain	31.35	Poznan SR1 ..		Poland
	Sydney VK2ME ..		Australia	31.38	Zeezen DJA ..		Germany
15.5	Ste Assise FTM ..		France	31.48	Schenectady W2XAF ..		United States
	Kootwijk PCP ..		Holland	31.51	Skamlebaek OXY ..		Denmark
15.44	Elisabethville OQH ..		Belgian Congo	31.55	Melbourne VK3ME ..		Victoria
15.51	Deal Beach WNC ..		United States	31.58	Rio de Janeiro PRXA ..		Brazil
15.576	Rio de Janeiro PPU ..		Brazil	31.75	Rocky Point (N.Y.) WEJ ..		United States
15.625	Ruyssedele (Bruges) ORG ..		Belgium	31.86	Bandoeng PLV ..		Java
15.63	Cairo SUY ..		Egypt	32.26	Rabat ..		Morocco
15.93	Bandoeng PLE ..		Java	32.85	Zurich HB9OC ..		Switzerland
16.10	Rugby GBU ..		Great Britain	33.0	Radio L.L. (Paris) ..		France
16.19	Coltano IAC ..		Italy	33.61	Elisabethville OQH ..		Congo
16.26	Bogota HKD ..		Columbia	34.66	Drummondville VE9AP ..		Canada
16.35	Maracay YVQ ..		Venezuela	34.68	Long Island W2XV ..		United States
16.36	Rugby GBS ..		Great Britain	35	Prangins (Radio Nations) ..		Switzerland
16.54	Rugby GBW ..		Great Britain	35.25	Deal Beach (N.Y.) WOO ..		United States
16.56	Bandoeng PMC ..		Java	35.55	Rio de Janeiro PRDA ..		Argentina
16.57	Chicago (Ill.) W9XAA ..		United States	36	Norddeich ..		Germany
16.66	Rocky Point (N.Y.) WAJ ..		United States	36.92	Bandoeng PLW ..		Java
16.8	Malabar PLF ..		Java	37.50	Tokio JKBB ..		Japan
16.85	Kootwijk PCV ..		Holland	38.07	Kemikawoa-Cho-Chiba-Ken ..		Japan
16.878	Boundbrook W3XAL ..		United States	38.17	Abul Zabal (Cairo) SUY ..		Egypt
17.0	Madrid EAQ ..		Spain	38.476	Prangins (Radio Nations) ..		Switzerland
18	Prangins (Radio Nations) ..		Switzerland	38.65	Kootwijk PDM ..		Holland
18.44	Lawrenceville WLO-WLK ..		United States	38.56	Rio de Janeiro PPB ..		Brazil
	Rocky Point (N.J.) WIY ..		United States	39.74	Calgary (Alb.) CKS ..		Canada
18.41	Kootwijk PCL ..		Holland	39.98	Tscheng-Ju XGD ..		China
18.56	Rugby GBX ..		Great Britain	40.3	Prangins ..		Switzerland
19	Barcelona ..		Spain	41.1	Budapest HAF4C ..		Hungary
	Prangins (Radio Nations) ..		Switzerland	42.8	Paris F8BP ..		France
19.36	Kemikawoa (Tokio) JIAA ..		Japan	40.4	Warsaw SP1AX ..		Poland
19.56	Schenectady W2XAD ..		United States	40.54	New York WEN ..		United States
19.68	Pontoise FYA ..		France	41.6	Las Palmas EAR58 ..		Canary Isles
19.72	Saxonburg W8XK ..		United States	41.7	Singapore VSLAB ..		Sts. Settlements
19.737	Zeezen DJB ..		Germany	42.3	Stuttgart D4XAA ..		Germany
19.84	Rome (Vatican) HVJ ..		Italy	43.75	Paris (Vitus) F8LH ..		France
19.9	Heredia T14NRH ..		Costa Rica	43.83	Stuhlweissenburg ..		Hungary
19.95	Moscow ..		U.S.S.R.	44.5	Rocky Point (N.Y.) WEJ ..		United States
20.0	Prangins (Radio Nations) ..		Switzerland	44.9	Nauen DGK ..		Germany
20.0	Drummanville CJA ..		—	45	Constantine FM8KR ..		Tunis
20.27	Rocky Point (N.Y.) WQV ..		United States	45.38	Moscow REN ..		U.S.S.R.
20.49	Deal (N.J.) W2XBJ ..		United States	45.5	Bucharest ..		Roumania
20.56	Lawrenceville WMI ..		United States	45.31	Riobamba PRADO ..		Ecuador
20.77	Rugby GBW ..		Great Britain	46.67	London (Ont.) VE9BY ..		Canada
21.53	Rocky Point (N.J.) WIY ..		United States	46.69	Boundbrook W3XL ..		United States
21.7	Abu Zabal (Cairo) SUZ ..		Egypt	46.73	Minsk RW62 ..		U.S.S.R.
21.73	Rocky Point (N.Y.) WAJ ..		United States	47	Coltano IAC ..		Italy
21.92	Stuhlweissenburg ..		Hungary	48	Casablanca CN8MC ..		Morocco
22.25	Rocky Point (N.Y.) WAJ ..		United States	48.05	Barranquilla HKD ..		Colombia
22.42	Nauen DGI ..		Germany	48.35	Bogota HKC ..		Colombia
23.28	Radio Maroc (Rabat) ..		Morocco	48.5	Brussels ON4FB ..		Belgium
23.7	Drummondville VE9AP ..		Canada	48.95	Maracaibo YV11BMO ..		Venezuela
23.858	Rabat ..		Morocco	48.86	Saxonburg (Pa.) W8XK ..		United States
24.41	Rugby GBU ..		Great Britain	49.0	Bombay VUB ..		Br. India
25.18	Abu Zabal (Cairo) SUC ..		Egypt	49.2	Johannesburg ZTJ ..		Sth Africa
25.20	Pontoise FYA ..		France	49.18	Boundbrook W3XAL ..		United States
25.24	East Pittsburgh W8XK ..		United States	49.22	Bowmanville VE9GW ..		Canada
25.27	East Pittsburgh (Pa) W8XK ..		United States	49.34	Chicago W9XAA ..		United States
25.27	Calcutta VUC ..		India	—	Caztago TIR ..		Costa Rica
25.34	Chicago (Ill.) W9XAA ..		United States	49.43	Vancouver VE9CS ..		British Columbia
25.4	Bowmanville VE9GW ..		Canada		Nairobi VQ7LO ..		Kenya Colony
25.465	Rome 2RO ..		Italy	49.5	Philadelphia W3XAU ..		United States
25.5	Saigon (Chi-Hoa) ..		Indo-China		Mason (Ohio) W8XAL ..		United States
25.53	Chapultepec XDA ..		Mexico	49.59	Halifax VE9GX ..		Nova Scotia
	Chelmsford 5SW ..		Great Britain	49.67	Miami Beach WHXB ..		United States
25.6	Pontoise FYA ..		France	48.93	Chicago W9XF ..		United States
	Winnipeg VE9JR ..		Canada	49.96	Drummondville VE9DR ..		Canada
25.7	Rio de Janeiro PPQ ..		Brazil	50	Bucharest ..		Roumania
	S.Y. Electra IBDX ..		—	50.1	Moscow RV59 ..		U.S.S.R.
25.72	Rio de Janeiro PPB ..		Brazil	50.26	Eindhoven ..		Holland
26.83	Funchal CT3AQ ..		Madeira	51.22	Rome (Vatican) HVJ ..		Italy
27.1	Brussels ORB ..		Belgium	52.7	Chapultepec XDA ..		Mexico
27.3	Wellington ZLW ..		New Zealand	52.7	Tananarive FIUI ..		Madagascar
28.5	Sydney VK2ME ..		New South Wales	54.4	Moscow RV38 ..		U.S.S.R.
28.98	Buenos Aires LSX ..		Argentina Repub.	54.52	New York W2XBXH ..		United States
29.16	Königswusterhausen DIQ ..		Germany	58	Prague OK1MPT ..		Czechoslovakia
29.83	Abu Zabal (Cairo) ..		Egypt	58.3	Bandoeng PMY ..		Java
30	Belgrade ..		Yugoslavia	60.3	Rugby GBC G6RX ..		Great Britain
30.2	Leopoldville ..		Belgian Congo	62.5	Long Island (N.J.) W2XV ..		United States
				62.5	Deal Beach WOO ..		United States

(Continued on page 288)



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Press-button tuning took Radiolympia by storm! It brought thousands of people to the Zetavox stand—to try for themselves the ease and simplicity of getting any of nine favourite stations **instantly** on the unique Zetavox press-button tuner. (Ordinary tuning brings in any other stations on Zetavox.)

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- LONG-RANGE RECEPTION.
- H.P. TERMS.
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No. 728 - L.T. (1 in. Longthroat) On-Off	-	" 2/3	" 1/9
No. 730 - S.P. with Terminals	- - - - -	" 2/3	" 1/8
No. 729 - S.P. Change Over	- - - - -	" 2/6	" 2/3
No. 161 - Semi-Rotary. On-Off	- - - - -	" 2/9	" 2/6
No. 2728 - Double Pole	- - - - -	" 3/9	" 3/3
No. 105 - New Type. 3 point On-Off	- - - - -	" -	" 2/-

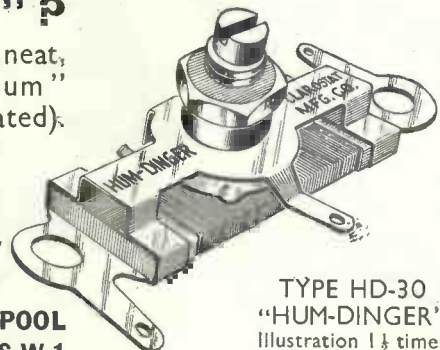
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BROADCAST WAVELENGTHS

Cont. from page 284

Wave-length	Name of Station	Dial Readings	Country	Wave-length	Name of Station	Dial Readings	Country
62.56	London (Ont.) VE9BY		Canada	351	Leningrad		U.S.S.R.
65	Budapest		Hungary	352.1	Graz		Austria
65.0	Kuala Lumpur VS2A		F.M.S.	355.8	London Regional		Great Britain
67.65	Doeberitz DFK		Germany	358	Moscow		U.S.S.R.
70.2	Khabarovsk RV15		U.S.S.R.	360.5	Muhlacker		Germany
74.0	Prangins (Radio Nations)		Switzerland	363.3	Algiers		North Africa
79.5	Salisbury ZEA		South Africa	364.1	Bergen		Norway
80.0	Rome		Italy	367.6	Frederikstaad		Norway
88.3	Rugby G6RX		Great Britain		Helsinki		Finland
92.31	Doeberitz		Germany	368.1	Seville		Spain
198.5	Riga		Latvia		Bolzano		Italy
207.3	Franchimont		Belgium		Kharkov		U.S.S.R.
208.3	Antwerp		Belgium	369.3	Radio LL, Paris		France
208.7	Budapest		Hungary	372	Hamburg		Germany
210	Magyazovar		Hungary	376.4	Scottish Regional		Great Britain
210.1	Liege		Belgium	378	Moscow Regional		U.S.S.R.
211.3	Newcastle		Great Britain	380.7	Lvov		Poland
214.2	Warsaw (No. 2)		Poland	384.4	Radio Toulouse		France
214.3	Aberdeen		Great Britain	385	Stalino		U.S.S.R.
215.3	Chatelaineau		Belgium		Frankfurt		Germany
217	Brussels (Conference)		Belgium	389.6	Leipzig (testing)		Germany
217	Konigsberg		Germany		Archangel		U.S.S.R.
218	Salzburg		Austria	394	Bucharest		Roumania
220	Beziere		France	398.9	Midland Regional		Great Britain
224.4	Cork		Irish Free State	403	Sottens		Switzerland
226.1	Fécamp		France	408	Katowice		Poland
227.4	Flensburg		Germany	411	Madrid (EAJ5)		Spain
230.3	Radio Wallonia		Belgium		Athlone		Irish Free State
232	Malmo		Sweden	413	Dublin		Irish Free State
232.2	Kiel		Germany	416	Radio Maroc		North Africa
233.4	Lodz		Poland	419.5	Berlin		Germany
235.5	Kristianssand		Norway	424.3	Madrid EAJ7		Spain
237.2	Bordeaux-Sud-Ouest		France	431.5	Belgrade		Yugoslavia
239	Nurnberg		Germany	435.4	Stockholm		Sweden
240.2	Binche		Belgium	441	Rome		Italy
240.6	Liege Experimental		Belgium	447.1	Paris PTT		France
240.6	Stavanger		Norway	449.4	Odessa		U.S.S.R.
241.6	Oporto		Portugal		Danzig		Danzig
242	Belfast		Ireland	453.2	Klagenfurt		Austria
244.1	Basle		Switzerland		Porsgrund		Norway
245.9	Radio Schaarbeek		Belgium	456.6	San Sebastian		Spain
247.7	Linz		Austria	459.4	Beromuenster		Switzerland
249.6	Berne		Switzerland	465.8	Tartu		Estonia
249.6	Trieste		Italy		Lyons PTT		France
249.8	Prague (No. 2)		Czechoslovakia	472.4	Langenberg		Germany
252.3	Juan-les-Pins		France	476	Sebastopol		U.S.S.R.
252.3	Barcelona EAJ15		Spain	480	North Regional		Great Britain
253.1	Gleitwitz		Germany	488.6	Prague		Czechoslovakia
255	Toulouse PTT		France	493.4	Trondheim		Norway
257	Horby		Sweden	500.8	Florence		Italy
259.3	Frankfurt		Germany	502.4	Nini Novgorod		U.S.S.R.
261.6	London National		Great Britain	509	Brussels No. 1		Belgium
263.8	Moravska Ostrava		Czechoslovakia	517	Vienna		Austria
265.4	Lille		France	525	Riga		Latvia
267.1	Bremen		Germany	525.9	Falermo		Italy
267.6	Valencia		Spain	533	Munich		Germany
268.5	Liege (Cointe)		Belgium	541.5	Sundsvall		Sweden
269.4	Bari		Italy	550	Budapest		Hungary
271.4	Rennes		France	559.7	Kaiserslautern		Germany
273.6	Turin		Italy		Augsberg		Germany
276.5	Heilsberg		Germany	563	Wilno		Poland
279.3	Bratislava		Czechoslovakia	566	Hanover		Germany
281.2	Copenhagen		Denmark	568.5	Grenoble		France
282.2	Lisbon CT1AA		Portugal	569.3	Freiburg		Germany
	Berlin		Germany	574.7	Ljubjana		Yugoslavia
283.6	Magdeburg		Germany	644	Kazan		U.S.S.R.
	Stettin		Germany	720	Moscow PTT		U.S.S.R.
	Brussels SBR		Belgium	760	Geneva		Switzerland
286	Innsbruck		Austria	770	Ostersund		Sweden
286.7	Montpellier		France	824.2	Sverdlovsk		U.S.S.R.
	Radio Lyons		France	849	Rostov (Don)		U.S.S.R.
	Bournemouth		Great Britain	937.5	Kharkov		U.S.S.R.
	Newcastle		Great Britain	1,000	Leningrad		U.S.S.R.
288.5	Scottish National		Great Britain	1,034	Kiev		U.S.S.R.
	Plymouth		Great Britain	1,071.2	Tiflis		U.S.S.R.
	Swansea		Great Britain	1,071.4	Scheveningen-Haven		Holland
291	Viipuri		Finland	1,083	Oso		Norway
293	Kosice		France	1,111	Moscow (Popoff)		U.S.S.R.
293	Limoges PTT		Czechoslovakia	1,153.8	Kalundborg		Denmark
296.1	Hilversum		Holland	1,171.5	Tasckent		U.S.S.R.
298.5	Tallinn		Esthonia	1,200	Reykjavik		U.S.S.R.
301.5	North National		Great Britain		Istanbul		Iceland
304.9	Bordeaux PTT		France	1,229.5	Boden		Turkey
306.8	Zagreb		Yugoslavia	1,237	Vienna (testing)		Sweden
307	Falun		Sweden	1,260	Bakou		Austria
309.5	Radio Vitus		France	1,275	Moscow (Trades Union)		U.S.S.R.
309.9	Cardiff		Great Britain	1,304	Motala		Luxemburg
312.8	Genoa		Italy	1,348	Novosibirsk		U.S.S.R.
315	Cracow		Poland	1,380	Warsaw		U.S.S.R.
	Marseilles		France	1,411.8	Paris (Eiffel Tower)		Poland
318.8	Naples		Italy	1,445.7	Moscow (Komintern)		France
	Dresden		Bulgaria	1,481	Ankara		U.S.S.R.
321.9	Goteborg		Germany	1,538	Daventry National		Turkey
325	Breslau		Sweden	1,554.4	Irkutsk		Great Britain
328.2	Poste Parisien		Germany	1,600	Königswusterhausen		U.S.S.R.
332.2	Milan		France	1,635	Radio Paris		Germany
335	Poznan		Italy	1,725	Lahti		France
338.2	Brussels (No. 2)		Poland	1,796	Huizen		Finland
341.7	Brno		Belgium	1,875	Kaunas		Holland
345.2	Strasbourg		Czechoslovakia	1,935	Königswusterhausen		Lithuania
348.6	Barcelona EAJ1		France	2,525	Königswusterhausen		Germany
			Spain	2,900			

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VS.2 (Metallized or Clear) PRICE 16/6

A new variable mu. valve with outstanding characteristics—long range, improved selectivity, adequate volume control, with only a 9-volt grid bias battery.

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The high slope screen grid valve to improve the reception of any three valve Kit set. Replace your old screen-grid valve with an OSRAM S.22.—A tonic to any set with single stage screen-grid.

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MUTUAL CONDUCTANCE 1.1 ma/volt at Ea 150, Esg 70, Eg. 0.

OSRAM 2-volt Valves with the WEMBLEY FILAMENT

PRICES

		PRICE
VS.2	Variable Mu. Screen Grid	16/6
S.22	High slope Screen Grid	16/6
S.21	Medium slope Screen Grid	16/6
H.2	High amplification Det. and RC.	7/6
HL.2	The non-microphonic Detector	7/6
LP.2	L.F. and Small Power	8/9
P.2	Super Power	12/6
PT.2	Economy Power Pentode	17/6

The OSRAM VS.2, S.22, S.21, H.2, HL.2 can be supplied either metallized or clear.

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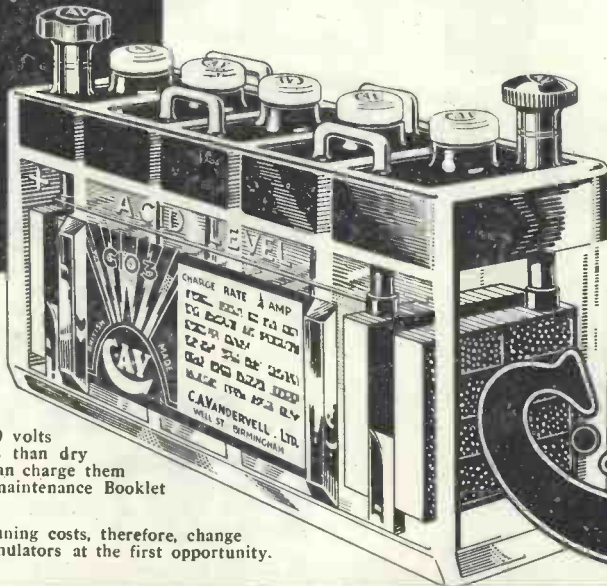
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Cheaper than dry batteries

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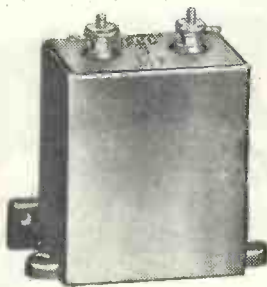
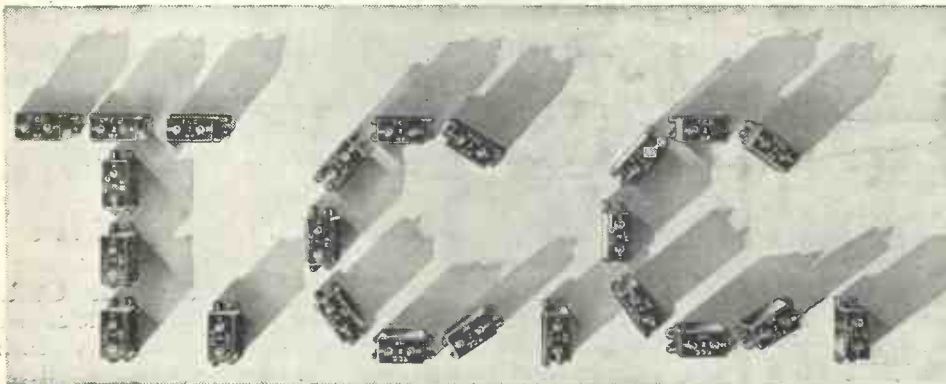


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The growing ether congestion calls for still more selectivity. The super-heterodyne and special ultra-reaction circuits have been developed to meet this requirement, the tuned circuits being made sharply resonant, **deliberately cutting off the high notes.** It is clear that a low-frequency coupling device is required which will restore these weakened high notes to their correct value. The new RECTATONE transformer does this. **Its frequency response curve is straight up to 1,000 cycles per second and then rises reaching a maximum at approximately 4,500 cycles.**

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The degree of compensation is variable and may be suited to the particular tuned circuits in use or employed to correct deficiencies due to the loud-speaker or to the acoustics of the room. RECTATONE is thus the ideal L.F. coupling for all selective sets—particularly useful for those using a pick-up or for radio-gramophones, since the tone control so valuable on radio, can be cut out on "gramophone" where it is usually unnecessary.

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SKYSCRAPING

"SKYSCRAPER" seems to me a very appropriate name for the new Lissen three-valve kit set. It is a powerful battery-driven set in which the one special cabinet houses batteries, set chassis, and loud-speaker.

The up-to-date three-valve circuit includes a metallised screen-grid valve, detector, and pentode output and, incidentally, you should note that the price includes the valves. You can start straight away and build it, using if you like your existing cabinet, batteries, and loud-speaker.

The complete set is pleasing to look at, the loud-speaker being housed behind a special type of fret front and the set controls being at the bottom. It justifies its name of Skyscraper because, having an easy-to-tune high-frequency circuit, it is a good distance getter and is not confined only to good-quality reception of the local stations. **282**

THE FORMO "SECRET"

THE snappy title of a new book which has just arrived on my desk is "Formo Has a Secret That Interests You." Well, I don't know about the secret, for I am reading the Formo book after seeing the special display at Olympia, but I confess that the book is of outstanding interest.

It describes dual-range, band-pass, high-frequency coils and other components of that ilk, while the second section of it deals with ganged condensers and combined condenser and coil assemblies.

By the way, Formo have introduced a novel colour scheme, which puts an end once and for all to any difficulty in connecting coils. The coils themselves are coloured. Red is used for the aerial; blue for high frequency; and green and yellow for the first and second band-pass stages. In conjunction with this colour scheme there is a colour connection chart. It is permanently fitted at the top of the coil inside the screen and it shows every terminal position.

This clever idea is described in the new Formo book, which also gives a number of helpful circuits in connection with the new coils. **283**

ALBA RADIOGRAMS

A LITTLE grouse I have about many catalogues of luxury instruments such as radio-gramophones is that they overlook the curiosity of the technical man and do not describe the works inside the exquisite walnut box. Let me say that this is not the case with the new Alba radio-gramophone folder.

On the one hand, this gives large illustrations of the various radiograms and table model sets; on the other, it gives illustrations of the set chassis and quite useful technical details which are a pleasant change from casual publicity blah about "purity of tone," "amazing reproduction," and other rather empty phrases.

If you get the Alba folder you will see just why these new instruments are on the top line of technical achievement. Incidentally, it seems to me to be a very convincing chassis. **284**

Further notes on trade activities appear under the title, "Notes and Jottings" on page 416.

FOR MAINS USERS

IF you are one of those technical wallahs who like to plaster the walls of the wireless den with charts and graphs, then here is something for you.

Even if you are just an ordinary mains user on the look-out for a new transformer for some special job (or even for some good mains-type condensers), then take heed. Parmeko have produced a comprehensive chart of transformers for our A-P-A amplifier, for all types of valves and metal rectifiers, for filament lighting, for low-tension rectifiers, and for special output purposes. The chart also gives details of special smoothing chokes.

In practically every case full details of capacity, inductance, size, weight, method of connection, and so on are given, so the chart deserves a prominent place on the den wall. **285**

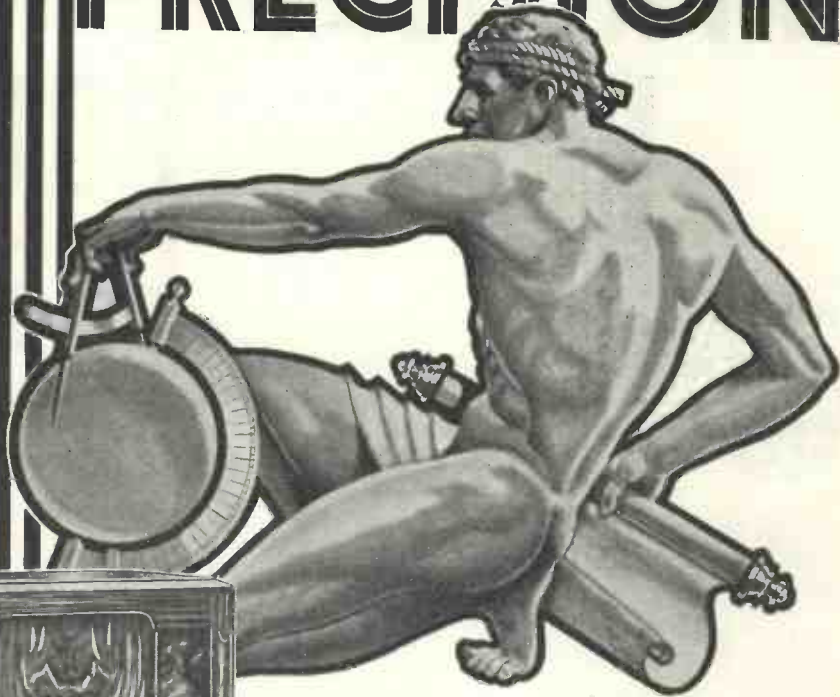
THE "303"

AS there are so many kit-set enthusiasts, I want this month to draw attention to the "303" three-valver of Ready Radio, Ltd. The "303" is supplied in kit form, either with a cabinet fitted with a permanent-magnet moving-coil loud-speaker, or as just the kit for the set.

It is built up on a metal chassis and only four components and five wires have to be fixed. An entirely new type of terminal has been invented for the "303," and this greatly simplifies construction. All kinds of little details like this make it a really good kit, and to ensure that there is no difficulty in the construction Ready Radio have produced a book fully describing the construction and operation of it.

A more elaborate kit, the Meteor S.G. Three, is also dealt with in this production. If you are keen on making up your own set from a kit of parts, then I should like to bring this book to your attention. It is priced at 6d., but free copies can be obtained through my catalogue service. **286**

PRECISION



The increase in the number and power of broadcasting stations make the selectivity and sensitivity of radio receivers of the highest importance. In the "KolStar" K.B. have produced an instrument that completely separates adjacent stations. Built with scientific accuracy the K.B. "KolStar" 6-valve Super-Het. covers three ranges of wavelengths—long (800-2,100 metres approx.); medium (190-575 metres approx.); and short (16-70 metres approx.). It is operated from A.C. mains, and has a high-grade moving-coil speaker incorporated in the figured walnut cabinet. Complete with valves and royalties **£24.17.6** or **75/-** down. Ask any K.B. Authorised Dealer for a demonstration or write for the new K.B. catalogue.



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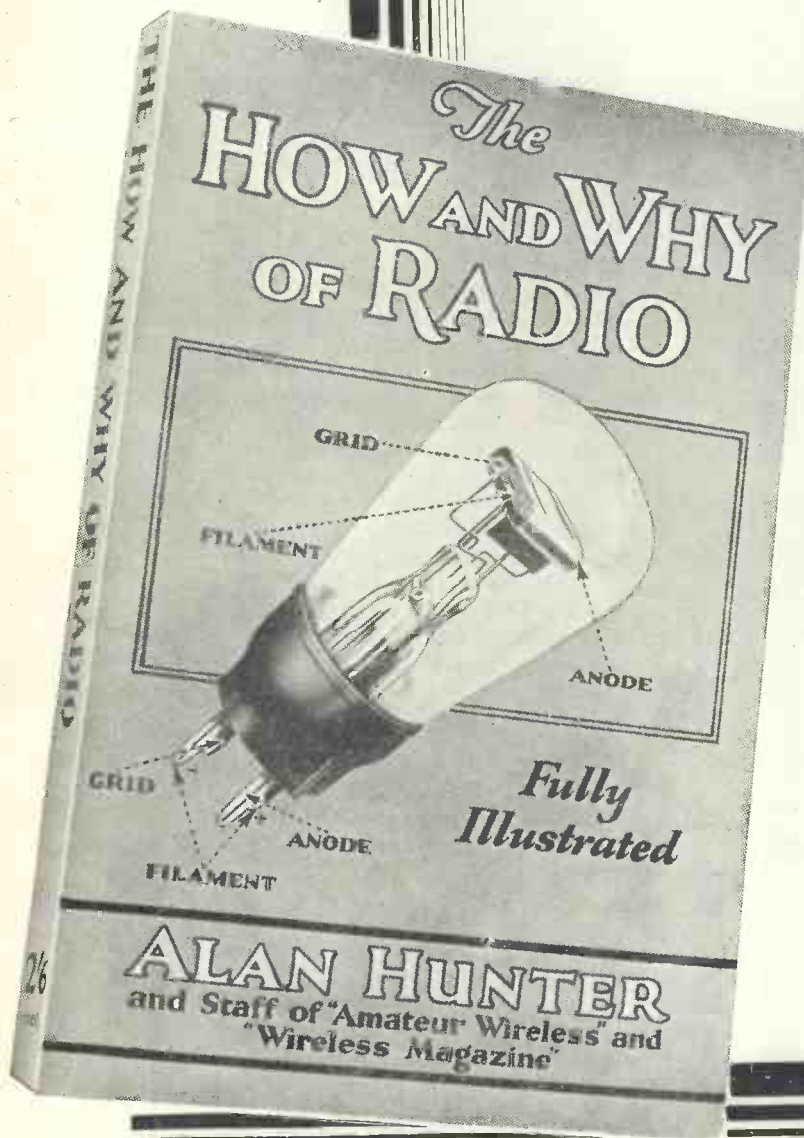
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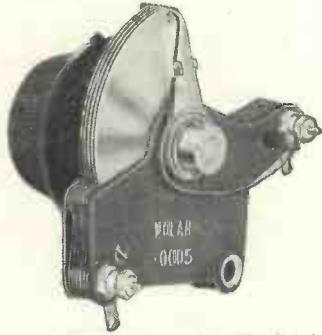
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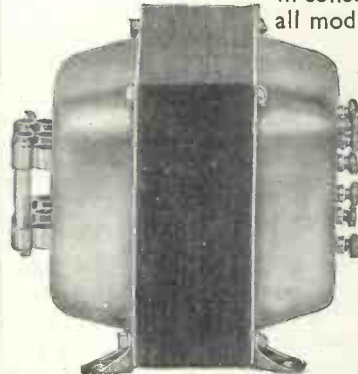
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ON THE CREST OF THE WAVES

RADIO NEWS FROM ALL EUROPE :: By JAY COOTE

BELGIUM

IN view of the number of private broadcasting stations which have recently been opened, especially in the Liège district, the Government have officially authorised the use of international common waves between 200 and 207 metres. The power of these installations, however, is restricted to 50 watts (aerial).

CZECHOSLOVAKIA

The old Strasnice 5-kilowatt station, after a thorough overhaul, has again been brought into action; on 249 metres it broadcasts the programmes put out by the Liblice high-power transmitter. In a few weeks time alternative programmes will be radiated through this channel.

DENMARK

From time to time during the winter months the Copenhagen studio proposes to relay a programme from the Greenland station at Julianahaab. As the transmission is to be broadcast simultaneously through Kalundborg, European listeners will be given an opportunity of hearing items provided by Eskimo musicians.

FRANCE

A site has been found at Thourie for the new Rennes high-power station, which will be the first to be built under the General Ferrié scheme for the reorganisation of the French broadcasting system. As soon as a start has been made, the French post-office engineers will devote their attention to the construction of transmitters at Biot (between Cagnes-sur-Mer and Antibes) for the Nice-Cannes-Juanles-Pins district and at Realtor near Marseilles. Work on the Lille transmitter, which was suspended some eighteen months ago for lack of financial support, is now to be resumed.

GERMANY

Following the change-over of Flensburg to 227.4 metres, other alterations are to be made in the wavelengths of German transmitters. Bremen and Hanover will shortly take over the same channel, but Kiel

for the present will retain its wavelength. The recently constructed 17-kilowatt Frankfurt-am-Main station has taken over the channel hitherto used by Leipzig, the latter raising its wavelength to 389.6 metres. The transmitting plant previously used by Münster for the relay of the Cologne programmes is being re-erected at Cassel where, when completed, it will take the Frankfurt broadcasts.

With the reorganisation of the German broadcasting system, a number of alterations are also being made in the programmes and time schedules. In future, with the exception of Saturdays, dance music will only be transmitted until midnight, as against 12.30 a.m. On two nights per week, however, special concerts will be broadcast from that hour for the benefit of Germans living abroad. These transmissions are to be radiated through the Zeesen short-wave station and will be announced in German, English and Spanish.

HUNGARY

It is expected that the 175-kilowatt transmitter which is now under construction at Lakihegy may be brought into operation by the end of the year. Although a definite wavelength for this broadcaster has not yet been fixed there is a likelihood that 210 metres may be used and that two of the three relay stations which are being simultaneously built may adopt the same channel. In the meantime the Budapest programmes are also broadcast on 208.7 metres for the benefit of local listeners. At Magyarovar a small relay station has been installed for experimental purposes; it operates on 210 metres.

FRENCH INDO-CHINA

Every effort is being made by French residents at Saigon for the re-establishment of the news service formerly given out by the short-wave broadcasting station at Chi-Hoa. Owing to the fact that the Governor-

General withdrew the annual subsidy the station was compelled to suspend its transmissions in May last. It is stated that without these daily news bulletins the French-speaking residents in isolated districts "up-country" may remain for weeks in ignorance of the most important happenings concerning their welfare.

ITALY

In view of the fact that the North Italian group of transmitters regularly relays performances from the Scala Opera House, the E.I.A.R., contrary to its previous decision, has now agreed to contribute a substantial annual subsidy to the theatre.

In the near future the ten Italian studios are to be amalgamated into two groups and nightly only two different programmes will be transmitted, as the revenue derived from listeners' licences will not allow the E.I.A.R. to provide separate entertainments from a number of individual stations.

PALESTINE

The first all-Jewish broadcaster was recently opened at Tel-Aviv (Palestine). Programmes are transmitted in both the Hebrew and English languages. Musical entertainments are to be developed and it is likely that a news bulletin will also be broadcast in Arabic.

POLAND

Economic conditions have compelled the Polish Government to cancel all subsidies to the broadcasting studios, thus making the latter entirely dependent on revenue derived from licences.

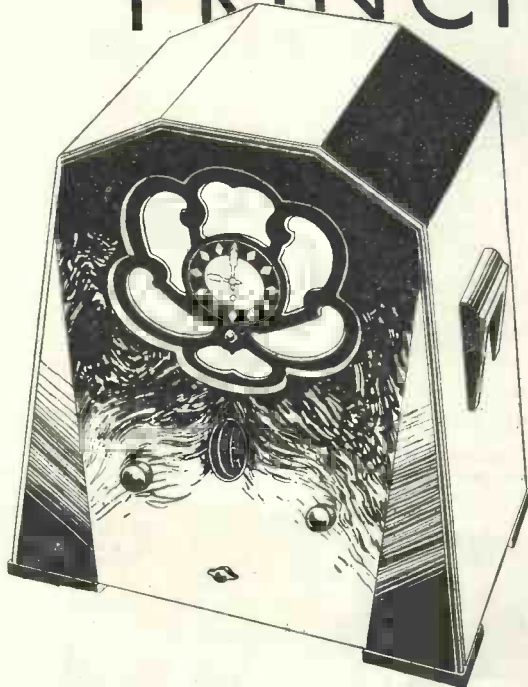
SPAIN

The broadcasting authorities have decreed that all dramatic artists, singers, instrumentalists, and, in fact, any persons engaged or invited to face the microphone, shall prove his or her possession of a listening licence and also show a receipt to the effect that he or she has possessed a wireless receiver for a period of at least six months prior to the broadcast.

BY FERRANTI- THE PERFECTION OF THE SUPER - HETERODYNE PRINCIPLE

Technical men are enthusiastic in their praise of the foresight shown in the design of the Ferranti 7-Valve Super-Heterodyne. This new receiver provides the sharp selectivity and freedom from interference demanded by modern conditions—and something more. For the Ferranti designers realised the vital importance of ensuring that no microphonic vibrations should occur in this super-sensitive super-heterodyne receiver, and made special provision for this purpose. Accordingly, the whole chassis is non-microphonically mounted on resilient rubber. This is just one instance of the care taken in perfecting the Ferranti Super-Heterodyne to the highest standard of efficiency yet attained.

¶ Suitable only for 200/250 volts A.C. supplies having frequencies between 40 and 60 cycles.



The design incorporates the most modern features, including INITIAL H.F. AMPLIFICATION, preventing interference with other sets; VARIABLE MU VALVES, providing the best form of volume control; GANGED CONDENSERS, giving one knob tuning; BAND PASS COUPLING, ensuring high selectivity without loss of high notes; MOVING COIL SPEAKER, for high quality reproduction; TONE CONTROL, to provide sharp or mellow tone at will; ILLUMINATED WAVELENGTH SCALE, giving instant station identification; AUTOMATIC MAINS AERIAL DEVICE, enabling the Receiver to be moved easily from room to room and used wherever an A.C. light or power socket is available; and provision is made for GRAMOPHONE PICK-UP

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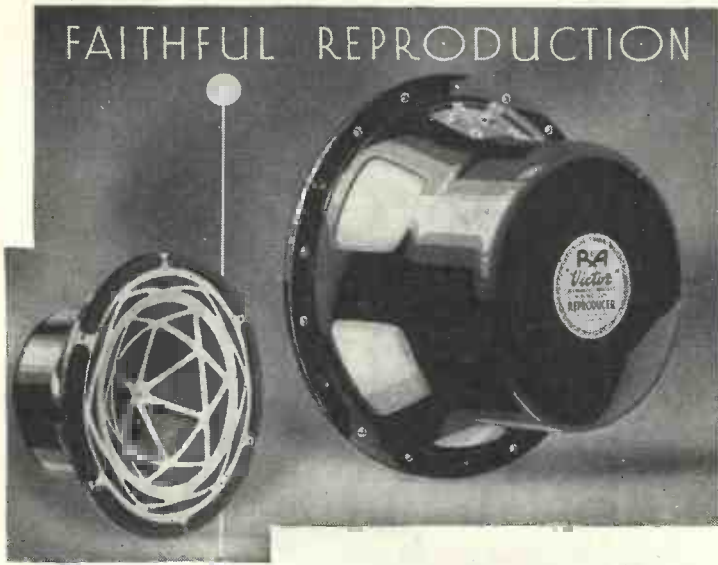
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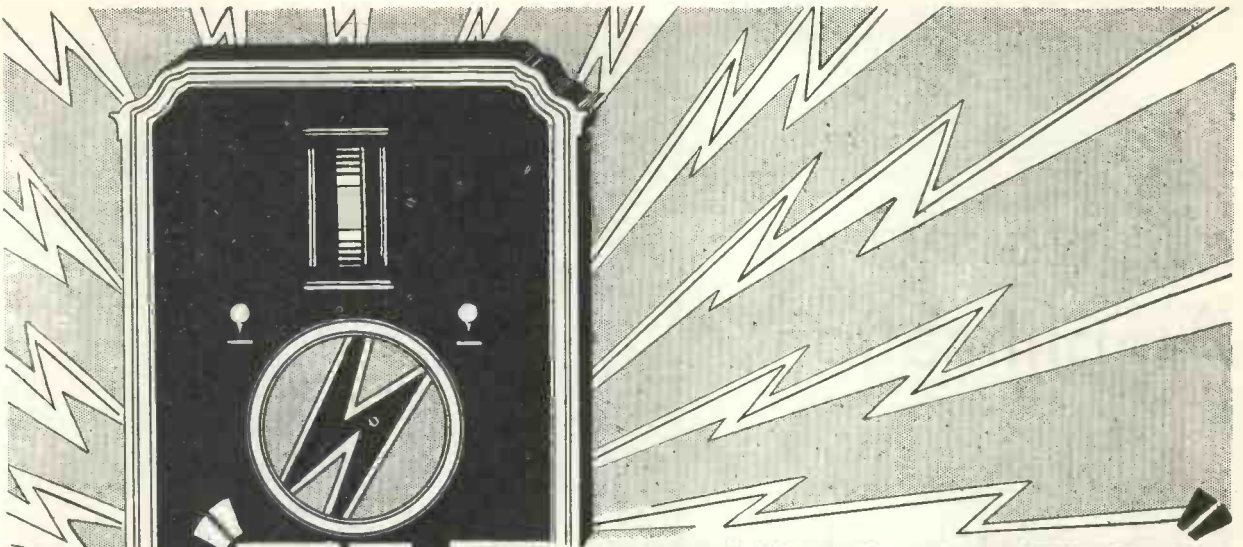
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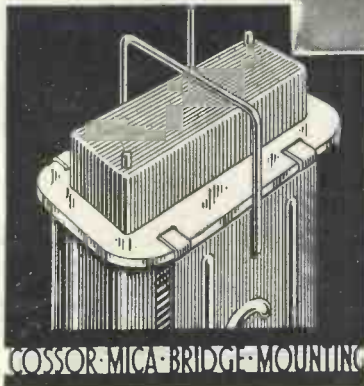
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THE CALIBRATOR



In these pages the "Wireless Magazine" Technical Staff is able to present details of a set with ganged tuning, but definitely without any of the troubles usually associated with a ganged receiver. A special tuning unit is employed and this is so designed that the dial can be calibrated directly in wavelengths—you tune directly to the station you want!

MORE than a year ago the suggestion was made in these pages that it was time for some manufacturer to combine a band-pass coil assembly with a three-gang condenser in one unit. The idea was that the coils and condensers would be matched up at the factory and the whole unit sent out already ganged and sealed.

Careful Experiment

The idea was put up to a number of manufacturers, but none of them showed any real interest and nothing was attempted until the scheme attracted the attention of British Radiophone, Ltd. Several weeks were devoted to careful experimental work before production was started.

In association with the "Wireless Magazine" Technical Staff the chief of the British Radiophone research laboratories has made a number of alterations since the first

experimental model was produced. *The final product represents one of the most outstanding developments in the home-constructor field this autumn.*

The new tuning unit, known as the Radiopak, is a combination of coils and a gang condenser accurately-matched up before they leave the factory. Small trimmers are provided, not because the coils and condensers are not matched to the finest limits, but because they are so accurately matched that variations in valve and circuit capacity are enough to effect the results.

This means that without the

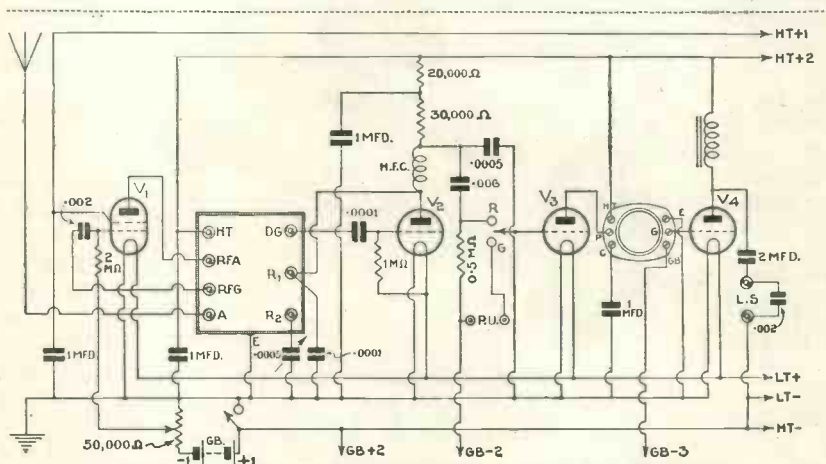
slightest difficulty any constructor can get perfect matching in his Calibrator. The coils and condensers are matched when he receives the Radiopak unit and he has only to make a slight readjustment to the trimmers to allow for stray capacities in the external connections.

Wavelength Calibrations

As the units are absolutely matched up to a standard, it is possible to calibrate the tuning scale directly in wavelengths. This is, of course, a great boon to the listener for it is not then necessary to look up

dial readings in a log before searching for a given station. You simply look up the wavelength and turn the dial at once to the station you want.

The coils used in the Radiopak are somewhat revolutionary, being wound with Litzendraht wire. They are provided with a new form of screen, oval in shape, which is found to



VARIABLE-MU VALVE FOR HIGH-FREQUENCY AMPLIFICATION
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THE CALIBRATOR—Continued

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- 2—Telsen .0001-microfarad, type W240, 2s. (or T.C.C., Dubilier).

- 1—Telsen .0005-microfarad, type W244, 1s. (or T.C.C., Dubilier).

- 2—Telsen .002-microfarad, type W246, 2s. (or T.C.C., Dubilier).

- 1—Telsen .006-microfarad, type W247, 1s. 3d. (or T.C.C., Dubilier).

- 4—Telsen 1-microfarad, 500-volt test type, 9s. (or T.C.C., Dubilier).

- 1—Telsen 2-microfarad, 500-volt test type, 3s. (or T.C.C., Dubilier).

CONDENSER, VARIABLE

- 1—Polar Compax .0005-microfarad, 2s. 9d.

- 1—British Radiophone Knob, 6d.

HOLDERS, GRID-LEAK

- 3—Bulgín, type G6, 1s. 6d. (or Telsen, Lissen).

HOLDERS, VALVE

- 4—Telsen four-pin, solid type, 3s. (or W.B., Lotus).

PLUGS AND TERMINALS

- 8—Belling-Lee wander plugs, marked H.T.+2, H.T.+1, H.T.—, G.B.+ (two), G.B.—1, G.B.—2, G.B.—3, 1s. 4d.

- 2—Belling-Lee spade terminals, marked L.T.+ , L.T.—, 4d. (or Clix, Eelex).

- 2—Belling-Lee terminals, type B, marked I.S., 1s.

RESISTANCES, FIXED

- 1—Dubilier 20,000-ohm metallised, 1-watt type, 1s. (or Claude Lyons).

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- 1—Lissen .5-megohm grid leak, 6d. (or Telsen, Dubilier).

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- 1—Belling-Lee terminal block, 8d.

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- 1—2.5-volt flashlamp bulb.

- 1—Bracket for mounting reaction condenser (Wearite).

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- 1—Ediswan 120-volt super-capacity high-tension type 69728, £1 5s. (or Pertrix, Siemens).

- 2—Ediswan 16-volt grid-bias, type 69805, 4s. (or Pertrix, Siemens).

- 1—C.A.V. 2-volt accumulator, type 2AG9, 12s. 6d. (or Lissen, Exide).

CABINET

- 1—Stenibac radio-gramophone, model 19, in mahogany, £4 15s.

GRAMOPHONE MOTOR

- 1—Cabaret double-spring clockwork, £1 15s.

LOUD-SPEAKER

- 1—Ormond permanent-magnet moving-coil, type R/475, £1 18s. 6d.

PICK-UP

- 1—Harlie, model 36, with volume control, £1 7s. 6d.

VALVES

- 1—Mullard PM12V, 16s. 6d. (or Cossor 220VSG, Marconi VS2).

- 1—Mullard PM1HL, 7s. (or Cossor 210HL, Marconi HL2).

- 1—Mullard PM2DX, 7s. (or Cossor 210LF, Marconi HL2).

- 1—Mullard PM202, 12s. (or Cossor 220P, Marconi P2).

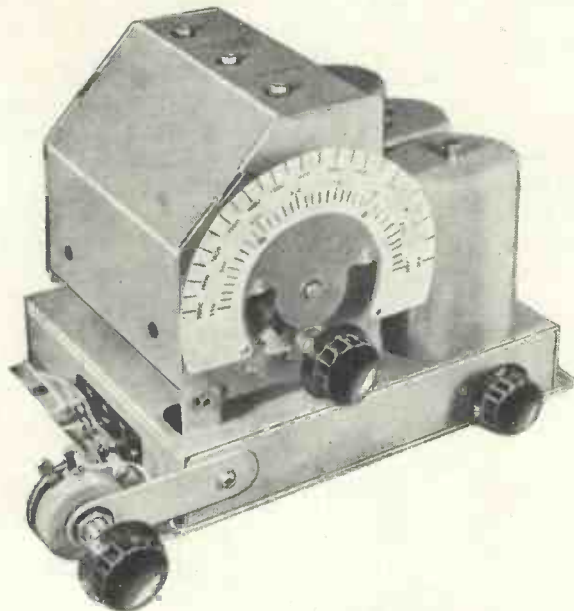
The prices mentioned are those for the parts used in the original set; the prices of alternatives as indicated in the brackets may be either higher or lower

minimise losses. Peaked aerial tuning is employed, the band-pass arrangement being inserted between the high-frequency amplifier and the detector, in which position it is found to be much more efficient.

There is a special form of British Radiophone three-gang condenser in the Radiopak, which is supplied with an escutcheon plate, scale calibrated in wavelengths, pilot-light attachment, wave-change switch, and combined 50,000-ohm wire-wound volume control and 750-watt switch.

Simple Construction

Besides having the advantages of easy ganging and wavelength calibration, the Radiopak also greatly simplifies the construction of any set in which it is used. That much will be clear from the photographs in these pages.

**A REVOLUTIONARY TUNING UNIT**

Great interest was taken in the British Radiophone Radiopak at the Radio Exhibition recently. It comprises a set of three coils specially matched up with a three-gang condenser

It will be seen from the circuit diagram that only seven connections have to be made to the unit, thus

saving time and trouble in assembling the complete set.

With such a revolutionary and efficient unit as the Radiopak at our disposal, it was not an easy matter to decide how to make the best use of it. It obviously had to be built into a set with a minimum of three valves. Experiments were made on these lines and excellent results were obtained. The set was so promising, in fact, that it seemed as if an extra valve would make it really the last word in broadcast receivers.

Selective and Sensitive

Such was found to be the case, and the Calibrator is presented as an exceptionally selective and sensitive four-valver with an outstanding performance. The test report that appears on page 305 is sufficient indication of the possibilities of the set to make most constructors enthusiastic about it.

The general simplicity of the Calibrator will be clear from the circuit diagram. There are no unnecessary frills, yet everything needed to make the set efficient and stable in operation has been included.

The first valve is of the variable-mu type and the 2-megohm grid leak is included, not to produce rectification, but in order to give the valve the required bias. The screen and anode circuits of the valve are provided with 1-microfarad by-pass condensers. The volume-control potentiometer associated with this valve has a resistance of 50,000 ohms, and is connected to a separate grid-bias battery

Tuner Connections

The aerial tuner is actually between the terminals RFG and A on the Radiopak unit, which also includes the three-gang condenser as already explained.

That part of the band-pass tuner for connection between the variable-mu valve and the detector is brought out to terminals RFA and HT on the tuning unit; these points are connected to the variable-mu valve.

The second half of the band-pass

WITH DIAL MARKED IN WAVELENGTHS!

tuner is between DG and E; therefore these points are connected in the grid-filament circuit of the detector valve. The terminals R_1 and R_2 are obviously those for reaction, which in this set is controlled by a .0005-microfarad condenser.

"Power Grid" Detector

The detector has "power grid" values of condenser and leak, namely, .0001 microfarad and 1 megohm. A further .0001-microfarad condenser is placed between anode and filament to act as a high-frequency by-pass.

The detector is resistance-coupled to the first low-frequency amplifier, the resistance being of 30,000 ohms and the condenser of .006 microfarad. In the anode circuit of the detector valve there is also a high-frequency choke and a decoupling resistance of 20,000 ohms. With the latter is associated a by-pass condenser of 1 microfarad.

In the grid circuit of the first low-frequency valve is the gramo-radio switch, actually mounted on the motorboard. The coupling between the low-frequency amplifier and the power valve is made by means of a resistance-fed transformer, the "feed" elements being enclosed in the same case as the transformer windings.

Stability is further helped by the use of a choke-capacity loud-speaker filter arrangement in the anode circuit of the power valve.

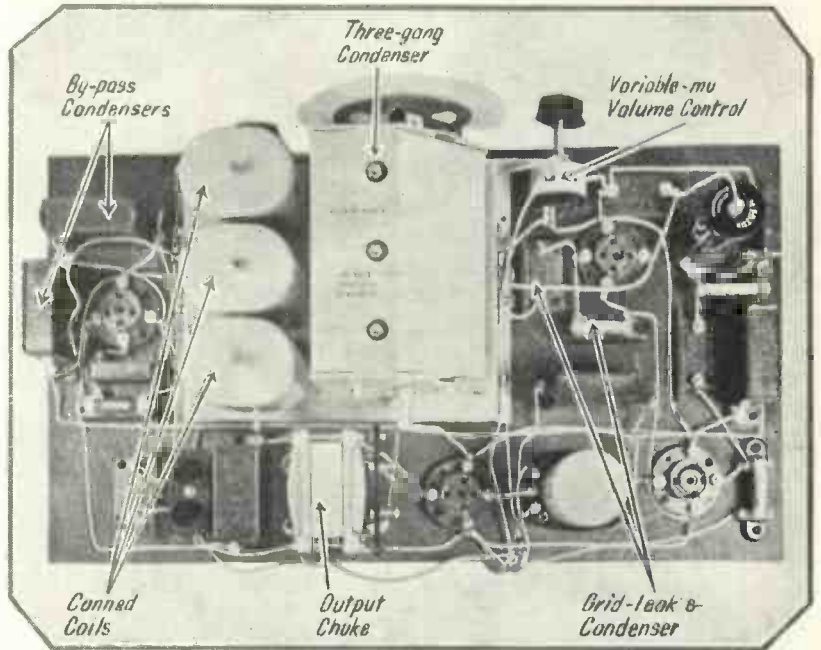
A .002-microfarad by-pass condenser placed directly across the loud-speaker prevents any possibility of high-frequency feedback.

The actual construction of the set is particularly straightforward for the type of circuit and it is not likely that any difficulties will be encountered in the assembly. Every detail needed for the construction of the Calibrator is included in these pages, but those who desire one can obtain a full-size

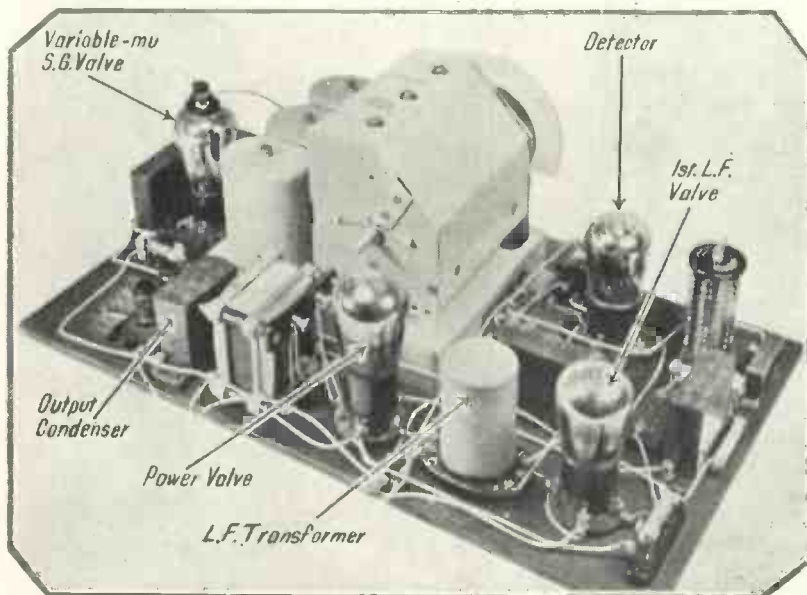
blueprint for half price, that is 9d., post free, if the coupon on the last page of the issue is used by October 31.

Address your application to "Wireless Magazine" Blueprint Dept., 58-61 Fetter Lane, London, E.C.4, and ask for No. WM300.

Looking from the front of the set, it will be seen that the layout is a little unusual. The three-gang condenser is on the left of the Radiopak assembly and the coils on the right.



EVERY PART IS EASILY ACCESSIBLE
This plan view of the Calibrator shows how easily the parts can be arranged on the baseboard. There is no difficulty about construction.



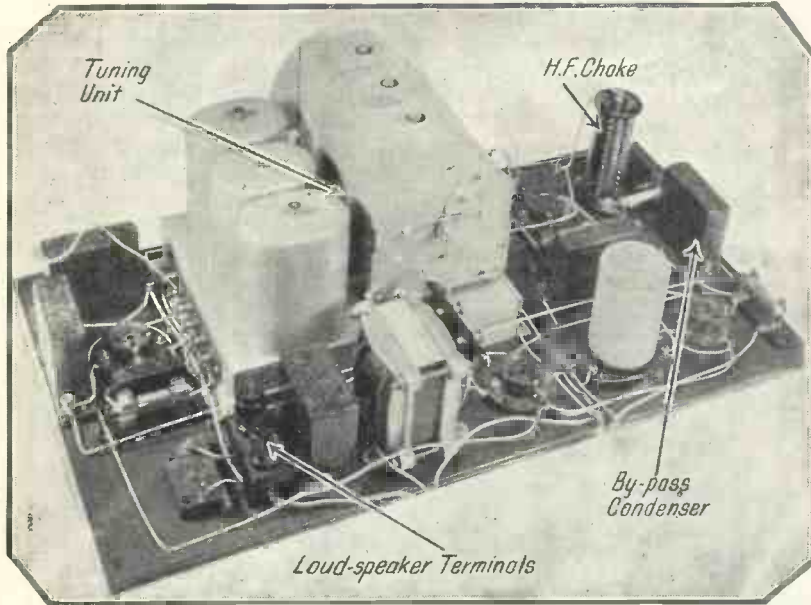
COMPLETELY ASSEMBLED SET WITH VALVES IN POSITION
Another view of the Calibrator, which has a tuning dial calibrated directly in wavelengths. The set has no ganging troubles and is particularly selective.

In order to keep the leads short, the variable-mu high-frequency valve is placed close to the coils at the right-hand end of the baseboard. The detector valve is placed at the left of the baseboard, where the other terminals to the coil unit are easily accessible. In the left-hand corner (remote from the front) is arranged the first low-frequency amplifying valve, while the coupling transformer, power valve, and choke-output parts are arranged in line along the back of the baseboard.

Simple Assembly

It will be evident that every part is quite accessible and that there will be no trouble in screwing the various components in position ready for wiring. Here the blueprint will prove invaluable, for each wire is numbered separately and can be easily followed

THE CALIBRATOR—Continued



CLEAN APPEARANCE—MODERN CONCEPTION

This view of the Calibrator shows its neat appearance. Note how the combination assembly for the coils and gang condenser simplifies construction

the combined volume - control potentiometer and on-off switch, in the centre the main tuning control, and on the right the knob of the wave-change switch.

Reaction Control

The Calibrator also needs an additional reaction control; for convenience in operation and to preserve a symmetrical front layout, the reaction condenser has been mounted on a bracket underneath the base-board and the knob appears directly under the main tuning control.

Care should be taken to see that the screws for fixing the bracket for the reaction condenser do not short-circuit on to the chassis of the Radiopak.

Easy "Trimming"

The "trimming" of the set will not prove to be at all difficult. As has already been pointed out, the coils and condensers will have been accurately matched before the unit leaves the factory. A very small amount of trimming only will be needed on the finished set to allow for stray circuit capacities.

The best procedure is to tune the set to a fairly loud signal of which the wavelength is known. Suppose that it is Mid and Regional
(Continued on page 306)

(a quarter-scale layout and wiring diagram appears on page 306).

It will be seen that each wire on the blueprint has its own number.

list of components that appears on page 302.

It is advisable not to attempt to run a set of this type from small capacity dry batteries, for they will not give good service. The battery used should be



EQUIPMENT FOR PLAYING RECORDS

The motorboard of the completed Calibrator, an up-to-date four-valver that will pick up dozens of stations at good strength

These numbers indicate the best and most convenient order of making the connections. In practice, the constructor starts off with lead No. 1; crosses through the corresponding number on the blueprint when the connection has been made; and then carries on in the proper numerical sequence until the receiver is completely connected.

Suitable valves for the Calibrator are now available in almost every manufacturer's range, and a number of alternatives are indicated in the

at least of the double-capacity type, if not a triple-capacity model. The point to remember is that the larger the battery, the more economical will the set be found in operation.

The operation of the Calibrator is quite straightforward. There are three controls on the Radiopak itself: on the left the knob of



ATTRACTIVE CABINET

A set like the Calibrator deserves a good cabinet. Here you see the attractive nature of the completed assembly

What the Calibrator Did on Test

IN the three hours this set was on test, I formed very favourable ideas of its capabilities. At a distance of twenty miles from Brookman's Park I naturally expected the set to be sufficiently selective to dispose of the local stations with a short twist of the dial.

Regionals Clear

I was not mistaken. Scottish Regional (376.4 metres) was clear of London Regional (355.9 metres) using a fairly large outdoor aerial.

Let me say at once that I received nearly forty stations on the medium waveband and ten on the long. Actually, I do not attach much importance to the number of stations received, although it does prove that the set is sensitive. Selectivity combined with sensitivity is the point that matters nowadays.

Daylight Reception

The following points were noted, using the outdoor aerial. Between 6 p.m. and 7 p.m., during daylight, I logged Brussels No. 1 and No. 2, Langenberg, and North, Midland and Scottish Regionals at sufficient strength to meet the ordinary listener's needs. Considering the distance between London and these stations, I think it is fairly safe to assume that this set will give good results at most places in the country.

When it was nearly dark I started the test in earnest. The long waveband was tried first. Kaunas on 1,935 metres was heard, but not at full loud-speaker strength. Hilversum, Radio Paris, and Daventry were all received clear of mutual interference and at good strength. Occasionally there was a little morse which spoilt reception of Hilversum. Zeesen could be heard almost clear, except for slight sideband twitter from its neighbours.

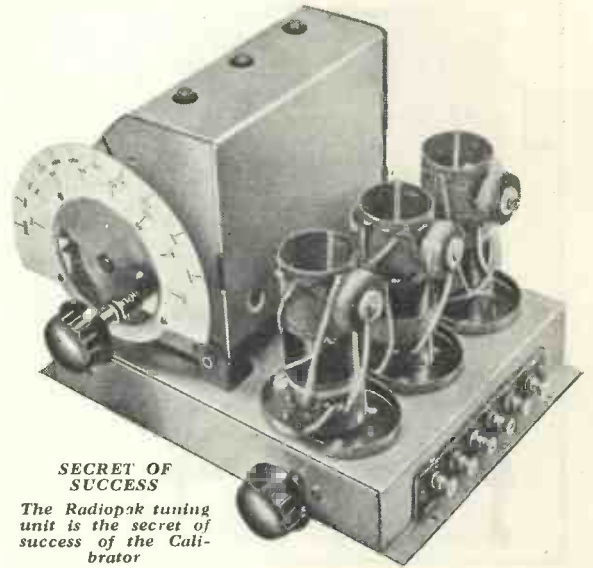
Most of the other stations on this waveband

(given in the log) were heard at reasonable strength, but some were useless for entertainment purposes. Morse and atmospherics were the prime causes of the trouble.

Leningrad was a strong signal on 1,000 metres.

On the medium waveband the same remarkable degree of selectivity and sensitivity was noticeable. Separating adjacent high-power stations was found to be quite easy.

Stations directly adjacent to London Regional and National, however, could not be separated. Reception of Prague, North Regional, and Langenberg was very interesting. Prague and Langenberg were very strong signals and did not fade, yet North Regional completely disappeared at intervals. Yet in daylight the latter station was a reliable signal.



SECRET OF SUCCESS
The Radiopak tuning unit is the secret of success of the Calibrator

Rome and Stockholm, Sottens and Midland Regional, and other pairs of adjacent high-power transmitters were heard clear of one another. To give a conservative estimate, I should say that the Calibrator will give a selection of fifteen or twenty stations on the medium and five on the long waveband, *entirely free of interference.*

The constructor who wishes to log as many stations as possible, with or without interference, should get fifty or sixty stations under good conditions.

Indoor Aerial

Using a 12-ft. indoor aerial—of course, the trimmers on the tuning unit were re-adjusted—results were satisfactory. London National and Regional were heard at full strength and many foreign stations at pleasant listening strength. North and Midland Regional were also logged.

The set was extremely easy to handle. Every control worked smoothly and reaction was also smooth.

To summarise, the set is sufficiently selective for modern conditions, easy to handle, and should give good service. T. F. H.

LOG OF THE CALIBRATOR

LONG WAVEBAND

Station	Wavelength	Station	Wavelength
Leningrad	1,000	Zeesen (not clear)	1,635
Kalunaborg	1,153	Radio Paris	1,725
Motala	1,348	Huizen	1,875
Eiffel Tower	1,445	Kaunas	1,935
Daventry National	1,554		

MEDIUM WAVEBAND

Fécamp	226	Bucharest	394
Trieste	247	Midland Regional	399
Leipsig	259	Sottens	403
London National	261	Katowice	408
Heilsberg	276	Stockholm	435
Scottish National	288	Rome	441
Hilversum	296	Paris PTT	447
North National	301	Beromuenster	459
Bordeaux	305	Lyons PTT	466
Poste Parisien	328	Langenberg	472
Brussels No. 2	338	North Regional	480
Strasbourg	345	Prague	488.6
London Regional	356	Florence	500
Hamburg	372	Brussels No. 1	509
Scottish Regional	376	Vienna	517
Lvov	381	Budapest	550
Toulouse	384		

THE CALIBRATOR—Continued



LOUD-SPEAKER AND BATTERIES
The back of the Calibrator showing how the loud-speaker and batteries are enclosed in the cabinet

on 399 metres and the actual reading shown on the dial is above or below this wavelength. The next thing to do is to adjust the first trimmer on the Radiopak (that is the trimmer nearest the front of the set) until the dial shows the correct reading.

Simply turn the trimmer slowly and at the same time twist the dial until the transmission is tuned at its maximum strength when the dial is adjusted to the proper wavelength setting.

Perfect Matching

Once the dial has been adjusted to read the right wavelength on the aerial side, the second and third trimmers should be adjusted until the best signals are received. There will be no difficulty about this, for the coils in the first place have been matched up with the condenser and only a very slight alteration in capacity will be needed to give perfect matching.

The trouble with many sets that have separate coils and a gang condenser is that the trimming variations are not sufficiently wide to enable the

coils to be ganged up properly. In the case of the Radiopak this is absolutely avoided.

The wave-change switch is clearly marked and the operator will have no trouble about deciding whether he is adjusted to the medium or the long wave-band. When the knob of the volume control is turned as far as possible to the left the on-off switch is actuated and the set is switched off. As the knob is turned to the right, the set is first switched on and the volume is then progressively increased until it reaches the maximum.

As has already been mentioned, the gramophone - radio switch is mounted on the motorboard. This has been done to preserve the symmetry of the front of the set.

The connections to this switch are clearly indicated on the blueprint. The pick-up specified incorporates its own volume control, so that the wiring of the pick-up automatically includes the volume control in circuit. If a different pick-up with-

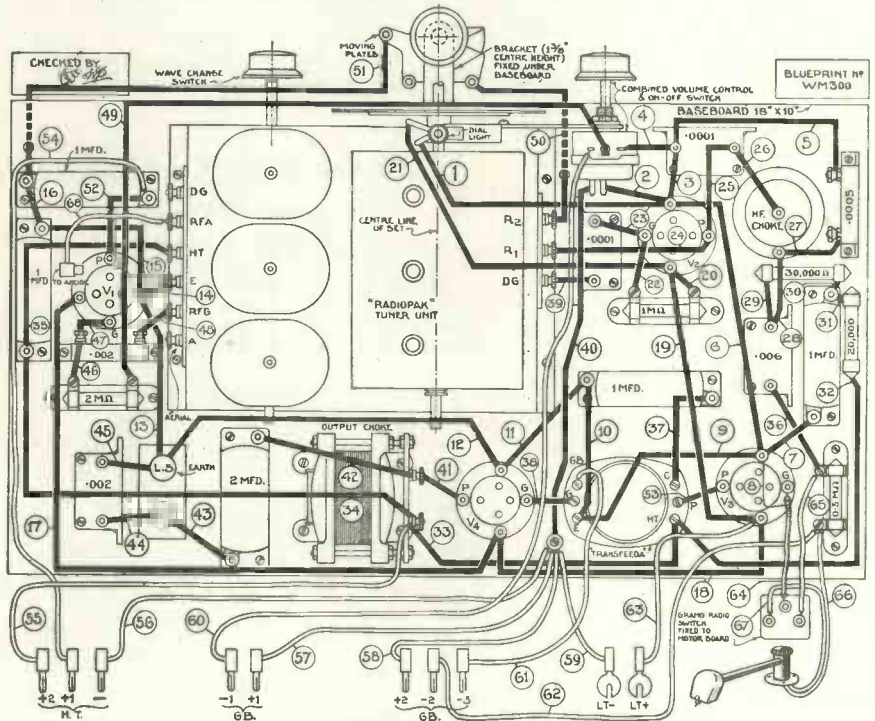
out a volume control is utilised it will be necessary to mount a separate potentiometer on the motorboard and also to connect it up separately.

After reading the test report that appears on page 305, constructors will have no doubts regarding the possibilities of the Calibrator. It is the ideal screen-grid four-valver for use in the winter months and will give satisfactory reception from stations all over Europe.

Good Bag Assured

Used in conjunction with the Station Finder given free with this issue of "Wireless Magazine," the Calibrator will enable the enthusiastic listener to bag all the transmissions he can reasonably desire. The scale of the Calibrator is divided off by wavelengths and the Station Finder will enable you to recognise very quickly any station you pick up.

Readers are reminded that half a guinea is paid for each photograph of a home-constructed "Wireless Magazine" receiver to be published in these pages. So send along your snapshots of the Calibrator—and your test reports! We shall be glad to have both.



QUARTER-SCALE LAYOUT AND WIRING DIAGRAM

A full-size blueprint can be obtained for half price, that is, 9d., post free, if the coupon on the last page is used by October 31. Ask for No. WM300. Wire up in the numerical order indicated

Locating Metal Pipes by Radio!

Simple Experiments Explained by
E. H. CHAPMAN, M.A., D.Sc.

HAVE you ever had occasion to dig for, or to pay somebody else to dig for, a lost water-pipe or gas-pipe in the road or in the grounds round your house? Such pipes have been laid and then mislaid, so to speak, in innumerable instances, and to locate a lost pipe by digging may prove an expensive business.

Simple Radio Method

There is, however, a simple way of finding a lost water-pipe, gas-pipe, metal sewer, or, in fact, a metal pipe of any description, and that is by the use of radio.

Although there may be a good deal of doubt as to whether metallic-ore bodies at depths of a few hundred feet can be found by wireless waves, there is absolutely no doubt what-

ever that metal pipes a few feet in the ground can be located, to an inch, one might almost say, by radio.

Experimenters who are familiar with direction-finding apparatus are aware that a mass of metal buried in

for that matter, but the results obtained would not be quite so precise as those which can be obtained with other apparatus.

In the application of wireless methods to the location of ore bodies

TABLE I

	First adjustment		Second adjustment	
	Normal position on footpath ..	10	10	11
Over pipe	45	42-44	43-47	60-65

the ground may cause large errors in the compass bearings taken of distant stations.

Direction-finding apparatus may well be used to locate pipes in the ground, or even shallow ore bodies

in the earth's crust, there are several very difficult problems. The most difficult is the problem of penetration. How far does a wireless wave penetrate into the ground over which it travels?

Whilst working on this difficult problem of penetration, I built a piece of wireless apparatus by means of which a buried pipe could most easily be located.

Details of Apparatus

Briefly, the apparatus consists of a carefully screened frame aerial, a stage of high-frequency amplification using a screen-grid valve with transformer coupling, and a specially designed type of valve voltmeter.

The actual measuring instrument is a sensitive galvanometer, the dial of which is divided into 120 equal scale divisions. The whole of the apparatus is assembled in portable form.

Position of Pipe

Fig. 1 is a plan showing the position of a galvanised-iron gas-pipe in the road outside my house. This pipe is of 2 in. diameter and it is buried at a depth of 18 in.

The actual geographical direction of the pipe is 35 degrees east of south. The direction of Daventry is 15 degrees east of south, and the direction of Moorside Edge is almost exactly opposite, namely 15 degrees west of north. It will be seen, therefore, that the waves from the four

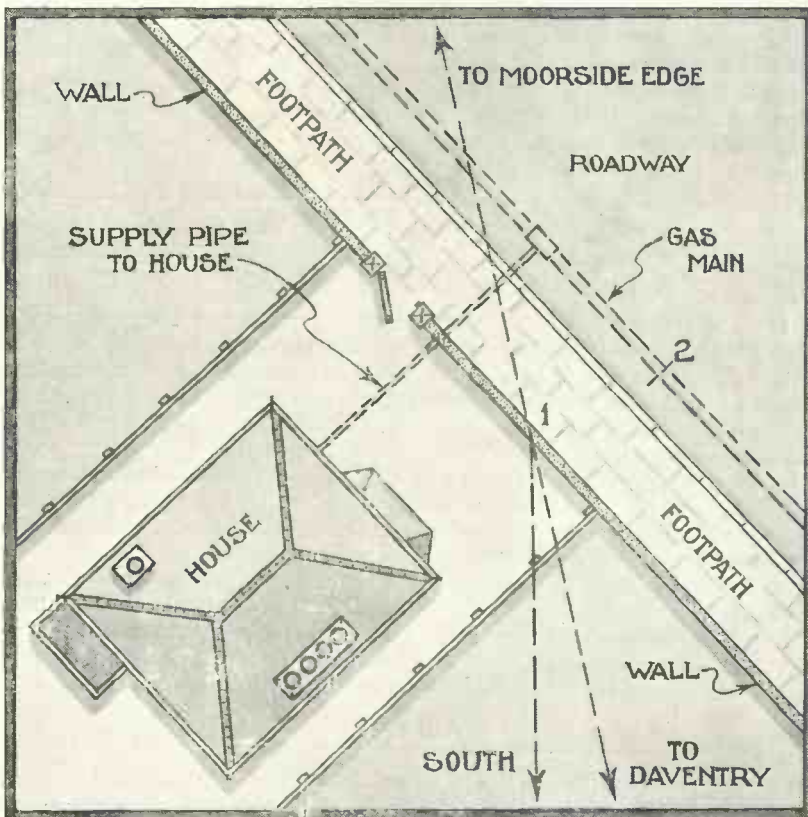


Fig. 1.—Plan showing position of gas main in roadway outside house. Daventry National, Midland Regional, North National and North National all cross the pipe at an angle of 20 degrees

LOCATING METAL PIPES!—Continued

transmitters—Daventry National, Midland Regional, North Regional and North National—all cross the pipe at the same angle, 20 degrees.

The first attempt to observe the difference in reading of the apparatus between a normal position and a position over the gas-pipe was made with the apparatus tuned to the North Regional transmitter. The normal position is shown as position 1 in the plan of Fig. 1, and the position over the pipe is shown as position 2. The readings were as

the North National transmission, the readings over the pipe are roughly two and a half times the normal readings.

The Midland Regional readings are scarcely comparable with the readings for North Regional and North National, for the Midland Regional transmitter is much more distant and, moreover, has only half the power of the other two transmitters.

From Table II it is clear that the effect of a buried pipe is greater the

effect of the pipe is felt for a distance of 4 ft. either side of it.

As a further test, the apparatus was taken to a road under which one of the main pipes of the Derwent Valley Water Board passes. This pipe is of 45 in. diameter and it is buried at a depth of 42 in. to the top of the pipe. The pipe runs almost in the direction of Daventry.

Further Observations

With the apparatus tuned to Daventry National and set to the same degree of sensitivity as when the readings of Table III were taken, the observations of Table IV were made.

This increase in reading of 15 on 22, or roughly two-thirds, is small compared with the tenfold increase over the small gas-pipe as shown in Table III, and illustrated in Fig. 2. Is this small increase over a comparatively large pipe at a depth of 3½ ft. of any significance?

To me, the great difference obtained in the effect of a small pipe at a depth of 1½ ft., and a large pipe at a depth of 3½ ft. can point to one thing only, and that is that the wave of Daventry National does not penetrate to more than 10 or 15 ft. in the ground in this district.

Is there anything unusual in this conclusion? It is on record some-

TABLE II

	North Regional	Midland Regional	North National
Normal position 1 ..	20 14 10	30 19 10	44 27 17
Over pipe, position 2 ..	67 56 42	63 38 23	92 63 41

in Table I.

We have in Table I a somewhat remarkable result. With this piece of wireless apparatus, the received strength of the North Regional transmitter, forty miles away, is increased four times by placing the apparatus over a buried gas-pipe.

Sunset Effect

The swinging of the readings in three out of the four sets of readings given in Table I was due to the fact that the observations were taken within the half-hour before sunset.

The next readings to be taken with the apparatus were taken in the afternoon and early evening on the three transmissions—North Regional, Midland Regional, and North National. These readings are given in Table II.

It is perhaps necessary to explain that the readings were made with the apparatus adjusted to different degrees of sensitivity, or, as we should say in wireless, to different degrees of amplification. This varying degree of sensitivity is one of the valuable features of the apparatus, and one which makes it suitable for numerous purposes in work of this kind.

North Reg. Readings

Now there is one very striking point about the readings given in Table II. For the North Regional transmission the readings over the pipe are roughly four times the readings in the normal position. For

longer the wavelength of the transmission used. Accordingly, in the next observations made with the apparatus, the Daventry National transmission was used.

The readings obtained on this transmission were quite astonishing. In the normal position, the reading of the galvanometer was 11 scale divisions. Over the pipe the reading was 110 scale divisions, that is, ten times as great as the reading in the normal position. It sounds almost incredible, but nevertheless it is true.

TABLE III

Over Footpath	Pipe	Over Road
11 11 12 15 21 35 78	110	92 55 30 22 15 12 13

With this simple piece of apparatus, the strength of Daventry National is increased ten times by the mere placing of the apparatus over a buried gas-pipe.

So interesting were these Daventry National figures that a series of readings were taken across the road at intervals of one foot, the pipe being crossed at right angles. The readings are given in Table III.

The observations given in Table III are illustrated graphically in Fig. 2. It should be noted that the

where that experiments with submerged submarines have proved that wireless waves will not penetrate more than 50 ft. into seawater. This depth of penetration, however, probably varies with the wavelength used, and with the sensitivity of the receiving apparatus on board the submarine.

Some years ago experiments were made in the Montreal railway tunnel. These experiments showed that a wave of 40 metres was comparatively weak in penetrating power, and that

TABLE IV

100 ft. to East	Pipe	100 ft. to West
22	37	22

INTERESTING RADIO EXPERIMENTS

a wave of 400 metres penetrated much further, whilst a wave of 10,000 metres had far and away the greatest penetrating power of the waves tried.

My experiments seem to agree with the Montreal results. Over a gas-pipe buried 18 in. in the ground, I have obtained with Daventry National a signal strength of ten times normal, with North Regional a strength of four times normal, and with North National a signal strength of two-and-a-half times normal. Thus, as the wavelength is decreased, the effect over the pipe is decreased.

Low Wavelengths

It seems reasonable to conclude from these figures that the lower the wavelength, the less the penetrative power of the wave into the ground.

The apparatus by which the results described in this article have been obtained provides a very simple means of proving this rather important truth regarding the power of penetration of the waves used in our broadcasting service.

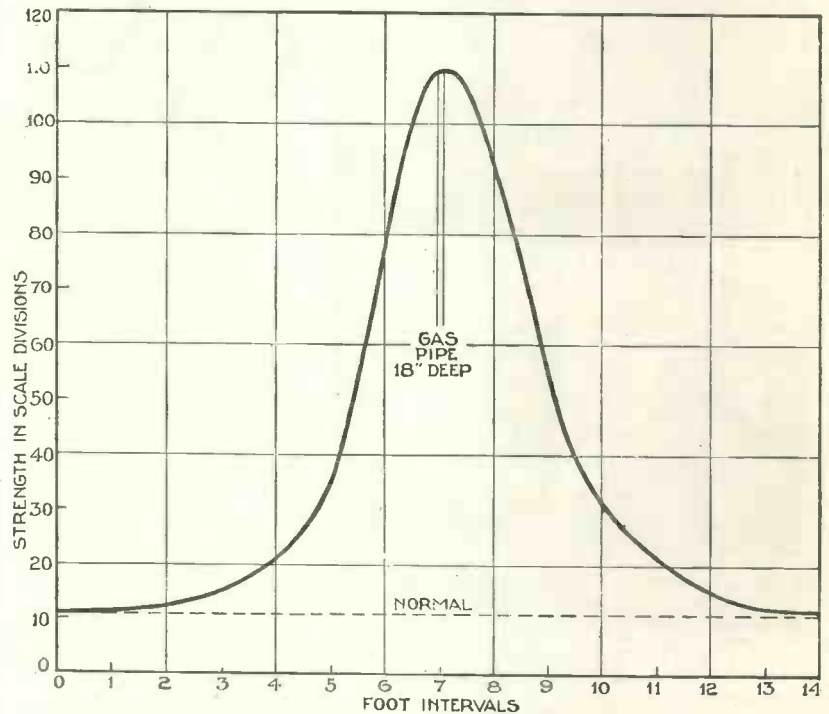


Fig. 2.—Graphic illustration of the results tabulated in Table III. Note how the strength falls off at a distance of 4 ft. from the pipe

Are You An Early Morning Listener ?

I WONDER how many listeners are taking advantage of the wide scope offered by the modern radio receiver. The days of crystal and one-valve sets are almost gone and in their place we have the multi-valve set that enables us to bring in on our loud-speaker the Continent at leisure and by day or night.

Lesser Known Concerts

In these notes I would draw your attention to a few of the lesser-known concerts radiated by popular Continental stations which are really worth the trouble of tuning-in.

Berlin on 1,634.9 metres broadcasts a pleasant light orchestral concert every morning between 7.0 and 8.0 a.m. and occasionally Langenberg (472.4 metres) can also be identified at the same time by its tuneful orchestral music.

The two "star turns" in the early morning are provided by the Dutch twins, Huizen and Hilversum, which are to be found on 1,875 and 296.1 metres respectively. Every three

months the programmes, which are provided by different religious organisations, change wavelengths.

The concerts from both these stations are given every morning starting at 7.40 a.m. and consist almost solely of gramophone records. Hilversum specialises in light music and variety, and Huizen is inclined to favour the classical-music lovers.

Nearly every morning Hilversum broadcasts one of Tauber's records. Richard Tauber, the great German tenor, is apparently very popular with Continental listeners.

One can always be assured of tuning-in to versatile programmes in which English records play a prominent part. Very frequently Hilversum broadcasts from 8.40 a.m.

onwards a trio or quartet concert which consists mainly of light classical works.

Both of these Dutch stations are easy to receive in most parts of the country. Any three-valver of fair merit should bring them in at full loud-speaker strength.

Late Evenings

In the late evenings two French stations can be heard broadcasting concerts which, although they contain a certain amount of advertising material, make pleasant listening. Toulouse radiates a special concert for Britishers from midnight till 12.30 a.m., and Fécamp can be heard right until 1.0 a.m., and on Monday morning until 3.0 a.m. Here, again, gramophone records of dance music and variety play a large part in the concerts.

Madrid is always on the ether until the small hours of the morning, but its signals can never be relied upon to provide care-free listening.

T. F. Henn

Tell your friends about the useful Station Finder given free with this issue of "Wireless Magazine."



THE B.B.C.'S TELEVISION STUDIO
Studio BB at Broadcasting House, normally used for dance-band performances, has been adapted for the new television transmissions

B.B.C. Television

There is considerable interest in the possibilities of the new B.B.C. television transmissions now being transmitted by the Baird system. In these notes ALAN HUNTER explains what is being done

television broadcasts that started on August 22. From now on we shall have four television broadcasts every week. The nights fixed are Mondays, Tuesdays, Wednesdays and Fridays, from 11 until 11.30 p.m. Sound will be transmitted from Midland Regional and accompanying vision from London National.

The choice of these two stations for the

In the present state of the art an ordinary studio, of average size, with a suitable white screen erected to form a background for the artists, serves perfectly. The adjoining listening rooms can be used to house the television apparatus, and the scanning device can be fitted up through the window of the listening room so that it projects on to the "televised" broadcaster.

Suited for Television

It is necessary to make all this clear, because in the present series of tests the dance band studio, known as BB, is brought into service. Studio BB is admirably suited to television, because it has the requisite listening room and it is about the right size.

The only difference noted during a television broadcast is the white screen, measuring approximately 7 ft. by 4 ft. wide, erected 3 or 4 ft. from the window of the listening room, through which the scanning is done.

Subtle lighting effects have to

SOME idea of the excellent impression created on B.B.C. engineers by the latest Baird television, described by D. Sisson Relph in these pages two months ago, may be gathered from the elaborate plans that have now been made at Portland Place in connection with television broadcasts.

Ever since television was first mooted as an auxiliary to sound broadcasting the B.B.C. has insisted on its function of true service to the listener, an insistence that has often annoyed those who would have liked to use the broadcast system as a means of experimenting with television apparatus.

Stumbling Block

The crudity of the images has always been the real stumbling block of *liaison* between the B.B.C. and the Baird Company. Now, with the introduction of the latest televisor, providing recognisable images of some entertainment value, there is nothing to stop the B.B.C. from making the most of the present state of television development.

Although a long way from perfect, the present images do certainly warrant serious attention.

This is fully realised by the B.B.C., as is proved by the new series of

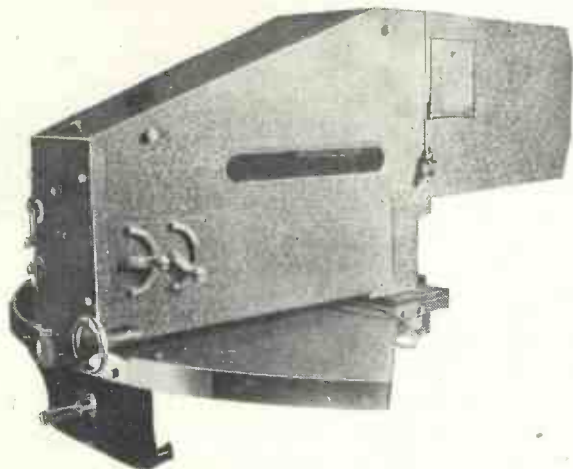
experimental broadcasts has to a large extent been forced on the B.B.C. They are the only two stations to spare. Normally, during periods used for television, these two stations would have closed down.

Most London listeners can bring in Midland Regional at satisfactory strength, though it is not so easy for listeners in the Midlands to get the London National.

In spite of the fact that television experimenters must rely on at least one of the two stations coming in from outside their reliable service area, it is thought that the present arrangements will serve for the present.

Later, other stations will almost certainly be brought into action.

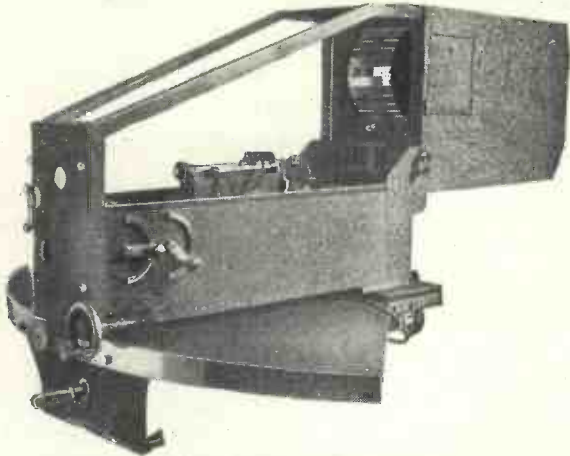
Although no provision was made during the design of Broadcasting House for television on a large scale most of the studios in the famous control tower are quite suitable for television broadcasts.



SPOT-LIGHT TELEVISION TRANSMITTER
This is the new Baird spot-light television transmitter that has been installed at Broadcasting House

go by the board during the television sessions. Apart from the candle light of the pianist the studio is in darkness, so that the subject can be explored with the spot of light from the transmitter.

The very latest thing in Baird television transmitting gear has been installed, utilising the mirror-drum system of scanning, building up 12½ images per second. Although installed by the Baird Company, this apparatus is now in sole control of B.B.C. engineers.



MIRROR DRUM FOR SCANNING
On the right can be seen the mirror drum for scanning. The arc light is in the centre

The importance now attached to television at Portland Place is clearly shown by the fact that Mr. H. Bishop, the Assistant Chief Engineer of the B.B.C., is in charge of operations, with Mr. D. C. Birkinshaw assisting him.

Baird Experiments

These and other engineers will devote considerable time to the television transmitter, and in the future may incorporate modifications and improvements discovered by actual experience. There will be ample opportunity for such development, as the B.B.C. is committed to the Baird process for at least two years.

And we must not overlook the possibilities of further improvement coming from the Baird people, who are transmitting almost every day on the 6-metre waveband.

Apart from the technical work

being done on television the B.B.C. is investigating the artistic possibilities. Mr. Val Gielgud, who is the Productions Director of the B.B.C., is taking a personal interest in the programmes being televised.

Suitable Items

He suggests that in the present state of technical development such things as caricatures, cartoons, funny faces, and individual artists will be most suitable, though experiments with the song-and-dance type of broadcast—shades of Ridgeway!—will be carried out in due course.

Under Mr. Gielgud, who has, of course, a tremendous amount of work to do anyway, there will be Mr. Robb, late of the Vocalion Company. This newcomer to Portland Place will devote much time to the arrangement of the artists figuring in the television broadcasts. Animals as well as humans are

being televised.

On the expert advice of Mr. Willie Clarkson, who has forgotten more about "make-up" than most people ever know, the broadcast artists will make up very heavily. Grease paint will, in fact, be laid on with the trowel to give the best contrast in the black-and-white images built up on the new Baird televisor receiving sets.

With so much work being done by the B.B.C. to further the science of television there will be a great incentive for listeners to investigate problems of reception.

The lack of enthusiasm of the B.B.C. in the past can no longer be cited as an excuse for the delay of perfected television. If the present system has inherently perfect possibilities the new series of transmissions will bring them to light.

Do not forget the publishing date for the next issue of "Wireless Magazine"—it will be on sale everywhere on Friday, October 21. In order to make certain of getting a copy it is advisable to order from your newsagent beforehand; he can then anticipate the local demand and order adequate supplies to meet it

Stories of the Operas

TOSCA (Puccini)

CHARACTERS

FLORIA TOSCA, a singer	Soprano
MARIO CAVARODOSI, a painter	Tenor
BARON SCARPIA, Chief of Police	Baritone
CESARE ANGELOTTI	Bass
A SACRISTAN	Baritone
SPOLETTA, police agent	Tenor
SCIARRONE, a gendarme	Bass
A GAOLER	Bass
A SHEPHERD BOY	Contralto

Time: June, 1800. Place: Rome.

ACT I

A church. Enter Angelotti, escaped from prison and seeking sanctuary, who discovers key to chapel and hides therein. Enter the Sacristan, who is cleaning the church. Finds Cavarodossi not at his easel; wonders who it was he saw enter the church. The Angelus. The Sacristan kneels. Cavarodossi enters and uncovers painting, a Madonna, but also really a picture of a woman who comes to the church.

Angelotti hearing nothing—the Painter is now at work—comes out of his hiding-place; recognition and promise of help from the Painter. Tosca is heard singing and is admitted. The Painter asks her to leave him as he is busy; she is angry. She goes, and Angelotti is let out of the chapel again.

A cannon shot from the castle announces the discovery of Angelotti's escape. Scarpia, Chief of Police, enters and searches the chapel. He finds an empty food-basket. The Sacristan says it is the Painter's and that the latter said he would not eat anything. Scarpia realises that he has helped Angelotti.

Tosca looks at the picture and recognises the portrait of a Marchioness. She is jealous. Scarpia, who secretly loves Tosca, insinuates that Cavarodossi is in love with his subject.

ACT II

Scarpia's apartments in the Farnese Palace. Cavarodossi is borne in as a prisoner. He has been tortured in order to wring from him the secret of Angelotti's hiding-place. Scarpia commands Spoletta to go to the well in Cavarodossi's garden, where Angelotti has hidden. The Painter knows Tosca has told him, as no one else knew.

Scarpia tells Tosca the only way to save Cavarodossi is for her to marry him (Scarpia). She demands safe conduct for the Painter. As Scarpia writes she secretes a knife in the folds of her robes. He gives her the paper and claims her. She stabs him.

ACT III

A platform in the Castle. The Painter is condemned to death. Tosca, allowed to see him, tells him all, and that Scarpia has ordered a mock execution. She tells him to fall at the sound of the rifles. He does so—but the execution is real, not sham. She hurls herself from the platform to instant death.

WHITAKER-WILSON

The Prosperity Three



THREE VERSIONS—for Batteries, A.C. and D.C. Mains THREE WAVE RANGES—Short, Medium and Long

VERY considerable interest is being taken throughout the constructor world in the three versions of the Prosperity Three described in the September issue of "Wireless Magazine." All three sets were on view at the Radio Exhibition and great interest was shown in such a revolutionary scheme.

Valve Combination

Each set is a distinct version of the same basic circuit and is a combination of a variable- μ high-frequency amplifier, leaky-grid detector, and a transformer-coupled pentode.

All three sets cover four wavebands, namely, from (1) 15 to 35 metres, (2) 35 to 80 metres, (3) 230 to 550 metres, and (4) 1,000 to 2,000 metres. These wave ranges are obtained by means of a single switch and there is only one tuning knob.

In addition, each set is arranged for the electrical reproduction of gramophone records.

From these details it will be apparent that the Prosperity Threes are the last word in radio design. With any one of them you can accomplish everything that a radio receiver can be expected to do. You can get reception from scores of stations all over the globe, and when you are tired of broadcast programmes you simply turn the gramoradio switch and play your own selection of records with the greatest purity and volume.

During the next few months we have no doubt that thousands of the Prosperity Threes will be built. We know that the sets are good, but we shall be glad to have reports on their performances from all constructors who build them up.

This month we are publishing some helpful hints for those who are about to make their first attempt at short-wave reception with one or other of the Prosperity Threes. Take note of the advice given.

Getting the Best Short-wave Results

READERS who hope to receive a large number of short-wave stations on the Prosperity Three may be disappointed unless they are prepared to try for certain stations only at the correct time of day or night.

For example, even a reliable station like W2XAD on 19.57 metres cannot be received late at night; neither can W2XAF, another strong station on 31.48 metres, be received early in the afternoon. By listening in at the correct times readers will find that these two

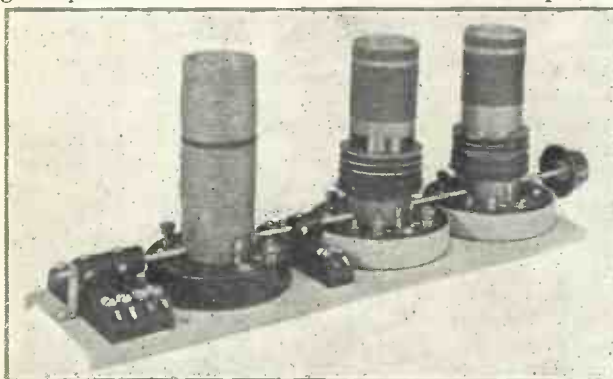
stations can be heard nine times out of ten.

If the following details are carefully noted, short-wave reception will be found reliable for definite entertainment, instead of considering it merely in the light of an experimental adventure.

Three Distinct Bands

Wavelengths between 15 and 80 metres can be roughly divided into three distinct bands: (a) 15 to 22, (b) 22 to 40, and (c) 40 to 80 metres. Taking the 15 to 22 metre band, these wavelengths may be considered only suitable for daylight working: that is, when both the transmitter and the receiver are working in daylight.

At a later hour, when either the transmitter or the receiver is working in darkness, the 22 to 40 metre band will yield more satisfactory results. Stations on the lower band



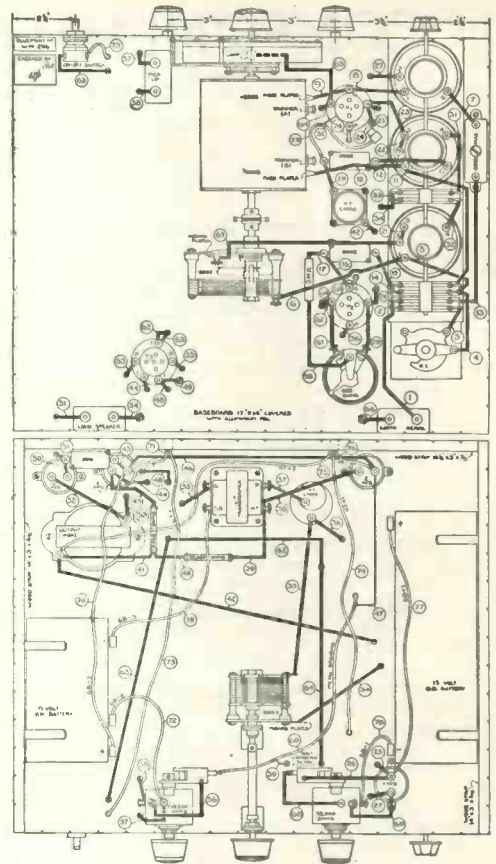
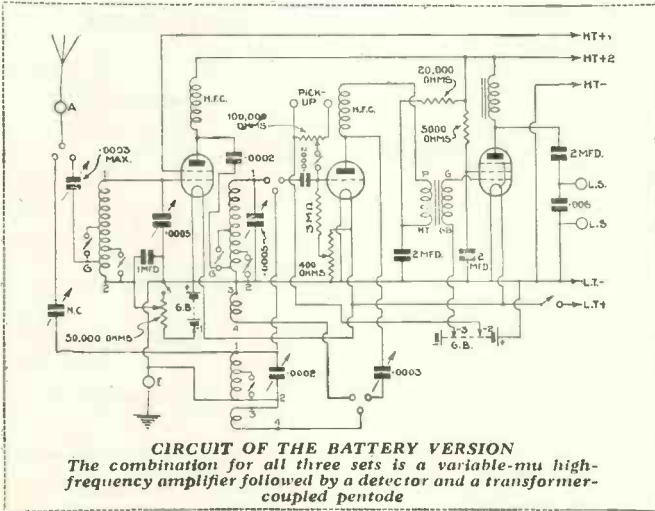
TRIPLE-RANGE TUNING UNIT
This is the coil assembly used for all three versions of the Prosperity Three. The short-wave coil, which has no can, is seen on the left

will still be received, but it will be found that the volume will gradually diminish until those stations cannot be obtained, except very weakly on headphones.

When the transmitter and the receiver are both working under the most favourable conditions, usually after about 11 p.m., the 40 to 80 metre band only will be found to give satisfactory results, and, except for a few powerful local transmitters and some commercial stations, the lower wavelengths will be practically dead.

and relays WGY, the medium-wave transmitter of the General Electric Company. The call sign of WGY will be heard as well as W2XAD.

W2XAD is scheduled to begin radiating at 9 p.m. or 4 p.m. Eastern Standard Time, but can be heard quite regularly after 8.25 p.m. on weekdays and 7 p.m. on Saturdays and Sundays, closing down at midnight.

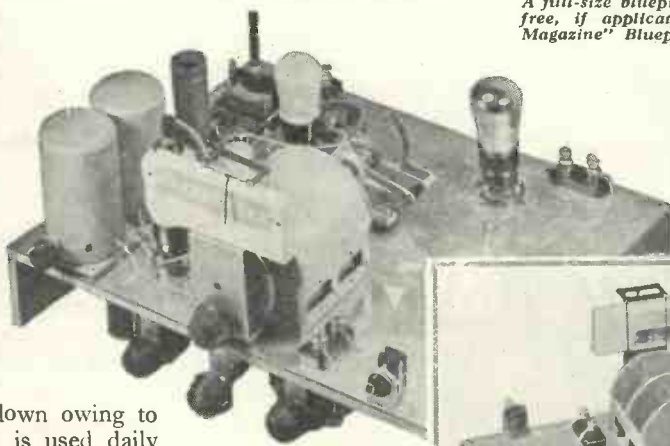


On the Prosperity Three, although only using two valves for short-wave reception, the following stations should be received without very much trouble.

The minimum wavelength of this receiver being about 15 metres, the first station to be received is Bandoeng on 15.97 metres. This station has officially closed down owing to lack of funds, but it is used daily for commercial telephony, working with Holland, and comes in at great strength during the day. It will serve as a good point from which to start the calibration of the receiver.

The Westinghouse Company of America has a number of short-wave stations, all of which use the same call sign, W8XK. The first of these is on 16.87 metres. When conditions are favourable, this station can be received after 2 p.m. and until about 5 p.m.

W2XAD is next, on 19.57 metres,

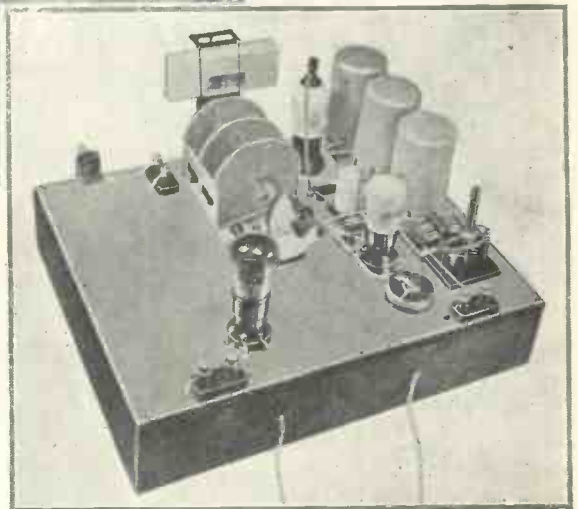


COMPLETE
 The battery version of the Prosperity Three ready for use

It is a good station for the beginner to start with, being one of the most reliable on the short-wave band. The news bulletins, which are transmitted quite regularly, will be of particular interest

and will give readers an American viewpoint of British and American affairs in general.

Once W2XAD has been logged, little difficulty should



CLEAN AND ATTRACTIVE LAYOUT
 Another view of the battery model, showing the clean appearance of the top of the baseboard-chassis

COMPONENTS NEEDED FOR ALL THREE —

PARTS COMMON TO ALL THREE VERSIONS

CHOKES, HIGH-FREQUENCY

- 1—Wearite standard, type HFO, 6s. 6d.
- 1—Wearite screened, type HFP, 3s. 6d.

CHOKE, LOW-FREQUENCY

- 1—Igranic, type C40, 12s. 6d.

COILS

- 1—Magnum three-coil assembly, type WM3, £1 10s.

CONDENSERS, FIXED

- 2—Dubilier .0002-microfarad, type 670, 2s. (or Telsen, I.C.C.).
- 1—Dubilier .006-microfarad, type 670, 1s. 6d. (or Telsen, T.C.C.).
- 1—Dubilier 1-microfarad, type 9200, 2s. 9d. (or Telsen, T.C.C.).
- 3—Dubilier 2-microfarad, type 9200, 11s. 3d. (or Telsen, T.C.C.).

CONDENSERS, VARIABLE

- 1—Utility .0005-microfarad two-gang, type W314/2, 17s.
- 1—Utility .0006-microfarad reaction, type W320, 4s.

- 1—Utility .0002-microfarad short-wave, type W187, 6s. 6d.
- 1—Peto-Scott neutralising, 3s. 6d.
- 1—Sovereign preset, .0003-microfarad max., type J, 1s. 8d. (or Formo, Igranic).
- 1—Utility non-insulated coupler, 1s.
- 1—Bulgin 4-in. condenser extension spindle, type BH2, 1s. 9d.

DIAL, SLOW-MOTION

- 1—Utility SL full-aperture, type W/317, 7s. 6d.

HOLDER, VALVE

- 1—W.B. five-pin, miniature type, 8d. (Benjamin, Lotus).

RESISTANCE, FIXED

- 1—Claude Lyons 20,000-ohm, 1-watt type, 10½d.

RESISTANCES, VARIABLE

- 1—Lissen 400-ohm baseboard potentiometer, type LN140, 1s. 6d. (or Igranic).
- 1—Wearite 100,000-ohm potentiometer (type QVC) combined with switch (type G40), 7s. 6d.

SUNDRIES

- Tinned copper wire for connecting (Lewcos).
- Lengths of oiled-cotton sleeving (Lewcos).
- Lengths of rubber-covered flex (Lewcos).
- 1—Packet of Golton shielded wire, 9d.
- 1—Peto-Scott Baseboard-chassis assembly, with foil, 8s. 6d.
- 5—Wearite aluminium brackets, 1s. 3d.
- 3—Lissen terminal blocks, marked: A and E, L.S., P.U., 3s. (or Belling-Lee).
- 1—Pair Ericsson headphones, 12s. 6d.
- 1—Belling-Lee insulated anode connector, 4d.

TRANSFORMER, LOW-FREQUENCY

- 1—Lissen Hypernik, 12s. 6d.

ACCESSORIES

CABINET

- 1—Camco Gresham radiogram, £8.

PICK-UP

- 1—Marconiphone, type K17, £2 2s

EXTRA PARTS NEEDED FOR THE BATTERY VERSION

HOLDERS, VALVE

- 2—W.B. four-pin, miniature type, 1s. 4d. (or Benjamin, Lotus).

PLUGS AND TERMINALS

- 8—Belling-Lee wander plugs, marked: H.T.+2, H.T.+1, H.T.—, G.B.+ (2), G.B.—1, G.B.—2, G.B.—3, 1s. 4d. (or Clix, Eelex).
- 2—Belling-Lee spade terminals, marked: L.T.—, L.T.—, 4d. (or Clix, Eelex).

RESISTANCES, FIXED

- 1—Claude Lyons 5,000-ohm, 1-watt type, 10½d.
- 1—Lissen 3-megohm grid leak with wire ends, 6d. (or Dubilier).

RESISTANCE, VARIABLE

- 1—Wearite 50,000-ohm potentiometer (type QVC) combined with switch (type G40), 6s. 6d.

SUNDRIES

- 2—Pairs Bulgin grid-battery clips, type No. 5, 4d.
- 1—2.5-volt flashlamp bulb for dial.

SWITCH

- 1—Becker on-off, type 460, 1s. 10d.

ACCESSORIES

BATTERIES

- 1—*Pertrix 150-volt super-power high-tension, type 301, £1 11s. (or Ever Ready).
- 1—Pertrix 15-volt grid-bias, type 262, 2s. 3d. (or Ever Ready).

- 1—Pertrix 9-volt grid-bias, type 260, 1s. 3d. (or Ever Ready).
- 1—Pertrix 2-volt accumulator, type PLB2, 12s. 6d. (or Ever Ready.)
- (* Or Atlas AC188 unit for A.C. mains, £8.)

GRAMOPHONE MOTOR

- 1—Garrard No. 30 clockwork with 12-in. turntable, £1 10s.

LOUD-SPEAKER

- 1—Rothermel Sonochorde type PMP, £1 12s. 6d.

VALVES

- 1—Cossor 220VSG, 16s. 6d.
- 1—Cossor HL2 metallised, 7s.
- 1—Cossor 220PT, 17s. 6d.

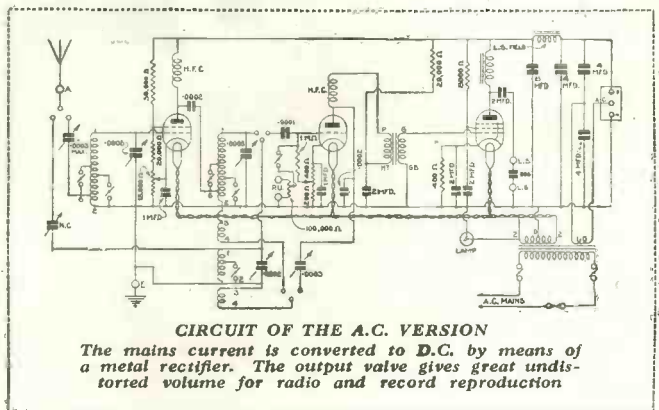
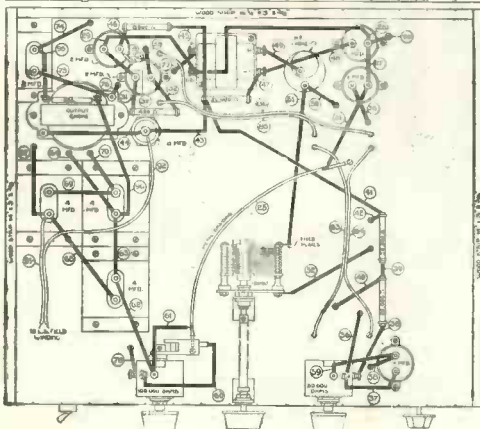
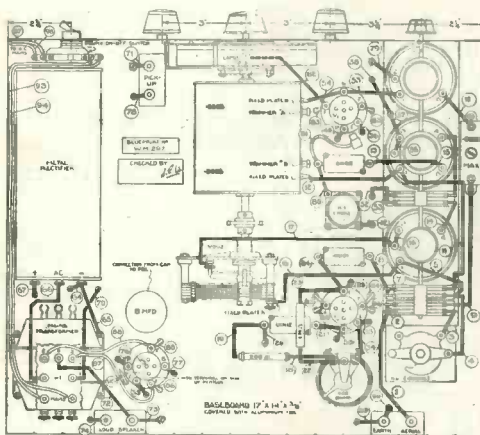
be found in locating Radio Colonial on 19.68 metres; it broadcasts daily from 1 to 4 p.m. On practically the same dial reading the second Westinghouse station, W8XK on 19.72 metres, will be received.

Although the latter station is on the air from 12.30 p.m. until 10 p.m., readers will usually find that it will not be receivable until after 4 p.m. and that signal strength will begin to diminish round about 9 p.m.

The next reliable station of interest will be Radio Colonial on 25.2 metres. This station transmits news bulletins in French, and occasionally English, to the French Colonies between the hours of 4.30 and 7.30 p.m.

More Stations

Just above Radio Colonial is the third W8XK station, working on 25.25 metres, then Rome, on 25.4, and, finally, G5SW on 25.53 metres. The first-named station may be received quite well from between 8 to 8.30 p.m., until 3 a.m., but after this hour it will be found to fade very badly.



CIRCUIT OF THE A.C. VERSION
The mains current is converted to D.C. by means of a metal rectifier. The output valve gives great undistorted volume for radio and record reproduction

(Left) A full-size blueprint of the A.C. version of the Prosperity Three (No. WM297 can be obtained for 1s., post free

— VERSIONS OF THE PROSPERITY THREE

EXTRA PARTS NEEDED FOR A.C. VERSION

CONDENSERS, FIXED

- 1—Dubilier .0001-microfarad, type 670, 1s. (or Telsen, T.C.C.).
- 1—Dubilier 1-microfarad, type 9200, 2s. 9d. (or Telsen, T.C.C.).
- 1—Peak 2-microfarad, 1,500-volt test, 3s. 0d.
- 3—Peak 4-microfarad, 1,500-volt test, £1 0s. 3d.
- 1—Dubilier 8-microfarad dry electrolytic, 450-volt D.C. working, 5s. 6d. (or T.C.C.).

HOLDERS, VALVE

- 2—W.B. five-pin, miniature type, 1s. 4d. (or Benjamin, Lotus).

METAL RECTIFIER

- 1—Westinghouse type HT8, 18s. 6d.

RESISTANCES, FIXED

- 1—Claude Lyons 200-ohm, 1-watt type, 10½d.
- 1—Claude Lyons 400-ohm, 1-watt type, 10½d.
- 1—Claude Lyons 8,000-ohm, 1-watt type, 10½d.
- 1—Claude Lyons 20,000-ohm, 1-watt type, 10½d.
- 1—Claude Lyons 50,000-ohm, 1-watt type, 10½d.
- 1—Lissen 1-megohm grid leak with wire ends, 6d. (or Dubilier).

RESISTANCE, VARIABLE

- 1—Wearite 15,000-ohm potentiometer (type QVC), 4s. 6d.

SWITCH

- 1—Becker double-pole, type 461, 2s. 0½d.

SUNDRIES

- 1—4.5-volt flashlamp bulb.
- TRANSFORMER, MAINS**
- 1—Sound Sales, type H8 shielded super, £1 5s.

ACCESSORIES

GRAMOPHONE MOTOR

- 1—Garrard No. 201 induction with automatic stop, £4 17s. 6d.

LOUD-SPEAKER

- 1—Rothermel Sonochorde, D.C. type with 2,500-ohm winding, £1 5s.

VALVES

- 1—Mullard MM4V metallised, 19s.
- 1—Mullard 904V metallised, 13s. 6d.
- 1—Mullard Pen4V, £1.

EXTRA PARTS NEEDED FOR THE D.C. VERSION

CHOKE, LOW-FREQUENCY

- 1—Atlas type CPT (for smoothing), £1 1s. (or Telsen, T.C.C.).

CONDENSERS, FIXED

- 1—Dubilier .0001-microfarad, type 670, 1s. (or Telsen, T.C.C.).
- 1—Dubilier 1-microfarad, type 9200, 2s. 9d. (or Telsen, T.C.C.).
- 1—Dubilier 2-microfarad, type 9,200, 3s. 9d. (or Telsen, T.C.C.).
- 2—Dubilier 8-microfarad dry electrolytic, 450-volt D.C. working, 11s. (or T.C.C.).

FUSE

- 1—Belling-Lee double fuse and holder, 2s. 6d.

HOLDERS, VALVE

- 2—W.B. five-pin, miniature type, 1s. 4d. (or Benjamin, Lotus).

RESISTANCES, FIXED

- 1—Bulgin universal D.C. mains resistance, type B, 18s. 6d.
- 1—Claude Lyons 300-ohm, 1-watt type, 10½d.
- 1—Claude Lyons 5,000-ohm, 1-watt type, 10½d.
- 1—Claude Lyons 20,000-ohm, 1-watt type, 10½d.
- 1—Claude Lyons 40,000-ohm, 1-watt type, 10½d.
- 1—Lissen 1-megohm grid leak with wire ends, 6d. (or Dubilier).

RESISTANCE, VARIABLE

- 1—Wearite 15,000-ohm potentiometer (type QVC), 4s. 6d.

SUNDRIES

- 1—4.5-volt flashlamp bulb.
- 1—4.5-volt flashlamp battery.
- 1—On-Off switch for pilot lamp.

SWITCH

- 1—Becker double-pole type 461, 2s. 0½d.

ACCESSORIES

GRAMOPHONE MOTOR

- 1—Garrard standard universal with automatic switch, £5 15s.

LOUD-SPEAKER

- 1—Rothermel Sonochorde D.C. model with 2,500-ohm winding, £1 5s.

VALVES

- 1—Osram VDS, 19s.
- 1—Osram DH, 13s. 6d.
- 1—Osram DPT, £1

The prices mentioned are those for the parts used in the original set; the prices of alternatives as indicated in the brackets may be either higher or lower.

The same programme is radiated from W8XX on 48.86 metres, so that it can be received satisfactorily until 5 a.m.

Rome is a station which comes in at an enormous strength and, generally speaking, relays the main Rome programme from 4 p.m. until 10.30 or 11 p.m.

Owing to the skip-distance taking effect on G5SW, this station cannot be received at all well, but in any case it is not of much interest to English listeners as the National programme is usually relayed.

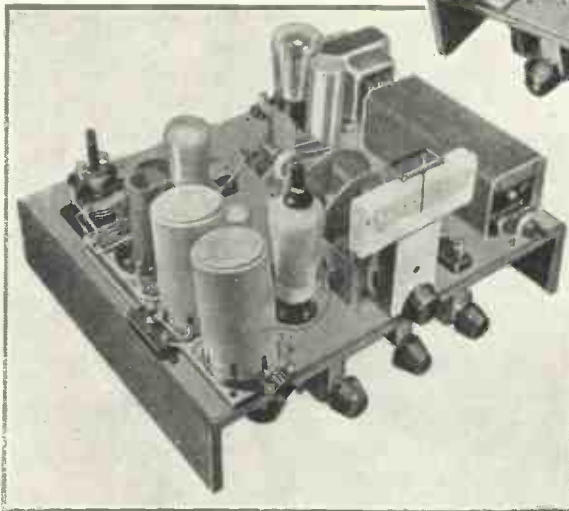
The third Paris station, radiating to the colonies on a wavelength of 25.63 metres, can always be received on the loud-speaker, even when conditions are unfavourable; it is usually to be heard between the hours of 9 p.m. and midnight.

Buenos Aires, LSX, on 28.9 metres, is the next station to receive attention.

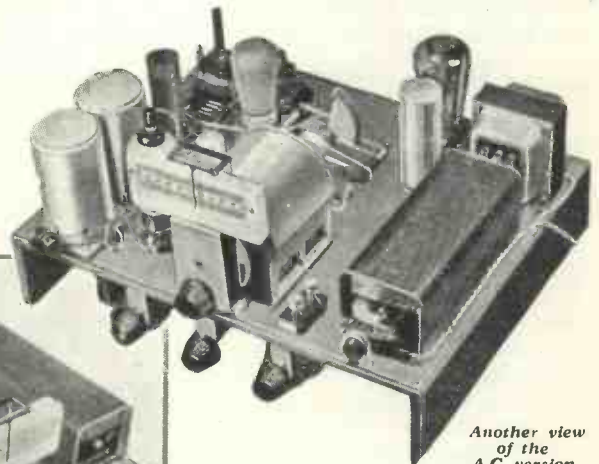
Although situated nearly 6,000 miles away, it can be received quite well between the hours of 9.30 p.m. and 1.30 a.m.

Those who rise early on Sunday morning have plenty of opportunities of hearing Sydney, 2FC, which trans-

mits gramophone records between 6 a.m. and 8 a.m. Although scheduled



TAKES ALL ITS POWER FROM THE MAINS
No batteries at all are needed to work the A.C. version of the Prosperity Three, one of the few all-wave radiograms yet produced for the constructor



Another view of the A.C. version

to work later in the day, great difficulty will be found in getting satisfactory reception.

The raucous voice of CT1AA, Lisbon, can be heard almost any night between 10 p.m. and midnight at great strength, not on its allotted wavelength of 31.56 metres, but on 31.3 metres.

Zeesen, DJA, on 31.38 metres, is one of the most reliable stations on the 22 to 40 metre waveband and, during the evening, can always be

BEST SHORT-WAVE RESULTS—Cont.

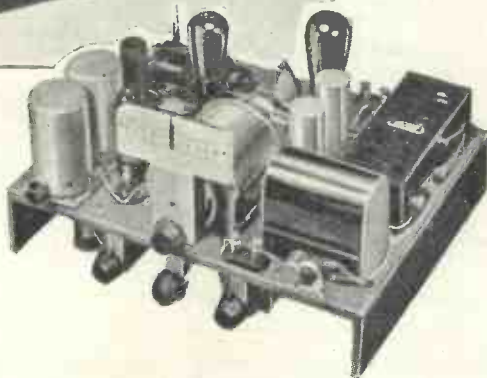


and midnight. most likely short-wave stations for reception on one or other of the Prosperity Three's.

Hilversum, on 52 metres, experiments at odd hours, and readers who receive this station should not jump to the conclusion that it is a harmonic of the long-wave transmitter. Rio de Janeiro, a

Station	Wavelength
Bandoeng ..	15.93
W8XK ..	16.87
W2XAD ..	19.57
Radio Colonial ..	19.68
W8XK ..	25.25
Rome ..	25.4
5SW ..	25.53
LSX, Buenos Aires	28.9

D.C. VERSION
Two views of the completed D.C. version of the Prosperity Three



heard between 8 p.m. and 11.30 p.m. It sometimes continues its transmissions until 12.30 a.m., relaying, for the most part, dance music. This programme is relayed from Königswusterhausen and readers who have any difficulty in separating this station from Daventry on the long waves will be well advised to tune to DJA.

Favourite Station

W2XAF, on 31.48 metres, which has been a favourite of short-wave enthusiasts for some years, can be heard any night, when conditions are favourable, between 10 p.m. and 5 a.m. We also have W3XAU and W1XAL on 31.35 metres, both of which usually relay Boundbrook, New Jersey, between the hours of 10 p.m. and 6 a.m.

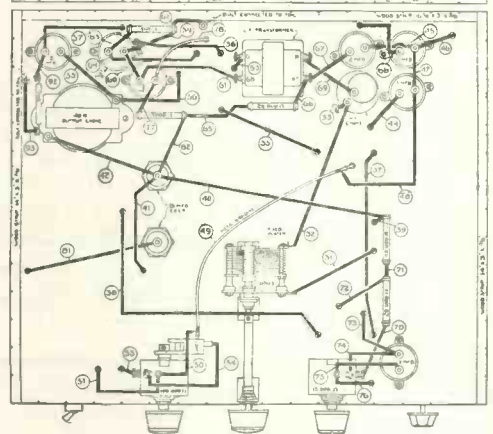
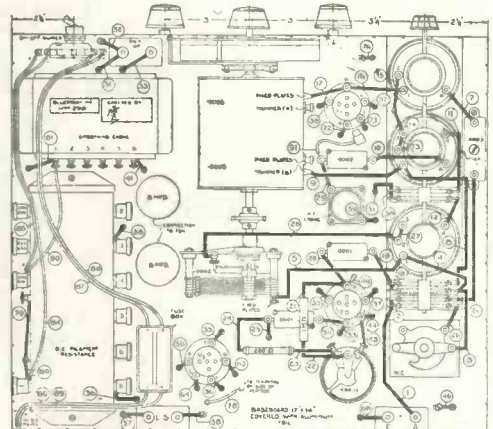
Now comes a gap in the tuning-condenser scale which causes a jump well into the 40 to 80 metre band. Between 46 and 50 metres there are at least eight American stations, all of which can be clearly received between the hours of 11 p.m. and 3 to 4 a.m. on the loud-speaker. Most reliable of these are W3XAL on 46.69 metres, W8XK on 48.86, W2XE on 49.02, W3XAU on 49.5, and W9XF on 49.83 metres.

Above the American stations will be found Moscow, on 50 metres, transmitting regularly between the hours of 9 p.m.

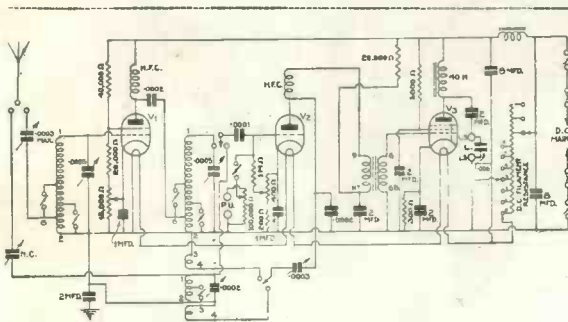
South American station working on 31.7 metres, can also be heard at good strength at irregular hours, but usually from 10 p.m. onwards.

Quite a number of European short-wave stations relay a programme from their main stations. Readers who are listening to medium- or long-wave stations which fade or are being interfered with can sometimes revert to the short-wave stations and obtain their programmes in this way.

Following is a list of the wavelengths of the seventeen



LAYOUT AND WIRING DIAGRAM
If desired, a full-size blueprint can be obtained from the "Wireless Magazine" Blueprint Dept., for 1s., post free. Ask for No. W298



CIRCUIT OF THE D.C. VERSION
Basically the D.C. set is the same as the battery and A.C. versions, but special D.C. mains valves are used, of course

2FC Sydney	31.28
CT1AA, Lisbon	31.3
Zeesen, DJA	31.38
W2XAF ..	31.48
W3XAL ..	46.69
W8XK ..	48.86
W9XF ..	49.83
Moscow ..	50
Hilversum ..	52

A little patience will enable any listener with a Prosperity Three—for all three versions are adapted immediately for short-wave reception—to tap the best of the world's short-wave programmes.

A Famous Swiss Station

At the invitation of Radio Suisse, Kenneth Ulyett recently visited Beromunster, a famous Swiss station built by British engineers. He describes his impressions in this article

BEROMUNSTER, with its 60 kilowatts on 459 metres, is a fine signal in this country, and when at Munster recently I took the opportunity of visiting the Schweizerischer Landessender. This is the colloquial title given to the Beromunster broadcaster, which is just outside the village of Munster, not far from Lucerne. It has studios in Zurich and an outside broadcast control point at Olten.

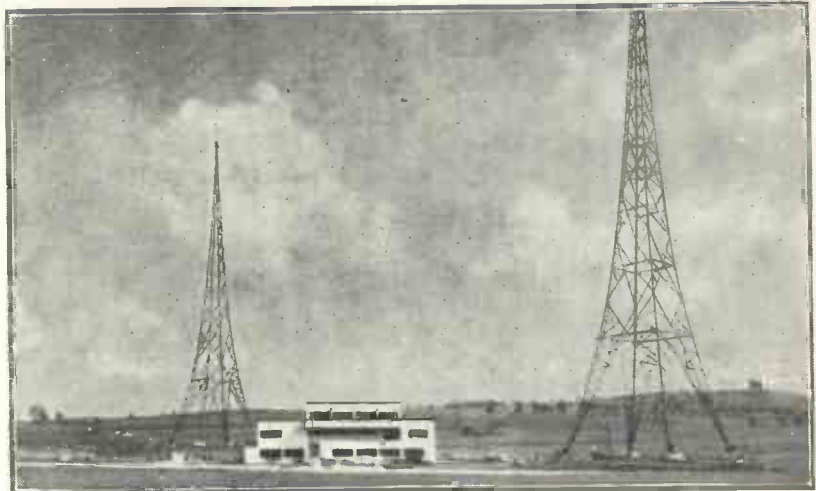
Cordial Invitation

Radio Suisse, the broadcasting organisation of Switzerland, had extended to me a cordial invitation to see the station. I think the Radio Suisse concern is proud of the fact that Beromunster has been built by British Marconi engineers and that it is such a success in our part of the world.

The Landessender is out on the main road from Munster and the 500-ft. high masts can be seen about three miles away. As I went up in the post car to Munster I noticed that the road was climbing all the while and, although Switzerland is a very difficult country to cover with a broadcasting service, the Beromunster station—one of the three Swiss regional stations—is in a fine position.

It is a white futurist-looking building, designed by a well-known Swiss architect, and is more like the new flats which are springing up in Zurich than a broadcasting station!

Outside is a large board which tells passing motorists that this is the Landessender Beromunster—as though the two huge Eiffel Tower-



AN IMPOSING LAYOUT

The masts and building of the Beromunster broadcasting station in Switzerland, the transmitter of which was designed and installed by British engineers, are imposing

type masts did not sufficiently proclaim the fact.

At the station I was welcomed by Dr. Walter Gerber, the Chief Engineer of Beromunster. He had previously been engaged on research work at the Zurich University. He was pleased to see me because the last Englishman he had met, several months back, was Mr. Noel Ashbridge, the B.B.C. Chief Engineer.

Mr. Ashbridge had told him of the new B.B.C. aerial developments at North Regional and Scottish Regional, and the Beromunster chief, hearing that I had met Mr. Ashbridge at Scottish Regional, was anxious to know how the new aerials were working. Our stations are well heard in Switzerland.

It was strange to see the transmitting panels of Beromunster, because at a first glance they look just like one side of the Brookman's Park transmitter. The apparatus was built by the same engineers, you see.

Control Precautions

It did not take Dr. Gerber long to show me that the Swiss station differs in many ways from our B.B.C. stations. The wavelengths of our main National and Regional stations are kept constant by a master oscillator valve working through a trap circuit. That is accurate enough for our requirements, but the Swiss stations, being in the middle of Continental jamming, have to take extreme precautions against wavelength wobbling.

The Beromunster station has a separate valve drive in a temperature-controlled cabinet. It is quite a different idea from the Marconi valve drive used at other stations, and perhaps the B.B.C. may use this system if our frequency bands are

An Old Rhyme Revised

*Sing a song of wireless
A magic box of tricks,
Four and twenty minstrels
Broadcasting at six;
When the set was tuned-in
They all began to sing.
Wasn't that a music feast
To offer to the King?
The King was in the studio
"Wireless Mag." perusing,
The Queen was in the parlour
Honeycomb coils choosing,
The maid was in the garden
An aerial to fix,
How they rushed to listen
The moment it struck six!*

LESLIE M. OYLER.

A FAMOUS SWISS STATION—Cont.



INSIDE THE LANDESENDER BEROMUNSTER

A view of the actual transmitting gear at Beromunster, which has rapidly become one of the most popular European broadcasters

ever crowded more closely together.

There is a control desk somewhat like that at the B.B.C. stations, but there are large coloured lamps which warn the man on duty when circuits go wrong. Our stations are fed from rotary converters supplied by Diesel-engine driven dynamos. Electric power is so cheap in Switzerland, however, that the power cables which run all over the mountain sides, are used to provide the power.

In Case of Breakdown

I asked what would happen in case of a landline breakdown and I was shown a large switchboard which is in contact with three sets of lines from various hydro-turbine power stations.

Huge Brown-Boveri mercury-arc rectifiers change the three-phase A.C. to D.C. for the transmitting valves. These rectifiers are in large iron containers about the size of a domestic copper, and the same shape. Mercury sprays about the bottom and a vacuum is maintained by rotary pumps. A mercury vapour is created in the vacuum space and huge electrodes inside the "copper" rectify the power at 12,000 volts!

Cooling the Valve Water

There are the usual push-pull water-cooled valves and Dr. Gerber showed me elaborate arrangements for cooling the valve water. Large motor-driven fans at one side of the building blow air on to radiators through which the valve water runs. There are pressure tanks so that if

the fans break down the cooling water can be circulated for quite a long while.

The rest of the Landessender is taken up with very modern offices with landline amplifiers, and with testing gear.

The programmes for all the Swiss stations are provided by a separate company, the technical side being run by a branch of the Swiss Post

is done at the studio centres—a more logical arrangement, surely, than that in force at some B.B.C. stations, where the station engineers have to regulate the input.

The Swiss Post Office lines are on a very efficient circuit, as indeed are most of the electrical systems in this industrious country.

Changing the Programme

The station just broadcasts whatever it is given over the landline system covering Switzerland. The local studio for Beromunster is in Zurich, but if the programme officials want to switch on any other studio they can do so through the control point at Olten without having to tell the broadcasting engineer that a change is being made. Quite often part of the news bulletin comes from Geneva, part from Zurich, and part from Lausanne.

As the Swiss Post Office is partly responsible for the stations, there is a comprehensive landline system available and, as I saw from a brief examination of the Beromunster station's log, outside broadcasts are much more frequent than they are with the B.B.C.

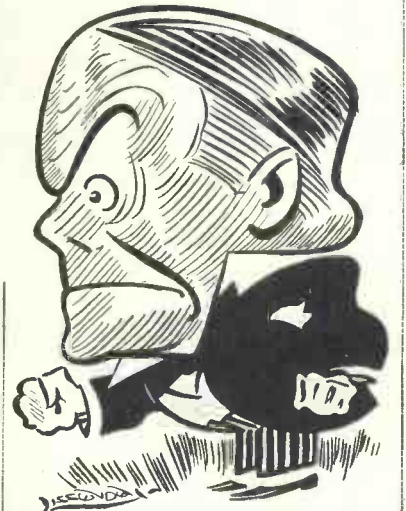
Reception Reports

Reception reports come in from all parts of the world and the station director at Beromunster welcomes helpful reception logs from British listeners. They should be addressed to Dr. Walter Gerber at the Landessender, Beromunster, Switzerland.



BOB AND ALF PEARSON

are duettists. Their turns are a popular feature in the vaudeville programmes



EDMUND GWENN

is a well-known actor and broadcaster

Office. The result is that at Beromunster, for instance, there are no amplifier switches or landline controls.

There is only one low-frequency amplifier on the landline coming into the Beromunster station. There is a grid-swing meter on this to show the normal depth of modulation, but the balancing between the landlines



B.B.C. Activities Reviewed by T. F. HENN

AT this time of the year we are naturally thinking of new sets for the winter and, what is just as important, the music we shall hear from them. Having learnt something of the plans now in the course of preparation at Broadcasting House, I think the B.B.C. is endeavouring to provide programmes which will appeal to the general listener and not so much the student.

Last Prom. Concerts

There is still another ten days of the Promenade Concerts to be finished before we get down to the usual routine. You should certainly make a note of hearing two or three of these last few concerts. The last concert, especially, should be noted for an evening at home, even if it means putting off some engagement. Briefly, the programme will be as follows:

Wagner's overture to the *Meistersingers* opens the concert and the main attractions will be Ravel's *Bolero*—a work which, once heard, is never forgotten—*Factory* (*The Music of Machines*), Liszt's *Hungarian Rhapsody No. 2*—a work you all know—and Sir Henry Wood's *Fantasia on British Sea Songs*, a composition which features in every last Prom.

Dr. Johnson's Dictum

I am sure that if the renowned Dr. Johnson were living he would alter his famous saying about music ("Of all noises, I think music the least disagreeable,") after he had heard Mossolov's *Factory*.

This work was given its first British performance during the Symphony Concerts last season. Those who were at the Queen's Hall, or were listening at home, will recall the

terrible din made by the orchestra and the shrieks of delight of the audience. Just listen on October 1 and join in the fun!

On October 19 the main weekly series of symphony concerts opens at the Queen's Hall. These concerts will begin at 8.15 p.m. The full B.B.C. Symphony Orchestra of 115 players will be conducted by the best known conductors, including

had to be considered probably, and the B.B.C. was wise enough to know that popular orchestral concerts will always fill the hall.

There are only six or seven works which might come under the classification of hyper or ultra-modern. The most outstanding of these, and the one which will arouse the most interest, is booked for performance next March. It is the first perfor-



Here you see Ambrose's popular Mayfair Hotel Band in one of the scenes from the New Era film, "Voice of the World," which will be seen at most cinemas in the country

Sir Edward Elgar, Sir Landon Ronald, Ernest Ansermet, Sir Henry Wood, and Adrian Boult.

I was very surprised at the popular material which has been chosen for these concerts. I imagine the B.B.C. is trying to meet the public cry for popular programmes or that the B.B.C. is very keen on seeing every one of the 2,000 seats at the Queen's Hall filled for every concert.

The financial side of the question

mance in this country of Paul Hindemuth's *Das Unaufhörliche*, an oratorio in three parts.

A performance of Stravinsky's *Le Sacre du Printemps* on November 16 and the first concert performance of Arnold Schonberg's *Variations for Orchestra* will also be interesting, the former work especially.

Three special concerts in celebration of Sir Edward Elgar's seventy-fifth birthday are to be given on

MUSIC OF THE MONTH—Continued



Bert Ambrose, having recently returned from his month's holiday, has now resumed his weekly broadcasts on Saturday nights

November 30, December 7 and 14. The Master of the King's Musik will be conducting some of his own works at the first two. The third concert will be a performance of his famous work, *The Kingdom*.

There will be no soloist at the first concert on October 19. This concert, conducted by Adrian Boult, will include three of Bach's works—the Suite No. 3 in D, Brandenburg Concerto No. 3 in G, and the sonata, "Der Himmel lacht," from

the church cantata No. 31—2nd Schubert's Symphony No. 7 in C. Mischa Elman is playing the solo part in Tchaikowsky's concerto in D for violin and orchestra in the October 26 concert.

This should be well worth hearing; in fact, every symphony concert on a Wednesday evening during the winter is worth hearing. The standard of performance is splendid and every concert is a treat not to be missed.

Another important series of winter concerts, the Sunday evening group, will be resumed in October, but at present it has not been decided whether they are to be relayed from No. 10 studio—that is, the river wharf—or from the new concert hall at Broadcasting House.

The B.B.C. understands from the L.C.C. that No. 10 will not be wanted for some time yet, so we shall still hear occasional broadcasts from there.

One thing is certain, the public will not be admitted to the concert-hall studio on Sunday evenings if the concerts are held there. There are over 600 seats in this studio and to me it seems a pity that they should be almost empty except for a handful of

press representatives or friends of the orchestra.

I think that the B.B.C. should allot either free seats to the public or else fill them with students from musical colleges. If we have an audience in the studio, the concerts will be more enjoyable—especially if the engineers permit us to hear the applause. Atmosphere is everything.

Plans for the Organ

Definite plans for the organ in the concert hall are now going ahead. As I mentioned in these pages some little time back, the organ is to be built on the extension principle for the purpose of saving as much space as possible. The instrument is to be built by the John Compton Organ Co., Ltd., a leading firm of organ builders, who now make a speciality of building extension-type organs. There are many Compton organs in cinemas all over the country.

Dance Music

We must not overlook dance music as one of the B.B.C.'s leading musical activities. Several rumours have been current lately regarding the ultimate policy of outside relays of dance music and I would like to take this opportunity of clearing the air for "W.M." readers.

Firstly, there is no truth in statements which have been published to the effect that relays of dance music from outside sources are to be



A clever Midland artist who recently broadcast a violin recital from London, Lily Barca



Dennis Noble, tenor, will be singing Rossini's famous aria, "Largo al factotum," in the last Prom.



An actress and singer, Janet Joyce is one of the earliest broadcasters. She was recently heard from London

B.B.C. PLANS FOR THE AUTUMN

curtailed. During the holiday month, when almost all the restaurant bands were away and Henry Hall broadcast almost every night, the B.B.C. received letters from listeners saying that they missed the variety.

The programme department has enough sense to know that Henry Hall's type of dance music would not suit everybody. Yet, on the other hand, the B.B.C. knows that song plugging is one of the curses of outside bands, but they will tolerate a little—and only a little—of this curse in order that the listener may have variety.

Of course, the formation of a second B.B.C. dance band might help to solve the problem, but I understand that no such step is contemplated. However, this talk of a second dance band does help to keep song plugging down to a minimum.

Talking of variety in dance music reminds me that Jack Payne will be heard again from 8 to 9 p.m. on October 5. I wonder how many listeners wish he were back at the B.B.C. permanently?

Annoying Habit

Now for a note regarding a bad habit which the B.B.C. is developing and which is most annoying. Records are used to amuse or entertain listeners during an interval. Very often the B.B.C. fades out an orchestral record because somebody's talk on pig farming is due to begin promptly at the hour. No words of apology are given, but surely the listener deserves it for having been rudely cut off in the middle of an item. The pig talk should be kept waiting.

I expect you remember the relay of the concert from Ostend Kursaal a few weeks ago. You may remember that listeners were switched off over here at 10.19 p.m., an announcement being made that there would not be time to hear Liszt's *Hungarian*

Rhapsody No. 2 and the epilogue would follow at half-past ten.

I had thoroughly enjoyed the Kursaal Orchestra and in the hope of hearing Liszt's "second," I tuned in Brussels No. 2. In spite of bad atmospherics, I heard the finish



Louie Freear, one of the best known Edwardian musical comedy stars, took part in the first of the new B.B.C. television broadcasts

the part of an official of the B.B.C. Would it have mattered if the epilogue had been a minute or two late? The B.B.C. must keep to a time-table of some sort, but things like this should never be allowed to occur.



Comey character sketches at the piano are broadcast by Laura Mann from the Midland stations

A popular broadcast baritone, Peter Dawson is featuring in the New Era film, "Voice of the World." The accompanist is Gerald Moore.



There is little news this month of forthcoming broadcasts of a general character. Hans Weisbach is announced to conduct the London Symphony Orchestra in a performance of Bach's *Art of Fugue* at the Queen's Hall in early October. The average listener will find little entertainment in this work, but ardent followers of the great Bach will be counting the days from now on.

Now I know how this work is universally appreciated, and I feel that there was negligence or ignorance on



Many works of Richard Strauss, the great Continental composer, have featured in this year's Proms.

The Crystal Palace is probably best known for its superb firework displays and band contests. Listeners will hear a concert by the winning band of the 1932 contest in the National programme on October 2.

One of the leading cinema organists of the North will make his broadcast debut on September 30. He is Sydney Custard, who plays at the Gaumont Palace, Chester.

Is the Variable Condenser Doomed?



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

SINCE the earliest days of broadcasting, variable condensers have been used for tuning the necessary circuits in receivers. It is, of course, equally possible to use a fixed condenser and vary the inductance of the coil used, and attempts have been made in various ways to utilise this possibility.

No marked success has attended the experiments, however, and the variable-condenser method of tuning has held the field.

News now comes from America of a form of tuning which may challenge this supremacy. In a paper read before the Radio Club of America, R. H. Langley described a system which he claims will oust the variable condenser from the receiver of the future.

Taken for Granted

If the problem is examined we find there are objections to the present methods. These disadvantages have long been accepted as inevitable, and we have grown accustomed to them.

The fundamental portions of a receiver are the tuned circuits, which are adjusted to resonance with the incoming signals.

The rate of vibration is determined by the inductance of the coil and the capacity of the condenser, and when we tune the circuit we adjust these values so that the natural frequency of the circuit corresponds to that of the oscillations being received on the aerial.

When this happens a very large amplification of the oscillations takes

place, and this enables us to select the signal we require.

As already stated, the customary method is to use a fixed coil and to tune this with a variable condenser, which is a device of which the capacity can be altered according to the setting of the dial. Such an arrangement works and is generally satisfactory, but there are several defects, of which two only need be mentioned as being the most important.

Almost every receiver in common use to-day is more lively at the bottom end of the tuning scale, and we have to bring up the sensitivity with reaction or by other suitable means as we increase the setting of the tuning condenser.

Selectivity Not Constant

As a logical, though not very obvious, development of the same idea we must remember that the selectivity of the circuit is not constant.

We obtain our best selectivity when the capacity is large, which is not where we want it, for the separation of the stations at the top of the scale is greater than at the bottom; we really require an increased selectivity on the lower wavelengths if possible.

If we can use a fixed condenser and vary the inductance,

then the defects are remedied to a large extent. If we can arrange that the ratio of the inductance to the resistance of the coil is approximately constant, both the sensitivity and the selectivity are uniform over the whole scale. Unfortunately the methods adopted for varying the inductance do not comply with this condition.

The simplest form of variable inductance is the variometer, in which one coil is rotated inside another. In the position of maximum inductance the two coils are

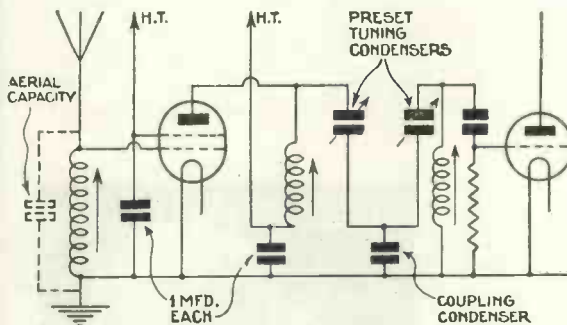


Fig. 2.—Three tuned circuits that lend themselves to ganging by the new tuning method

The first is that the voltage produced across the condenser by the signal is dependent upon the value of the condenser. As the capacity is increased the voltage developed falls off considerably. Since it is this voltage across the condenser which we utilise by applying it to a valve amplifier or detector, it means that the sensitivity of the receiver is not constant, but falls off as we increase the condenser capacity.

Readers will be familiar with this

in the same direction as each other, whereas in the reverse position they oppose each other, giving us a very much smaller inductance, and a continuous variation is obtained between these two extremes.

It is clear that with this arrangement the effective resistance does not change appreciably over the whole scale, whereas we require the resistance to decrease as the inductance decreases.

Other Attempts

Other attempts have been made to vary the inductance by bringing a metal plate near the coil. It is well known that if a coil is placed inside a metal pot the inductance is reduced due to the proximity of the metal. In the ordinary canned coil we minimise this effect as much as is practicable, but attempts have been made to accentuate this variation of inductance by bringing a shield quite close to the coil.

This arrangement has been called spade tuning, but suffers from the same disadvantage as the variometer—the ratio of the effective resistance to the inductance is not constant. Consequently before inductance tuning could be satisfactorily employed some other method of variation had to be designed.

Effect of Iron Core

Now it is well known that if an iron core is inserted in a coil the inductance increases considerably. The increase in inductance, however, is only marked at low frequencies, and when we deal with very rapidly oscillating currents, such as those in a radio set, we find the variation of inductance becomes almost negligible. What is more, the losses due to circulating currents

set up in the iron are very heavy and render such a system impracticable under normal conditions.

Attempts have been made to overcome these disadvantages, with some degree of success, by using very thin sheets of iron only 1,000th of an inch thick but, even so, the performance was not entirely satisfactory.

More recently the British Post Office designed a form of iron which was distinctly more successful. This consisted of very finely powdered granules of iron compressed under hydraulic pressure to form a semi-solid block. Even this, however, was not as good as was desired owing to the difficulty of obtaining really finely divided iron.

Now comes the news that two American scientists, Polydoroff and Johnson, have found a method of obtaining iron powder in such fine granules that it will float in the air. The particles are only about 14-1,000ths of an inch in diameter. This, in itself, is not sufficient, however.

The losses due to the iron are caused by circulating currents which flow in the mass of the iron itself. These can only be limited if the volume of iron within which they circulate is restricted.

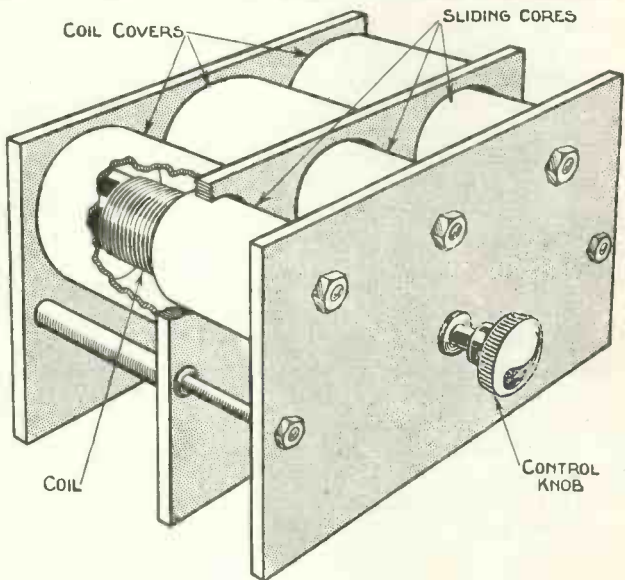


Fig. 3.—How a three-coil unit with ganged control could be assembled. Each core would be controlled by the single knob shown

inserted right inside a tuning coil.

On the other hand it does still have a very marked effect on the inductance of the coil, increasing the inductance just as an ordinary iron core will increase the inductance at low frequencies. The total variation of inductance with the core completely inserted, as compared with the inductance with no core, is about 8:1, which is quite sufficient to tune a coil over the normal waveband.

Wavelength Increased

These two inventors have devised a method of spraying the particles with varnish to an almost infinitesimal thickness so that each one is individually insulated from its neighbour. They then use this powdered iron mixed with a little

The tuned circuits are made up with a small coil tuned with a fixed condenser to the shortest wavelength required. As the iron core is inserted the wavelength of the circuit increases steadily until, with the core completely in position, it tunes to the highest wavelength (for example, 550 metres).

The "core" is arranged to go both inside and outside the coil itself and the whole arrangement is included in a metal can for shielding purposes as shown in Fig. 1.

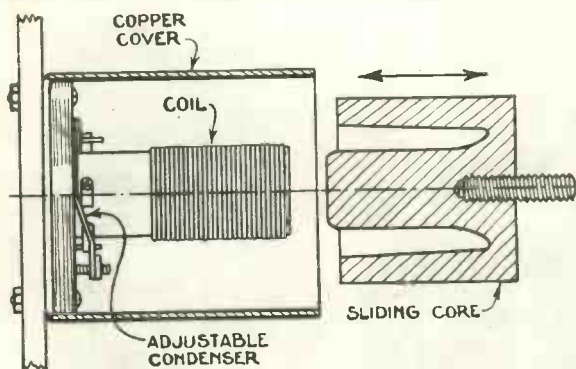


Fig. 1.—Sectional drawing of coil, showing core so shaped that it goes round the former as well as inside it. As the position of the core is varied, so is the wavelength controlled

IS THE CONDENSER DOOMED?—Continued

Now we come to a second important advantage of this system. The variation of the inductance is always of the same order, namely, 8:1, irrespective of the actual inductance of the coil.

Ganging Two Coils

Consequently we can have two coils of different inductances and tune them both together by merely inserting cores into each. In other words they will be ganged up just in the same way as we gang condensers, and will tune to the same frequency throughout the tuning range, although their actual inductances and tuning capacities are quite different.

Needless to say, the tuning capacities must be so adjusted that the circuits tune to the same frequency without the core in position but, once this has been done, the mere act of inserting cores in the coils at the same time and the same rate causes the circuits to tune in unison.

This is a very considerable advance over the present practice, where it is necessary not only to make the

coils exactly equal, but also to match up all stray capacities before the circuit can be properly matched. Even then the tuning condensers used have to be specially designed to have exactly similar capacities at each point of the scale.

One obvious development of this idea is shown in Fig. 2, where we have three tuning circuits. The aerial circuit is tuned with its own capacity, there being no necessity to tap down on the coil as is usually done. The anode circuit of the valve is then tuned and finally the grid circuit of the second valve is tuned, the energy being handed on from one to the other through a capacity coupling.

These three inductances can all be different and would, indeed, be made different in order to obtain the greatest efficiency from the circuit. Yet if the tuning capacities are initially adjusted as already described, then the circuits can be tuned in unison over the whole scale by merely inserting three cores into the coils by a suitable mechanical arrangement (Fig. 3) which

moves all three at the same time.

The inventors make a very curious discrimination in their description. They say that they are altering the permeability of the space around the coil rather than altering the inductance of the coil itself. Actually, of course, the two effects go hand in hand, because the inductance of the coil depends absolutely on the permeability.

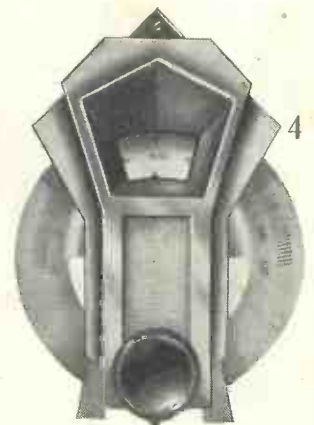
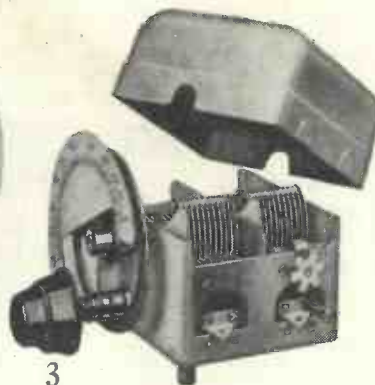
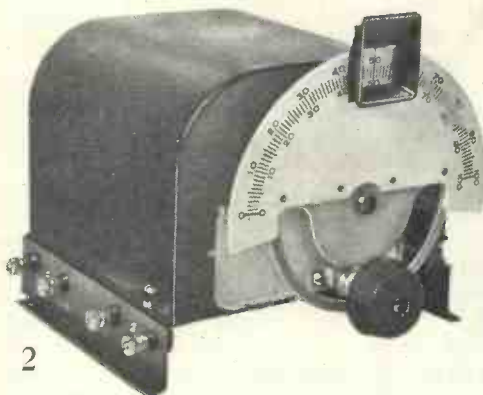
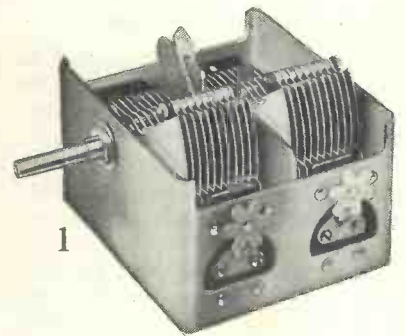
"Permeability" Tuning

The system is one in which the inductance of the coil is varied to suit the tuning requirements, but the method has become known as "permeability tuning" and this name will probably stick.

Pending any practical tests of the system, which cannot yet be made because the special iron is not, so far, available in this country, it is not possible to comment any further on the system. The arguments put forward by the originators are ingenious and appear to be sound. Time alone will tell whether the variable condenser is really doomed as a tuning device for our receivers.

The Latest Examples of Condenser Practice

Whatever happens about variable condensers in the future, manufacturers are at present turning out some fine examples. These photographs show: (1) a J.B. Nugang model, with star-shaped trimmers; (2) the Ferranti three-gang model, with feet for raising it from the baseboard; (3) the J.B. Untune model, also with a star-shaped trimmer; and (4) the latest J.B. illuminated disc drive



With the Set Makers

IN the August issue I looked forward to the Exhibition and dealt with some of the sets that would be on show. Not being clairvoyant, I could not foresee every item of interest, but now, looking back at the Show, I find I am suffering from what the French would call "embarrassment of riches."

There is so much news from the set makers that they—and you—must forgive my many sins of omission.

The Twin-speaker Idea

If with one loud-speaker you cannot reproduce all the required frequencies in the musical scale, try two! That seems to be the idea behind the new twin-speaker system, which has just arrived hot-foot from America.

My eye caught the McMichael radio gramophone at the Exhibition because this 40-guinea instrument is, I think, one of the first to include two moving-coil loud-speakers in its cabinet.

Although no claim is made for any stereophonic effect with this twin-speaker idea, it is definitely claimed that the sharing of the responsibility for the bass and treble between two units allows greater freedom of design and ensures real high notes from one and real low notes from the other.

The Golden Voice

This year Telsen's have produced a set that will be talked about. It is the Macnamara Three, named after the head of the firm that has had such a meteoric rise to prominence. This three-valver is a perfectly straight set, with all the desirable refinements of its type. Its good reproduction is evidently the makers' greatest claim, since it is referred to as "The Golden Voice".

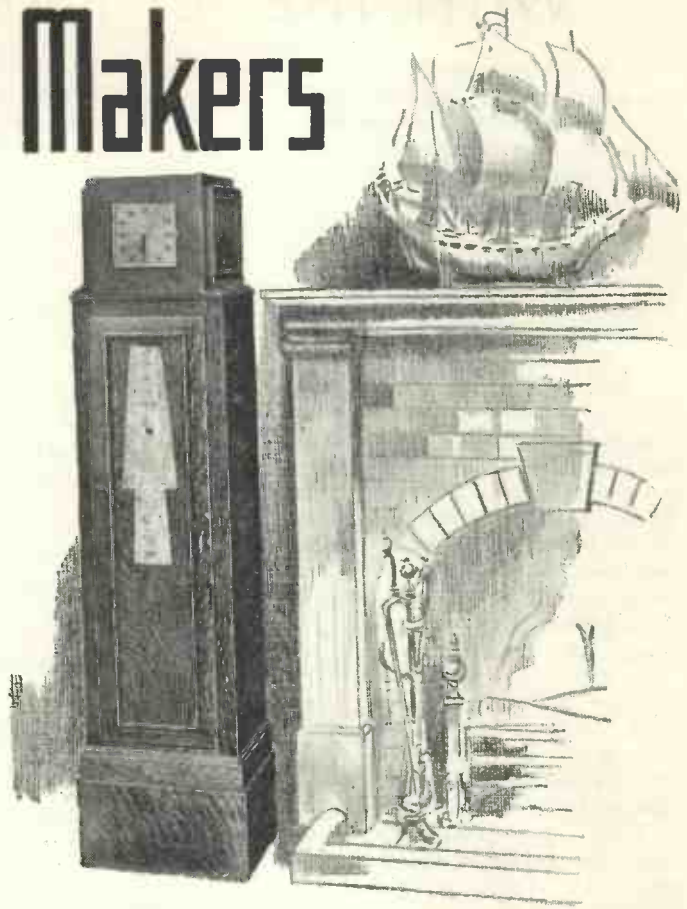
There are all the attributes needed to produce such an effect. A mains-energised moving coil is driven by a pentode valve, which has 2 watts undistorted output.

A commendable point is the alternative cabinet design. You can get all the advantages of the chassis for 12 guineas, but if you want a de-luxe cabinet you must pay 15 guineas. Even this is very reasonable as average prices go this year.

Cheap but Really Good

I imagine the Regentone straight three-valver for A.C. mains will often be recommended this season. Not only because the design is perfectly sound, as anyone can see who cares to examine the "clean" chassis construction, but because in addition the price is just right for the listener of modest means.

For £12 you get, in the new Regentone straight set, a detector and two low-frequency combination, with



SOMETHING UNUSUAL IN THE WAY OF SET DESIGN
This set, made by Mains Radio Gramophones, Ltd., strikes a new note. It is a combination of an electric or eight-day clock with either a band-pass four-valve set or a screen-grid three

moving-coil loud-speaker, tone filter, and metal rectifier. There's no catch—it's a genuinely efficient set at a bargain price, so far as I can see. Makers: Regentone, Ltd.

Ultra's Visual Indicator

In several of the value-for-money Ultra sets I notice a very useful station indicator. This takes the form of a long horizontal scale, the novelty being that when medium waves are switched on a red light shines and when long waves are in circuit the light turns to green. Such devices all help to make operation simpler for the ordinary listener.

I saw this particular development on the new Panther set at 18 guineas. This is a set with two variable mu's, detector, and pentode, driving an Ultra loud-speaker. Good value indeed. Makers: Ultra Electric, Ltd.

Atlas Enter the Set Field

So the makers of the famous Atlas mains units and components have come into the set market. The Atlas mains two-valver interests me, as it has a mains-energised moving coil and Westinghouse metal rectifier for the high-tension supply. This little set is for A.C. or D.C. mains, and the price is only 10 guineas.

WITH THE SET MAKERS—Continued

There is a great market for two's this year, with the regional scheme in sight of completion and thousands of listeners wanting good-quality local alternatives.

With a permanent-magnet moving coil and low-consumption pentode the Atlas battery two-valver at £6 10s. ought also to cause a stir. Makers: H. Clarke & Co. (Manchester), Ltd.

Meet the Clock Receiver

In a season of sets not very notable for individuality in cabinet design, the M.R.G. clock set stands out very clearly. Made by Mains Radio Gramophones, Ltd., this unique instrument strikes a welcome new note. Inside the grandfather-clock cabinet is housed either a band-pass four circuit or a screen-grid three.

An electric or eight-day clock fits into the top of the cabinet, which contains, in addition to the set, a moving-coil loud-speaker. Prices: 32 guineas for the four and 24 guineas for the three.

This is a type of set that will stand very comfortably in the hall or by the fireside. I think the idea is really good.

All-steel Chassis

One of the minor sensations of the show was the "all-steel" chassis on the Brownie stand. Here is a two-valver with built-in loud-speaker at the remarkably low price of £3. This, note well, includes the valves. Made by the Brownie Wireless Co., Ltd., this little set leaves no excuse for anyone not having a wireless installation. Inside the oak cabinet there is ample room for the usual high- and low-tension batteries.

For Constructors

Although not an item of red-hot news, I would like to stress the interest taken by constructors in the Ferranti band-pass three kit set. The 1933 model is one of the most scientifically designed battery sets available in any shape or form. It is a set essentially for the discriminating constructor who is after the real goods in quality reproduction and selective sensitivity.

The price of the parts, excluding cabinet, valves, and batteries, is £7 19s. 6d., and the makers are Ferranti, Ltd., of Hollinwood, Lancs.

Brains Behind Murphy Radio

I must say I admire the original design of the new Murphy eight-valve super-het. This is, I believe, almost the only set to make use of an automatic volume-control valve—a device very popular in the U.S.A. but only just filtering through into this country. Apart from the circuit points, this new Murphy set has a sensible sort of cabinet, with the controls tricked out as part of the artistic treatment of the *tout ensemble*.

The pedestal type of cabinet exemplified in the Murphy will surely be more common by next season, when the public has discovered how much better it is to buy a set with legs on than a set needing some form of table to stand on.

I see the table model three-valve Murphy set can also be had in attractive pedestal form for an extra 2 guineas.

Pegasus Solves All-wave Problem

Great interest will be taken in the new four-valve Pegasus set, price

24 guineas, made by Pegasus, Ltd., of Leeds. This is one of the very few sets that, *by means of a switch*, will tune short, medium, and long waves at will. In addition to this special advantage, the Pegasus has a thoroughly up-to-date circuit, with two variable mu's and a pentode giving 2.5 watts output.

Band-pass aerial tuning is employed, and the whole tuning system is done with one knob controlling a four-gang condenser.

Boon to Battery Users

Philips are to be congratulated on their new four-valve battery model at 11 guineas. With two screen-grids, detector, and large pentode output it might be thought that a very large drain would be exerted on the high-tension battery. Normally this drawback of an otherwise excellent valve combination would deter people, but I should emphasise that a great economy is effected in the running cost of this new set by the inclusion of what is termed a regulator valve.

The high-tension current consumption is greatly conserved with this set during intervals in the programmes or when only a low-volume output is required.

A.C. or D.C. Mains Set

To overcome the great difficulty facing many listeners now on a D.C. supply and imminently changing over to A.C., a unique type of set has just been produced.

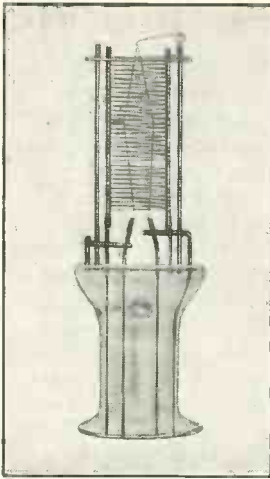
This is the Deecce-Acee three-valver, which, without any alteration whatever, can be plugged straight into either an A.C. mains socket or a D.C. socket, provided the mains voltage is between 200 and 250 volts.

This all-British novelty has a trustworthy specification. The rectifier is a Westinghouse. The valves are Marconi screen-grid, detector and pentode. The loud-speaker is a mains-energised Magnovox. The average consumption is said to be 55 watts. The price is 18 guineas, which, in view of the unique facilities, is very reasonable.

As this is a newcomer, I should mention that the sales department is at 6 Burnley Road, Padiham. *Vanguard*.



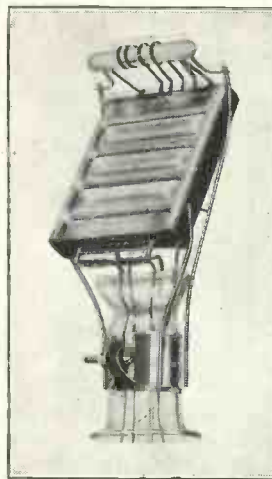
A NEW ALL-ELECTRIC RADIOGRAM
This is the new McMichael radiogram which uses the two tone-compensated moving-coil reproducers. It incorporates the standard four-valve A.C. receiver and costs 40 guineas



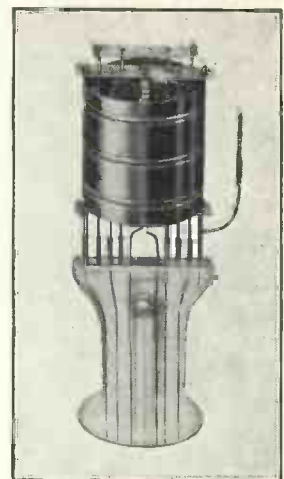
Grid design of the new Osram 2-volt variable-mu valve, a useful type



Mica plate bonding employed in the Osram MHL4 A.C. mains valve



Note the heavily-ribbed anode of the Osram PX4 power valve



The Osram indirectly-heated pentode is very rigidly constructed

What of the New Valves?

BY THE "WIRELESS MAGAZINE" TECHNICAL STAFF.

NOW that the tenth Radio Exhibition has come to a successful conclusion, we can spare time to consider some of the remarkable improvements made during the past year. This applies not only to receivers and components in general, but particularly to the remarkable and unheralded achievements of the valve makers.

Practically every type of valve has been improved in some way or other, and slopes of 5 and 6 milliamperes per volt are quite common in many makes.

The re-entry of Standard Telephone & Cables, Ltd., into the valve-making world is very welcome, doubly so when we realise what an excellent product they market.

High "Mutual"

Many readers will remember the original Weeco valve of some eight or nine years ago; a comparison between valves of this type and some of the later Standard patterns is quite impossible. One of the most interesting of the valves marketed by this firm is the PA1, having a mutual conductance of 12, which is considerably higher than any other valve of this kind on the market at the present time.

Many interesting valves are to be found in the Cossor range for this year, some of them having extremely

good figures. Not only have they considered the user who has an A.C. supply available, but also the man who has to run his set from small-capacity dry batteries. For this purpose we have two entirely new valves, a 220HPT and a 220PT.

Moderate Consumption

The 220PT is very suitable for a two-valve or portable-type receiver as, with a filament current of .2 ampere, the high output of 550 milliwatts can be obtained with quite a moderate high-tension consumption. With only 100 volts on the anode, the makers claim that this valve consumes 2.8 milliamperes. This goes to show what a wonderful emission the modern valve must have to give such a high performance.

The 220PT is for use with a standard type mains unit or high-tension accumulator, the consumption being 13.5 milliamperes when operated correctly with 120 volts on the anode.

These two valves are supplied with the full operating details, as well as the optimum load, so that the valves can be correctly matched to whatever loud-speaker is employed.

Readers will no doubt remember the first Cossor battery variable-mu valve; this in its original form had a comparatively poor performance when compared with the standard

screen-grid valve, but it has recently been issued with such improved characteristics that it is comparable with the most efficient 2-volt screen-grid valve in the range.

In the mains class we find two very interesting pentodes, designated PT41 and PT41B. The PT41 handles 250 volts on the anode, consuming 30 milliamperes when operated correctly, and has a maximum A.C. output of 2,600 milliwatts.

Those who wish to have a high A.C. output will be well advised to consider the PT41B for an output stage. This valve has an A.C. output of approximately 3,600 milliwatts and will take up to 400 volts on the anode. The consumption is 30 milliamperes when operated under normal conditions.

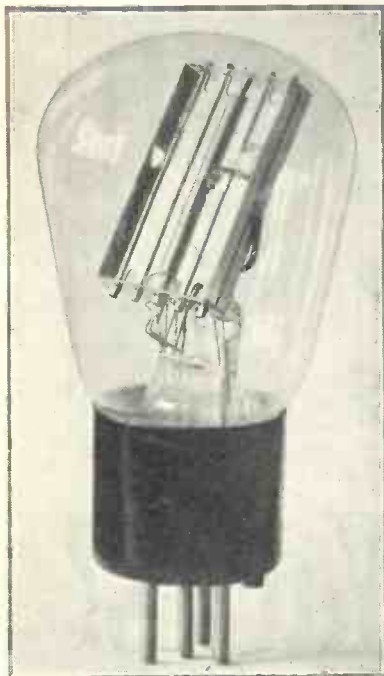
Latest D.C. Types

Listeners on D.C. mains have been very badly neglected in the past but, with the issue of the latest D.C. mains valves, they have now no further cause for complaint.

In the Osram range are some valves designed solely for operation on D.C. mains. These compare very favourably with the equivalent types in the A.C. range, so that designers can now obtain the efficiency usually associated with A.C. receivers.

The Osram D.C. variable-mu valve has a standard 16-volt .25-

WHAT OF THE NEW VALVES?—Continued



NEW MICROMESH VALVE

This photograph shows the construction of the Standard Telephone and Cables' Micromesh valve, the electrode assembly being common to the PA1 and HLA1 types.

ampere filament. This requires quite a reasonable wattage from the mains, so that a D.C.-operated receiver could be run at a very little more expense than the equivalent A.C. receiver.

This valve has a maximum mutual conductance of 2.4 milliamperes per volt and is, we believe, the first valve of its kind to be issued in this country. It is used in the D.C. version of the Prosperity Three.

The type DH is suitable for use in either detector or low-frequency positions. With an impedance of 10,800 ohms, it has the extraordinary mutual conductance of 3.7 milliamperes per volt. A high output can be obtained with only a small input, and when used as an anode-bend detector it will handle 6 to 9 volts input with ease.

In the small-power class, we have an output valve designated DC/P, having an anode dissipation of 5 watts. The impedance in this case is

2,660 ohms, with a mutual conductance of 4.5. Finally we have the DC/Pen, which has an amplification factor of 90 with an anode dissipation of 8 watts.

It will be seen from these figures that those having D.C. receivers needing this type of valve can now obtain a really high degree of efficiency.

The Osram PT25 is a new pentode valve of very high output for use mainly in A.C. receivers. Valves of this type have an A.C. output greater than that of a 60-watt triode, similar to the DA60, with less than half of the anode dissipation. The PT25 dissipates 25 watts; it has an A.C. output of 9,000 milliwatts and has the amazing amplification factor of 100.

In view of the trouble experienced with portable and self-contained receivers due to microphony, the latest Osram valves have been constructed to overcome this difficulty. All valves which are likely to suffer from this trouble have been constructed with a special locking device that holds all the electrodes in a perfectly rigid manner.

It is claimed that this method of construction not only overcomes microphony but, as the electrodes are so firmly held, variation in spacing between electrodes is not likely to occur and that valves of a similar type have more or less the same characteristics with only a very slight variation.

Those who require exceptional reproduction from their pick-up cannot do better than to use one of the new Osram super-power valves, such as the PX25, in the power stage. The particular valve mentioned has a mutual conductance of 7.5 with an impedance of 1,265 ohms, and will give an A.C. output of 5,600 milliwatts. It has been designed to have a particularly long life, and to this end the heater is run from a 4-volt A.C. supply with a current of 2 amperes.

Battery Valves

As it is to be expected, the users of battery valves have not been forgotten. No introduction is needed to the Osram S21 and S22 screen-grid valves. These have now been joined by the new VS2, a battery variable- μ type. The filament current of this valve is only .1 ampere at 2 volts, and to obtain a slope of 1.25 milliamperes per volt is a great achievement. In a receiver where the anode and filament current is of primary importance this valve will be very suitable, for when tuned to the local station, and the volume control is brought into operation, the anode current is reduced to somewhere in the region of .2 or .3 milliampere.

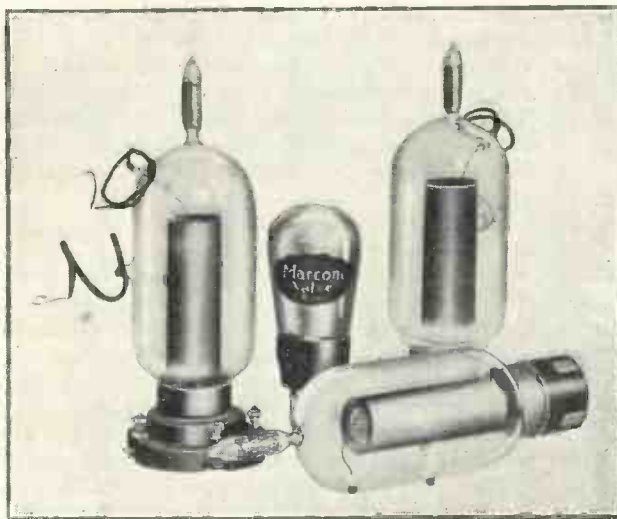
Increased Efficiency

Those who are already using the Osram VMS4 will be pleased to know that the efficiency of this valve has been greatly increased. The original VMS4 was the first variable- μ valve of this kind to be issued in this country, but the efficiency was not really sufficient when compared with the MS4B.

The new valve, however, fully makes up for this as the slope is variable between .005 with 40 volts bias to 2.4 with zero bias, giving a really good control of amplification.

Grid emission has for a long time been difficult to overcome to the absolute satisfaction of all concerned. The new Standard Micromesh valves appear to have

(Cont. on page 392)



HISTORIC MARCONI VALVES

Three of the old Marconi-Round valves grouped round a modern Marconi product. The "pip" at the top contained asbestos and had to be heated to keep the valves reasonably hard.

The Broadcast Play

Some Suggestions by WHITAKER-WILSON

NO doubt you have often said that radio plays are not worth listening to. I know I used to make that remark. At one time it was undoubtedly true, but I am not at all sure the plays were wholly at fault. Perhaps you and I should realise that we had not then become accustomed to plays we could hear but not see.

Seeing Our Plays

We had been accustomed, all our lives, to seeing our plays. The advent of the cinema altered things for us a good deal in that we became accustomed—not without grumbling at first—to seeing plays *without* hearing them. Perhaps we did not realise that the cinema made it difficult for us to hear plays without seeing them?

We did not mind hearing symphonies without seeing the actual orchestra before us, any more than we objected to being entertained by vaudeville without visualisation, because in the first instance we comforted ourselves with the fact that, after all, there was not much to see in an orchestra and, in the second, that people were funny and amused us in a light fashion easy to follow.

Moreover, our experience in these things had been considerably heightened by gramophone records. All the same, I doubt if many of us would have bought an expensive album of discs recording a full evening's play, even had it been obtainable.

The fact is we have *gradually* become used to hearing plays by wireless. It has been a very gradual process and we have—as usual—

grumbled steadily all the time.

Since the B.B.C. went to Broadcasting House the more sensitive of us have sat up and taken considerable notice, because of the enhanced effect of broadcast plays. The studios are, as we all know, capable of being linked up to a single control panel. By this means all sorts of effects have become possible.

It was done at Savoy Hill, of course, but not nearly so effectively. There is a distinct improvement in all forms of broadcasting since the B.B.C. went to Portland Place, not least in



RADIO PLAY PRODUCER
Introducing Val Gielgud, productions director of the B.B.C., who has collaborated with Whitaker-Wilson in the production of a radio play about Christopher Wren to be broadcast in October

casting has, by virtue of hard work and ceaseless experiment, brought about a very satisfactory state of things. Radio plays are beginning to drift away from stage productions altogether. Soon there will be very little in common between radio and stage productions.

This, to my way of thinking, is all

to the good. The B.B.C. has always been out to help art where it can. Unfortunately, it has often been impossible to avoid being a hindrance.

Undoubtedly, art and music in the country as a whole have suffered greatly because of the situation broadcasting has brought about. Teachers of music find that young people are now inclined to listen



AT THE MUNICH "MIKE"
Erika Mann, daughter of the famous author, Thomas Mann, is a well-known actress. She is here seen performing before the microphone at Munich

the transmission of drama. The effects studio has every conceivable noise-making machine.

Experiments have been tried in most kinds of play. My view of the result, as a whole, is that broad-

rather than perform themselves. Here, however, the B.B.C. is helping the theatres—definitely so. The creation of broadcast drama, as a *separate form* of art, is going to do two things. First, it is going to stand on its own feet and interest all thinking people by its own virtue and, secondly, it is going to make the ordinary stage play stand out as a distinct form of art. An older form, if you will, but a *distinct* one.

To the Theatres

We shall know in the future that we are *not* to look to Broadcasting House for the production of plays of the theatre type. For them we must go to the theatres. Quite right, too.

The truth of the matter is that radio plays need special writing. They need specialised acting. They even need specialised listening for their reception. Broadly speaking, a

THE BROADCAST PLAY—Continued

relay from a West End theatre is doomed to partial failure at the outset, because one is bound to be held up while the actual theatre audience is following some *action* on the stage.

Apart from that—a vital point—it is inconvenient to give nearly three hours to the relay of a play; if only an hour be given the play loses its meaning. You must have seen it previously before you can enjoy it at all.

Numerous Successes

I have been looking through my notes on the various types of play I have heard since last September. There have been many successes and not a few failures, but the successes just recently have been so numerous that the failures do not seem to matter. Going through the various kinds of play in a haphazard sort of fashion, I am inclined to suggest



CARNIVAL
Children taking part in a carnival broadcast from the Munich studio

that only specially written plays, or at least special adaptations, have proved to be the real successes.

John Drinkwater surprised many of us by his amazing satire called *Midsummer Eve*. Well, then, there is a point worth consideration.

England has always appreciated satire. English people never mind satirising their own customs, laws, and habits. Our humorous journals depend upon satire for their very existence.

John Drinkwater went one further; he produced what was intended to be a delicate fantasy. He drew a charming picture almost worthy of Sir James Barrie and then proceeded to fill his lines with all sorts of satirical delicacies that left you wondering what he meant and what he did not mean.

He employed four characters. He satirised a self-made man—an easy victim, of course; then he satirised a virtuous maiden so cleverly that one wondered whether virtue was really a vice; he satirised a yokel by making him clever in his own stupidity, and finished up by dragging in the god Pan and satirising the satyr, so to speak.

I maintain that we can do with more of this sort of entertainment. They keep us awake. If the B.B.C. made a definite move in the matter we might get more of them.

I am well aware that two thousand plays are sent in every year to the B.B.C. and that most of them are not worth the paper on which they are written. Nevertheless, it would not be a bad plan to approach good writers and ask for satirical plays and see that one was occasionally broadcast.

There have been some first-rate Shakespearian relays. Shakespeare, of course, is not

everyone's meat, but there is no doubt as to its suitability for broadcasting. The reason is obvious. In his day scenery was at a discount. Often they did without it. Neither was too much attention paid to the acting. The speech was the important thing. Hence the suitability for the microphone.

Shakespeare must always be a separate venture. His plays have nothing to do with most other kinds. All the same, there are other types of classical play that have come through amazingly well.

Those of you who heard Christopher Marlowe's *Dr. Faustus* will agree with me, I am sure, that it was a real "gripper."

Adding to the Three

No form of play is more suitable for the microphone than the play of fact. *Flags on the Matterhorn* was a very good example. It added to the thrill when we were told that all this had actually happened and that one of the original German authors had himself climbed the mountain.

Waterloo was another type of success. That sort of play might become a wireless classic and be given on June 18 each year, but *Waterloo* is not the only incident in English history worth working up into a play.

Lastly, there is the biographical play. Not many have been done yet, but the B.B.C. productions director is wide awake to the power of biography in play form.

Fact is so much more powerful and often so much stranger than fiction that it seems feasible to explore further in this direction. Great lives, after all, have always been made up of great acts and great incidents.

Radio plays dealing with such incidents, and which make a great soul live again for a few moments, are likely to become really popular.

There is no necessity to suppress the play that creates a character, but there is every use for a play that portrays a real character, even if the authors have to resort to a little fiction in order to present the facts.



GERMAN BROADCAST FOR AMERICAN LISTENERS
Cabaret being relayed from the famous Haus Vaterland in Berlin for the benefit of American listeners. Such exchanges of programmes are frequently made

Broadcasters in Caricature



CEDRIC BELFRAGE

has recently been appointed the film critic of the B.B.C. He broadcasts on Tuesday evenings



MOLLY STOLL

pairs with Douglas Steward in variety broadcasts. They are exceptionally good at cross-talk



GEORGE BAKER

has made himself a great favourite in musical-comedy broadcasts. He has a fine baritone voice



ANN PENN

is a favourite vaudeville artist renowned for clever character impersonations both on the stage and in the studio



TOM PURVIS

is a popular tenor, who sings in operatic, classical, and revue concerts. He is heard very frequently



DOUGLAS STEWARD

is well known for his broadcasts with Molly Stoll in studio variety programmes



To get the best results you must tune with your head as well as with your fingers; the complete operation is here explained by ALAN HUNTER

COMPLETE control comes, I think, only to those of full understanding. That there is something worth while in attaining complete control must be admitted. It does not greatly alter the truth of the statement whether we are referring to the control of a motor-car on the road, a horse on the ride, one's feet on a dance floor, or the knobs on a wireless set. The deeper your knowledge the greater your control.

Understanding "the Works"

My experience in attempting to control radio sets leads me to believe that much of the ultimate possibilities of reception is sacrificed by those who do not understand what is happening inside the set when each knob is turned.

I have yet to come across any listener who is at once really adept in the art of set control and entirely ignorant of the *modus operandi* of the set.

At this stage in the development of wireless reception it is, of course, impossible for everyone to be thoroughly conversant with the technicalities. I maintain that although to many newcomers to broadcasting a mastery of even the elements of the technique appears as an unattainable goal, the more knowledge that can be assimilated the better will the set be operated.

Between something like a working knowledge of wireless and abysmal ignorance is a gap that may take years for the average intelligence to bridge

—pre-supposing an inclination to do so. Meanwhile, there is a great non-technical host of listeners—of people buying sets for the first time this year. Can anything be done to help such newcomers, many of whom will assuredly be numbered among readers of "Wireless Magazine," to make the most of the controls on the modern sets?

I am not suggesting that the present article can do more than outline some of the subtleties of the art of set control. If it succeeds in whetting the appetites of non-technical listeners imbued with a desire to do the right thing at the right time I shall have done all I can hope to do in one article.

We may as well make a start with tuning because this has to be controlled in every set, no matter what its make or type. A tour of the Radio Exhibition revealed to all visitors that tuning in the modern set is mostly done with a single knob.

There is no point in talking about *passé* sets with two or three tuning knobs. Even if in the cheaper sets absolute single control of tuning is not achieved, there is usually no more than a trimmer knob superimposed on the main knob that works the tuning condensers and the wavelength scale.

Well, then, tuning means turning a knob. Is that all it means? To the uninitiated perhaps it does. To the expert even a single tuning knob offers scope for *finesse*. Watch

the expert "run round the dial" when searching for a likely foreign station. Notice the *speed* with which he flicks the knob backwards and forwards about the station's logging point.

This sort of pendulum action is characteristic of the expert. It is seldom practised by the tyro, who laboriously moves the dial pointer slowly—oh, far too slowly!—up to the station's tuning point and past it, finally settling down somewhere near the right point, but by no means certainly on the point, for all the care in slowly adjusting the tuning control.

Correct Tuning Is Rare

I am amazed how seldom the correct tuning action is adopted, even by those who have been working sets for years. The correct action is to move the knob slowly between stations, so as not to miss any, but to move the knob *quite quickly* to and fro about each station's approximate tuning point. Only in this way can the exact point be determined.

Gradually shorten the travel of the knob in the "pendulum swinging" process and finally settle down, like a contented bee, on the right spot.

Apart from this purely mechanical aspect of tuning operation there are points to watch in modern sets, especially band-pass sets. If it is known that the set incorporates a band-pass aerial-tuning circuit care should be taken to set the tuning knob so that signals are received at

the centre point of whatever dial space is taken up.

A characteristic of band-pass tuning is that each station has an appreciable "spread" on the wavelength scale, although signals will fall away sharply on each side of the spread limit. Signals will sound best in quality when the tuning knob is adjusted so that the adjustment is at the centre. At either of the side adjustments there may be appreciable loss of quality.

Avoiding Interference

Sometimes it is advisable deliberately to sacrifice quality in order to clear a station of interference. I have found on several band-pass sets that a high-pitched heterodyne whistle coming in at uncomfortable strength at the correct setting of the tuning knob can be partially removed by adjusting the tuning knob to one of the side points.

Usually the whistle, which is caused by heterodyning of the adjacent station with the wanted station, is pronounced only at one side of the spread of the required signal.

If by chance the tuning is adjusted to the wrong side of the available space occupied on the dial by the station an unnecessary amount of interference is endured. This is a good tip for the whistle-infested winter, when quite low-powered foreigners set up interference with the high-powered stations at home and abroad.

Now we come to volume control. It is unfortunate that makers of sets dub so many different controls as volume controls. In even the latest sets I find that volume control may mean sensitivity control of the screen-grid valve; it may mean reaction on the detector valve; or even capacity coupling of the aerial to the input tuning circuit.

So far as I can see the nomenclature is too loose. We ought to reserve the term volume control to the knob that provides us with a variation in volume from zero to the maximum of which the set is capable.

Other controls, such as aerial-coupling condensers, which alter the selectivity and only incidentally alter the volume, and reaction

controls, which only increase weak signals, without being able to decrease strong signals, should be called by something to indicate that they are not real controls of the volume.

Most of the bigger sets have a volume control that affects the sensitivity of the screen-grid valves, altering their amplifying properties so that signals of widely differing strengths can be reproduced at a constant level of volume.

A good volume control, such as that working on the bias of the variable-mu type of valve, will enable any volume output up to the maximum of the set to be obtained irrespective of the strength of the incoming signal, providing it is above what is known as the "static level."

In this question of "static level," which is, I believe, an Americanism, lies the secret of volume control in the bigger sets. The great point to grasp is that signals below a certain initial intensity cannot be satisfactorily reproduced, no matter how "high up" the volume control may be turned.

Most newcomers to radio are unaware of this fundamental limitation in the reception of foreign stations. Much fruitless time in knob-twiddling could be avoided by a careful estimation of the initial strength of the required signal.

Here is the simplest method.

Tune in a dozen or so foreigners at normal strength on the loud-speaker and then note the approximate setting of the volume control needed to give this reception.

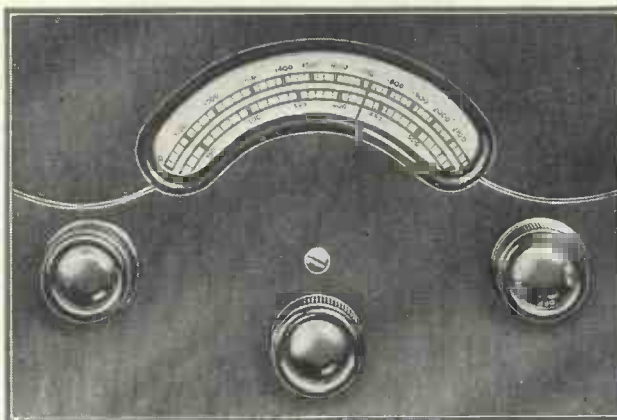
Too-weak Signals

Probably the setting will be little more than half-way towards its maximum setting. Almost certainly it will not be in its maximum position. Then try for one of the more doubtful foreigners, and if a considerable increase in the volume-control setting is required to give loud-speaker signals it may be fairly safely assumed that the signal is not worth worrying about.

It may be brought in at full strength by setting the volume control "all out," but the amplification of the hundred and one back-



CONTROLS OF A TEN-VALVE SUPER-HET
On the right are seen the controls of the H.M.V. Super-het Ten Autoradiogram. The condenser scale is calibrated directly in wavelengths



AN EASILY-READ TUNING DIAL
A large wavelength-calibrated scale is fitted to the Marconiphone model 253, a three-valver for A.C. or D.C. mains operation

ground noises lurking in the ether at all times—and in the set—will make enjoyable reception of the signal impossible.

The guiding rule is to keep the set well within its limits. Just as a car will run more sweetly when there is 10 miles an hour speed in hand than when the throttle is fully open, so a set will give sweeter music when the volume control is kept down.

The volume control is not a *genie* that will

TUNING THE NEW SETS—Continued

summon any station in the ether at will. The ether is master of the situation and the set, however powerful, can only function as the condition of the ether dictates.

Increasing Selectivity

On the smaller types of set—three-valvers with reaction on the detector—the volume control can be used with great advantage in increasing the selectivity of the tuning circuits. Properly used, the volume control on such a set will enable stations to be separated in a way that would seem impossible to those lacking the knowledge required.

Here, by the way, is an excellent example of my contention that a technical knowledge of the set helps the operator to get better control. If the peculiar action of the reaction control is understood it is quite easy to do the right thing with a modern three-valver.

Reaction Amplification

Reaction has the effect, when applied to a tuning circuit, of reducing that circuit's resistance. It so happens that this reduction of the resistance affects the amplification only of the signals to which the circuit is tuned. Reaction is often thought of as a form of amplification, which indeed it is; but a peculiar form of amplification that comes into action only for the signal tuned in.

This accounts for the selective property of reaction, which builds up the strength of the required signal without increasing the strength of unwanted signals, such as those on adjacent wavelengths.

The usual procedure when making use of reaction to enable a wanted station to be separated from near-by unwanted stations is first of all to cut down the strength of all signals by adjustment of the volume control—which will be an aerial-coupling condenser or a screen-grid bias resistance—and then to increase the strength again by turning up the reaction to the limit.

This procedure works every time. Yet many a non-technical listener gives up the attempt to separate two stations because the simple facts about reaction are not known.

I want to make another point about reaction in simple sets, in the popular two's and three's for battery and mains operation.

There is a tendency, which I deprecate, to simplify control by making volume and reaction a continuously variable movement on a single knob; so that at the minimum setting of the new type of volume control, and for, say, the first three-quarters of its rotation, the knob is actuating some form of sensitivity control, such as a screen-grid adjustment, while on the last quarter of the rotation of the knob a little reaction is applied.

Such a simplification, in view of what has already been explained about the function of reaction, is too great a sacrifice of the set's selectivity.

It may possibly be argued that to increase reaction to the limit is a bad thing for quality, since the decrease of the resistance of the tuning coil will lead to mutilation of the high notes. Up to a point this is true, but the whole tendency in modern design is not to attempt to maintain a "straight" frequency response throughout the set but to compensate at the low-frequency end of the set for any losses introduced at the high-frequency end.

Tone-compensating transformers



LEVERS AS WELL AS KNOBS

Blue Spot sets make use of levers as well as knobs. This particular model is the Table Grand, a four-valve set with moving-coil reproducer.

and other methods of adjusting the low-frequency response will be the complete answer to the purists who quibble about high-note cutting in the early stages.

Before I mention tone control there is a further point to be made about volume control. This again bears on the quality question. On some of the existing sets, though not so frequently as last year, setting

the screen-grid type of volume control at its minimum position tends to cut off the high notes.

Avoiding Distortion

This form of distortion can often be avoided by slight, very slight, detuning of the tuning knob, enabling a higher setting of the volume control to be used for a given volume requirement.

This hint does not always apply, especially, as already indicated, in band-pass sets, and in sets of great sensitivity, where a slight de-tuning may run the listener into an adjacent station. Still, it is worth trying on sets with the old-fashioned form of screen-grid valves. The variable- μ type of valve is more or less immune from this trouble, and distortionless low volumes are practicable.

Tone Control

On the subject of tone control I cannot speak with great experience, though this additional control is undoubtedly coming into popular favour. In brief, the good tone control will enable either high or low notes to be accentuated. Many so-called tone controls merely cut off the high notes or leave them alone, there being no real control of the low-note reproduction.

These quasi-controls of tone are useful in powerful sets, especially when listening to foreign stations. The cutting down of the high-note response has the effect of lessening the background noises, most of which are of fairly high frequency. Often a slight sacrifice of quality is bearable when a continuance of the background of hissing and frying noises would be intolerable.

If, at this early stage, one can talk of *finesse* in tone control, I should say it is in the judicious application of high-note cutting when listening to foreigners. As far as I can hear the so-called "mellow" effect obtained on tone controls is a snare and a delusion. The effect is nothing more than that of bad reproduction.

In this article I have dealt with all the important variable controls likely to be found on the modern set. There are many minor controls for switching wavebands and switching the power on and off, but these obviously present no difficulty.

We Test Before You Buy

By the "W.M." Set Selection Bureau

SUPER-HET Versus STRAIGHT

ONE of the major puzzles of this year's radio sets centres around the super-het type. The latest models give such good quality that many who have been deterred from taking advantage of the great selectivity of the super-het system are now wavering.

The situation is not made any easier by the increased selectivity of the straight type of set with two stages of screen-grid high-frequency amplification and three or four simple tuned circuits. It would be true to say now that while the super-het approaches the straight set in quality of reproduction, the straight set vies with the super-het in selectivity!

Nor can the price question greatly

selectivity bar getting the foreigners immediately adjacent to the locals.

Let us for the present put the matter thus: if the last word in selectivity is wanted plump for the super-het; but if quality above all other considerations is the requirement go in for one of the latest straight four's or five's. With prices much the same for both types of set that is the best advice we can offer.

♦ ♦ ♦

One of the biggest drawbacks of the past season has undoubtedly been the lack of efficient service when sets have gone wrong. We have on record duly authenticated examples of really negligent treatment although, in general, there has been a genuine desire on the part of manufacturers to give the purchaser satisfaction.

All too often this has meant entirely replacing the set that has gone wrong. It seems to us that if a set can go so far wrong after a week or two's use that a new set has to be installed, that first set should never have left the factory.

The trouble is not so much lack of service attention as lack of really thorough testing before the sets are allowed to pass into circulation.

♦ ♦ ♦

Judging by the efforts of several set makers whose factories we have recently visited, there will be a higher standard of reliability during the coming season than has been our experience in the past.

Most of the tests will be concentrated on the actual component parts, which will be selected by precision testing apparatus. Close tolerances for inductance and capacity values can now be ensured with the latest test apparatus.

There does not appear to be any widespread effort to put the final product through a test machine, and



A TEST OF STRENGTH!
"Demonstrating the strength of the new Columbia chassis" is the official caption for this photograph. Well, well! Still, it IS a charming picture, isn't it?"

in most factories the idea seems to be that if the set will tune in the usual stations at the usual points on the dial it is good enough.

We suggest that the question of the final performance of the set, as regards quality, selectivity and range, might often be more carefully scrutinised, and not left to the discretion of a factory hand. However conscientious he may be there is no doubt that aural tests alone are not conclusive, especially in a factory filled with alien noises, both electrical and mechanical.

FREE ADVICE TO PROSPECTIVE SET BUYERS

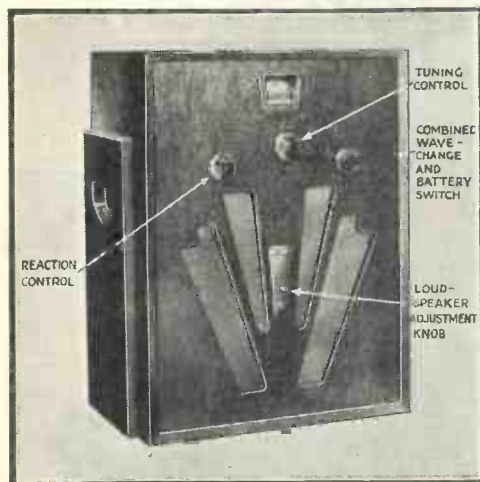
To take advantage of this service it is necessary only to mention (1) the maximum price and whether this is for a complete installation or the bare set; (2) where the set will be used; (3) what particular stations are desired; (4) whether a self-contained set with or without aerial, or an ordinary set with external accessories, is preferred; and (5), in the case of mains-driven sets, whether the mains are A.C. or D.C.

A stamped-addressed envelope for reply is the only expense. Address your inquiry to Set Selection Bureau, "Wireless Magazine," 58-61 Fetter Lane, E.C.4. There is no need to send any coupon, but it is essential to give the information detailed above on one side of the paper only. Tell your friends about this useful service.

assist the set buyer to make a decisive move towards one type or the other. We ourselves are in rather a quandary. One at least of the latest super-hets has greatly impressed us with the excellence of its reproduction. Similarly, more than one straight four-valver has done all the super-het could do in



Marconiphone Model 248 Two-valver



SIMPLE TO OPERATE

A glance at this photograph will show that the set is extremely simple to operate. The cabinet design is quite neat

TYPIFYING the new order of things, this two-valver is entirely self-contained except for the aerial and earth. Yet it is just a two-valver, with an efficient detector followed by a transformer-coupled power valve. Moreover, it is battery operated.

The batteries are contained within the neat oak cabinet, which in appearance really is attractive. So, as can be appreciated, are the lines on which this cabinet is fashioned. Neatness pervades this little set. When the back is on there are no straggling battery leads—only the aerial and earth leads.

Adjustable Loud-speaker

Besides containing the set chassis and batteries the cabinet houses the moving-iron loud-speaker, which has an adjustment on the front.

You may like to know the dimensions—15 in. high, 12 in. wide, and 8½ in. deep. The back is instantly removable by means of “quick-action” clips—there are no screws to fiddle with. As a matter of fact, the only time you need open the cabinet is to put in the two valves and connect up the batteries.

These will want renewing or re-charging from time to time, and can be quickly unhooked from the clearly-marked terminal tags and plugs.

About these batteries—an Exide

2-volt 20-ampere-hour accumulator and a combined high-tension and grid-bias battery of 120 volts. Renewal of the high-tension battery should not be frequent, as the total consumption of the model tested was only 5 milliamperes. Say three months hard use. The accumulator, with its low drain of .3 ampere, should give over 60 hours use per charge. A cheap set to run, without a doubt.

The rather remarkably low current figures are achieved by the inclusion of the latest Marconi valves. The metalised detector is particularly efficient. So is the LP2 output valve, which is well matched to the balanced-armature loud-speaker. There is enough volume for modest domestic requirements.

We passed the tonal quality without a quibble. Clear speech and mellow music—what more could you ask of such a two-valver? Control is child’s play. There

are the usual three knobs, one for tuning the single circuit, one for applying reaction to the detector, and the other for changing the wave range and switching off.

Reaction builds up well, giving ample volume even when the tuning is made as selective as possible, as

NUTSHELL SPECIFICATION

MAKERS: Marconiphone Co., Ltd.

PRICE: £4 19s. 6d.

VALVE COMBINATION: Detector (Marconi HL2 metallised) and power output (Marconi LP2).

POWER SUPPLY: Self-contained batteries.

POWER CONSUMPTION: Anode current 5 milliamperes and filament current .3 ampere.

TYPE: Table set needing only external aerial and earth to complete installation.

REMARKS: One of the best battery two’s we have tried. Fine for local work, with scope for D.X. when conditions are favourable. Cheap to run.

on the “A3” aerial terminal connection. On “A2” and “A1” less selective tuning with greater volume is obtained. Long waves work well, Daventry coming through at full strength. Radio-Paris fair strength and quite clear of Daventry on “A2.”

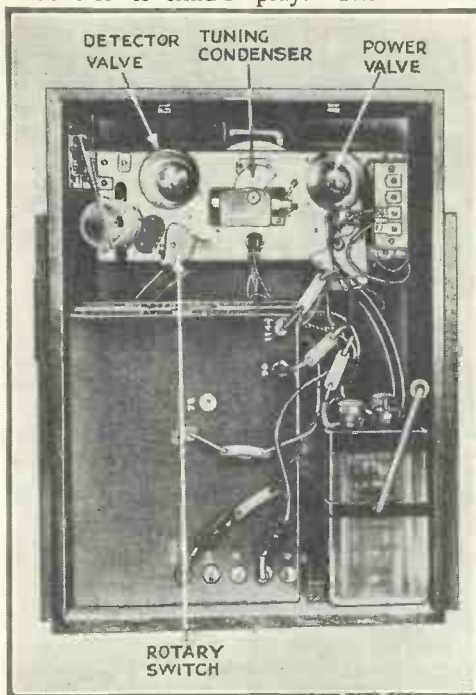
A good feature is that the tuning range is from 200 to 550 metres, so the new B.B.C. wavelengths around 214 metres can be coped with.

Station Separation

We tested the set on the usual 60-ft. aerial and found “A3” connection necessary for complete separation of the London stations. These were then perfectly clear of each other. Midland Regional was heard clearly and Brussels No. 1 was louder than North Regional.

The strength at which we tuned-in Post Parisien leads us to think the set will prove a distance-getter in the coming season, as well as being an ideal local-station set.

Easy to work; cheap to run; eminently sound—that is our verdict on this welcome addition to the Marconiphone range.



COMPACT LAYOUT

An interior view of the Marconiphone model 248, showing the disposition of the batteries. All parts are accessible



Osram Thirty Three (Kit Set)

THE radio season would not be complete without its new Osram Music Magnet kit set. This year's version is in many ways the most surprising of the whole admirable series. The completed set has all the best attributes of the latest factory-built sets of the battery-driven type.

Bakelite Cabinet

Perhaps the most outstanding feature is the one-piece bakelite cabinet—as handsome a piece of moulding as anyone could desire. Very solid and attractive it is, with its ample opening for the loud-

a delightful morning's work, wherein we carefully followed the well-minuted instructions. The work of assembly is simplified by the reduction of the constructor's part to the very minimum.

The coils are already assembled and wired. Likewise the variable-condenser unit which, in common with the coils, is a fine job of engineering, is already ganged up and ready for base-plate fixing.

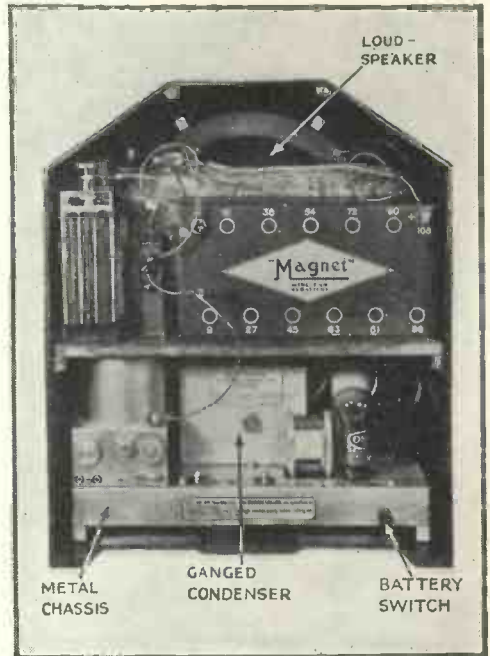
The assembly of the base-plate takes up most of the time spent on the construction of the kit. Parts literally fall into position and then we are ready for the wiring. There are thirteen wires, the length of each being given in the chart. Why not supply the wires already cut?

When the battery cord has been fitted to the chassis, the loud-speaker, which is a new balanced-armature design, is bolted in position and the chassis can then be fitted into the lower part of the cabinet. Simple enough for even a novice to assemble.

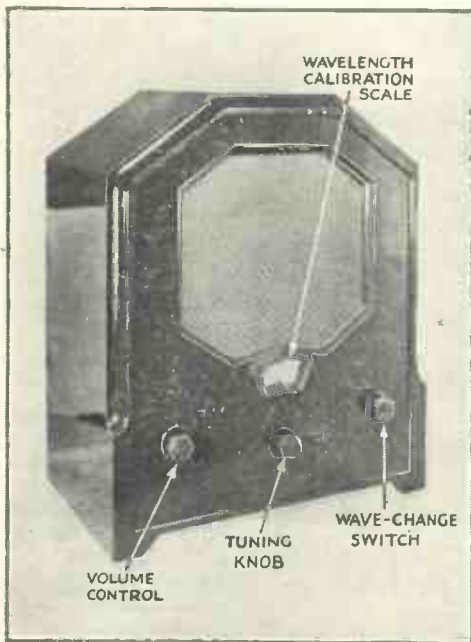
The circuit has novelties. A screen-grid high-frequency stage precedes a screen-grid detector, which is followed by the transformer-coupled power or pentode output valve. Volume is controlled by varying the aerial input to the screen-grid valve, with reaction applied at the maximum setting. This method, while providing a progressive increase in amplification, prevents use being made of reaction as an increaser of selectivity.

Fortunately the selectivity of the two tuned circuits, in conjunction with the use of a screen-grid detector, is of a high order.

Sensitivity is very good. Most medium-wavers came in at loud-speaker strength without reaction.



AN OUTSTANDING KIT
Here you see an interior view of the Osram Thirty-Three. The layout of the accessories has certainly been well thought out



IN A BAKELITE CABINET

The new Osram kit is housed in a bakelite cabinet of neat design. The dial is calibrated in wavelengths for the sake of simplicity

speaker and its neatly cut-away holes for the tuning escutcheon and control knobs.

Inside the bakelite cabinet are fitted the loud-speaker, which is factory assembled and merely requires bolting in position, the set chassis—modern in every touch—and the necessary batteries. So it will be seen that this season the Music Magnet has blossomed out into a *pukka* consolette, needing only an aerial and an earth to finish the installation.

Building the chassis proved to be

Interference was normal for the type of set—perhaps a little less than usual. Long waves were really remarkable. Such stations as Huizen and Paris were received too loudly at the minimum setting of the volume control, and the link connection had to be used to cut down volume.

Selectivity depends a great deal

BRIEF SPECIFICATION
MAKERS: General Electric Co., Ltd.
PRICE: £9 9s.
VALVE COMBINATION: Screen-grid high-frequency (Osram S21), screen-grid detector (Osram S21), and power output (Osram LP2, PT2, or P2.)
POWER SUPPLY: Self-contained batteries (not included in above price, which is otherwise inclusive).
POWER CONSUMPTION: Anode current with LP2 was 8 milliamperes.
TYPE: Table cabinet kit set of outstanding performance.
REMARKS: Easy to make and gives exceptional results on long waves.

on careful setting of the medium- and long-wave trimmers fitted to the coil unit.

Tone from the self-contained loud-speaker is quite pleasing, judged by even the latest standards. There is a slight cabinet boom on low notes, but this is not a great worry, especially when using a pentode.



Zetavox Model A.T. Consolette



COMPLETELY SELF-CONTAINED
This Zetavox receiver needs only an aerial and earth to complete the installation. The appearance of the cabinet is particularly pleasing

THIS is a type of set that offers those in need of great power and more than ordinary performance in sensitivity and selectivity a very reasonable alternative to the super-het receiver.

Straight in the ordinary sense of the term as applied to set design

THE SET IN BRIEF

MAKERS: Zetavox Radio and Television, Ltd.

PRICE: £19 19s.

VALVE COMBINATION: Two screen-grid high-frequency amplifying stages (Mullard MM4V), screen-grid detector (Mullard S4VB), and pentode (Mullard Pen4V), with mains rectifier (Mullard DW3).

POWER SUPPLY: A.C. mains from 200 to 250 volts.

POWER CONSUMPTION: 40 watts.

TYPE: Table cabinet set needing only external aerial and earth to complete the installation. No mains aerial provided.

REMARKS: An extremely powerful set, specially recommended for use in districts remote from broadcasting, and for those wanting exceptional range clear of local interference.

the Zetavox is definitely a challenging product, proving that the super-het is not the only solution to our present-day problems of congestion in the ether.

It is, moreover, a set that makes us wonder whether we are quite right to make such a fuss of the

three-valver as being the set for the man in the street. Here is a set, the Zetavox A.T. model, that competes in performance with the average super-het and yet is offered at a price comparable with that ruling for most three-valvers.

The sequence of valves in the set thus upsetting preconceived notions will interest even the non-technical reader. There are two screen-grid stages preceding a screen-grid detector, which is coupled to the pentode output valve by the usual transformer. Really, then, this is a four-stage set, for the fifth valve is the mains rectifier.

These five valves are arranged in line on the top of one of the neatest chassis—we have come across this season. Take a look at the illustration. Apart from the screen-grid detector the layout appears to be fairly normal, with three canned tuning coils, a three-gang condenser, and electrolytic fixed condensers.

Above the chassis is the moving-coil loud-speaker—a Rola—admirably matched to the pentode. A well-defined bass-note effect is obtained, though speech retains its clarity.

The external connections are for the aerial and earth, and there is a bridge piece for the optional use of a pick-up, with which an external volume control would be needed.

The controls of the set are simple. One tuning knob works the three-gang condenser. Another gives remarkably good control of volume, with a little reaction (unintentional?) at the maximum setting—not that the maximum setting is often needed. Budapest, for example, came in at full strength during daylight with

the volume control quite a bit short of maximum.

Then there is a wave-change knob. The mains on-off switching is obtained on the volume control, which at its minimum setting switches off the mains.

Apart from the stations immediately adjacent to the London locals, we had no difficulty in getting all transmissions clear of interference. The wavelength calibrations are exceptionally accurate.

Range is phenomenal. Long before darkness had descended we logged twenty-two stations at enter-



WELL-DESIGNED INTERIOR

The moving-coil reproducer incorporated is a Rola model. Neatness is one of the main features of the design

tainment strength on the medium waves. In the winter, allowing for a certain amount of increased interference, this log should certainly exceed fifty stations.

An advantage is that the tuning range goes right down to 200 metres and up to well over 550 metres, thus bringing in a number of stations many other sets arbitrarily shut out of tuning range.

The long-wave performance is not so good as on the medium waves, but this does not mean it falls short of normal expectations.



Pye Model G Mains Receiver

THIS new Pye set shows just where the British-made product has all its foreign competitors beaten. The power and volume are all any ordinary listener would want in the home. The range is such that all stations worth hearing can be tuned in very simply. Not least, the tone is much better than usual for the type of set.

A NUTSHELL SPECIFICATION

MAKERS: Pye Radio, Ltd.

PRICE: £18 18s.

VALVE COMBINATION: Screen-grid (Mazda ACSIVM metallised), detector (Mazda AC2HL), and pentode output (Mazda ACPen) with Westinghouse metal rectifier.

POWER SUPPLY: A.C. mains of 200 to 250 volts.

POWER CONSUMPTION: 45 watts.

TYPE: Table-cabinet set needing only aerial and earth to complete installation. External loud-speaker can be added.

REMARKS: Well-designed three-valver with pleasing quality of reproduction.

With which eulogy we introduce one of the nicest three-valve consoles so far tested this season. Pye model G is thoroughly well designed. The cabinet is neatly and tastefully fashioned out of the light walnut now so popular.

We need hardly say that the set has a self-contained moving-coil loud-speaker. What we

ought to add is that the makers have contrived to avoid "boxiness" in the reproduction, so that the tone sounds unimpeachable. The bass is rich but not boomy.

The high-note cut-off is a little too low to suit the purist, but it is just about right for modern ether conditions. Any further emphasis, we are inclined to think, would bring in a great deal of irritating background.

The elimination of the higher notes and of interference is achieved by means of a resistance-capacity filter shunted across the loud-speaker transformer.

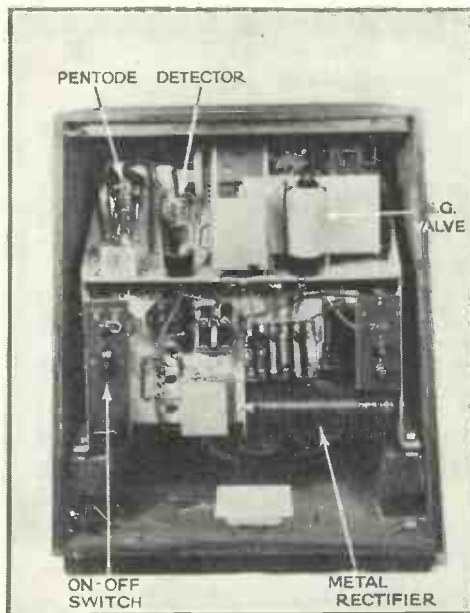
The output stage, as we found on test, will stand almost the full use of the appropriate control, even when tuned to the locals. There is no overloading of

the loud-speaker up to the limit of the pentode output valve.

As might be expected, the sequence of valves follows convention—screen-grid, detector, and power. This popular circuit has been well interpreted in a metal chassis of distinctive design. Liberal decoupling is a feature that can be seen from even a superficial look over the chassis. A metal rectifier for the high-tension supply is fitted to the lower portion of the chassis.

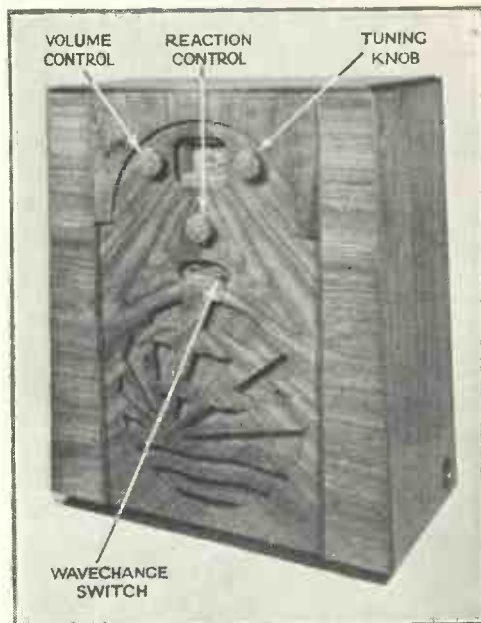
The externals needed with this set are an aerial and earth. If desired a pick-up can be used; the quality of the output makes this well worth while. Moreover, the volume control works just as well for the pick-up as for the radio. A screened flexible lead from pick-up to set sockets is desirable.

We are specially pleased to note that an external loud-speaker can be used with the set—without necessarily using the internal loud-speaker at the same time.



WITH THE BACK REMOVED

An interior view of the Pye model G, showing the internal layout. The metal rectifier can be seen in the bottom right-hand corner



HANDSOME CABINET WORK

This new Pye receiver is housed in a walnut cabinet of distinctive appearance. The dial is calibrated in wavelengths

Control is delightfully easy. One knob for tuning, another for volume, and a third for reaction. Then there is a lever, with indicating marks, to switch from long to medium waves or over to gramophone. Reaction is exceptionally smooth, and helps the selectivity a lot.

The volume control does not cut off the high notes at low volume outputs. Like the reaction, it is graduated in numbers—useful for non-technical operators.

During reception there is no background, though a certain amount of mains hum can be heard, with or without the earth, when the set is detuned. Not serious, this.

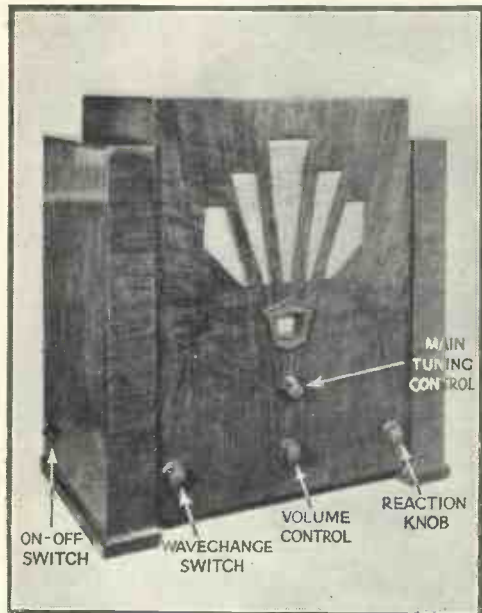
Well-Calibrated Dial

Tuning is simplified by the very wide scale, which is marked not only in medium and long waves but for most of the well-known stations.

Selectivity is really good. Clean-cut separation between foreigners and total elimination of the London stations within 15 metres. Same on the long waves—Zeeseen clear of all but a side-band twitter from Daventry.



Bell Piano A.C. Three-valver



GOOD CABINET WORK
The Bell Piano three-valver is notable for its neat modern walnut cabinet. It is operated from A.C. mains

THAT exceptional results can be obtained by concentrated attention to the popular three-valve type of circuit is well known to amateurs, though the non-technical set buyer may not fully appreciate how much difference can exist between sets with approximately similar circuits.

Detail counts very much in this straightforward type of circuit, as is once again emphasised by our test of the Bell Piano three-valve table model. Here we have a screen-grid, detector and pentode sequence producing an unusually full-toned volume of sound, rich in true bass and capable of giving as much top-note response as modern conditions in the ether will stand.

Massive Cabinet

As can be seen, a somewhat massive cabinet houses the chassis of the set. This is all to the good, for it means that the moving-coil chassis mounted at the top has a chance to bring out the really low notes. Further, the tendency for the cabinet to resonate at the 150-cycle band is less likely to arise.

On the front of the somewhat severely modern walnut cabinet,

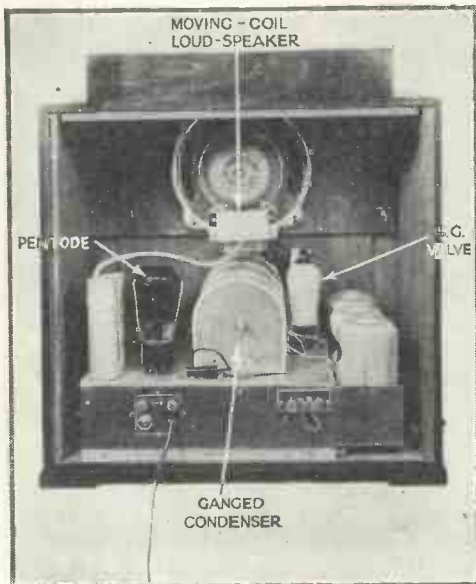
which is finished in a subdued shade to tone with almost any other wood furniture, are the usual tuning, reaction, volume and wave-change switch knobs. These match the cabinet.

The mains switch is on the side of the cabinet, while at the back is a tone-control switch, as well as the aerial, earth and pick-up sockets. A mains-aerial plug and socket connection is also provided.

Another advantage of the large cabinet is that the metal chassis for the set has plenty of room. On the chassis we find some familiar components, including a Polar three-gang variable condenser and Varley canned coils for band-pass aerial tuning and interval-coupling. Electrolytic smoothing condensers are another feature.

There is a mains-energised moving coil at the top—a Magnavox model 144—and a very accessibly-placed pilot lamp behind the tuning scale.

On test we first noted the very



STONE CONTROL FITTED
The switch for operating the tone-control device can be seen at the bottom on the left. Provision is also made for connecting a pick-up

small amount of mains hum. This is absolutely negligible during reception. The good tone was most impressive. With the high notes "all in" an exceptional brilliance was obtained on music, with speech much more clearly delivered than usual.

During more distant reception the tone-control switch proved a great boon in cutting down the background

A NUTSHELL SPECIFICATION
MAKERS: Bell Piano Co., Ltd.
PRICE: £17 17s.
VALVE COMBINATION: Screen-grid (Cosor MSG/LA), detector (Mullard 354V), pentode output (Mullard Pen4V), and mains rectifier (Mullard DW3).
POWER SUPPLY: A.C. mains 200 to 250 volts.
POWER CONSUMPTION: 50 watts.
TYPE: Table cabinet receiver with built-in moving-coil reproducer.
REMARKS: Good straight three giving first-class tone.

noises. Just enough high-note cutting is effected.

The search for stations is made easy by the good wavelength calibrations on the tuning scale. The range is from 200 to 550 metres in steps of 20-metre markings on medium waves, and from 800 to 1,900 metres in steps of 100 metres on the long waves. The scale lights up brilliantly when the set is switched on and the calibrations, which were found quite accurate, can then be read with great ease.

At twenty miles from Brookman's Park the London stations, with a 60-ft. aerial, were limited on the scale to a 20-metre spread. The band-pass action of the Varley coils is well marked. We can say that selectivity is well up to standard, perhaps a bit above.

All the B.B.C. regionals were heard at good strength during daylight, and later many of the better foreigners came in with good tone and strength.

On the mains aerial perfect local-station reception was easily obtained. There is no additional mains hum with this device, except at the lowest wavelength settings.



Components As I Know Them—4

The Fixed Resistance

By PERCY W. HARRIS, M.Inst.Rad.E.

NEXT in the line of components I want to talk to you about comes the fixed resistance. It plays an important, if unsensational, part in the modern receiver and it will pay you to know a little more about it than appears from the ordinary constructional article.

Before we go any further I would like to refer you to Fig. 1, which shows a 100-volt high-tension battery and a 100,000-ohm resistance joined together. In the middle of the diagram I have drawn three letters, E above the line and $I \times R$ below the line.

Most readers are acquainted with

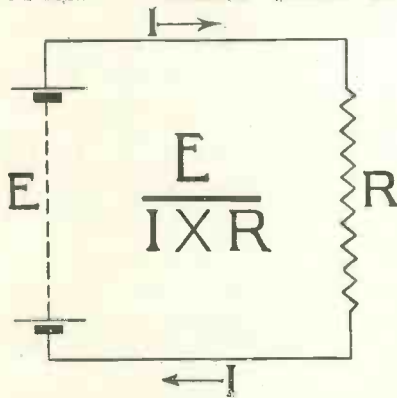


Diagram showing application of Ohm's Law. To find any one of the three unknowns, place a finger over it; the remaining letters indicate what calculation has to be made

Ohm's Law, but this little diagram is an additional help. You can easily memorise it, and while it is very old it is not very well known. If you commit it to memory you will be able to solve in a moment many of the little calculations in wireless design which come your way.

For example, if you want to know the resistance which, when a certain voltage E is applied, allows a certain current I to flow, all you have to do is to place your finger over R, whereupon the result will be E (the voltage) divided by I (the current).

Similarly, if you want to know what voltage E is required to drive a current I through a resistance R,

you put your finger over E, whereupon you will see $I \times R$.

Again, if you want to know what current I will flow through the resistance R when applying voltage E, then put your finger on I and you will find $E \div R$. Just place your finger over the letter corresponding to the value you wish to obtain and you will see at once what to do.

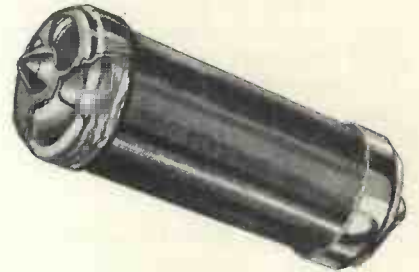
Don't forget, however, that this rule requires voltage to be given in volts, current in amperes, and resistance in ohms. Volts you will always find given as volts, but resistance will sometimes be expressed as ohms, sometimes as megohms (millions of ohms), and occasionally (very rarely) as microhms (millionths of an ohm). Current will be variously expressed in amperes, milliamperes (thousandths of an ampere), or microamperes (millionths of an ampere). For this reason you must remember to correct your results correspondingly.

A frequent calculation you will have to make is of currents through high resistances, and the currents in these cases will generally be expressed in milliamperes. As an example take the case of a 100-volt battery and a 100,000-ohm resistance in series.

To find the current we divide volts, 100, by resistance, 100,000. If you do it this way the answer will come as a fraction of an ampere, that is one-thousandth ($\frac{1}{1,000}$), which is, of course, a milliampere. If, however, before starting calculation you multiply the voltage by 1,000 (thus getting 100,000) the answer will be in milliamperes.

Now the resistances we use in a

wireless circuit must have certain properties. They must be constant, mechanically strong and electrically strong. By "constant," I mean that if they are rated at 100,000 ohms



A typical power resistance wound with fine wire on a fireclay former, which is hollow to allow of clear air circulation to dissipate heat

they must still have a value of 100,000 ohms in working conditions when a current is flowing through them, and they must not vary with time.

You would be surprised how poor were many of the fixed resistors we had to put up with in the early days. Some were made of special composition which was quite good when the resistors were new but as time went on the resistance went up and up, until after a month or two they might be ten times as high as when they were new!

Effect of Current

There are some substances, too, such as carborundum, whose resistance actually varies according to the amount of current flowing through them.

A point which is often ignored is that a resistor which may be perfectly suitable for one purpose is entirely unsuitable for another. A grid leak, for example, connected between the grid of a valve and the filament through a grid-bias battery carries practically no current so long as the grid is held negative, but a bias resistor connected to the cathode of a mains valve and designed to enable the voltage drop across it to be used as grid bias on the valve must carry the whole of the plate current of the valve, as this is its only path of return to the cathode.



A cartridge type of fixed resistance wound in sections on a bobbin made of an insulating material. The cartridge is held in position in the set by means of spring clips

THE FIXED RESISTANCE—Cont.



A "composition" resistance, which is almost unbreakable and remarkably uniform in its resistance properties. Note the granular formation

This plate current may be very large, particularly in the case of super-power output valves. I have in mind one quite well-known valve the plate current of which when tested with 12 volts grid bias and 200 volts on the anode, as indicated in the makers' leaflet, was about 50 milliamperes.

Value of Bias Resistor

The rule I have given above shows us the value of a bias resistor in this case would be 12 (multiplied by 1,000, as we are dealing with milliamperes) divided by 50, or 240 ohms. In practice the makers recommend a 300-ohm resistance, which with the current I have mentioned gives a little more bias, but with the average current of these valves will give the correct bias.

Now some materials used for grid leaks are totally unsuitable for carrying more than a milliamperes or so, and similarly the material often used for anode resistances (which actually must carry the plate current of a valve) is also unsuitable for bias resistances.

Resistance Couplings

Remember that valves used for resistance coupling have themselves a fairly high internal resistance, while the high resistance used for coupling will itself keep the current down. For example, if we are using a 100,000-ohm resistance with a 200-volt high-tension supply, the current flowing through this resistance could not possibly exceed 2 milliamperes even if the valve itself is shorted.

From this it follows that resistors used for resistance coupling need carry only a few milliamperes and can be made of carbon material or very fine wire, and still give excellent service.

So far as materials are concerned, the first grid leak and anode resistances were generally made of white

Bristol board soaked in Indian ink. The width and length of the strip of ink-soaked cardboard determined the resistance, for obviously if we took a given length the narrower the strip the higher would be the resistance.

Grid-leak and anode-resistance makers became quite expert in making this type, which were finished off by wrapping pieces of wire round each end of the strip, slipping them into little paxolin tubes and passing the ends of the wire out through tin caps to which they were soldered.

After some years an improved form of resistance came along, consisting of a high-resistance material fused on to thin glass rods and a wide variety of types soon made their appearance, prominent among which were the metallised resistors consisting of an extraordinarily thin layer of metal sprayed over the inside surface of a glass tube.

By a special process the film of metal could be so thin as to have a very high resistance, while it was comparatively easy to establish contact with this layer inside.

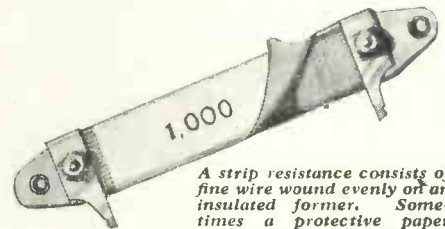
Carbon has always played a very important part in the making of resistors for carrying small currents. Indian ink is merely finely divided carbon in a kind of gum solution, while some very fine resistors capable of carrying quite high

currents have been made by coating a special porcelain rod with smoke, subsequently fusing the carbon deposit into the porcelain.

Carbon and Chalk

Carbon mixed with chalky material and then compressed has also been used, the proportion of carbon to non-conducting material determining the resistance.

I remember that one firm used to make its anode resistances by taking an ebonite tube, fixing a metal cap in one end, placing a small ball of tinfoil inside the lower end of the tube so as to make contact



A strip resistance consists of fine wire wound evenly on an insulated former. Sometimes a protective paper covering is provided

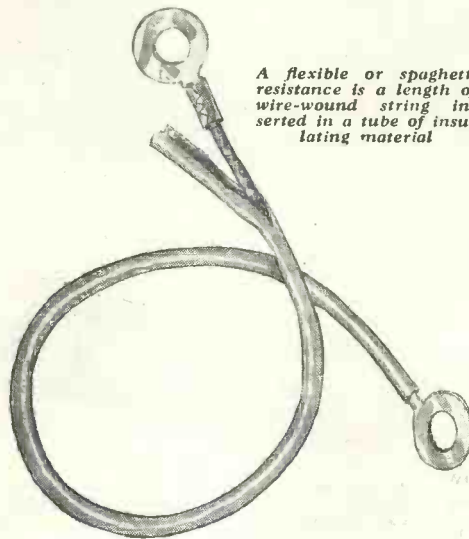
both with the metal cap and the powder, and then ramming the powder into the tube until the right resistance was obtained. Another ball of tinfoil was then thrust into the end to make contact and a brass cap screwed on.

Later came the era of wire-wound resistances. They had very good talking points, for it did seem to be a fine idea to have your resistance made of solid metal wire.

Visions of sound permanent resistances are immediately conjured up and most of our problems appear to be solved till we realise that to

get a very high resistance requires a tremendous amount of wire, which in turn must be very fine indeed and therefore fragile if it is to be wound into a convenient space.

There are two kinds of wire-wound resistors used for radio purposes (I am referring now to the high resistances for anode coupling and grid leaks respectively). In the one kind the wire is wound on a bobbin (usually in sections) and in the other a special string is used. This latter type is quite interesting and merits a special word of explanation.



A flexible or spaghetti resistance is a length of wire-wound string inserted in a tube of insulating material

HOW IT IS MADE AND USED

Imagine a piece of string held tightly by its two ends and rotated. If now a piece of fine wire is attached to one end the wire can be conveniently run on with turns touching until the whole string is wire covered, like a miniature armoured cable. You might imagine the turns would all short-circuit one another but actually there is so little potential difference between adjacent turns and the wire itself is, so to speak, not quite clean, so that no short-circuiting occurs.

Resistance by Length

This wire-covered string obviously has a certain resistance per unit length, and if the manufacturer buys it ready made he knows how many inches are required for any given resistance. The ends can then be attached to metal caps of an insulating tube and the wire-covered string bunched up inside. You would be surprised if you knew how many wire-wound resistances are made in this fashion!

A type of resistance which has come into common use in the last year or two is known as the spaghetti resistor. It consists of two eyelets which act as terminals for a flexible insulating tube.

Mechanical Protection

If you were to remove this insulating tube you would find it to be simply a piece of systoflex or some similar material acting as protective covering for our friend the wire-wound string. The wire itself you would find is usually and literally as thin as a hair and breaks just as easily, but being adequately protected it is not likely to suffer much mechanical injury.

Now this hair-like wire would fuse up at once if we were to use it for anything more than a few milliamperes, and you will find the makers in their catalogues are careful to point out the current limits for the type in question.

If we want a bias resistor in a mains set to carry a heavy plate

current much thicker wire is necessary, but fortunately we can get this in a compact space as grid-bias resistors are usually comparatively low in resistance, values from 300 to 1,000 ohms being quite common. Fairly heavy wire wound on flat insulating strips is often used for heavy currents.

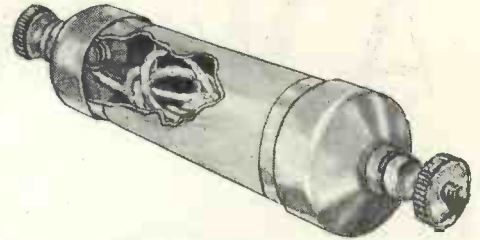
In commercial sets there is a growing tendency to use resistors made of special vitrified composition, which are strong mechanically and very robust electrically, maintaining their resistance constant under all normal working conditions.

These resistors are the result of much study and investigation of material, and the various manufacturers naturally keep their processes secret. Resistor trouble is, in fact, gradually passing, and I do not think it will be long before such components are among the most constant and reliable in wireless sets.

And now a word or two about choosing resistors and finding out which is

the most suitable type. Fortunately manufacturers are publishing much more data than they used to do regarding their products (at least as far as resistances are concerned), and it is comparatively simple to find from a maker's catalogue the maximum current a given resistor will carry safely.

It is always advisable to allow a good factor of safety when choosing resistors. For example, if you know a certain bias resistor must carry 20 milliamperes it will be much safer to buy one rated to carry 40



Some cartridge resistances are made by placing a length of wire-wound string in a cardboard container

than one which will carry only 25 milliamperes.

Some wire-wound resistors, too, get very hot indeed when carrying current approaching their rated maximum, and it is nothing to see blue smoke coming from some of them after a quarter of an hour's running with the full rated current!

To be Avoided

The resistor may not break down—usually it does not—but it is inadvisable to have such a hot resistor adjacent to other components when the cabinet is an enclosed one.

Many resistances, not of the wire type, get noisy if they are used to carry much current even when they are used well within their rated capacity. Noise is due to sudden variations of resistance, which means variations of voltage across the ends, which appear as variations of sound in the output.

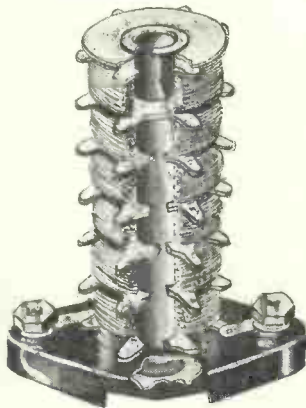
Grid-leak Differences

In this connection it should be remembered that there is a difference between the grid leak used to give grid bias to a low-frequency valve (following a resistance-coupled valve, for example) and the grid leak in the detector circuit. In this latter case quite an appreciable grid current will be flowing constantly through the leak, and if this is faulty the detector circuit may become very noisy.

The same leak, however, used in the former case, where the grid current is much less, may be comparatively silent. It should also be remembered that more magnification follows the detector leak, and noise is thus emphasised.

Some manufacturers rate their resistors in watts. For example, you may have a 1-watt model, a 2-watt model, or a 5-watt model. This means that they can be used

(Continued on page 361)



An upright resistance consisting of a winding of fine wire wound on a slotted bobbin



Another type of cartridge resistance, with wire-wound string placed round a cylindrical former

A SPONSORED SPASM

By FISHGLUE, UNLTD.

IN the fervent hope that the Editor is at present on his holidays, or otherwise engaged, and is blissfully unconscious of the fact that I am tuning up again, I'm going to attempt a little — — — — — stuff.
— — — — — Ready?

*To you, to whom I will be true, by all the stars above you
I dedicate this Mullardy, just be Cossor love you.*

The little brook is burbling,
The birds are on the wing :
[They've more than one wing really,
I know, you horrid thing !
You've gone and spoiled the poetry,
Without a blighted doubt,
You've got your quota of wings correct,
But you've left 5XX out.]
So here goes for the second time,
This trip we'll write it neater :
I've thought of a lovely, juicy rhyme,
But it's N'O.K., it busts the metre.

Excuse me a moment, whilst I put another bucket of H²O down the cooling jacket of the top near bottle. Thank you. Now we can continue :—

I'm starting again for the umpteenth time,
Isn't it fine, oh, isn't it fine ?
Won't someone help me out with another line ?
[I'll help you with my boot, it's a broad size nine.
Sez which ? Sez me ! Sez the Editor.]

There will now be a ten-minute interval whilst the announcer has a gargle.

Sorry, it will only be a five-minute interval, as it is twenty-five minutes past ten already. With our sincere apologies to Miss Rose Fyleman, we will now ask her to give us a reading of one of her poems, entitled

THE WICKED FAIRY

There's a fairy at the bottom of our wireless,
[I've never, never seen him, but I know]
And it isn't just chance, he does a little dance
On the doings : then the set won't go.
He sings in the middle of the programme,
Such a funny little whistly tune :
And mixes up Rome with the Uncle chap at home,
Then does a dinky little gurgling sort of croon.
I'm sure 'tis he who aggravates the neighbours,
And mixes up the numbers till they're wrong :
When he burned out a transformer,
Pa consigned him where it's warmer,
But I KNEW it was a fairy all along !

Thank you very much. Miss Fyleman will broadcast again soon, but not if she can help it.

Professor Ah Node Bhend, Erasmic Professor of Howls, Pure and Applied, in the University of Washbuk, Wiz., Conn., will now give us a talk on "Current Events and Bits of Things."

The Professor is an engaging young man, who speaks fluent French, German and American, as well as English. He is well connected, and well brought up (twice in New York and once at Bow Street).

His charge varies between five guineas, and drunk and disorderly, according to where he is performing.

Ladies and Gentlemen, Professor Ah Node Bhend.

Peace be unto you. All ye that are heavy laden, fit ye push-pull. If thine output valve offend thee, pluck it out, and therewith plant an Ode which is called Pent, for such is the Law and the Prophets.

And there shall be false prophets which shall say unto ye "Fill thine whole house with musick," and it shall be filled to overflowing, and well shaken up. But therein will there be much Re Action, which disturbeth thy neighbour, and troubleth the face of the musick. And one, Tur Ner, shall say: "It is false, the Quality thereof is verily Z, and the sound of it is as mud in my sight."

Take ye rather a multitude of volts, whose number is like unto the sands of the sea shore, and a valve called 6A, of the tribe El Es. And there shall be a concord of sweet sounds. And lo, the harp, psalter and tabor shall sound like unto the harp, psalter and tabor, and no more like unto the Ban Jo, the Tin Kan, or two pieces of Ti Shu Pap Er. Then the base shall be like unto the bottomless pit, which hath no bottom, and the curve, which is called Re Spons, shall be as the Narrow Way, which is straight, and peaks not.

Hearken also, ye people, unto Whit, son of Wil, for he is mighty, and his pen writeth winged words.

He calleth before him the musickians and the minstrels, between the waxing and waning of each moon, and he seeth the tablets of wax whereon they have written. And to one he saith: "Sandi, be not vulgar" [and he disobeyed the voice of Whit which spoke thus unto him, and was vulgar again, next month, and therefrom gathered of silver many sheels].

And to another he saith: "For the sake of goodness, make us to laugh and be merry. For thy wit is as a blunt spear, and there is no cheer in my heart."

To those who sing of Vic Tor Ia, and the Hus Sar, which is hers, he saith: "Make ye no more tablets of wax, for they make my stomach to be sick, unto so many have I given mine ear."

"Rather write ye of Bach, for his is Good Musick, and of Bey Toven, which is Great. Even unto Shu Bert will I lend mine ear, and cause my face to shine upon him, for that his songs will live, and thy children, and thy children's children shall sing them.

"But the songs of Jazz, which are rude noises, pleasing unto the ear of the children of Ham, and the Bar Bar Ians from the West, they shall be as the grass of the field, which to-day is, and to-morrow is cast into the oven.

"Against them have I hardened my heart, and mine ear is deaf unto them. Verily they are a thorn in my flesh."

Hearken therefore unto Whit, for Whit is Great. Woe unto ye who heed him not.

Great also is Ray Nor, called Be Es See. He calleth the lightnings to run in narrow paths, and they obey him. He maketh Het, which saith unto the words of Reg "Come," and unto the words of Mul Hak Ker "Come not," and it is so. And the words of all nations come unto Het, and he chooseth where he listeth.

Great is Ray Nor which hath made Het.

And so, for the present, I leave you. Kiss me Hardy.

That was Professor Ah Node Bhend, giving you his bi-weekly notions. A very well-finished talk, I'm sure you'll all agree, though doubtless some of us wondered whether it was ever going to be.

With the kind permission of Hambone, Miss Effie Carwhine will now moan her favourite ditty "Elevennn pounds of hevennnnn . . . *ad nauseam*," otherwise called "The lay of the hysterical hen." This item is by special request (but not ours).

Next, Mr. William Whine, technical adviser to Moan, Misery, Moan, Moan, and Misery, Unltd., will give us his talk on this week's programmes. Mr. Whine.

Ladies and Gentlemen, what is the matter with our programmes? I have studied the matter rather closely, and have come to the conclusion that what is wanted is more variety.

If it isn't opera, it's jazz, if it isn't religion. If it isn't chamber music, it's a symphony concert when it isn't a talk. Other times, it's vaudeville, when the news isn't on, unless it's a sports broadcast.

Now then, the public have made it plain, from time to time, that they don't want opera, nor jazz, nor religion, nor chamber music, nor symphony concerts, nor talks, nor vaudeville, nor news, nor sports broadcasts.

I can show you letters asking for the abolition of each of these adjectival forms of entertainment. It's obvious what the public wants, isn't it? Yes, I know what you'll say. You'll say "Plays." Well, you're wrong.

I've a letter here suggesting that plays be consigned to a region, where, owing to the heat causing the balls to assume distorted attitudes, billiards becomes a theoretical impossibility. No, it's obvious what they want! What do they want; I ask you!?!?

Still, like pawnbrokers, programmes have a redeeming feature. Sooner or later they stop, and are then succeeded by better or worse ones.

Mr. I. Frequency, the man who would have invented wireless had not Marconi pinched the inventor's ideas in advance, will now conduct our Technical Service Bureau:—

Seeker After Knowledge (Far East).—A variable Mew indicates that the kitten is sickening for mumps, or wants more milk, whichever is the greater. To avoid a catastrophe (pardon my being dogmatic), you must give damped milk, straight from the condenser twice daily.

Pro Patria (aged 85).—No, Henry Hall isn't an anarchist. Oh, quite! No, he isn't going to be hanged, not yet, at any rate.

Querulous (Near East).—Sorry, but I can't recommend a funny record. There are none. You'll have to ask Mr. Whitaker-Wilson nicely, and perhaps he'll compose one for you. It's the only hope.

Winsome Winnie (Little Upper Ghumtree).—The best type of "pick-up" is a trim figure, shapely ankle, and an encouraging eye. These generally meet with an even response. A scratch filter shouldn't be necessary until you're married.

The last time Mr. I. Frequency conducted this column his excited listeners all wrote saying "Fine! Fine!" We are afraid that next time it will be imprisonment. However, he will conclude with one or two new ones for your wireless glossary. (Cut these out each month, paste on blue cardboard, tie up in bundles of ten, with pink ribbon, then burn them.)

Optimum Load.—One less than the straw which broke the camel's back.

Jamming.—Interference due to signals other than those desired. Usually Mother calling Maggie from the top of the stairs.

Skin Effect.—This is the property possessed by a dry-cat, in front of a warm fire, of giving sparks from his ears, if his hide be rubbed with an ebonite (or similarly high S.I.C. substance) panel.

Ticker.—A combination of a registry office and a Reno divorce court, designed to produce a rapid make-and-break device.

Type B Waves.—(Damped water waves, semi-permanent.) Waves forming successive trains, in each of which the amplitude, after reaching its maximum, progressively decreases towards the nape of the neck. These waves are only semi-permanent in character, as the damping reaches only to the (N-1) root. There is a large point charge usually involved—little point, but the charge, anything from two guineas.

Impedances in Series.—These are usually given by:—

$$Z = \sqrt{(R_1 + R_2)^2 + (X_1 + X_2)^2} \text{ with lag } \tan^{-1} \frac{X_1 + X_2}{R_1 + R_2}$$

More simply, impedances in series can be given by 101 cars in front, travelling at 10 m.p.h. along a white-line road. The lag, in the latter case, is usually hours.

The programme you have just heard (or just haven't heard) has been arranged by the courtesy of the Fishglue Chewing Gum, Iron Bedstead and Rubber Catswhisker Corporation Inc., Ltd., Waz., Buz., U.S.A. We are now closing down owing to shortage of time (our directors got it all at the last Assizes).

A very good night to you, folk,
from

UNCLE FISHGLUE.

Interval signal—bats chuckling in the belfry—then fade-out.





The New-style Battery Radiogram

Here are details of a battery-operated radio gramophone that can be built complete for about £10. It uses a special form of cabinet and incorporates a tone control. It is the work of the "Wireless Magazine" Technical Staff

AS can be seen from the photograph that appears in the heading above, the New-style Battery Radiogram is one of the neatest outfits of its kind yet produced. Standing only 16 in. high and approximately 15 in. square, the case includes an efficient two-valve set, loud-speaker, batteries and all the additional equipment needed for reproducing gramophone records electrically.

New Style of Cabinet

The cabinet is of an entirely new style and has been specially designed for this receiver. Wooden struts are provided at the bottom of the case, and the baseboard of the set actually forms the bottom of the cabinet. The controls are easily accessible; as can be seen, they project through a semi-circular opening in one side of the case.

In order to save space, the loud-speaker fret is not on the same side of the cabinet as the controls. Although the arrangement adopted is somewhat unusual, it has no disadvantages in practice.

Another new feature of the outfit is the provision of a tone control by means of which the

bass notes or the high notes can be accentuated at will in order to get the most pleasing reproduction for any particular conditions. For instance, for the reproduction of clear speech, it is usually better to have the high notes somewhat accentuated, while for orchestral performances it is preferable in most cases to have the bass response strengthened.

It will be apparent that this set is a real attempt to provide an outfit that will be of the maximum convenience in its general layout and also of the maximum efficiency in performance. Thousands of constructors are in need of a simple and cheap radio gramophone operated from batteries, and we believe that

the New-style Battery Radiogram anticipates the desires of most of them.

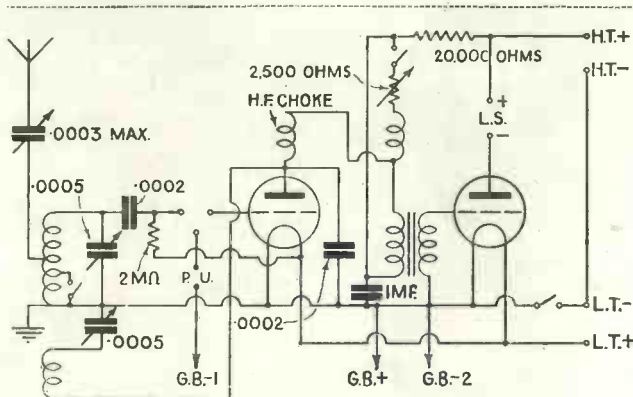
The set itself is a two-valver incorporating a number of novel features. The detector is arranged on the leaky-grid principle and the power valve is coupled to it by means of a special tone-control transformer.

Great Efficiency

Every part has been chosen with the object of providing the greatest efficiency from two valves and in practice a fair number of stations, both home and foreign, can be picked up at full loud-speaker strength.

The tuning coil is, of course, of the dual-range type that covers the medium and the long wavebands. It is particularly efficient and gives good signal strength with a high degree of selectivity. There is no trouble with high-power medium-wave stations breaking through when the set is adjusted for long-wave reception.

The controls have been arranged for the greatest simplicity of operation. In the centre of the panel is a new combination component, which incorporates the main tuning condenser, the reaction condenser,



EFFICIENT TWO-VALVE CIRCUIT

This is the circuit of the New-style Battery Radiogram. The combination consists of a leaky-grid detector and a transformer-coupled power valve. The transformer is designed for tone compensation

the wave-change switch and the on-off switch. There are two knobs in the centre of this component, one being placed behind the other. The foremost knob is the control for reaction, while the other knob controls the tuning of the set.

Combination Switch

Under these knobs is a lever, which can be placed in three positions. When placed in the left-hand position, the set is completely switched off; in the centre position, medium-wave reception can be undertaken; and in the right-hand position the set is adjusted for the long waves. It will be obvious that when the lever is placed in either the medium- or the long-wave position the set is automatically switched on.

On the left of the panel is the gramo-radio switch. This is so arranged that when it is put in the "gramo" position the detector valve is supplied with grid bias, so that it functions as an amplifier instead of as a detector. To play gramophone records this switch is turned to the left; the lever on the centre component must also be placed in either the medium- or the long-wave position.

The main tuning knob should be so adjusted that no powerful radio transmission breaks through and causes interference with the record reproduction.

The knob on the right of the panel is the tone control.

When it is turned to the right the top-note response is accentuated, while as it is turned to the left the bass is gradually brought up in strength.

It should be clearly understood that the effect of this control is simply to alter the response curve of the special low-frequency transformer with which it is associated. In other words, the tone control only affects what is already there to be affected; it does not add high notes or low

notes to the reproduction.

By cutting off the high notes the bass response is apparently accentuated, and by cutting off low notes the treble response is apparently accentuated.

This point is mentioned because, although tone control has captured the imagination of the radio public, it is only effected at the expense of overall volume.

As the top-note response of a receiver is lowered, the volume apparently falls off somewhat. It is for this reason that we have coupled to the arm of the tone-control resis-

that this tone-control system can only be used with the particular transformer specified. It will not work with an ordinary low-frequency transformer, nor is the value of the resistance suitable for use with any other make of tone-control transformer.

Simple Construction

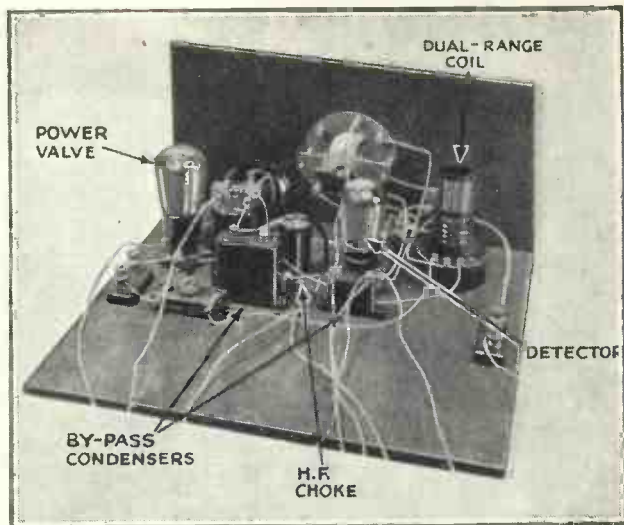
The construction of the set itself is quite straightforward and will present no difficulties, even to the beginner. There are only three components to be fixed to the panel; the makers of the combined condenser and switching device supply a special template that can be easily understood.

The arrangement of the remainder of the parts on the baseboard calls for no special comment; the layout is quite clean and there is plenty of space between adjacent parts.

Full-size Blueprint

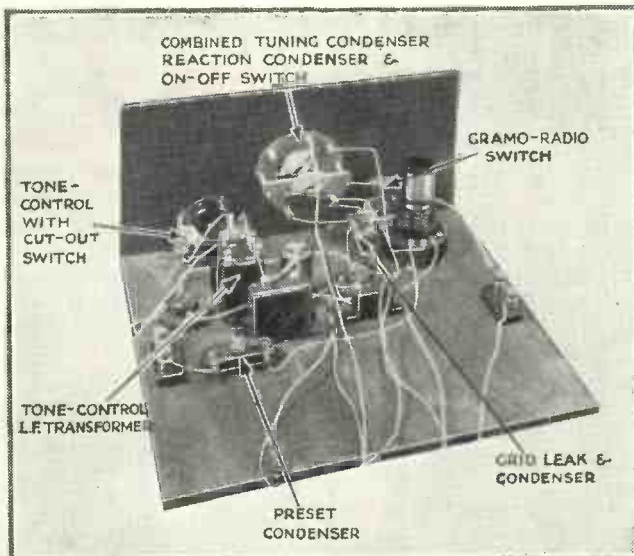
However, there is no doubt that most constructors will prefer to work from a full-size blueprint and one of these can be obtained for half price (that is, 6d., post free), if the coupon on the last page of this issue is used by October 31. Ask for No. WM299, and address your application to "Wireless Magazine" Blueprint Dept., 58-61 Fetter Lane, London, E.C.4.

The wiring of the set will prove to be quite simple. Each wire is numbered separately and the numbers indicate the best and most convenient order of making the connections. For instance, the constructor should start off with wire



EASILY-BUILT RECEIVER—LOW COST

Of course, if desired, the receiver can be used on its own for radio reception without the additional gear needed for record reproduction



ONLY TWO VALVES BUT ALL THE PUNCH YOU NEED

Thanks to the efficiency of modern components this two-valve set gives excellent loud-speaker reproduction from a number of foreign stations; it can also be used for record reproduction

tance a switch which, when the knob is turned as far as possible to the left, cuts the tone control completely out of circuit.

For the reception of weak foreign stations, therefore, the knob of the tone control should be turned to the left in order to obtain the maximum signal strength. Otherwise the control can be used for radio or gramophone reproduction.

It should be emphasised, perhaps,

NEW-STYLE BATTERY RADIOGRAM—Cont.

No. 1, cross that number through on the blueprint as soon as the connection is made, and then proceed with wire No. 2. The same process should be gone through until the set

with an economical consumption of high-tension current. The detector is of the medium-impedance type, while the power valve is of lower impedance. Suitable valves of three

for gramophone-record reproduction the "detector" valve needs a little bias so that it works as an amplifier instead of as a detector. Normally, about 4.5 volts bias will be needed for the power valve, while the "detector" will need 1.5 volts.

COMPONENTS NEEDED FOR THE NEW-STYLE RADIOGRAM

CHOKE, HIGH-FREQUENCY

1—R.I. Quad Astatic, type FY2, 3s. 6d. (or Telsen, Igranic).

COIL

1—Colvern dual-range, type KGR, without screen and wave-change switch, 8s. 6d.

CONDENSERS, FIXED

1—T.C.C. .0002-microfarad, SP type, 2s. 4d.
1—T.C.C. .0002-microfarad, type 34, 1s. 6d. (or Dubilier, Telsen).

1—T.C.C. 1-microfarad, type 50, 2s. 10d. (or Dubilier, Telsen).

CONDENSERS, VARIABLE

1—Lissen ganged-condenser control unit, 14s. 6d.

1—Goltonne preset, .0003-microfarad max., type J, 1s. (or Telsen, Igranic).

EBONITE

1—Becol 14 in. by 7 in. panel, 4s. 5d. (or Peto-Scott, Permcot).

HOLDERS, VALVE

2—Lotus four-pin, 1s. (or W.B., Telsen).

PLUGS AND TERMINALS

5—Belling-Lee wander plugs, marked: H.T.+, H.T.—, G.B.+, G.B.—, 1, G.B.—2, 10d. (or Clix, Ealex).

2—Belling-Lee spade terminals, marked: L.T.+, L.T.—, 4d. (or Clix, Ealex).

RESISTANCES, FIXED

1—Lewcos 20,000-ohm spaghetti, 1s. 6d. (or Bulgin, Telsen).

1—Dubilier 2-megohm grid leak, 1s. (or Telsen, Watmel).

RESISTANCE, VARIABLE

1—Magnum 2,500-ohm variable resistance combined with on-off switch, type 1130, 7s.

SUNDRIES

Tinned-copper wire for connecting (Lewcos).
Lengths of oiled-cotton sleeving (Lewcos).
Length of rubber-covered flex (Lewcos).
Length of Goltone shielded cable for pick-up leads.

2—Lissen terminal blocks, marked: A and E, and Pick-up, 2s. (or Belling-Lee).

SWITCH

1—Tunewell gramo-radio, 1s. 9d. (or Bulgin).

TRANSFORMER, LOW-FREQUENCY

1—Varley Rectatone, 15s.

ACCESSORIES

BATTERIES

1—Ever Ready 120-volt high-tension, Winner type, 11s. (or Siemens, Lissen).

1—Ever Ready 9-volt grid-bias, Winner type, 1s. (or Siemens, Lissen).

1—C.A.V. 2-volt accumulator, type 2AG5, 8s. 6d. (or Exide, Lissen).

CABINET

1—Peto-Scott table model, 17s. 6d.

1—Peto-Scott wooden chassis, 2s. 6d.

GRAMOPHONE MOTOR

1—Garrard clockwork No. 30, £1 10s.

LOUD-SPEAKER

1—R. & A. chassis, type 50, 15s.

PICK-UP

1—B.T.H. Minor, with volume control, £1 5s.

VALVES

1—Mazda HL210, 7s. (or Cossor 210HL, Mullard PM1HL).

1—Mazda P220, 8s. 9d. (or Cossor 220P, Mullard PM2).

The prices mentioned are those for the parts used in the original set; the prices of alternatives as indicated in the brackets may be either higher or lower

is completely wired throughout.

It will be found convenient to make most of the connections with lengths of bare tinned-copper wire threaded through lengths of oiled-cotton sleeving. All the connections drawn as solid lines should be made in this way, but rubber-covered flex can conveniently be used for the connecting wires drawn as open lines.

Earthed Pick-up Lead

Lead No. 36, from one side of the gramo-radio switch to one of the pick-up terminals, should be made with metal-braided wire to prevent the possibility of noises being picked up when records are being played. It is of the utmost importance, though, that the metal braiding should itself be earthed. This is done by twisting a thin bare wire round it and earthing it to one side of the variable tuning condenser. This earthing lead is numbered 37 on the blueprint.

The valves for this set have been chosen to give the best performance

well-known makes are listed in the specification that appears above.

The battery connections are clearly indicated on the blueprint. The high-tension battery is of 120 volts, the grid-bias battery is of 9 volts, and the accumulator is, of course, of 2 volts. The full voltage of the high-tension battery is applied to the set; this means that the power valve gets the full 120 volts, while the detector gets a little less, because of the 20,000-ohm decoupling resistance in series with the primary of the low-frequency transformer.

Although for radio reception the power valve only needs grid bias,

Cost of Construction

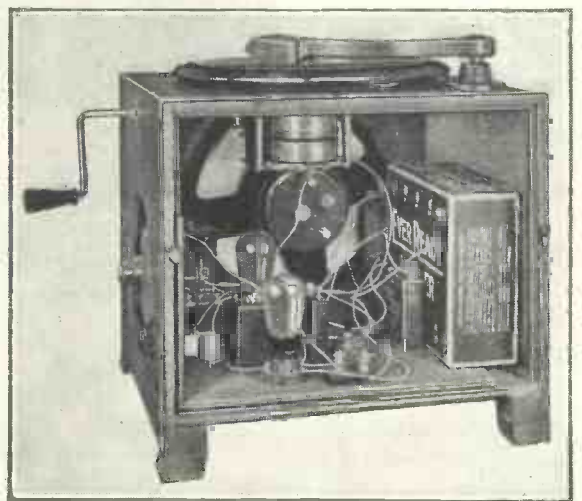
A glance through the list of components needed for the New-style Battery Radiogram will show that the cost of building the two-valve receiver portion is very low—not more than £3 or £4. The cost of assembling the complete radio gramophone is approximately £10, the additional cost being represented by the accessories and additional equipment necessary for reproducing records electrically.

Gramophone Equipment

The actual gramophone part of the equipment consists of an electromagnetic pick-up combined with a volume control and a clockwork motor and turntable for the records. The pick-up is of a type that has been found good after many tests. It gives a high output and the volume obtained from the two valves is all that is needed in the average home.

Beginners should note that the majority of three- or four-valve radio gramophones use only the last two valves for pick-up work, so the New-style Battery Radiogram is quite up to average as far as record reproduction is concerned.

When the construction of the set



THE COMPLETE RADIO GRAMOPHONE

This view shows how the set, loud-speaker and batteries are accommodated in the radio-gramophone cabinet, which was specially designed for this receiver

CAN BE BUILT COMPLETE FOR £10

has been completed the cabinet assembly can be finished off. The clockwork motor must first be mounted on the motorboard; the makers of the motor supply a template for this purpose. Next, the pick-up should be mounted in position. In this case the maker's template should also be used, as it is most important to have the pick-up correctly positioned, otherwise excessive record wear will result.

Mounting the Loud-speaker

There will be no difficulty about screwing the loud-speaker chassis into the cabinet. The model used is of the balanced-armature type as there is no space in the cabinet for a moving-coil reproducer.

Next, the set itself can be fixed in position. The baseboard should be tilted slightly so that the control knobs can be pushed through the semi-circular opening. After that the baseboard should be held firmly in position by means of a few screws placed in the three wooden struts across the bottom of the case.

Avoiding "Boom"

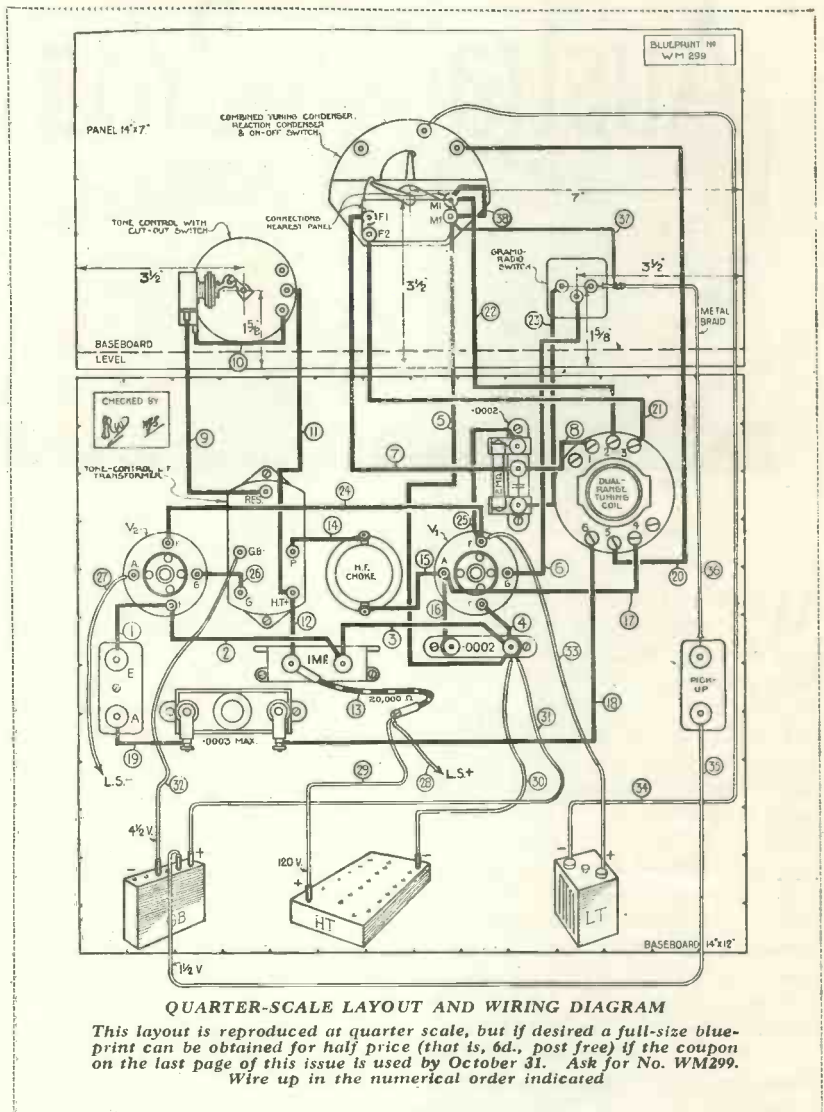
The cabinet is supplied without a back, as is common practice among cabinet makers this season. Filling in the back with a piece of solid wood does not improve the reproduction in any way; in fact, in many cases, it produces a "boom" that is annoying to sensitive ears. Those who want to protect the "works" from dust can fix a thin piece of silk or muslin across the back of the case. This will keep dust out, but will not keep the sound in.

When all the various parts have been placed in the cabinet they should be wired together as shown on the blueprint. The connections between the pick-up and the pick-up terminals on the baseboard of the set should be made with metal-braided wire, and it is advisable that this should be earthed in the way already described.

Operating the Set

The method of operating the set has already been explained in a general way. There is very little to add to what has been said on this score, but the preset condenser mounted on the baseboard of the receiver has not yet been mentioned.

This condenser, which is adjacent to the aerial and earth terminals,



QUARTER-SCALE LAYOUT AND WIRING DIAGRAM

This layout is reproduced at quarter scale, but if desired a full-size blueprint can be obtained for half price (that is, 6d., post free) if the coupon on the last page of this issue is used by October 31. Ask for No. WM299. Wire up in the numerical order indicated

should be adjusted until the best compromise between signal strength and selectivity is obtained. When the knob is unscrewed as far as possible the signal strength will be at its minimum, while when the knob is screwed right down the set will be in its most sensitive condition.

In practice it is best to start with the knob screwed up tight and then to unscrew it gradually until no interference is noticed between stations working on adjacent wavelengths.

Of course, the setting of this preset condenser for the best results will depend on the particular aerial with which it is used. If for any reason the aerial is altered in length it will be necessary to readjust the preset condenser.

Do not forget that for the reception of weak stations it may be an advantage to cut the tone control out of circuit by turning the knob of the tone-control resistance as far as possible to the left.

Of Use to Thousands

That completes our description of the New-style Battery Radiogram, which will meet the needs and fulfill the expectations of thousands of listeners who want a cheap and simple outfit for the reception of a fair selection of radio programmes and full-volume reproduction of records.

We shall be glad to have reports from constructors regarding the radio results obtained in their particular localities—will you drop us a line when you have tried the set?

Australian Broadcasting



IN NEW SOUTH WALES

An aerial view of the broadcasting station 2FC, situated at Pennant Hills, New South Wales

A special article by C. DANVERS-WALKER, who was talks manager and announcer at the station 3LO, Melbourne; he has recently returned to England to study British broadcasting methods

WHEN analysing the position of broadcasting in Australia, it is perhaps unjust to do so in the form of a comparison with English or Continental conditions, particularly when we take into consideration the number of licensed listeners, the talent available, and the vast distances over which the operations of the many Australian broadcasting stations daily pulsate.

To illustrate this, there are three salient points that should be realised—firstly that there are 335,000 receiving licences in the Commonwealth compared with 4,600,000 in Britain: secondly, the stations rely, with the exception of isolated instances when visiting celebrities arrive, upon local talent; and, thirdly, the area covered by the Australian services is over nearly three million square miles against the United Kingdom's one hundred and twenty-two thousand.

Contrasting Factors

In quoting these figures it must not be thought that they are used to deprecate in any way the material that constitutes the Australian programmes—they are used to impress upon the reader the strongly contrasting factors that confront the organisations in the two countries.

Briefly then, under what conditions does the broadcasting service operate in Australia? The elements are these:—

(1) The Commonwealth is served by two systems of broadcasting—

(a) Through the medium of National or "A" class stations in each State (there are two in New South Wales, two in Victoria, and one each in the remaining States), together with appropriate relay stations, which are financed by a proportion of the licence fees.

American Principle

(b) By an adaptation of the American principle, namely, "B" class stations owned and operated by private concerns on a lower wave-band, deriving their revenue from advertisements.

Broadly this principle was evolved in 1924 and still exists up to the time of writing but it will, as far as the control of the National stations is concerned, go through certain changes thereby placing it, in major principles, on parallel lines with the English system of control by a broadcasting commission.

(2) A fee of 24s. is charged for the right to install and operate a receiving set. Out of this sum the programme contractor receives 12s., the remainder being retained by the Postmaster-General's department for administrative and technical services.

(3) From 7 a.m. up to 11.30 p.m. there is always something being broadcast from both the "A" and "B" class stations—and there are approximately twelve of the latter in Victoria alone.

(4) Gramophone records constitute almost universally the pro-

grammes from "B" class stations, while the "flesh and blood" artists are broadcast from the National group.

(5) Inter-State relays by landline are fairly frequent, thus enabling the outstanding items of one State to be heard by the small set owner in another.

Broadcasting history in the Commonwealth goes back to the year 1920, but we can skip eight years and begin about the middle of 1928, when the Government decided to establish a national broadcasting service whereby one organisation of experienced entrepreneurs would cater for the national broadcasting programmes for all States, with the Postmaster-General's department undertaking the provision and maintenance of the technical services of the stations.

Programme Contractors

The contractor supplying the programmes is Union Theatres, Ltd., who succeeded J. C. Williamsons, Ltd., in 1929.

The increase in licence figures has been ever-growing, a most satisfactory indication that the public have appreciated the efforts of the companies concerned. The general "tone" of the programmes is naturally subject to changing influences, but advancement has not been noticeable only in the entertainment value; perhaps the most marked development has been in utility services, talks that deal with

world conditions, and lectures on every-day difficulties.

Rapid "Uplift"

One of the outstanding examples of the rapid "uplift" the Australian programmes have been subject to in the past year or so is the unstinted praise that was given when the Melbourne station launched the first attempt in Australia of broadcasting to schools. From its inception the scheme bore fruit, and now many primary and secondary schools both in the suburbs and country centres are enthusiastic supporters and users of the lessons broadcast. The material is so attractively prepared that many business men write in asking that the material be repeated in the night programmes.

The programmes generally, both musical and otherwise, are of a high standard when one considers the difficulties that confront the directors, and "John Citizen" undoubtedly gets excellent value for his 24s., for thirty thousand hours of programmes throughout each year are sent out from the National services alone.

Alternative Programmes

When we come to the question of music it leads the discussion into many different channels. A very natural query is: "What is the prevailing type of music, classical or jazz?" Both receive their full share of programme space, and New South Wales and Victoria are fortunate in having two National stations each, thereby enabling an alternative type of programme to be broadcast.

The "B" class stations have a greater tendency to "fluctuate" to the prevailing demand, and consequently have quite a large following; they play a very definite part in the broadcasting service of Australia.

As has been mentioned previously, they are dependent upon advertising for their revenue and consequently have been given a great impetus, holding as they do a source of revenue which is very much sought after. The "B" stations fill a section of the daily programmes which the National service cannot always be expected to cover. Their offerings are mainly made up of gramophone music, which is very acceptable to a large percentage of listeners, although somewhat spoiled

by an excessive amount of advertising propaganda.

This article would be incomplete without some mention of the children's session. A great feature in connection with this section of the programmes throughout every State of the Commonwealth is the Birthday Club. This will always retain its popularity, due perhaps to the intimacy which is possible when the birthdays of the youngsters come round.

Closely allied to this session are the charitable activities. In the southern State, the Lord Mayor's Hospital Radio Fund was inaugurated in 1929 for the purpose of equipping and maintaining Victorian hospitals with receiving apparatus. The necessary funds are derived from collections taken at the community-singing sessions conducted by the companies concerned.

It is not out of place to mention here that these gatherings are exceptionally popular, between two and three thousand people attending each week. This, of course, is only one instance of the several charitable bodies that derive benefit from the activities of the companies.

There are two other details that should be mentioned and which form a most popular part of the National services—they are radio plays and sporting activities. In regard to plays, careful study has been made of all the detail necessary to turn this phase of broadcasting from an experimental feature of irregular

appearance into a vital and definite part of the programmes, holding its full proportion of time in relation to other items.

Care in Casting

Several hundred productions have been presented and in the casting of these every care has been taken to secure actors and actresses who, from the vocal standpoint, could give desirable interpretations.

In the early stages of broadcasting in Australia many listeners were too impatient to wait until the plot of a play had sufficiently unfolded itself

Next month our contributor, who has had an unrivalled experience of Australian conditions, will deal with some special aspects of Commonwealth radio programmes. His article will be fully illustrated

to make the presentation interesting. This led to an editing of production which brought at the earliest possible moment a quickening of interest to the listener.

It has frequently been remarked by overseas visitors that Australians are the greatest sport-loving people in the world. The numerous and varied sporting fixtures that find their way into the programmes certainly lend colour to this assertion. It is claimed that there is no feature of broadcasting that catches the imagination so quickly as the dramatic picturisation of some exciting sporting event.

The National stations supply a most comprehensive service, which is not confined to Saturday afternoons, but offers for the enthusiast mid-week racing descriptions and a running commentary of the dirt-track racing on Saturday nights.

The sporting transmissions put out in all States include horse racing, cricket, football, boxing, wrestling, rowing, tennis, cycling, and athletic events.

The object of these necessarily sketchy notes is to refute any idea that broadcasting in Australia is undeveloped. It is naturally in its early stages when compared with conditions in England, but through no cause other than the state of transition that everyone must experience before the ultimate goal is reached.



IN QUEENSLAND

Station 4GQ, which is located in the Queensland Government Insurance building at Brisbane

What Readers Are Doing

THERE is no sign—in spite of what the pessimists have said in the past!—of constructional interest in radio falling off. Indeed, it is

EASYTUNE 60

(May, 1932)

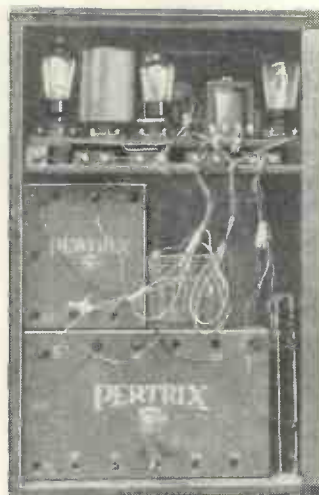
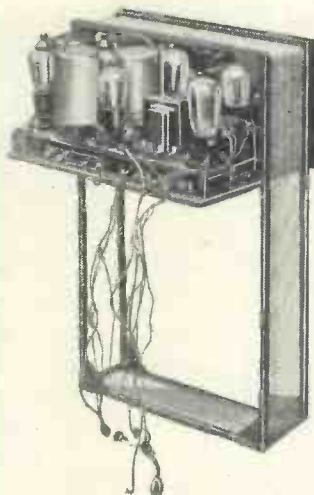
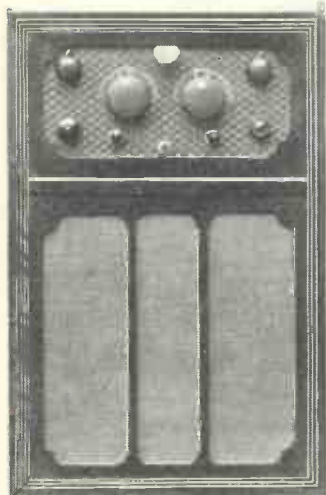
London, N.I.—I have built many sets in my time since radio first

American receivers for range and tone in the dust box. Long-wave stations come in with volume which shakes the room, using only an indoor aerial wire slung around the four walls of the apartment.

Some of the medium-wave stations come in in daylight with decent volume and at night, long before it is dark, you get a ten-ton punch behind many of them. The tone is marvellous; no distortion can be detected at all on decent transmissions.

Gateshead (Durham).—I have built several "W.M." sets but your last super is one of the best I have ever

built. I have incorporated P. K. Turner's Economy Push-pull Amplifier as an output stage. The whole outfit together is wonderful on both gramo and radio reproduction.



A SCOTTISH READER'S VERSION OF THE SUPER 60 PORTABLE

These three photographs come from a reader at Bridge of Allan (Stirlingshire) and show his adaptation of the famous Super 60 Portable. He has certainly made a good job of it

probable that this autumn more sets will be built than ever before. At any rate, the "Wireless Magazine" Technical Staff is preparing some ambitious plans on the basis of that assumption.

The building of radio sets is a source of pleasure to thousands of handymen all over the British Isles, and there is no reason why a hobby that has been so popular in the past should suddenly fail in its appeal.

In order to give new readers of "Wireless Magazine" some idea of the scope of the receivers of which constructional details are given in these pages, we are publishing here reports from eight readers on seven well-known "W.M." designs.

Such reports are of the greatest value to other constructors who are thinking of building the same, or similar, sets, and we are always glad to receive from readers information about the sets they have built from details in these pages.

We would also take this opportunity of reminding our readers that half a guinea is paid for each photograph of a home-constructed "Wireless Magazine" set published.

kicked off, but I have never found a set to beat the Easytune 60. Gee, it is some set! I reckon the guys who have not built it have missed the best opportunity in radio; it puts most



EVERYBODY'S PORTABLE ON AN OCEAN CRUISE

This happy group of holiday-makers is listening to music supplied by Everybody's Portable, described in "Wireless Magazine" for July. The set is a five-valve super-het

With Their "W.M." Sets

EVERYBODY'S PORTABLE

(July, 1932)

Ardrossan (Scotland).—I have now finished the set and, to put my findings in a nutshell, it is the best portable set, trade or amateur built, I have handled. The tone is excellent. During my holidays here the set is proving itself a distinct

still gives up-to-date results on the frame aerial.

NEW ECONOMY THREE

(December, 1931)

Bradford (Yorks).—I am more than delighted with its performance. The set is now incorporated in a radio-gramophone, the cabinet of

of months, yet this one has stood the test for over six months. I have not yet found a set which I think will come up to it.

A.C. QUADRADYNE

(April, 1932)

Colchester (Essex).—The set is excellent in every respect. I was

READERS ARE REMINDED

that "Wireless Magazine" is the only radio paper in the world that offers a half-price blueprint service to its readers.

Each month a special coupon is to be found on the last page of the issue; this entitles any reader to a full-size blueprint of a set constructionally described in the same issue for half price, that is 6d., post free, for a blueprint of a set with not more than three valves, and 9d. for a blueprint of a set with more than three valves.

Remember, if you are a set constructor, that the special coupon saves you 6d. or 9d.

acquisition and is giving me great pleasure.

IDEAL HOME SUPER

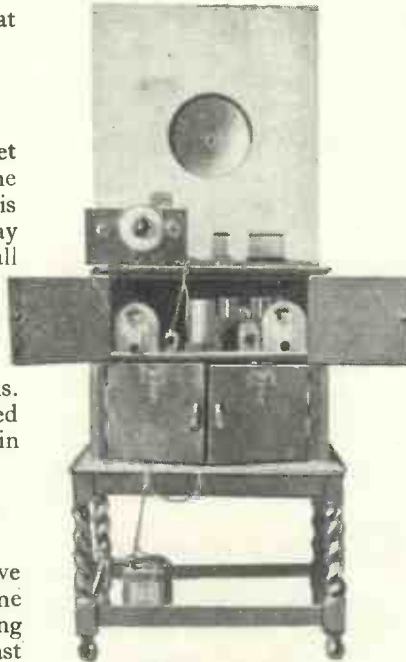
(April, 1932)

Carlisle (Cumberland).—The set is a wonder! I think the name explains in a few words that it is just the set for the home. The way in which it brings in the stations all round the dial, clear of each other and without the usual background noises, is truly uncanny. This is the ideal set for those who like roaming round Continental stations. I will not list the stations I picked up in one night. They all roared in at full loud-speaker strength.

JAMES PORTABLE S.G.3

(July, 1930)

Southampton (Hants).—I have built three sets using the same circuit, the portable edition having been taken on a Welsh tour last year, during which all the home stations were well in evidence. In the evenings some dozens of the high-power Europeans, all at good loud-speaker strength, were heard. The set has also provided constant entertainment in a local hospital for the nurses. The daylight reception is as good as most four's of the same class. A cabinet model of the same set has had constant use for nearly a year and, used with an eliminator,



ANOTHER SUPER-HET

Another version of the 1932 Super 60, this time with a short-wave convertor. The constructor is an enthusiast at Golborne, near Warrington

which I had especially constructed to fit. Since making the set I have logged forty-one stations and I have identified thirty-eight of them. For so moderate an outlay, it is by far the best set I have heard or seen. It is unusual for me to have a complete set for more than a couple



SENSIBLE CORNER CABINET

This sensible corner cabinet for the 1932 Super 60 is the work of a reader living at Kedleston. Note the combined loud-speaker baffle and cupboard

amazed at the selectivity and ease of tuning with the one control. Quite a number of foreign programmes are received at the same strength as London Regional.

SUPER SENIOR

(October, 1931)

Dorchester (Dorset).—I have made up one of your Super Senior superhets and have nothing but praise for it. Whilst Glasgow was transmitting on 1 kilowatt, I could tune it in at any time of the day although I live right down in the South of England. Tuning-in the different stations is a perfect joy because each one is clear of the other. I can get Belfast at any time of the day even now in July. I think any station receivable can be heard on my Super Senior.



Automatic Volume Control

By
P. WILSON,
M.A.

IF one had asserted twelve months or so ago that it was not impossible to design a receiver which would give first-class quality combined with a high degree of selectivity, and which, moreover, would produce that quality from a distant station just as well as from a local station, one would have been classed as a crank and a dreamer whose proper place was a lunatic asylum.

At any rate, that would have been my own verdict. Yet I am prepared to subscribe myself to that bold assertion at this very moment and, what is more, I could, if necessary, demonstrate the truth of it to any scoffer, unbeliever, or other type of sceptic.

Of course, one could not guarantee to produce A1 quality from any foreign station at any particular moment; thanks to faulty studios at Broadcasting House, I wouldn't give such a guarantee even for a local transmission.

But I find that even at this time of year (July-August) it is usually possible during the course of any evening after dusk to receive at least one or two foreigners with the desired quality.

Enormous Step

This is clearly an enormous step gained. I should say that it is due principally to two things: the recent developments in super-hets and the invention of the variable-mu screen-grid valve. But with these two I should also couple the invention of better types of detector circuit and the use of an automatic volume control.

The latter is something of a novelty in this country, though I have had

one working for some time; but it is becoming a standard fitment in American receivers.

In a sense, it does not appear at first sight to add either to the selectivity or to the quality. One of its characteristics, indeed, is to reduce the *apparent* selectivity and at the same time to increase the noisiness of a receiver. The former result, however, is merely an illusion and the latter only applies when a station is not tuned in.

Reduced Background

In actual listening conditions background noises are substantially reduced. I can often listen to Rome, or Langenberg, or to Poste Parisien, for example, with as little distraction from background noises as one normally has to endure when tuned-in to London.

The last statement is qualified for a very important reason: fading. Now an effective automatic volume control mitigates the tendency for fading to such an extent that normally one is not conscious of any real change in volume level.

This does not mean, however, that one cannot detect fading; for unfortunately, although the volume level of the music may not be appreciably affected, the volume level of the background noises is greatly increased during a fade.

At first sight one might regard this as a serious disadvantage. In practice, however, it proves not to be so; modern conditions of life accustom us to shut out of our consciousness all sorts of extraneous sounds, though they do not as a rule enable us to hear a sound which is not there to be heard.

The reasons for these interesting characteristics will appear more fully at a later stage in this article. Before I go on to consider the principles of operation and a few of the possible methods, however, I should mention two other important features.

The first is that atmospherics are almost instantaneously damped out. This has the effect of reducing their raucousness as heard in the loud-speaker: they go off, as it were, like very damp squibs instead of like a series of back-fires from a badly adjusted motor-car. It also has a most beneficial effect on the amplifier in that it reduces any tendency to parasitic oscillation and even to common or garden instability.

It is a common experience with a set adjusted to the verge of oscillation (that is, to the point where it is most sensitive) for a strong atmospheric to topple it over the line. But that is not all.

Bad Quality

It is generally true, or at any rate I cannot at the moment think of any exception to the rule, that a receiver which is on the verge of self-oscillation is bound to be producing bad quality. This applies more, perhaps, to low-frequency oscillation—motor-boating and the like—than to radio-frequency oscillation, but it is true even of the latter.

Not only may the frequency response of the receiver be affected but, what is even more disgusting, the response to the strengths of different notes, which in the case of high-frequency oscillation means to the different depths of modulation, is badly upset. In other words,

serious amplitude distortion occurs, and amplitude distortion is as a rule far more distressing than other kinds as anyone who is not accustomed to overload his valves has reason to know.

An automatic volume control, then, tends to stabilise a receiver and, thereby, if it is of good design, to avoid much distortion.

Eye on Volume Control

The other feature to which I referred relates rather to the handling of a receiver than to its quality or its selectivity. Anyone who has handled a sensitive receiver such as a modern super-het will know how disconcerting it is to have to keep an eye on the volume control during the process of re-tuning.

If one has been tuned-in to a distant station and then passes through a local station one of two things will normally occur. If the (second) detector will handle a big input signal, as of course it should, the local-station signal passed on will overload subsequent valves and give a nasty jolt to the loud-speaker.

On the other hand, if the detector will not take a big signal it will badly overload and present the paradox that the volume produced by the set from the local station will be less, and much worse in quality than that produced from a more

presented to the detector should be cut down in inverse proportion to the strength of the station.

That is to say, the high-frequency amplification should be much greater for distant stations than it is for local stations. A detector only functions effectively if the signal strength applied to it is neither too small nor too big.

In the old days we really fumbled the problem and made local-station sets for quality reception and more sensitive sets for distant reception. Then we introduced some sort of volume control in the high-frequency stages and so achieved a measure of compromise.

But no such volume control was really satisfactory until the variable-mu valve came along and enabled us to control the high-frequency amplification effectively, and with a minimum of distortion, by simply varying the grid-bias of the high-frequency valve.

It is just this method of bias variation that makes an automatic volume control a feasible proposition. Various schemes were proposed in the past, but all of them failed for want of just this thing: an electrical and distortionless means of controlling the input to the detector valve.

It would not have mattered much whether the means had been the variation of bias or the variation of screen volts so long as it had a fairly long range without appreciable distortion. This is what the variable-mu valve supplies.

The principle of an automatic volume control, then, is simply this. We have to find some part of a circuit after the high-frequency amplification in a receiver, or we have to design a special circuit for the purpose, in which a voltage is built up varying with the signal strength as passed on by the high-frequency amplifier.

In principle, it does not much matter whether the voltage increases or decreases as the signal strength increases. It is possible to deal with either case quite effectively. Then we have to feed back this varying voltage to the high-frequency amplifier in such a way that it will reduce the amplification as the signal strength increases and increase it as the signal strength decreases.

In this way the signal strength will automatically pick out a suitable degree of amplification for itself.

That, of course, is a counsel of

perfection and in practice one must not expect such a perfect control that the input to the detector is automatically adjusted to the same amount whatever station is being received.

Two months ago we introduced P. Wilson to our readers as a leading authority on gramophone matters. Now he shows himself to be a highly skilled radio experimenter.

This is the first of two articles on automatic volume control (another will appear next month); these two articles will form, we believe, the most complete explanation of automatic volume control that has yet appeared in this country.

The addition of automatic volume control to a set is well within the capabilities of the average experimenter. These articles by P. Wilson give just the information that the practical man needs

Where can we find a varying voltage of this kind in a receiver? Or, alternatively, where can we find a varying current which we can pass through a resistance and thereby set up the required voltage?

As a matter of fact there are quite a number of ways in which we can get what we want, so many, in fact, that I shall have to content myself here with mention of only one or two.

Problem Not Insoluble

First of all, to appreciate that the problem is not insoluble (though some qualifications may be necessary in regard to the reactions on the normal functions of the receiver) just look at the circuit of an anode-bend detector (Fig. 1).

The circuit is shown in the simplest possible form since at the moment it is only the principle of the thing that we are considering.

If we put a milliammeter in the anode circuit or in the high-tension positive lead to an anode-bend detector the reading should be in the region of .2 to .5 milliamperes when no signal is being received. As soon as a signal is applied to the grid, however, the reading may

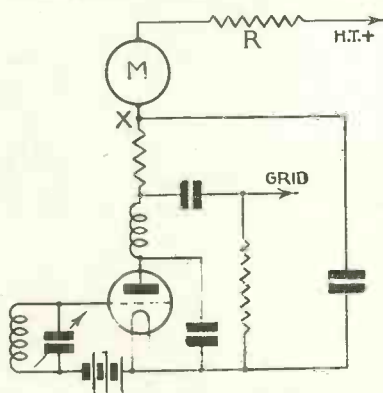


Fig. 1.—Circuit of a straightforward anode-bend detector arrangement

distant station with the same volume-control setting.

On many an occasion have I been asked to explain the reason for this queer result and always it has been detector overloading.

In order to secure this desirable freedom from overloading, therefore, it is necessary that the signal strength

AUTOMATIC VOLUME CONTROL—Cont.

increase to 1 milliampere or more. Here, then, is a current I which increases as the signal increases.

If we pass this current through resistance R , say a decoupling resistance, there will be a drop of voltage across that resistance of

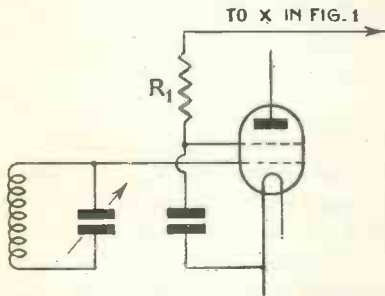


Fig. 2.—Skeleton circuit of a simple form of automatic volume control

magnitude $R \times I$, and this, of course, likewise varies with the signal applied to the grid.

If we can apply this varying voltage back to the high-frequency valve in such a way that it increases the bias on that valve as the signal strength increases we shall have achieved our object.

At first sight the problem does not appear to be at all easy of solution unless a special valve is used for the purpose. For, remember, the resistance is in the high-tension positive lead of the circuit and therefore is at a high voltage above earth, while the grid circuit of the high-frequency valve is at a low potential.

Cunning Necessary

Unless we are cunning, therefore, we shall apply not only a varying voltage to the grid of the high-frequency valve but also a steady high voltage as well—and this would be fatal.

We cannot use a condenser to block the steady voltage for it would also block the variable voltage as well. This may puzzle readers who remember that condensers do pass varying currents but not steady currents. But they should reflect that here we are not dealing with varying currents or varying voltages of any particular frequency; we are dealing with variations as a station is tuned-in.

Apart from fading, which is slow

and irregular, no variation takes place whilst any particular station is being received.

This steady high-tension voltage would be an advantage if we were controlling our high-frequency amplification by means of the screen volts on a screen-grid valve. Thus, in skeleton form, we might try some such arrangement as that shown in Fig. 2.

There would be a number of objections to such an arrangement (for example, the high-tension voltage on the detector valve would vary with the signal strength), but since the voltage at x would be decreased as the signal strength increased owing to the increased current passing through resistance R in Fig. 1, so the screen volts applied from the point x through the decoupling resistance R_1 in Fig. 2 would also be reduced and therefore a reduction would be effected in the amplification of the screen-grid valve.

I have not tried such a system myself and I very much doubt whether it would function satisfac-

in the usual way. Apart from this the detector circuit is exactly as we discussed in Fig. 1.

For a strong signal the reduced voltage is fed back from the point x to the foot of the tuning coil in the grid circuit of the screen-grid valve. The cathode of that valve is connected, for high-frequency signals, to the earth line through the condenser c , but its steady potential is that of $H.T. + 2$ and is thus positive to the point x .

Note, however, the resistance marked s in the lead from that cathode to $H.T.+2$. The high-tension current of the screen-grid valve must pass through this resistance on its way to $H.T.-$, and therefore there is an actual fall of voltage in s , so that the actual cathode is positive with respect to $H.T.+2$.

Permanent Bias

This in effect gives the grid of the valve a permanent negative bias, since the potential of the grid is the same as that of the point x and is therefore negative with respect to $H.T.+2$.

We thus have a permanent bias on the screen-grid valve due to (1) the drop of volts in R when no signal is impressed on the receiver, and (2) the drop of volts in s due to the anode current of the screen-grid valve; and we have a variable bias applied from the point x through a decoupling resistance to the foot of the grid coil due to the increase of the current passing through R when

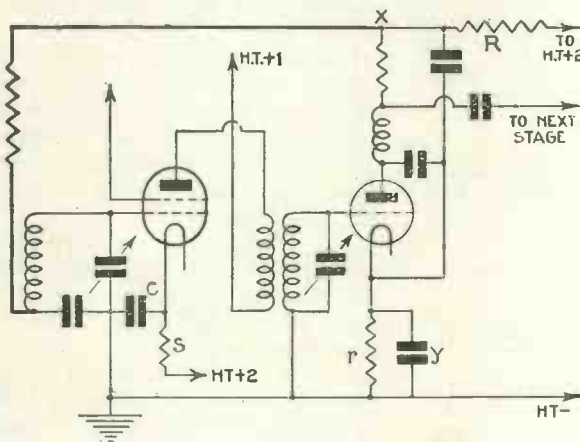


Fig. 3.—Another skeleton circuit of an automatic volume control

torily. I give it here purely as an illustration of the principle involved.

If sufficient high-tension voltage is available, however, the variation of volts in the resistor R in Fig. 1 could be made to control the bias of the high-frequency valve. A scheme of this kind has actually been used with a certain amount of success. The skeleton circuit is shown in Fig. 3.

Here the detector bias is applied by means of the cathode resistor r

a signal is applied to the grid of the anode-bend detector.

It all sounds very complicated to describe, but a little study of the operation of this circuit should make the fundamental principle quite clear. It should be noticed, however, that $H.T.+1$ will have to be very much larger than $H.T.+2$.

The anode voltage of the screen-grid valve is to be measured between anode and cathode, and the potential of the latter is positive to $H.T.+2$ by

ALL YOU WANT TO KNOW ABOUT IT!

the volts dropped in the resistance s . Thus, if H.T.+2 is 200 volts and the voltage dropped in s is, say, 2 volts, then H.T.+1 would have to be 322 volts in order to get an anode voltage of 120 for the screen-grid valve.

Serious Disadvantage

This, it will be agreed, is a serious disadvantage of the circuit, and it is not the only one. Thus the increase in anode current in the detector valve reduces the high-tension voltage on the plate of that valve and at the same time, since it has to pass through the resistor r in the cathode lead, increases the grid bias.

Both of these conspire against the very increase of anode current to which they owe their origin, and thus they tend to reduce the automatic bias voltage fed back from the point x . What is perhaps more important, they interfere with the proper functioning of the valve as an anode-bend detector and give rise to harmonic distortion.

But I must refrain from discussing that aspect of the subject.

A Modification

Before I pass on to a different type of control, however, I should indicate a modification of this anode-bend arrangement which might seem to avoid a high high-tension voltage. The anode current of the detector passes through the resistance r as well as through R . It is this which gives the detector its bias by making the cathode potential positive with respect to the earth line. A varying voltage is therefore set up across r according to the strength of the input signal to the detector.

Why not make use of this variation for automatic volume con-

trol purposes? In principle the idea seems sound enough. Thus we might feed back from the point Y in Fig. 3. But since Y is positive with respect to the earth line, the feedback would have to be to the cathode of the screen-grid valve and not to the grid circuit.

In that case the anode current of that valve would also pass through r with the result that that resistance would have to be relatively small in order not to over-bias the detector. This would mean that the change of volts dropped across r would be relatively small and therefore the automatic control would be of very limited range.

Moreover, unless a positive potential were also applied to the grid of the screen-grid valve the bias on that valve would never be less than that on the anode-bend detector, and for weak signals that would be too much.

Much better arrangements than these can be devised if a separate valve is used for the sole purpose of automatic volume control, and it is for this reason, I understand, that a separate control valve is most commonly used in America.

One system which has a wide range is illustrated in Fig. 4. Here the voltage set up across r , the bias resistor of the anode-bend detector, is used to give a positive bias to the grid of a control valve. Grid current is avoided, however, by

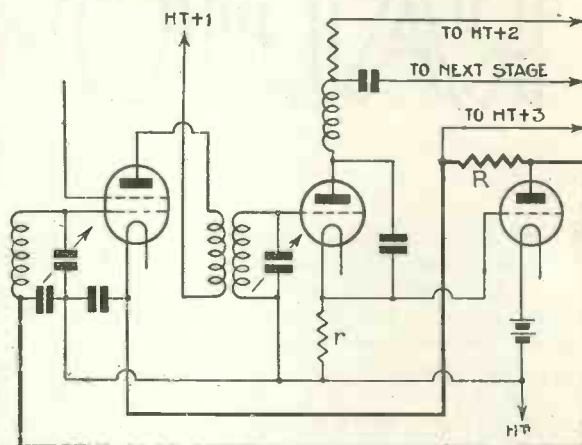


Fig. 4.—A system of automatic volume control that has a wide range

giving the cathode a greater positive bias so that the grid is always negative relative to the cathode.

As the signal to the detector valve increases the anode current passing through r increases and thus the grid of the control valve is made more positive. The anode current in the control valve is therefore increased and causes a larger drop of volts across the resistance R in the anode circuit and this is fed back as bias to the grid circuit of the screen-grid valve.

Stabilised Bias

In this way the change of volts across r is magnified many times. In the diagram the positive cathode bias is indicated by means of a bias battery, but of course the usual alternative methods of automatic bias may be used provided that the positive bias is stabilised and is not allowed to fluctuate with the anode current of the control valve.

(To be continued)

EDDY PUTS UP A GOOD SHOW!

This amusing window display was staged to advertise Mazda Valves. Eddy, the little man with a valve on his head, is the official Mazda "Mascot"



RADIO *in* REVIEW

Detectors :: Producing Ultra-short Waves :: "Deaf"
Loud-speaker :: Electric Timekeepers

JUST as the advent of the loud-speaker ousted the crystal detector, so the gradual increase in the power output obtainable from the modern set has served to make the leaky-grid detector old-fashioned, because of its tendency to produce tone distortion. For a time anode-bend rectification came into vogue; this has been followed, in turn, by the power-grid detector.

Grid Rectification

The latter is in large measure a reversion to the early grid-leak principle, since rectification is confined to the grid circuit, as distinct from the plate.

But by reducing the normal values of the leak resistance and grid condenser, and simultaneously increasing the plate voltage, the valve is made to operate strictly on the straight-line portion of the characteristic curve, whilst shunt losses on the high notes are avoided.

A still later refinement is the push-pull detector, in which, as the name indicates, two valves are used "back to back," the input being applied across the two grids and the plates being directly connected.

The advantage of this method lies in the fact that the high-frequency components are completely balanced out in the plate circuit, and so cannot get through to the low-frequency side of the set, where they usually give rise to parasitic noises and other forms of trouble. High-frequency currents in the detector output are usually only tolerated when they are required to provide back-coupling, and in the modern set this is no longer necessary.

Alternative to Valves

A recent invention provides an ingenious alternative to the use of valves for generating waves a small fraction of an inch long. When one is dealing with this order of frequency the time taken by the electrons to

By MORTON BARR

pass from filament to plate, inside the valve, is far too long to produce the required results.

This difficulty has to some extent been overcome by the Barkhausen-Kurz system of using a highly-positive grid and a negative plate, and limiting the path of the electron stream to a rapid oscillation to and fro across the grid. But even this method has its limitations.

The new scheme is to apply a high voltage across a cell containing a colloidal solution of small metal particles of uniform size. The high potential breaks down the insulation between the metallic particles, and creates a succession of small spark-discharges from one to the other. Each time a spark passes a series of damped oscillations of very high frequency occurs.

These overlap to form a practically continuous stream of wave-energy, having a frequency depending in part upon the size of the particles and in part upon their natural period of free vibration in the solution.

Professor Bedell, of Cornell University, has recently produced a device operating on the principle of the loud-speaker for assisting deaf people to hear. Applying the theory that defective hearing is in most cases due to some disease of the middle ear, the "deaf speaker" first amplifies the sound vibrations and then conducts them to the inner ear, either by pressing a flat disc against the forehead or cheek-bone, or through a mouthpiece held between the teeth.

Some people are more deaf to high notes than to low, whilst in others the reverse is the case. The instrument is therefore provided with means for adjusting the relative intensities over the whole audible range, so as to produce the optimum effect.

The mouthpiece type is most suitable for concerts, theatres, etc., whilst the disc type allows the patient to carry on a conversation. By fitting the latter type with a microphone, a deaf person is able to hear his own voice and so train himself to cultivate a normal manner of speaking.

"Grid" System

The popularity of the mains-driven time-keeper—which rivals a ship's chronometer in accuracy and costs less than an average spring-driven clock—has been brought about by the reorganisation of our electric supply services under what is known as the grid system.

So long as each distributing company was an independent concern, the particular frequency of the A.C. supply was more or less a matter of individual choice, but now that different generating stations are being linked up to share a common load, an accurately synchronised frequency becomes absolutely essential.

This frequency has been standardised at 50 cycles per second. It is supervised and maintained by a "master chronometer," which represents the last word in accurate time-keeping, and incidentally shares its accuracy with every household taking its time from the mains.

Inner Mechanism

The inner mechanism of the electric clock consists of a simple synchronous motor provided with a suitable train of gear-wheels between the rotor and the indicating hands. The only possible contingency to guard against is a temporary cessation of the supply current, which will of course stop the clock.

Many models are fitted with a large "seconds" hand, the continuous rotation of which is a sure indication that all is well, whilst others drop a red disc as a warning that there has been a current stoppage, and that re-setting is therefore necessary.

TELELOGOSCOPY

An art that has grown out of television, "telelogoscopy" (literally "seeing writing at a distance") is here discussed by H.J. BARTON CHAPPLE, Wh.Sch., B.Sc., D.I.C.

TELEVISION can and will be put to numerous uses, and one of the earliest possibilities to be considered was that of seeing writing or printed characters at any distance from their place of origin. As far back as 1927 J. L. Baird took out patents covering apparatus for this purpose, and went to the trouble of coining a word to describe the process.

Greek Combination

The word used has the advantage of being pure Greek instead of being a hybrid of Greek and Latin like "television," but unfortunately the word is rather unwieldy—"telelogoscopy." This is literally "seeing writing at a distance," being a combination of the three Greek words, *tele*, *logos*, and *skopos*.

In the early television transmissions put out by the Baird Company, especially when vision only was possible, the present dual sound accompaniment being absent, television screen news was a familiar part of the programme. Figs. 1 and 2 explain the scheme.

Apparatus for News

At the back of the seated artist is a white back screen and in the centre is an aperture behind which the "news" apparatus was placed. Originally this was hand worked and is shown in the photograph, but

later a motor-driven model was introduced.

When the announcer was heard to say "One moment, please, for television screen news" the sliding panel, which had previously obscured the aperture, was drawn on one side and the lettering was at once seen to move across the field of vision from right to left.

The size of the letters, by the way, was 3 by 2½ in., these being the most suitable dimensions for producing the best results.

The interior of the apparatus contained an endless roll of varnished linen, passing at intervals over rollers, and along which were regularly-spaced small slots for the insertion of the letters. It was lined with thick felt to reduce the sound caused by the letters continually passing over the rollers.

Fig. 2 conveys an impression of the complete transmitting equipment, the ordinary spotlight method of scanning and a standard-ratio disc being used, the photo-electric cells picking up the reflected light in the usual way for conversion to terms of electrical current.

At the receiving end those looking in read out the words in the centre of their built-up "screen" in much the same way as news bulletin signs.

A specialised form of the same



Fig. 1.—The original hand-worked screen news apparatus is seen fixed to the back of the artist's chair in a television studio

AN ARTICLE ON THE B.B.C.'S TELEVISION TRANSMISSIONS APPEARS ELSEWHERE IN THIS ISSUE.

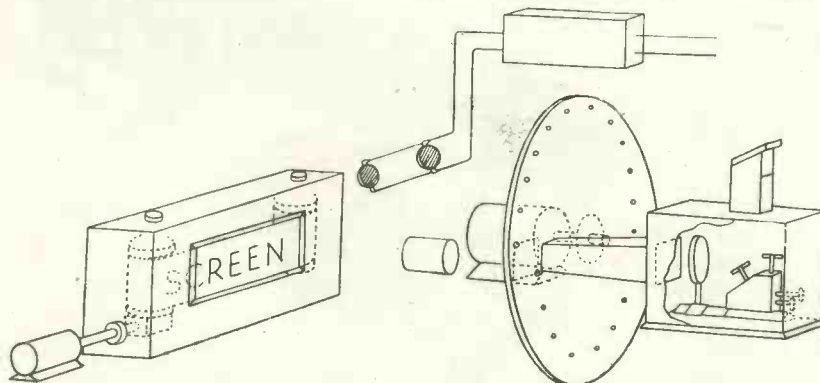


Fig. 2.—Schematic diagram of the apparatus used for making screen announcements by television

equipment was, however, developed in 1929, it being adapted to scan only the actual tape (simply a paper tape of the tape-machine kind with typewritten characters on it) in rectilinear strips.

It is of prime importance for the transmission of unorthodox characters such as Chinese, Japanese, and Siamese, or printed or typed matter, by radio in circumstances in which the Creed undulator is useless and fading makes morse transmission difficult.

One model was constructed for Prince Purachatra with a view to its employment in Siam for the transmission of that country's characters and although it is learned that the negotiations were never carried to a conclusion this was not due to any failure on the part of the apparatus. The scheme employed is shown in Figs. 3, 4 and 5.

TELELOGOSCOPY—Continued

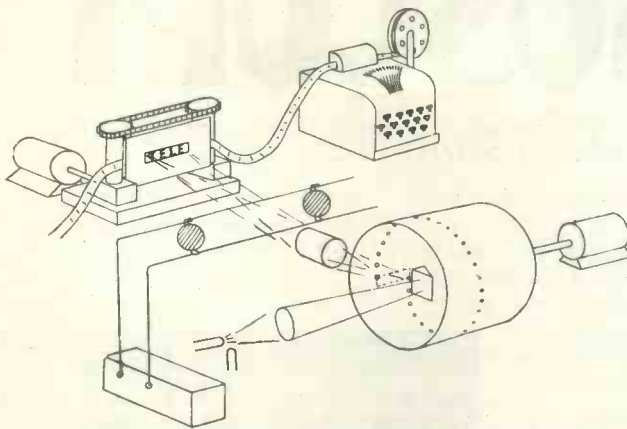


Fig. 3.—General arrangement of apparatus at transmitting end

Fig. 4 shows a typewriter adapted to allow the printing of letters on a paper tape, the roll of tape being accommodated in the shallow cylinder on the right. Fig. 5 depicts the whole of the transmitting apparatus laid out ready for use, the individual items being disposed in such a way that their function can be readily appreciated. Of course, in actual use screening cases would house the parts and Fig. 3 pictorially represents the working arrangement.

Steady Feed

The characters are printed on the tape and this in turn is fed at a uniform speed through a framework having a long rectangular slot. To allow for the intermittent feed of the typewriter and the steady tape movement through the motor-driven framework a "loop" of tape is purposely maintained between the two machines.

These moving characters therefore form the subject to be scanned and this latter operation is carried out in an ingenious manner. A projection-lamp light source has its beam condensed by a lens on to a right-angled prism mounted inside a hollow drum. This drum is driven at a constant speed by a motor, and by having a spiral of holes pierced through the drum side as shown it became an apertured drum scanner.

Rectangular Light Area for Scanning

The beam of light was bent at right angles and made to cover a rectangular area (shown dotted) inside the drum and as each hole passed vertically across the area a pencil of light passed through. This pencil of light was finally projected on to the moving tape by means of a focusing lens.

The drum rotation was in such a direction that the light spot explored the exposed type area from bottom

to top and right to left, the usual Baird scanning order, but the pitch of the holes in the apertured drum was such that the shape of the picture was much longer horizontally than vertically.

Furthermore, the scanning area conformed exactly to the size of the portion of the tape exactly in the field at any time. This was done in order to make the fullest use of the available transmission channel, whether wire or wireless.

Converting Light into Current

One or more photo-electric cells suitably positioned picked up the light reflected from the printed strip and converted this to proportional current variations in the amplifier circuit of which they formed a part.

The televising of printed matter forms a very rapid means of communication and from the very nature of the subject is much simpler than the transmission of actual objects. It will be noticed also that with this particular layout there would not be so much curvature of the lines in the type of scanning employed as would be the case if a transmitting disc had been used.

Receiving End

Coming now to the receiving end, the pictorial diagram of Fig. 6 shows one type of receiver in which a disc is used with a scanning area conforming to the width of the image of the tape, namely long horizontally and narrow vertically. Furthermore, Fig. 7 is an actual photograph of one of the receiving discs having a 60-hole spiral; this gives the scanning area



Fig. 4.—Special typewriter built for printing the letters on a paper-tape roll



Fig. 5.—Layout of the apparatus for transmitting by television printed characters with the maximum efficiency

A TELEVISION "SIDE LINE"

desired. The minute holes are just visible inside a larger protecting hole in an outer covering.

Occasions may arise when it is found desirable to record the signals permanently and if this is the case a British patent (No. 324904) describes a piece of suitable apparatus. In essence it consists of a chemically prepared tape passed through a set of contacts which are connected in turn, in scanning sequence, to the

alternatively it can be projected on a screen by suitable established means.

It will be seen, therefore, that quite apart from any other aspect of television, "Telelogoscopy" (oh! for a simpler word) has a definite and even im-

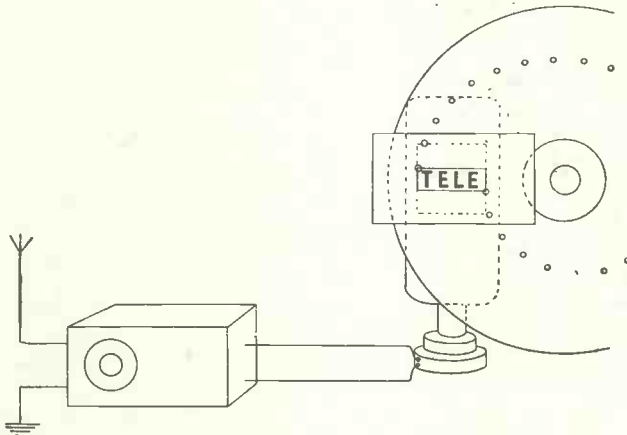


Fig. 6.—Television receiver with scanning disc connected to it

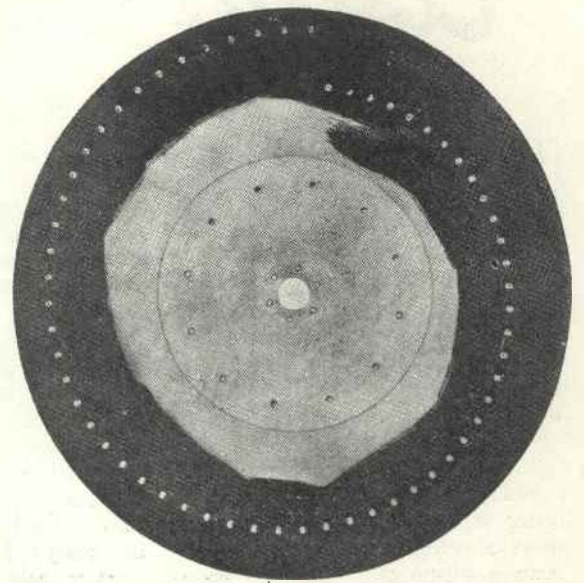


Fig. 7.—The 60-hole disc, giving a long rectangular scanning area, used in one type of telelogoscopy receiver

output of an amplifier at the receiving station.

If necessary the marked tape may be inspected as it is being printed or

them in particular cases.

Our afflicted brothers whose hearing has gone, but whose sight is unimpaired, would undoubtedly wel-

mediate use and can well supplement established means of communication or even supplant

come an innovation of this character if it could be broadcast as a special news service for the deaf.

Financial Possibilities

In its broadcast sense the idea may be regarded as a television "side-line," but these "by-products" have an uncanny knack of proving capable of giving a greater financial return than the principal factor which gave them birth.

THE FIXED RESISTANCE—Continued from page 343

to dissipate that amount of energy and still work efficiently. Wattage is the produce of voltage and amperage, and calculations are very simply made.

For example, if we have a current of 1 ampere flowing through a resistance and the voltage across the end of this resistance is 1 volt, then 1 watt of power is being dissipated as heat in this resistance.

Another Example

To take another example, let us say we have a 1,000-ohm 1-watt resistance. This will take about 31 milliamperes without overloading, for a simple calculation will show you that it requires 31 volts to send 31 milliamperes through 1,000 ohms, and as the wattage is a product of the current and the voltage, we

see that .96 watt will be dissipated as heat in this resistance.

Make a few calculations for yourself and you will find it very instructive. You will quickly find that the power dissipation rises rapidly with current. For example, 31 milliamperes in a 1,000-ohm resistance dissipates about 1 watt, but 100 milliamperes through the same resistance dissipates 10 watts.

One final point regarding resistors requires a note before we close this brief chat on the subject.

Any resistor which consists of a coil of wire wound in the ordinary way is bound to have inductance, and an inductive resistance can sometimes cause trouble with instability. This may be the case when the inductance of a low resistance, together with stray and other asso-

ciated capacities, happens to tune to a frequency within the particular tuning range of the receiver, but such cases are rare.

Sometimes, indeed, the inductive effect may actually be an advantage, for both chokes and resistances are used in coupling certain circuits, and an inductive resistance in such cases is merely a combination of both forms.

Special Types

If a particular circuit calls for a non-inductive resistance, one of the moulded or carbon types should be used, or else one of the wire-wound types specially made to be practically non-inductive. Unless there is a special mention, however, you will be safe in choosing your resistor without regard to its inductance.

Using Our Free Gift

HOW TO FIND EUROPE'S BEST 100 STATIONS

THIS month we are presenting every reader with a Station Finder, a list of Europe's best 100 stations that will prove invaluable during the coming months. The stations in the chosen hundred are those which are most commonly included in the average listener's log, although he may not up to the present have been able definitely to identify all of them.

Order of Wavelength

Stations are arranged in ascending order of wavelength, this being the most convenient method for identification purposes. After the wavelength, name of station and country of origin, we give the call sign, spelled out phonetically. This will be found one of the most useful points in the guide.

How many times, for instance, have you heard the call "Ach-toong, vest-doytcher roond-foonk"? At all times of the day a normal three-valver will pick up this German station at quite good loud-speaker strength at the top end of the dial. A glance at the Station Finder will show that the name of the station is Langenberg and that it transmits on 473 metres.

Dial Readings

This is where the usefulness of the log becomes evident. When you identify any station, do not forget to make a note (in the columns on the right-hand side) of the dial readings on your set for the station received.

Take our Langenberg example: 16 metres below Langenberg is the Swiss high-power station Beromuenster, which is easily received in this country in the evenings. The Station Finder gives the call sign of Beromuenster and in order to log this station you have only to turn the dials of your set down a few degrees until you pick up the station which you believe to be Beromuenster.

If the call sign given in the log for this station and what you hear from your loud-speaker agree, then you will know that your set is tuned to Beromuenster. Then write the readings on your dial in the space provided. One can tune near Beromuenster to such stations as Rome and Prague, but do not forget to write down in the columns provided the dial readings on your set.

The best way to start off is to make a note of the dial readings of all the stations you are positively sure you have identified. Your local stations are positions from which you can work to other stations. Make certain that your identification is right. A slip at the beginning may lead to half a dozen or more mistakes later.

There are two or three hundred stations in the medium waveband alone, and this list gives you the

bells, cuckoos or trumpet calls. The interval signal will be found in brackets after the call sign in the main list.

The relaying of one another's programmes is a practice becoming very popular with European stations. Italian and German stations are now linking up more than ever for common programmes. Identification under these circumstances must be done very carefully.

Type of Programme

The main type of programme (of which we give a brief indication) is also a useful item. The Italian stations are known for their excellent operatic relays; German for their stirring light music; and French for gramophone-record broadcasts.

There is a wealth of information packed away in this Station Finder.

Every detail has been carefully checked and listeners will find it an invaluable guide to Continental reception for the winter months.

Last year we gave a similar chart with the October issue of "Wireless Magazine." The following letter is typical of the appreciation with which it was received by thousands of listeners:

Treasured Help

"Almost a year has elapsed since I became the owner of one of my most treasured wireless helps. I refer to the excellent station log which was presented with the October (1931) issue of 'Wireless Magazine.' One could not wish

for a better chart, but one addition I found an advantage was the kilowatt output.

"Please forgive the liberty I take when I suggest that at some future date I dare to hope that you will print a revised copy showing alterations and additional stations. If a station log as good as this could be purchased, I should have been spared this liberty."



TELL YOUR FRIENDS!

Everybody who owns a radio set will find the "W.M." Station Finder an invaluable aid to foreign station identification

pick of the European transmitters.

We have also given, as far as possible, the interval signals. Musicians will be able to spend hours searching the ether for the musical signals which are reproduced in the Station Finder. Those listeners who are not musicians can spend an evening searching for such odd interval signals as nightingales, musical boxes, hooters, carillons and



Things That Struck Us at the Exhibition

There were scores of things to attract the attention of the visitor to the Radio Exhibition recently—so many things, in fact, that it is not at all easy to pick out the most outstanding items. In this symposium members of the "Wireless Magazine" Technical Staff, together with some distinguished "W.M." contributors, give their impressions of the greatest radio show yet staged in this country

INTRODUCTION BY BERNARD E. JONES

WHAT struck me most at Olympia was that the Show was nearer to my ideal radio exhibition than any of its predecessors. In spite of the great heat which we "enjoyed" throughout August, there was a liveliness about the Show which was very inspiring—possibly "perspiring" would be as true a word.

As a spectacle, all preceding Radio Exhibitions were outclassed. The boldness of its decoration and lighting; the attractiveness of the Show as a public entertainment—these have never before been approached, and the happiness and enthusiasm of the crowds left a great mark on my mind. The management is taking a bigger view as the years pass.

Its vision is widening, and the Exhibition is becoming less a multiplication of radio showrooms and more a real focused centre of radio interest where the trade meets to exchange ideas and other things, and the fans congregate.

Exhilaration of Mind

The light, the colour, the music, the bustle, the very spirit of the Show produced an exhilaration of mind far greater than on any previous occasion.

And then the growth in the number of exhibitors, in the space occupied by the Exhibition, in the huge number of sets and components on view, and, I understand, in the amount of orders taken!

It is a great triumph for the Radio Exhibition to achieve in its first decade the honour of being housed in Olympia's great hall, which in the past has been sacred to nothing smaller than the Motor Show. The

wider gangways gave the crowd greater freedom of movement and made the visitor's task just a little less arduous than it might otherwise have been.

Visitors' Searching Questions

Both public and visitor have grown in another sense. The visitor on this occasion was a more informed person. His radio knowledge was, in most cases, quite appreciable and his questions were often searching and had to be dealt with seriously. It was not enough for the stand attendant to attempt some sort of non-committal reply. He had to know what he was talking about, and for the most part there is no doubt whatever that attendants were far more helpful to the inquirer than in previous years.

Which reflection gives rise to a suggestion: Is there not a need for official guides to the Radio Exhibition, alert men who know what is on view, and where it can be found, men with more than a smattering of radio knowledge? Other exhibitions have found special guides necessary. I prophesy that the Radio Exhibition of future years will not be able to do without them.

Good as Olympia was this year, I still miss what my ideal radio exhibition will contain, and perhaps next year or some other year I shall find it. I want the manufacturers to let the public into some of their secrets. I should like to see valve-making machines installed, to see manufacturers bring their best squads of workers from their factories and demonstrate before the eyes of the public how radio components and sets are manufactured, built, and tested.

THINGS THAT STRUCK US—Cont.

This reminds me that I was disappointed in our own "Wireless Magazine" stand in one respect. By bad luck in the ballot we were unable to get a stand as large as we wanted, and we consequently had no room to demonstrate set-building by the expert members of our Constructional Staff.

What a great pleasure it was, and always will be, to welcome at our stand so many readers, all friendly and some of them critical. Our contact with our readers at exhibition times is our great annual privilege.

BY W. JAMES

THE radio manufacturers seem at last to be getting down to the design of receivers and accessories.

That was what I felt after several visits to the Show. Sets this year are better designed for no more money than last year. There appeared to be a sort of uniformity in the finish and appearance of cabinet sets, and I judge that many makes of sets sound practically alike.



A CENTRE OF INTEREST AT OLYMPIA

An H.M.V. radiogram fitted into an all-glass cabinet so that every part could be clearly seen by visitors

There is still, however, plenty of evidence of individual design and I saw many cleverly thought-out chassis.

The need for selectivity has resulted in a number of makers producing super-heterodyne sets. I do not feel very happy over some of these for technical reasons, and I expect servicing difficulties will be met with.

There is a marked improvement in components. Gang-tuning condensers have been a weak feature of many sets in the past, but the new ones are better built, have frames not so liable to twist, and the trimmers are more satisfactory. There are new designs of coils, too, which lend themselves to matching.

Altogether, I felt that the home-constructor had not been forgotten this year. The number of makes of parts may be less than formerly, but there is no doubt about the better quality and greater value.

MORE SENSITIVE LOUD-SPEAKERS

I noticed nothing much that was new in loud-speakers, but the prices have come down. Some of the permanent-magnet moving-coil loud-speakers are sensitive enough to work well from a battery set having a medium power valve.

There is one thing for which I am thankful; the valve-makers did not introduce new types for the Exhibition. There are quite enough types of valves, and I would rather see improvements in the uniformity of valves than in efficiency.

BY PERCY W. HARRIS, M.INST.RAD.E.

OF all the Radio Shows I remember—and I have visited many both in England and America—this year at Radiolympia stands out as the most interesting and time-absorbing.

On the manufactured-set side of the show there were a number of outstanding examples of sound radio engineering. For example, I particularly admired the sound design and breakaway from convention shown in the Murphy super-heterodyne. Too many receivers nowadays give me the impression that the chassis has been designed to suit a particular cabinet.

Chassis First—Cabinet After

In the Murphy Super the chassis had obviously been worked out for results, the cabinet being later designed to fit it, and as a consequence the whole receiver gives me the impression of essential fitness for the job, which in itself is a kind of beauty.

It was pleasing, too, to find that at last the real chassis form of construction has been generally adopted for commercial receivers. It was less pleasing to see a monotonous uniformity of design throughout most of the stands. Most of the tuning indicators are much



GERMAN CAR EQUIPMENT

Radio equipment for a motor-car shown at the Berlin Radio Exhibition. The receiver is mounted round the steering column

THE MOST OUTSTANDING EXHIBITS

too small—a tiny aperture with only one or two figures showing at a time—I was therefore pleased to see the excellence in this regard of the Ekco sets and a few others.

I may be a voice crying in the wilderness, but I do hate the bamboozling of the general public into thinking that the sound issuing from the set on the stand is the same as they will get at home.

Demonstrating the Loud-speaker

If you were to go into a shop to buy a receiver with a separate loud-speaker, and the salesman pretended to demonstrate it by connecting, not the set, but the *loud-speaker* to an elaborate power amplifier actuated from a gramophone pick-up you would call him dishonest.

If the same salesman showed you a set with built-in loud-speaker and demonstrated it by connecting the loud-speaker *alone* to the same amplifier, you would still think him dishonest if he did not tell you what he had done.



GERMAN TELEVISION

Television apparatus was prominent at the Berlin Radio Exhibition. This is claimed to be the smallest television gear in the world

Yet this is precisely the method adopted at Olympia. The sets would have operated just the same if there had been no valves in them!

Interest in the New Products

The home-constructor was badly looked after as usual, and I am glad that the few firms who catered for him report very satisfactory results and much interest in the new products. The British Radiophone Radiopak deserves a special word of praise, and the similar scheme put out by Formo will also help the construction of multi-valve, ganged and band-pass sets.

I like the combined units for transformers with resistance feeds, but there is still room for improvement in the matter of niggly terminals and poor soldering lugs.

And silly grub-screws!



LARGE-SCALE VALVE MODELS

These two models attracted much attention on the Cossor stand. One visitor wanted to know where the emission was; he had been told his had gone!

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

ONE or two exhibits took my fancy, the first being the Murphy super-heterodyne receiver, which really seemed to contain all that the most ambitious fan could require, including diode detection and automatic volume control.

This does not mean that I considered it the best set in the Show, because it is not everybody who wants these refinements.

Set for Use on D.C. or A.C. Mains

Secondly, my attention was attracted by the Dece-Acee receiver, which is a set using low-consumption D.C. mains valves in a circuit suitable for either D.C. or A.C. mains. It was the successful interpretation of an obvious idea which appealed to my fancy here.

As a third outstanding exhibit I would choose the Lewcos potentiometer, which is a really snappy piece of work, both mechanically and electrically, apart from its very low price, and although it is a small component I did consider it of unusual merit.

Remarkable Price Reduction

An exhibit which is too specialised to be included in the list, but which made a strong appeal to me was the Cossor cathode-ray tube (on which many "Wireless Magazine" readers, no doubt, saw their own voice waves) principally because this very handy instrument can now be obtained for the sum of £7 10s. as against nearly £30 a few years ago.

THINGS THAT STRUCK US—Cont.



THE MOST POPULAR EXHIBIT

This two-ton Robot was shown by Mullard's. By means of photoelectric cells and microphones it read newspapers, told the time and answered questions

BY ALAN HUNTER

I THINK the most outstanding feature of the Radio Exhibition was the provision of numerous "side shows" for the benefit of visitors wanting to hear the apparatus actually working. Some of these side shows were really entertaining, particularly the Ekco, H.M.V., and Varley shows.

Another point that continually impressed me was the almost universal adoption of some form of moving-coil loud-speaker. Two makes in particular, both of American inspiration, but British manufacture, have done much to standardise the quality of the reproduction for this year's sets.

I could not help noting the extraordinary lack of originality in the design of cabinets. Except in one or two de-luxe models there is no furnishing sense shown in this year's crop of cabinets.

BY MORTON BARR

MY first impression of Radiolympia at night was one of externals—the dignified, almost cathedral-like, aspect of the main hall, wonderfully lit up, an immense throng of people, and the rise and fall of interminable music.

Such signs of prosperity are very welcome in these hard times.

After making the rounds, I stood convinced that the home-constructor is still one of the best customers of the wireless trade—in spite of the bewildering variety of assembled sets, principally mains-driven.

There were kit sets for everything—including a radio-gram—and components and "gadgets" galore.

I would also say there is a definitely growing interest in short-wave working.

Attraction of "Automatic Tuning"

I confess to a special attraction towards anything that is "out of the ordinary," and on that ground was particularly struck by the Zetavox system of "automatic tuning." This receiver is provided with an ingenious selector device, which, when once fitted to the main tuning shaft, renders it possible to bring in any desired programme—out of a choice of, say, ten or a dozen—merely by pressing a button!

Not everybody's choice, perhaps, but there should be a welcome for it amongst those who find wireless "difficult and complicated."

I noticed that another receiver—the Ethatrope—secures much the same result by different means.



JETSAM LOOKS ROUND OLYMPIA

Jetsam, of Flotsam and Jetsam, examining one of the latest Columbia radio gramophones. In the foreground is Mr. L. T. Neck, managing director of the Columbia Graphophone Co., Ltd.

BY L. A. CHAPMAN

IN my work for "Wireless Magazine" and *Amateur Wireless* I have handled, during the course of the past twelve months, more complaints about heterodyne interference in reception than about any other matter. This, coupled with the fact that "Wireless Magazine" has recently published the design for a heterodyne filter device, caused me to take more than a casual interest in the Kinva heterodyne filters which I saw at the Radio Exhibition.

These filters, I understand, are designed to give a sharp cut-off at a frequency of 3,500 cycles. They should therefore be very effective in reducing or com-

SPECIAL ITEMS AT OLYMPIA

pletely eliminating the heterodyne whistles which so often accompany reception when a sensitive receiver and a good loud-speaker are used.

Turning to the more technical side of radio engineering, I would like to mention the A.C. adaptation of that very useful and almost indispensable test instrument, the Avometer. Both the D.C. and the A.C. Avometers are marvels in design in that they embrace thirteen different measuring instruments in a case little larger than a quarter-plate camera.

A special totally-enclosed gramophone needle cup, shown by British Goldring Products, Ltd., is another thing with which I was particularly intrigued. It works on the principle that when the top is pressed down a small platform is brought into view, and on this is reposed a single gramophone needle.

I consider this to be a very decided advance upon the more usual type of open needle cup. It certainly possesses advantages that commend it for popular use.

BY J. GODCHAUX ABRAHAMS

IN the restricted space at my disposal it would be hopeless to attempt to detail the impressions I gathered from the numberless exhibits shown at Olympia. My first impression, possibly, was the remarkably good quality of production given by the majority of sets and loud-speakers, however low their cost. If anything, the choice and variety of instruments was too liberal, inasmuch as the great number of different models offered was inclined to render the selection of one particular receiver a difficult matter to the prospective purchaser—difficult in the sense that it was hard to differentiate between so many makes of equal value and reliability.

It was obvious that the present increasing congested state of the ether would prove an impetus to the renaissance



MODEL OF BROADCASTING HOUSE
Much interest was taken in the large-scale model of Broadcasting House shown by the B.B.C. at the Radio Exhibition

of the super-het which, without doubt, in its present advanced form will stay with us for some time.

Also, I was specially interested in short-wave receivers, either complete or as adaptors to the ordinary three- or four-valve broadcast set and which, offered at a reasonable price, open up a hitherto little explored field to the average listener.

Kits for the home constructor equally attracted my
(Continued on page 420)



A TUNING DIAL FOR GIANTS
A feature of the Ekco exhibit was this large model of a special tuning dial. It has the names of stations marked on it



THE POSTMASTER-GENERAL LISTENS-IN
The Postmaster-General, Sir Kingsley Wood, visited Olympia and broadcast a speech to the visitors. Great interest was taken in the Post-Office display

Modern Tuning-Coil Practice



A comprehensive review by W. JAMES of modern practice in tuning. Mr. James has always been regarded as an authority on tuning coils and this contribution from his pen will be welcomed by many enthusiasts

TUNING coils are of all shapes and sizes. At the present time small coils appear to be fashionable. Some are made complete with switch and many have a metal cover.

And so we can go on, accepting the small coil because, speaking generally, it can be used with little trouble.

We might conclude, therefore, that a really good coil is what is needed for a small set, as this coil will provide fairly good tuning and strength.

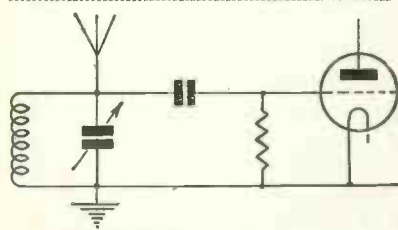


Fig. 1.—It would be no use connecting a good coil directly in the aerial circuit

We look to the tuned circuits for selectivity and we know that the strength of the signals applied to the first valve and the amount of the amplification at high frequency depends to an extent upon the coils.

Inferior Results

With a small coil the results would definitely be inferior. We could, therefore, use a large coil for the medium wavelengths, having, for example, 55 turns of No. 22 or 24 silk or enamelled wire.

Now, even a properly made coil of small size cannot be as efficient in many ways as an equally well-made coil of larger dimensions. The position is the more interesting when we take account of the need for shielding, the characteristics of aerials and valves, and make allowances for the known defects of gang-tuning condensers.

Tuning coils must be designed to suit the rest of the set. Thus, if the receiver is a simple two-valver, having a detector and power valve, the question of instability hardly arises.

There would be no sense in joining this good coil directly in the aerial circuit as in Fig. 1. For one thing, the tuning would be poor and, secondly, the strength of the signals applied to the detector would be less than the maximum obtainable. You should tap down the coil, as in Fig. 2.

Easiest to Handle

As practical people, we know that the small coil with its relatively high losses is the easiest to handle in any circuit.

We desire the best selectivity and maximum input to the detector valve. Very special selectivity is not required as, presumably, the set will receive only the local stations and one or two others. With favourable circumstances, a few more stations may easily be within range, but the point is

A tap-half way, to which the aerial is connected, might prove much better. The selectivity would certainly be better. But whether or not the strength would be greater depends upon the size and nature of the aerial.

Effect of Tapping

If this were a small one, it might be found that the strength is about equal to that obtained when the aerial is joined nearer the top of the coil.

A set fitted with small coils is likely to be stable provided the circuit is a sound one.

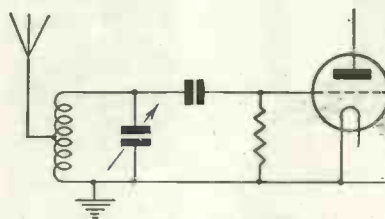


Fig. 2.—A tap taken half way down the aerial coil

Small coils are the easiest to gang, because they tune relatively broadly. Owing to their size, they can be placed conveniently near the tuning condenser. Short connecting wires can then be used, which reduce troubles from couplings.

that a set of this nature can receive at good strength only a limited number of stations.

When a large aerial is used, however, the strength will almost certainly be greater and experience shows that a tap about one-third from the bottom or earth end is usually the best.

Indeed, it may well be definitely harmful to provide good selectivity involving a sacrifice in signal strength.

The selectivity will improve as the tap is made nearer the earthed end. But the signal strength will not be found to increase in this manner.

Considering signal strength alone, as you tap down from the top or grid end of the coil, the signal will at first improve, and later will weaken as the tap is made nearer the earth.

The actual results depend upon the wavelength of the signals as well as upon the size and "goodness" of the coil and the details of the aerial.

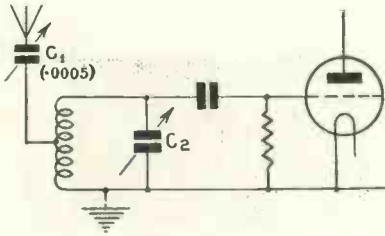


Fig. 3.—A condenser in series with the aerial is a help

As the wavelength of the circuit is increased, its losses fall. The result is that you might easily find that the best results are obtained at 250 metres with a tap one-quarter up from the earth end; at 350 metres, one-third up; and at 500 metres, half up.

Alternative Taps

So you see that if you fix one tapping point for the aerial connection, the results cannot be the best possible over the whole tuning range. A good idea is to provide three taps.

This may not be convenient, however, because switching must be considered. A single tapping must then be used if possible.

But how are we to get over the difficulties of loss in signal strength and selectivity? An adjustable condenser fitted in the aerial lead to the coil or switch will help matters con-

siderably. With such a condenser, joined as in Fig. 3, and having a maximum capacity of .0005 microfarad, the effective coupling of the aerial to the coil may be varied over a wide range and the effect is somewhat like altering the tapping position.

Let us start with the condenser C_1 of Fig. 3 set at its maximum capacity. If you tune to a station and then short-circuit this condenser, the chances are that the results will hardly be affected after a little re-tuning.

Now reduce the capacity. Immediately three things happen. First, the main tuning condenser C_2 must be increased a little. This shows that an effect of lowering the capacity of the aerial condenser C_1 is to reduce the amount of the capacity effectually across the tuned circuit composed of the coil and C_2 . Condenser C_2 must, therefore, be increased in capacity a little to maintain the circuit in tune.

The next thing you are sure to

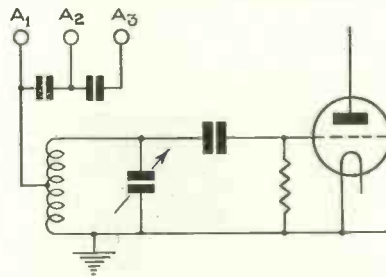


Fig. 4.—Use of two condensers with three tapping points

notice is a change in the selectivity. The selectivity will have improved, the tuning being sharper. This is because the load due to the aerial is now reduced.

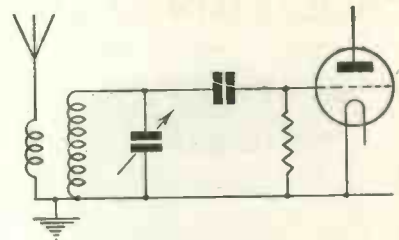


Fig. 5.—Separate aerial winding coupled to the grid winding

The tuning may be very much better and you might now find it is possible to hear clearly the two local stations, whereas before one could be faintly heard, although the circuit was fully tuned to the other.

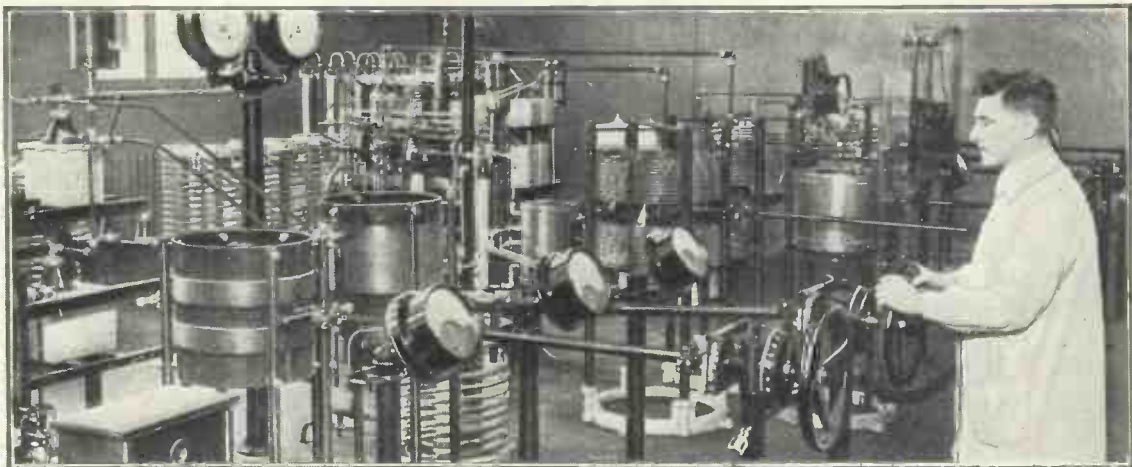
Change in Signal Strength

There will also be a change in the signal strength. It might have increased or decreased. If you are testing with the coil tapped half-way and the circuit is tuned to above about 400 metres, the chances are that the strength will have increased, especially if a good outdoor aerial is being used. With a small aerial the opposite result may well be obtained.

There is no other effect to be noted. If there is reaction, and there usually is with a detector and power valve circuit, it will be found that less reaction is required to make the circuit oscillate. This should be so, as the load has been reduced.

Thus four things have happened as the result of altering the capacity of C_1 .

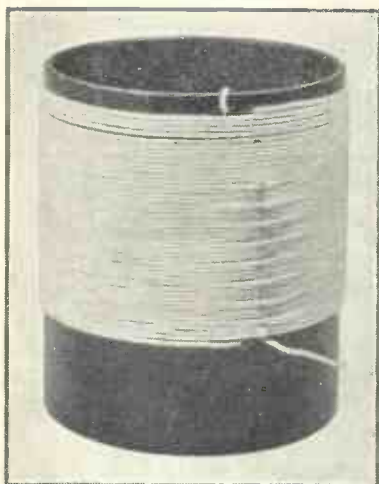
Now suppose that the capacity is still further reduced, the moving plates being turned almost nearly out of the fixed vanes. There will now



A GIANT STATION NEEDS GIANT TUNING COILS

A photograph of the Zeesen high-power station. Transmitting stations need large coils as they have to be wound with thick wire to carry heavy currents

MODERN TUNING-COIL PRACTICE—Continued



SOLENOID WINDING
A plain winding on a cylindrical former is known as a solenoid. This is the basis of most modern coils

be no doubt as to the effects produced. The tuning will be much sharper.

No doubt the signals will be greatly weakened, the reaction will have to be reduced in order to avoid oscillation, and the coil-tuning condenser will have to be increased a little to bring the circuit once more fully into tune. You can, therefore, obtain a fairly wide range of tuning, including selectivity and strength, merely by altering the value of the aerial coupling condenser C_1 . This method is, therefore, a valuable one.

Good Results

If you note the effects and tune properly, very good results can be obtained. The best use can be made of the aerial system and the coil, but care must be taken to note exactly what happens.

Briefly, if you reduce the capacity of C_1 (Fig. 3), the capacity of C_2 , the tuning condenser, must be increased a little, and the reaction must be reduced a trifle in order to avoid oscillation.

The strength varies most when the capacity of the aerial coupling condenser is changed from a large to a small value. It is possible that the great strength of the local station may be so cut down by turning C_1 to its minimum position that it can hardly be heard.

Thus we have here a

good volume control, but it must be remembered that a change in C_1 must be followed by a change in C_2 , and also the reaction, when critical reaction is being used.

In any case, the best results at all wavelengths cannot be obtained from a coil having the aerial joined to a single tap and a number of taps on the adjustable coupling condenser ought to be used.

If the extra tuning control is objected to, then the arrangement of Fig. 4 is usually satisfactory. Three aerial terminals or sockets are used. One is taken direct to the tap on the coil and the others are connected through fixed condensers of .0002 microfarad each. In one position the two condensers are in series, forming, in effect, a .0001-microfarad condenser.

The tap would in this case be chosen to give the maximum strength at the highest wavelength. Then at a

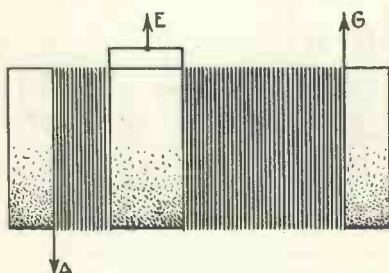


Fig. 7.—Coil with the aerial winding spaced some distance from the grid winding

point about half way in the tuning range, the second aerial connection with the .0002-microfarad condenser would be used. For extra selectivity, the third connection would be made, both condensers being in circuit.

Instead of tapping the coil, a

separate winding may be used (Fig. 5). In general, the aerial winding should have from one-third to a half as many turns as the grid coil (Fig. 6). A fairly fine wire may be used for the aerial coil, such as No. 28 or 30.

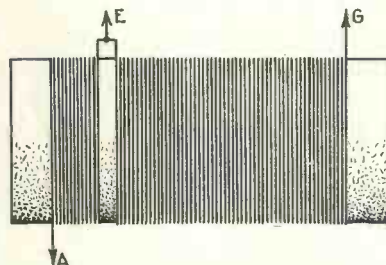


Fig. 6.—Coil with aerial winding close up to the grid winding

If this is wound as in Fig. 6, the results will be quite different from when there is a space between the coils as in Fig. 7.

Separate Formers

You will find, if you wind the two coils upon separate formers, beginning the windings near the edges, that the signal strength, selectivity, and tuning may be altered by altering the distance between the coils.

As they are separated, the selectivity is improved; in fact, the effect is much the same as tapping the aerial towards the earthed end of the coil of Fig. 1.

But if a large aerial coil is used, and testing at, say, 300 metres, the distance between the coils is increased to improve the selectivity, it will be found that the results at longer wavelengths, such as 500 metres, have been affected, too.

In fact, the coupling may be altogether too weak, that is, the distance

between the coils may be much too great for satisfactory results. To obtain the best results, the coupling ought to be made variable, and if this were 1923, instead of 1932, we would fit an adjustable coupling and get good results.

The best fixed arrangement is to fit the aerial coil about $\frac{1}{8}$ in. from the grid coil and to have the earthed ends together as in Fig. 8. Then, either tap the aerial coil or use the



AN ASSEMBLY OF MODERN CANNED COILS
This is a group of the latest Tunewell coils. Any number can be combined into one assembly and a single wave-change switch can be used

A SPECIAL ARTICLE BY W. JAMES

fixed condensers as shown. If a volume control is needed and the best results are desired at the expense of a further control, fit an adjustable .0005-microfarad tuning condenser in the aerial lead and use it as described above.

Earthed Ends Together

It is important to have the two earthed ends of the coils together. Let us see what would happen if we placed the aerial coil at the grid end of the grid coil, as in Fig. 9.

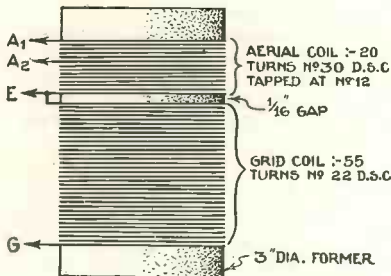


Fig. 8.—It is best to earth the adjacent ends of the aerial and grid windings

There would be a capacity coupling between the aerial and the grid. The selectivity would be affected, particularly at the lower wavelengths, signal strength would suffer, and the tuning would be affected as the aerial condenser was altered. It is bad practice and should never be used.

Always have the aerial coil at the earth end of the grid coil. When the aerial coil is tapped, the reaction coil should go at the earthed end, as shown in Fig. 10.

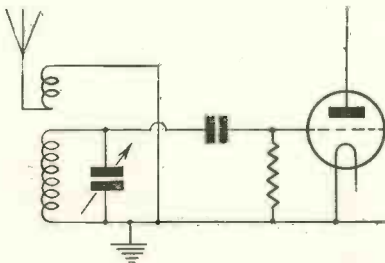


Fig. 9.—Placing the aerial coil at the grid end of the grid coil

When the reaction coil is in this position, the reaction circuit will have the minimum effect upon the tuning of the circuit as a whole, and the proper reaction effects will be obtained.

There is usually but little to choose

between connecting the reaction condenser between the plate of the detector and the reaction coil, and between the earth and one end of the coil.

If a metal panel is used, the moving vanes of the reaction condenser can be earthed, but when the panel is of ebonite or wood, there is little to choose between the two methods of connecting.

Notice the direction of the windings for the right results. When the grid coil and the reaction coil are wound in the same direction, the outside ends go to grid and plate respectively. The inner ends then go to earth, the reaction condenser being included in the circuit in the plate or earth side without affecting the results.

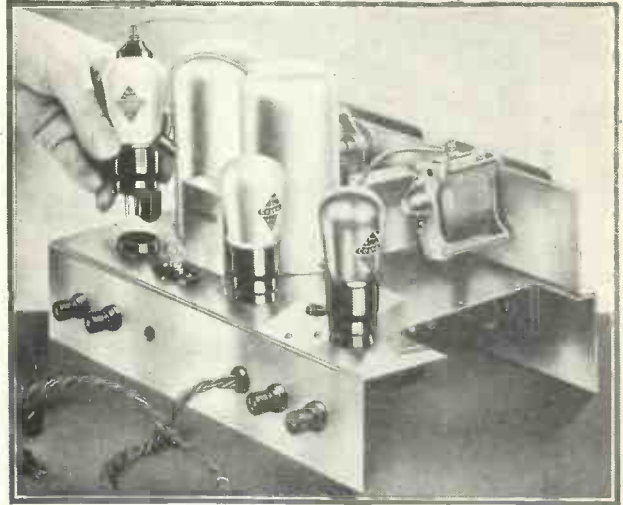
When we come to consider the long-wave coil, we find that the principles discussed for the medium-wave circuit apply in detail.

A separate aerial coil can be used or the grid coil can be tapped. A slotted former is often used, and the aerial section may have one-third or a half as many turns as the grid coil. But now a difficulty is nearly always met with.

If you tune over the lower end of the long-wave circuit, say from the minimum, which might be 900 metres, to 1,400 metres, the medium-wave local station may be heard. The medium-wave station is said to be "breaking through."

I have tried many coils in order to trace to what this trouble is due. Sometimes the aerial circuit itself, consisting of the aerial and the portion of the grid coil connected (or the separate aerial coil) tunes broadly over the medium wavelengths. This allows the strong local station to set up a signal in the aerial coil which reaches the grid by the stray capacities in the circuit.

The "goodness" of the coil



A MODERN KIT SET WITH CANNED COILS
One of the Cossor kits with canned coils. Most modern receivers have their tuning coils screened

affects the results. With a good coil, having tapings, it might so happen that the local station is tuned in quite strongly. With a bad coil it is more the general lack of selectivity that allows the local station to get through. If you definitely tune the aerial to a wavelength such as 1,000 metres, break-through vanishes.

But the reaction circuit will be

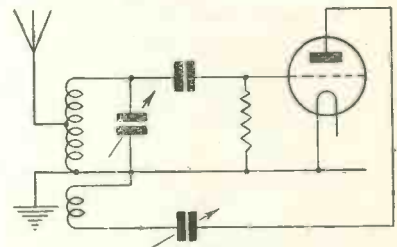


Fig. 10.—With a tapped coil, the reaction winding should be placed at the earthed end

found to behave strangely at about this point. This arrangement is really not satisfactory and it does not pay, therefore, to use a good coil and to tap it near the grid end.

Poor Selectivity

This avoids break-through, but the selectivity over the long-wave band is poor, as the coupling is too great. As soon as it is reduced, the wavelength of the aerial circuit is lowered and the medium-wave station is again admitted.

A separate aerial winding can be used and if there are sufficient turns, the break-through will disappear, but

MODERN TUNING-COIL PRACTICE—Continued



UNSCREENED DUAL-RANGE COIL
The Lotus unscreened dual-range coil is a typical example of modern practice

the aerial and grid coils must be well spaced.

It is possible to adjust a coil to suit a particular aerial and set of condi-

ffect the long-wave stations a little.

Thus the addition of a choke breaks the resonant circuit to medium wavelength, but tends to affect the selectivity and signal strength over the long wavelengths. If bad break-through is experienced, try first a pre-set condenser in the aerial lead to the coil. Then try a low value across the aerial tap to earth. This is often effective. See that the aerial wire does not lie near the grid lead to the valve or the tuning condenser, and be particularly careful when the medium-wavelength coil is fitted near the long-wavelength coil.

Much of the trouble is to be traced to the way in which the two coils are connected by the switch and it is advisable to fit the two coils at right angles.

If you switch over from one coil to the other as in Fig. 11, the results will be least affected by break-through provided the precaution is taken to adjust the aerial circuit.

switched in many ways. They may be placed in parallel with a simple switch, as in Fig. 12, for medium wavelengths, the switch being opened

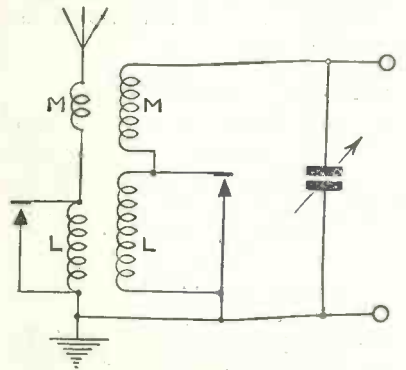


Fig. 13.—Short-circuiting long-wave portion of dual-range coil for medium-wave reception

for long wavelengths. Another method is to short-circuit the long-wave part when receiving over the medium-wave band, Fig. 13.

These last two methods are often used, but not when really good coils are fitted. The best practice is to change over completely as in Fig. 11, but then care must be taken to see that the coils are not coupled.

Tuning "Dead"

If, for example, the coils were close together and you were receiving over the medium wavelengths a point in the tuning might be found where the set seemed "dead."

This would be due to the wavelength being equal to the natural wavelength of the unused long-wave coil. If this coil is short-circuited, the natural wavelength will alter and the tuning of the medium-wave coil might not be affected. By placing the coils at right angles, however, the possible ill effects are greatly reduced.

When using good coils, therefore, mount them at right angles, as far apart as possible, and switch from one to the other.

Break-through will be the minimum, and if it cannot be avoided by altering the position of the aerial tapping, a resistance or small choke should be joined in the aerial circuit.

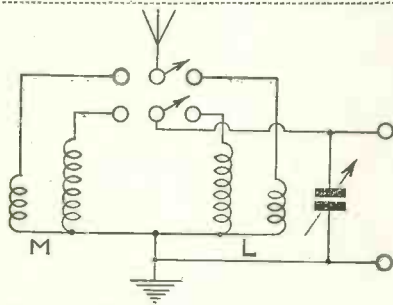


Fig. 11.—Method of switching a dual-range coil

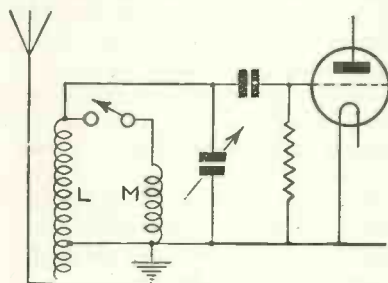


Fig. 12.—Series-parallel method of switching a dual-range coil

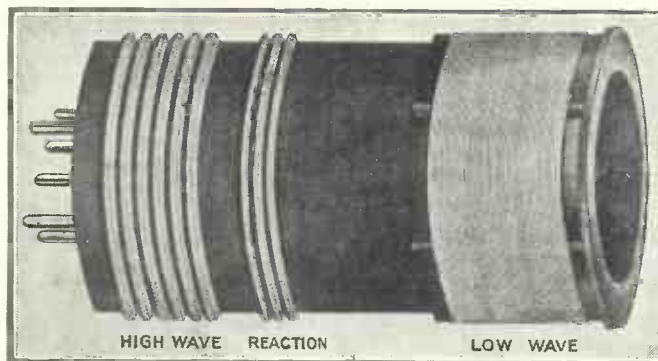
tions, but for general purposes there is a simpler method of attack. The thing to do is to destroy the resonance at any medium wavelength.

A resistance may be fitted in the aerial circuit. The exact value will, once again, depend upon the type of coil, its goodness, and the nature of the aerial.

The resistance may be joined in the aerial lead to the coil and an adjustable one of a few hundred ohms is best tried. A small choke having 200 turns of No. 36 or 38 enamelled wire on a bobbin about 1-in. diameter will have the desired effect. But any such addition to the circuit is bound to

When a choke or damping resistance is used in the long-wave circuit, it must be switched out of circuit when the medium-wave coil is being used or the results will be very poor.

Medium- and long-wave coils are



HOW THE WINDINGS ARE SOMETIMES ARRANGED
A simple form of solenoid winding arranged in three sections. Normally, the aerial portion is tapped off from the main winding

GRAMO-RADIO SECTION

A Special Section for Those Interested in Electrical Record Reproduction

Something New in Radiograms

SOMETHING quite new in radio-gramophone cabinets has recently been marketed by Micro Perophone & Chromogram, Ltd. The cabinet will appeal in particular to home-constructors for it will enable them to build up a complete radio gramophone in the space usually occupied by a transportable set.

The motor used requires no sub-baseboard space.

Round the metal plate is a semi-circular loud-speaker fret. The loud-speaker is mounted on a baffle-board midway between front and back of the cabinet. Any type of cone, inductor, or moving-coil loud-speaker can be fitted, provided the size is suitable, of course.

Set at Bottom

The set panel is in the usual position for an ordinary transportable cabinet, that is at the bottom, while in place of the loud-speaker fret there is a hinged metal plate on which is fitted a synchronous gramophone motor and a pick-up.



AS A RADIO SET

The Chromogram cabinet shut up and used for radio reception only



AS A RADIOGRAM

The front pulled down, making the gramophone equipment accessible

It is claimed that excellent results, free from all trace of box resonance, are obtained.

A baseboard, 17 in. by 10 in., is supplied with the cabinet, which will accommodate a front panel 11 in. wide and 5 in. high. The overall size of the cabinet is 19 in. wide, 20 in. high, and 10 in. deep. Complete with a Simpson syn-



FROM THE BACK

A back view of the Chromogram cabinet, showing the loud-speaker and radio set

chronous motor, Limit Reliance pick-up, and extra baseboard, the cabinet costs £7 7s. 6d.

Supplied As a Kit

Constructors can, if they wish, build up this novel cabinet in sections. A kit B is supplied, consisting of the cabinet without motor and pick-up, and a loud-speaker fret in place of the motor plate, for £3 10s. A unit C, comprising synchronous motor and pick-up for converting model B to the complete cabinet, can be obtained for £3 17s. 6d.

The constructor's model will accommodate any set not exceeding 8 in. high, 10 in. deep, and 17 in. wide.



DYNAMICALLY LEVEL PICK-UP
Part of the author's radio-gramophone equipment. The pick-up is of a special type and has been set dynamically level

THE importance of correct tracking of pick-ups has repeatedly been pointed out in the columns of "Wireless Magazine," and there can be but few who have not followed the good advice given.

Manufacturers have, almost without exception, responded by offsetting the pick-up head to the correct angle in relation to the length of the arm and have provided templates that ensure correct positioning on the motorboard.

Better Bearings

Tracking within a plus or minus error of 3 degrees is within everyone's reach. There is, perhaps, some room for improvement in respect of the arm for carrying the pick-up head, in that the bearings for these do not invariably attain the twin ideals of freedom from chatter with freedom of movement.

Of the two, freedom of movement both laterally and vertically is by far the more important. Any restriction of lateral movement will result in the needle bearing more on one wall of the groove than the other, and in the case of playing a record that is a "swinger" (that is, in which the hole is slightly out of centre with respect to the playing grooves) will considerably stress the slight pitch variation and uneven scratch factor.

Correcting Your Pick-up for Side Thrust

By CHARLES E. WOOD

It may here be pointed out that among the better makes of records a real "swinger" is rarely encountered and will always be replaced by the makers.

Under actual playing conditions, however, due

to the mechanical difficulties of setting the turntable so that it is absolutely true to the spindle, and to the clearance that must exist between the record centre hole and the spindle, a very slight "swing" effect is usually apparent.

Freedom of vertical movement is essential to allow for the slight irregularities of turntable just referred to and for the slight warp that may be present in the record itself. Careful storage of records will do much to keep warp at a minimum.

Given a good pick-up with negligible tracking errors and free bearings for both vertical and lateral movement, what further precautions must be taken to ensure that the unit is working under the best possible conditions?

The answer is that the dynamic level of the pick-up must be found. Under normal circumstances, if a spirit level were placed on the motorboard, it would show that it was approximately level. This is the normal, stationary, or static level.

If, with the record stationary, the needle of the pick-up were

Lateral "Pull"

placed in a groove, its tapering point would rest with equal pressure on either wall. This, then, is the condition which we desire to reproduce for the first few unmodulated grooves when the record is in motion.

It is a fair assumption, however, that in the majority of home-constructed radiograms (and not a few commercial ones) an appreciable amount of lateral "pull" is present. This may be verified by setting the turntable in motion and placing the needle on the smooth outer edge of a record.

If the bearings are free the pick-up will, in a majority of cases, run unaided into the first groove of the record. This may appear to be a very convenient effect, but it certainly is a very undesirable one, since it implies that the needle will press harder on the inner wall than on the outer.

Offset Pick-up Head

An examination of Figs. 1 and 2 will make clear the reason for this inward turning tendency. In order that good tracking may be obtained it is essential to "offset" the pick-up head as shown in Fig. 1.

With such an "offset" head it is equally important that the unit be fixed to the motorboard so that when over the centre of the turntable the needle slightly overlaps, as shown in Fig. 2. The amount of "overlap" varies with the length of arm and the amount of offset and is usually to be determined with the help of the maker's instructions or template.



Fig. 1.—Pick-up heads are "offset" to obtain good tracking

It is this overlap that produces the inward thrust and Fig. 3, by illustrating an exaggerated overlap, shows how the record tends to sweep the pick-up towards the centre.

Equal Pressure

But for this effect, or if the pick-up and turntable were set dynamically level, the needle would have remained where it was originally placed on the smooth outer rim, and when subsequently pushed into the first groove would have continued to run with an almost equal pressure on either wall.

The term "dynamically level," then, means that certain precautions have been taken to

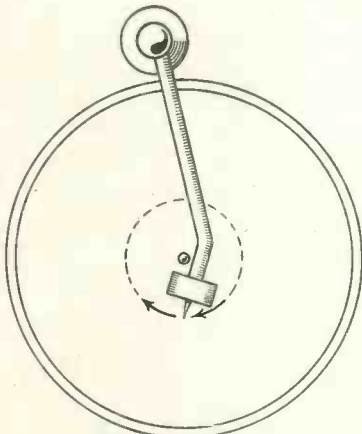


Fig. 3.—Exaggerated overlap showing how an inward thrust is produced

counteract the side thrust that occurs when the record is in motion and to thus virtually reproduce, as far as possible, the effect of equal distribution of pressure against the walls that obtains when the record is stationary.

A pick-up may be for test purposes very easily set dynamically level by packing up the whole unit so as to make the resultant slope of the record tend to throw the needle outwards.

Tilting the Cabinet

If the record is set in motion and the needle placed on the blank portion of the outer edge the whole cabinet may be tilted until a position is found where the needle will remain indefinitely in the position in which it is originally placed.

It should be noted that the side of the cabinet which should be raised is that which, when the needle is in the outer groove of the record, is most nearly at right angles to the arm.

In cabinets where the arm, when in the outer groove, lies at or nearly parallel to the one side of the cabinet, a relatively small amount of lift will be sufficient. If, however, the arm lies diagonally, then to achieve the same results a greater degree of tilt will be called for.

Experimental tilting in this manner will serve to show the angle finally required.

Obviously, the whole cabinet (unless the amount of tilt required is exceptionally small) cannot be permanently left propped up at an angle, but a packing strip of the desired thickness may be inserted between the motorboard and the bearer on which it rests. Alternatively, the bearers may be re-set to the equivalent angle at which the cabinet was propped.

From the foregoing it will be readily apparent that the stress which was earlier laid on the necessity for free bearings has a special importance if efforts are to be made to set the motorboard at its dynamic level.

Correction for this inward turning movement, which is associated with most offset pick-up arms, is sometimes effected by packing up one side of the pick-up arm and the same side of the motor, thus leaving the board level but putting a slight cant on both the vertical bearing of the pick-up and the turntable.

This is not such a desirable method as actually tilting the whole board, as it results in the needle

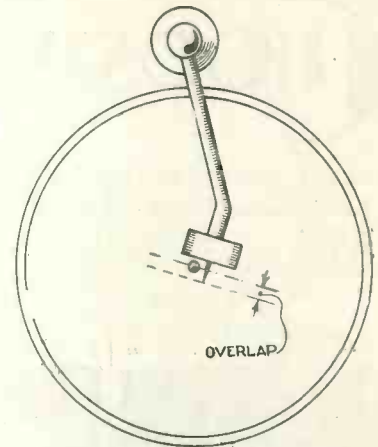


Fig. 2.—The needle should slightly overlap the turntable spindle when the pick-up is over the centre

and pick-up armature being either not dead vertical or else not dead at right angles to the record. Either of these conditions is undesirable, but if such a method is adopted the thickness of packing should not exceed $\frac{1}{8}$ in.

It may be pointed out that the design of tone arms in acoustical gramophones (of the better makes, at any rate) is such that the inward thrust is not so often encountered, nor is it inevitable with pick-ups. The purpose of these notes is to point out the existence in many cases of the defect, and the means for checking and remedying it.

Link in the Chain

No vast and striking improvement will result from setting the motorboard at its dynamic level, but it is a definite link in the chain of better results, and those who adopt it may rest assured that from the point of view of the actual mechanical process of playing the record they have taken a wise step.

"The Needle and the Record"

OWING to pressure on our space this month we are obliged to hold over the third of P. Wilson's articles in his "The Needle and the Record" series. It will appear in the November issue of "Wireless Magazine," to be published on Friday, October 21.

In this third article the author continues his analysis of what happens when a needle is tracking a record groove; his conclusions are of

importance to all grammo-radio fans. In this issue P. Wilson contributes a special article on automatic volume control. This shows that he is not only an authority on grammo-radio matters—he is also a skilled radio designer. Quite recently he was invited to join the Set Approval Committee of the Central Council for School Broadcasting, a job for which he is very well qualified.

CHOOSING YOUR RECORDS

GRAND OPERA AND CLASSICAL ARIAS

★(a) Creed (A. Archangelsky), (b) Credo (from "Liturgia Domestica") (A. Gretchaninoff), Theodore Chaliapine, bass, 4s. H.M.V. DV1701
H.M.V. gave me a copy of this in advance. Do you want the



THEODORE CHALIAPINE

finest Chaliapine record in existence? If you do, buy this and you have it. Fine!

(a) Wie Sich Die Bilder Gleichen (Puccini), (b) O Lola, Rosengleich Bluhn Diene Wangen (Mascagni), Richard Crooks, 4s. H.M.V. E601
A fine voice! If you like tenors with some "guts" about



RICHARD CROOKS

them—pardon the term—get this and you will have all you need.

PIANO SOLO

★(a) Mazurka in A Flat Major, Op. 59, No. 2 (Chopin), (b) Mazurka in D Major, Op. 33, No. 2 (Chopin), Ignace Jan Paderewski, 4s. H.M.V. DA1245
Characteristic of Paderewski and also a sound interpretation of Chopin, this should be added to the library of all Chopin-lovers. There is some authority about the rendering.

LIGHT ORCHESTRAL MUSIC

Fantasia on Sea Chanties (d.s.), London Symphony Orch., 4s. H.M.V. C2452

Here are reviews of the latest releases by WHITAKER-WILSON, the "W.M." Music Critic. Outstanding records are indicated by an asterisk (*) against the title

Reminds you of the last Prom. of the season. It is a good show throughout. Well worth buying.



IGNACE PADEREWSKI
(see first column)

La Boheme (Puccini) (d.s.), Albert Sandler and his Orch., 2s. 6d. COL DB876
This should be popular. It is thoroughly characteristic of



ALBERT SANDLER

Sandler and his orchestra—so popular on the wireless.

Stealing Thro' the Classics (d.s.), Debroy Somers Band, 4s. H.M.V. DX366

The title should be enough. Personally I abominate stealing through classics. It is like steal-



DEBROY SOMERS

ing the composers' good names. Sorry, but I refuse to recommend a medley of this kind.

SPOKEN RECORDS

How to Make an Omelette (d.s.), X. M. Boulestin, 1s. 6d. ZONO 6174

Have you ever made an omelette? No. Nor have I. Try this; then you will know how. Whether you will eat it afterwards is another matter.

Splitting Up (d.s.), Flanagan and Allen, 2s. 6d. COL DB895

Not too impressed. It is original, but that is about all. You may think differently, but that is my impression.

LIGHT INSTRUMENTAL SOLOS

(a) At Dawning, (b) Down in the Forest, Howard Jacobs, 2s. 6d. COL DB886

Quite effective. I thought I should hate it when I read the label, but I must confess to hearing it with pleasure. I imagine it will be a good seller.

★(a) Forest Idyll, (b) Hermit, Marek Weber and his Orch., 4s. H.M.V. C2451

I like the Forest Idyll im-



MAREK WEBER

mensely. The bird-calls really improve it. The Hermit is also good. An outstanding record, not only for its matter, but as a piece of recording.

★(a) Les Millions D'Arlequin-Serenade (Drigo), (b) Serenade (Drdla), Mischa Elman, 4s. H.M.V. DA1214

Mischa Elman's violin playing always appeals to me—rarely more, I think, than here. It is a very good record, good for pleasurable listening and for work; I mean that violin students could make good use of it.

LIGHT SONGS AND BALLADS

(a) Big Ben Calling, (b) Ghost of an Old King's Jester, Mr.

Flotsam and Mr. Jetsam, 2s. 6d. COL DB888

Flotsam and Jetsam at their best. What more? Don't argue—buy it!

★(a) High Barbaree, (b) Twankydllo and Ching-a-Ling, Stuart Robertson, 2s. 6d. H.M.V. B4240

Stuart Robertson's diction is a feature of both sides of this pleasant record. The other point is the splendid rhythm of the male quartet. I sincerely recommend the disc.

Noel Coward Medley (d.s.), Noel Coward, 4s. H.M.V. C2450

If you like Noel Coward's voice and music this is well worth having. I like neither, but don't go by me; I am not very well educated!

MILITARY BAND RECORD

(a) Soldiers in the Park, (b) Soldiers of the King, B.B.C. Wireless Military Band, 2s. 6d. COL DB878

Another good record which reminds you of the B.B.C. Military Band broadcasts. A fine piece of recording, too.

HUMOROUS RECORD

Round Scotland with Will Fyffe (d.s.), Will Fyffe, 4s. H.M.V. DX369

Will Fyffe is a real Scot and a real comedian. Here you get him singing and talking at his best. It should be a seller.

Additional Records Reviewed by CHOPSTICK

LIGHT ORCHESTRAL MUSIC

★Accordeon Nights Medley, Geraldo and his Accordeon Band, 2s. 6d. COL DB891

Of course, we all like Geraldo records. This is the third of this medley series and includes such old-time favourites—if I may use the word—as *Can't We Talk It Over*, *Smuggled on Your Shoulder*, and *Snap Your Fingers*. You cannot dance to this record, but it is thoroughly enjoyable for listening. The double bass is well recorded.

LIGHT SONGS

(a) Echo of a Song, (b) My Mom, Louis Spiro, 1s. 6d. ZONO 6170

Louis Spiro is billed as the "confidential singer." He sings with crooning expression two very popular songs, both with (Continued on page 380)

THREE FAMOUS "RADIOGRAMS" BY "HIS MASTER'S VOICE"

Now—on the threshold of the 'home season' just when thoughts are turned naturally to lengthening evenings and the revived joys of radio and gramophone—the prices of the three most popular "His Master's Voice" instruments are down! Two things have alone made possible such price reductions at such a time: the unprecedented flow of orders at Olympia, and extensive rationalisation at the great Hayes factories of "His Master's Voice"—already renowned for their scientific organisation.



Only 25 guineas now for a table radio-gramophone with the performance of a full-sized cabinet model—with all that amazing 'true to life' quality and satisfying reliability for which "His Master's Voice" instruments are famous everywhere—with simplicity of operation involving the use of but one switch for gramophone, long and medium wave wireless.

NOW COST YOU LESS!

And again—Model 521—the most popular 'radiogram' ever produced—popular because it is so easy to operate, so reliable, and so wonderfully life-like in reproduction. Now 39 guineas.

The Automatic Record-changing Model 522, identical with 521, except that it plays eight records without attention, is more compact than any other record-changing radiogram in existence. Now 46 guineas.

HEAR THESE INSTRUMENTS AT ANY "HIS MASTER'S VOICE" DEALER

"HIS MASTER'S VOICE"



"True to Life"

The Gramophone Co., Ltd., London, W.1.

Better service results from mentioning "Wireless Magazine" when writing to advertisers



TRACK RADIO TROUBLES EASILY

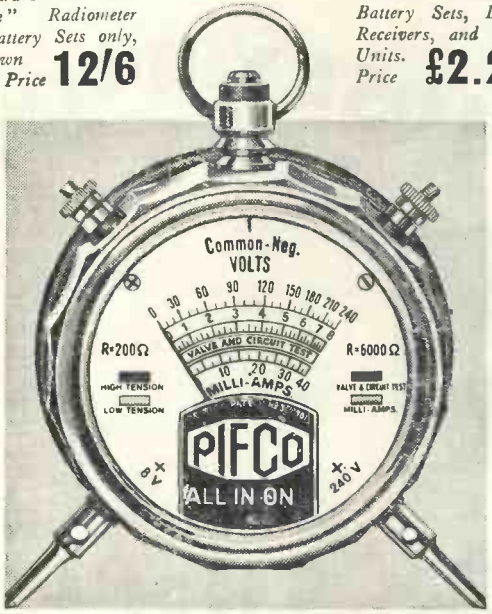
Put an "All-in-One" Radiometer on the trail and the hunt is quickly over. In an amazingly short time this instrument will track down the trouble.

There is no other instrument in the world like the "All-in-One" Radiometer. It works with an accuracy that must be seen to be fully appreciated. Every single component of any radio set can be tested swiftly and surely. Ask to see it at your Radio Dealer's or Electrician's.

If in any difficulty, write direct to: PIFCO LTD., HIGH STREET, MANCHESTER

Standard Model "All-in-One" Radiometer for Battery Sets only, as shown here. Price 12/6

De Luxe Model, for Battery Sets, Electric Receivers, and Mains Units. Price £2.2.0

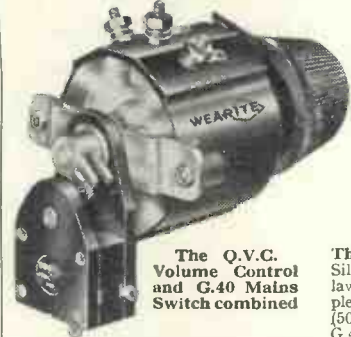


PIFCO ALL IN ONE RADIOMETER

There is news in the "Wireless Magazine" advertisements

YOU WILL NEED THESE

WEARITE COMPONENTS for THE "PROSPERITY 3"



SCREENED H.F. CHOKE (H.F.P.)
Entirely enclosed in an aluminium "pot," which is provided with an earthing point, interaction between it and neighbouring components is eliminated. Suitable for all wavelengths from 15 to 2,500 metres. Price 3/6
The Wearite Choke (type H.F.O.) Price 6/6

The Q.V.C. Volume Control and G.40 Mains Switch combined

The Q.V.C. VOLUME CONTROL Silent in use—approximately square law—space-wound element (completely enclosed). Price complete (50,000 ohms), with type G.40 Mains Switch ... 6/6
100,000-ohms Volume Control with G.40 Mains Switch. Price 7/6

Above is illustrated the combined Q.V.C. Volume Control and G.40 Mains Switch. In the component is seen an example of how Wearite components are adapted to the every need of the constructor—whether a standard part or a specialised design—Wearite can supply it. 7/6

AND FOR THE "PERCY HARRIS" RADIOGRAM

One WEARITE Screened H.F. CHOKE (H.F.P.) as described above. Price 3/6

One VARIABLE RESISTANCE (Q.22), .25 meg. A silent, robustly constructed component. Price 4/-

One WEARITE 4-WAY SWITCH (1.24) Complete with window knob dial. Price 5/-

(Also made in 1, 2, 3, 5, and 6 way.)



The H.F.P. CHOKE



THE WEARITE STICK-ON SELECTIVITY CONTROL AND AERIAL LEAD-IN fits any window—no holes—no tools. For use with any receiver.

HAVE YOU RECEIVED YOUR COPY OF THE NEW WEARITE ILLUSTRATED BOOKLET? If not, write now before you start that new set.

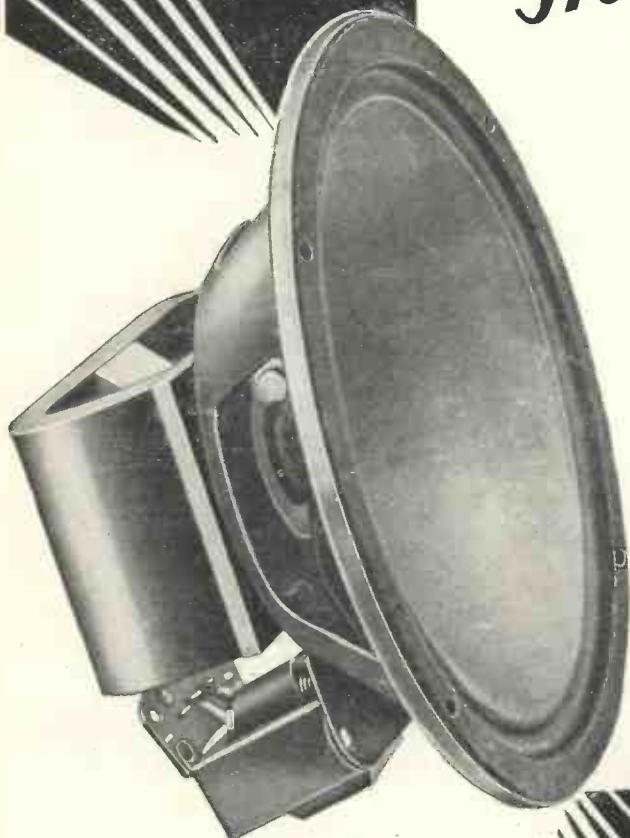
PRICE 1/- COMPLETE With aerial anchoring block 1/6

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The Quality of Tone will amaze you!

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as specified for "The Calibrator"!



The radio enthusiast who sets out to secure really realistic reproduction must inevitably arrive at this New Ormond Loudspeaker. Its response to a wide range of frequencies is unsurpassed by any loudspeaker at any price There is a full, rich bass minus the slightest hint of "boom" and a sparkling treble without the slightest suggestion of over-emphasis. Yet—almost as amazing as this satisfactory completeness of tone-colour is its price—

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Robustly constructed and fitted with large cobalt Permanent Magnet to ensure long life and reliability; complete with Input Transformer. Overall size: 8" diameter, 4 $\frac{1}{4}$ " depth.



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FOR PUNCH POWER & PURITY !!

CHOOSING YOUR RECORDS—Continued from page 376



Flotsam and Jetsam, two popular entertainers with very fine voices. Their latest record is reviewed by Whitaker-Wilson on page 376

piano accompaniment. The piano is excellently recorded, but is far too prominent in (a). Anyway, this is a useful record for those who like croony interludes at dances.

★(a) *Hummin' to Myself*, (b) *If You Were Only Mine*, Sam Browne, 1s. 6d.

ZONO 6172

A fine piano with saxophone obligato is the accompaniment to these two present-day favourites sung here by Ambrose's Mayfair Hotel vocalist. Sam Browne's easy style makes these records excellent light entertainment. We usually have one every month.

NOVELTY RECORDS

★*Hilly Billy Songs Medley*, Carson Robison and his Pioneers, 4s. COL DX365

Very fascinating and amusing! Fascinating because hilly-billy songs are songs of the American backwoods, which have only recently become popular over here. You will enjoy *Why Did I Get Married* and *Bury Me Not on a Lone Prairie*, which are the two best numbers in the medley. Instructive because Carson will

teach you how to speak true American. The banjoist in his small band is a wonder.

★*That Goes on for Days and Days*, The Hottentots, 1s. 6d. ZONO 6169

A rollicking quick-step played by a band composed of rather unusual instrumentalists, together with a full chorus. The band, I believe, has the usual dance-orchestra combination, with accordions, mouth organ, and a strange instrument which resembles a street organ. I strongly recommend this record, because it appears to be an ambitious effort to produce something different. I think it a notable success.

DANCE MUSIC

★(a) *A Great Big Bunch of You* (f.), (b) *Marta* (slow f.), Syd Lipton and his Grosvenor House Band, 1s. 6d. ZONO 6181

The Grosvenor House Band is a newcomer to Zonophone lists. They have a light melodic style, can play at the right time, and have a splendid pair of vocalists. Both of these tunes are well done and I congratulate them on their first effort.

(a) *Bahama Mama* (f.), (b) *Cabin in the Cotton* (slow f.), Teddy Mack and his Boys, 1s. 6d. ZONO 6180

Another new band on Zonophone. (a) is a rumba fox-trot, at the right time. The pianist is the leading personality in the band and his excellent playing can be heard throughout. (b) is too fast for a slow fox-trot. I wonder when bands will learn to play a slow fox-trot slowly? Halfway is awkward!

★(a) *Downhearted* (f.), George Olsen and his Music, (b) *Fools in Love* (f.), Lew Conrad and his Musketeers, 2s. 6d. H.M.V. B6214

(a) is an up-to-the-minute number which has a catchy melody. George Olsen's quiet arrangement is one of the best I have heard and is excellent for dancing to. (b) is also a good tune, which is outstanding because it gives wide scope for the pianist to "do his stuff." Here the pianist takes advantage, with the result that we have an outstanding disc.

(a) *Help Yourself to Happiness* (f.), (b) *My Extraordinary Gal* (slow f.), Henry Hall and the New B.C. Dance Orch., 2s. 6d. COL CB478

What can one say about Henry Hall's records? He has broadcast quite a deal lately and probably I am a little tired of hearing him. Anyway there are

no outstanding qualities in these recordings. To say that they are typical of his broadcasts is the best I can do.

★(a) *Let That be a Lesson to You* (f.), (b) *I Don't Blame You* (f.), Savoy Hotel Orpheans, 2s. 6d.

COL CB479

A record which should be in the album of every dancer and lover of pleasant light music. Tunes are snappy, and arrangement and time are excellent. Here is a rare record, where the vocal refrain is worth listening to. It is sung by Chick Endor and Charlie Farrell—they need no introduction. A bold statement, but this is the best dance record of the month.

(a) *The "Oi" Song* (f.), (b) *The Clouds Will Soon Roll By* (f.), Blue Lyres, 1s. 6d. ZONO 162

Splendid! (a) is a lively number, with plenty of "pep," at the correct time for quick-stepping. (b) is slow and does not impress me greatly. The arrangement is too heavy. An asterisk for (a) but not for (b).

(a) *Why be so Unkind to Me* (w.), (b) *Where Are You?* (f.), Ray Noble and his New Mayfair Dance Orch., 2s. 6d. H.M.V. B6220

Rather a disappointing record. Melody has been sacrificed to noise. If you like Ray's records, make a point of hearing it. Time is suitable for dancing.

ABBREVIATIONS USED IN THESE PAGES

bar ..	baritone	H.M.V. HIS MASTER'S VOICE
COL ..	COLUMBIA	orch. .. orchestra
com. ..	comedian	sop. .. soprano
con. ..	contralto	ten. .. tenor
d.s. ..	double-sided	w. .. waltz
f. ..	fox-trot	ZONO .. ZONOPHONE

(a) and (b) indicate the titles of each side of a record.

Gramo-Radio Notes and News

WHEN visiting the Radio Exhibition at Olympia, Mrs. Mollison (Amy Johnson) chose a C.A.C. radio gramophone, which she took away with her. It is understood that she intended to present it to her husband on his return from America. The instrument she chose was an assembled model of the C.A.C. radio-gramophone kit for constructors.

Tone control is very useful in radio gramophones, as it enables

the quality of reproduction to be varied to suit any particular type of record. Varley's have produced a new tone-control transformer (one is used in the New-style Battery Radiogram described on page 346 this issue) and are distributing a booklet entitled "Book of the Rectatone." This is priced at 6d., but a copy can be obtained free by using the coupon that appears on page 291.

A top-of-motorboard turntable

assembly, with or without pick-up, is being marketed by Univolt Electric, Ltd., of 119/125 Finsbury Pavement, London, E.C.1. The unit consists of a D.C. or A.C. motor, mounted in a strong framework and provided with a pick-up and volume control. Two models are made, a Standard unit and a Junior unit, the prices being £5 15s. 6d. and £3 13s. 6d. respectively. In both cases an equivalent universal model (for D.C.) is available for 15s. extra.

1933's GREATEST RADIO ADVANCE

The "ATLAS TWO" starts new era of TONE-TRUE RADIO



THE "ATLAS TWO" now brings a completely new thrill to musician and listener alike. Catching the very personality of the artist, with every subtlety of tone and overtone unblurred and delicate, and with a brilliance and sparkle that seems to put you in the front row at every entertainment.

Your choice of the worth-while British and Continental programmes is tuned by a single knob. Nothing could be simpler. Months of research perfected the amazingly efficient circuit, in which every component, the valves and moving-coil speaker are all matched with meticulous precision.

Ask your dealer now for a demonstration and insist on hearing the "ATLAS TWO." Make your own comparison with the next best and the low prices will amaze you. Fill in the coupon below and post it to-day for full details and specification.

"Atlas" Moving-coil Loud Speaker . . . Single knob tuning. Sockets for Pick-up and extra Speaker.

For A.C. and D.C. Mains, and Batteries.

Guaranteed 12 months.

A.C. & D.C. MODELS
10 CASH
OR 50% DOWN
 GNS.
 BATTERY MODEL
6/10 CASH
OR 40% DOWN
 (Less Batteries)

POST NOW!

Messrs. H. CLARKE & CO. (M/CR), LTD.,
 George Street, Patricroft, Manchester.

Please send full details of the new "ATLAS TWO" Receivers.

Name

Address

88/10

CLARKE'S
"ATLAS TWO"

H. CLARKE & CO. (M/CR), LTD., PATRICROFT, MANCHESTER.
 SOUTHERN OFFICES : BUSH HOUSE, LONDON, W.C.2.

Speedy replies result from mentioning "Wireless Magazine"

TRIPLE SPRING

GRAMOPHONE MOTORS

Chosen by the designer of the "Calibrator" for their absolute dependability; their long, silent running; and because they are super quality triple spring motors offered at a specially attractive price.

These motors, originally intended for use in gramophones selling at £25 and upwards, were made by the famous Garrard Company for one of the largest English gramophone factories, which has since closed down.

Offered to readers of "Wireless Magazine" at a bargain price—this is your opportunity to secure a first-class motor for your "Calibrator," or for your existing gramophone.

BRAND NEW



as SPECIFIED for the "CALIBRATOR" RADIO-GRAM

OFFERED AT

LIST PRICE
£4 : 1 : 3

A Limited Number in Gift, 5/- Extra.



PLAYS 3-12" or 4-10" RECORDS AT ONE WINDING



These motors embody three distinct spring drive units, and are three times as powerful and long-running as a single spring motor. Complete with motor plate, speed regulator, safety friction clutch, 12 in. turntable, winding handle and automatic brake. All bright parts nickel-plated, and every part absolutely silent in operation.

CABARET ELECTRIC CO.

170 Vauxhall Bridge Road, London, S.W.1
and 238 High St., Lewisham, London, S.E.13

Postal Orders and Money Orders should be crossed, and Treasury Notes sent by Registered post.

Manufactured by the World-famous
GARRARD Eng. & Mfg. Co., Ltd.

THEY COMPLETELY CAPTURED "Radiolympia"



"Mansfield Senior"

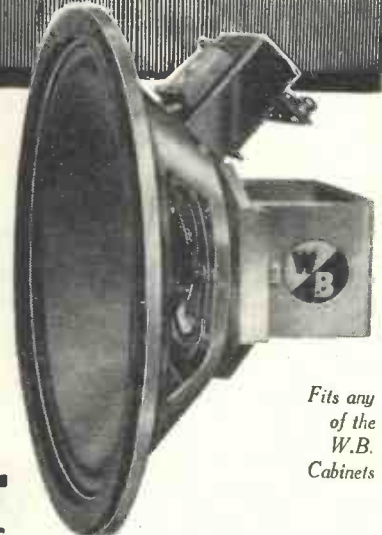
The new



"MANSFIELD"

PERMANENT MAGNET Moving-Coil Speakers

Write NOW for the art booklet, "Speaking of Speakers," giving full information on all the new W.B. moving-coil speakers. They caused intense interest at Olympia. W.B. are and always have been Pioneers and Leaders in this field. Makers also of the famous valve holders, switches, and the new Mansfield Kit—the only kit with a moving-coil speaker—ask for all the latest lists.



Fits any of the W.B. Cabinets

"Mansfield Junior" (P.M.5.)

(The Improved P.M.4.)
42/- COMPLETE with 3-ratio transformer

27/6 COMPLETE with 3-ratio transformer

Whiteley Electrical Radio Co., Ltd., Nottingham Road, Mansfield, Notts.

Irish Free State Distributors: Kelly & Shiel, Ltd., 47, Fleet Street, Dublin.

TO YOU

THE COST OF A BETTER SET— MAY ONLY BE THE PRICE OF A FERRANTI TRANSFORMER

It is easy to spend many pounds on a set giving poorer quality of reproduction than you would get from your own by simply installing a Ferranti Transformer.

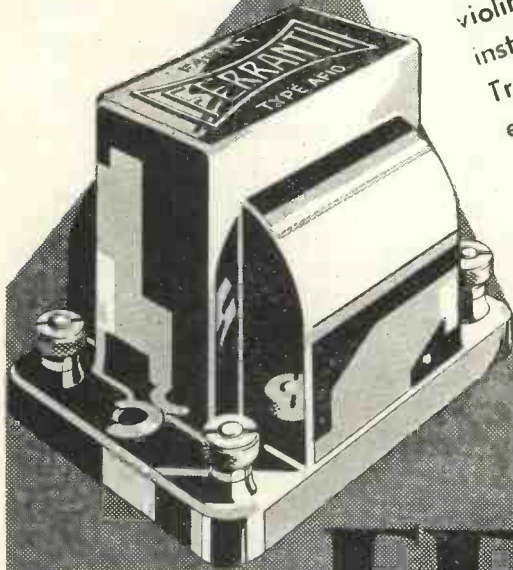
Listen IN—critically to your present set. Are the bass notes really there? Do the high notes of the violin really sound like a violin or like a flute? The installation of a Ferranti Transformer is the most economical way of effecting an improvement that will delight you

Ferranti Ltd., of Hollinwood, Lancashire, have been making transformers since 1882 and every engineer knows that no better transformers are obtainable the world over.



A.F. TRANSFORMERS

A.F.3 Ratio	1/3.5	25'
A.F.4 ..	1/3.5	17'6
A.F.5 ..	1/3.5	30'
A.F.6 ..	1/7	30'
A.F.7 ..	1/1.75	30'



A.F. TRANSFORMERS		
A.F.8 Ratio	1/3.5	11'6
A.F.10 ..	1/3	6'6

Every Ferranti Transformer is guaranteed to give a performance within 5% of the published curve, AND within 5% of every other Ferranti Transformer of the same type. Ferranti are the only transformers so guaranteed.

FERRANTI TRANSFORMERS

FERRANTI LTD., Head Office & Works, Hollinwood, LANCASHIRE
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When replying to advertisements, please mention "Wireless Magazine"

NEWS of the SHORT WAVES

IT is rather strange that radio, and particularly short-wave radio, has made itself considerably more prominent in some quarters of the world than it has in others.

In some countries this is no doubt due to the fact that the government authorities do not, even to-day, take a very kind view of radio as far as the man-in-the-street is concerned, and consequently the would-be experimenter has to get past much red tape before he can begin work.

Official Opinion

This type of official opinion on the matter is, however, gradually decreasing and greater fields are being opened up, with brighter business prospects also. On the other hand, there possibly exists a population in some countries which shows very little interest in radio matters at all.

Possibly a mixture of these conditions accounts for the fact that short-wave broadcasting stations are by no means distributed all over the world, but are to be found in groups in certain countries where they are either run as a public service or as an advertising medium.

Short-wave stations are different from ordinary broadcasting stations in that they are not intended in the first place for local reception and thus, as a rule, it is not a simple matter to run these stations by licence money obtained from local listeners, who will, in all probability, obtain no service at all from the station.

First in Europe

The Americans probably started the first short-wave service for overseas reception. About the first regular station in Europe to open up the short waves for a broadcasting service was the old PCJJ station in Holland. The lists of stations have grown somewhat since those days and now we find groups of short-wave stations all over the world.

There are many stations on the east coast and immediate middle east of America. On the west coast are a number of stations which rarely, if ever, find their way over here. Amongst these are a number of commercial telephone stations at

Many people who buy this issue of "W.M." will be reading a radio paper for the first time. These notes by MANDER BARNETT will give them some idea of the tremendous possibilities of short-wave transmission and reception

Bolinas, California, with calls such as KKZ, KEW, KEV, KEL, and KEZ, which are mainly used for communication with countries to the west of the States.

Then there are a number of transmitters in Central and South America which do service for both broadcasting and telephonic communications.

* * *

In the Old World and the East interest in short-wave matters does not perhaps run quite so high, but there is no doubt whatever that this interest is increasing all the time, as the general usefulness of short-wave radio becomes more apparent.

Java, in the Dutch East Indies, has always been famous for its short-wave stations, and although part of the service has now been suspended, owing, I believe, to economic reasons, a very useful service is still maintained, particularly the telephonic service with Amsterdam.

We hear very little of short-wave broadcasting from Africa apart from the 7LO station in Nairobi and the Rabat station in Morocco. Short waves are, however, used considerably in this continent for communication purposes.

* * *

Well, we never heard anything more about that short-wave running commentary on the war in Manchuria which an American commentator was supposed to be making some months ago. I don't know if this idea ever came to fact or if the war ended before the aforesaid commentator arrived there.

The Americans make a great feature of radio personalities and possibly the affair would only be successful if this particular gentleman or some other equally famous personality were there to do the job.

There doesn't appear to be a war handy anywhere at the moment, and therefore, however great the demand for this class of broadcast material, listeners will just have to wait until another war can be fixed!

Talking of wars reminds us that if and when there is another European war the authorities will have a horrid time trying to confiscate radio receivers. It apparently could not be done at all, owing to the terrific growth of radio receivers which has enveloped us since the last war when the authorities confiscated everything which made a pretence of being called a wireless set.

Secrets Impossible

In fact, the tremendous number of short-wave receivers in use by both professionals and amateurs would, in all probability, prevent any country making use of wireless for the purpose of secret messages. Codes can practically always be de-coded, and the multitudes of short-wave listeners of most countries would be ready to pick up any messages. Apart from this point, the use of any higher wavelengths would also be quite out of the question in view of present-day circumstances.

* * *

Seven-metre Work

I wonder if many readers have succeeded in picking up the 7-metre transmissions from Broadcasting House? If and when the time arrives when the B.B.C. will have drawn some favourable conclusions from these experiments, it is to be hoped that they will open up a number of other transmitters in other parts of the country for ultra short-wave work as, of course, those listeners not living in the vicinity of London are not able to pick up any of the present transmissions.

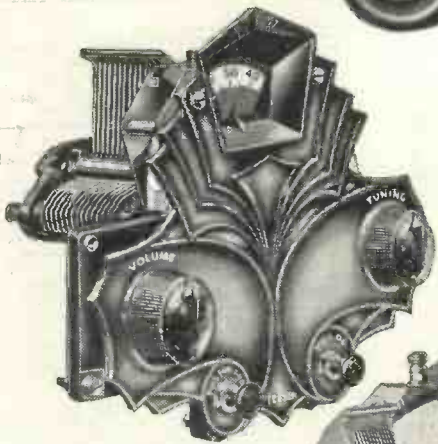
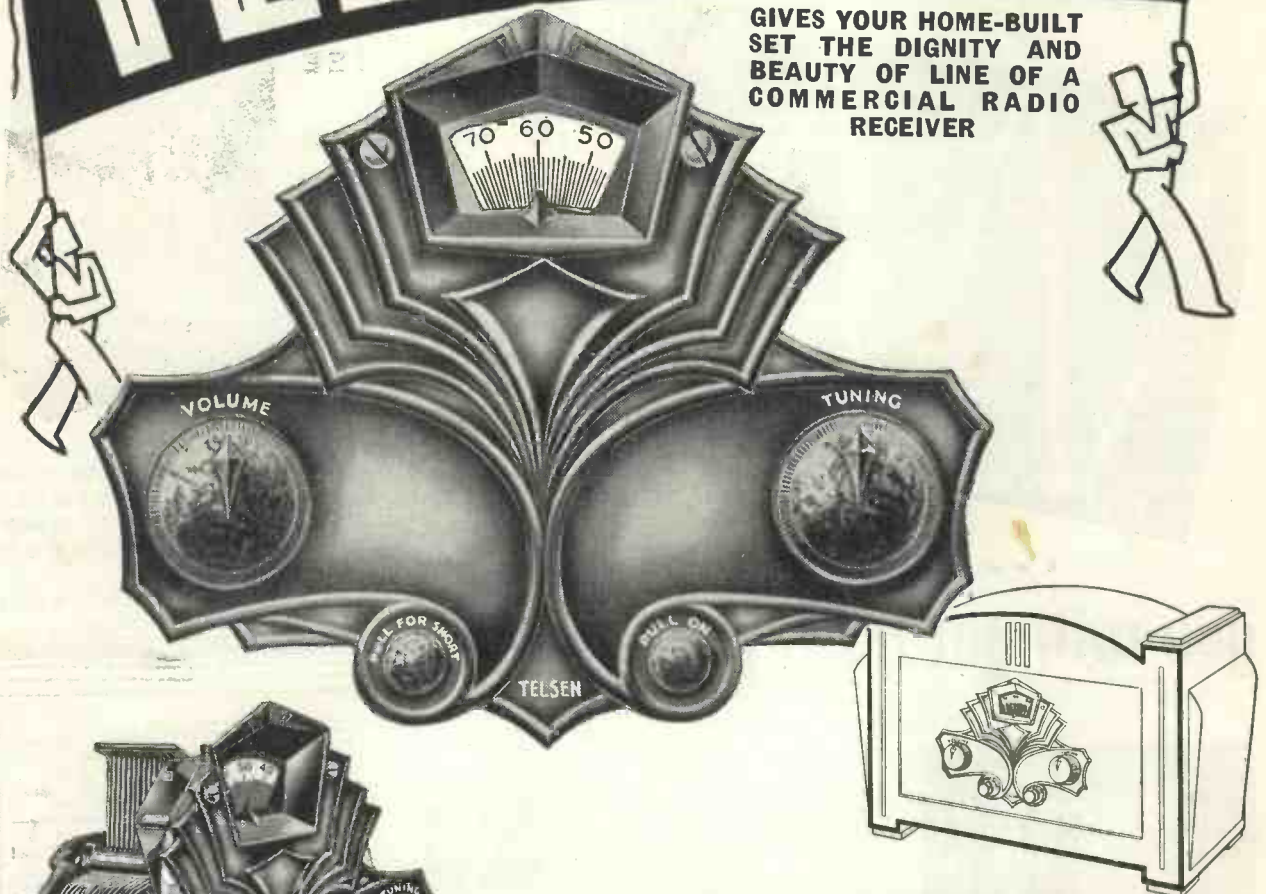
When the ultra short-wave art is further advanced and a greater interest is taken, we shall, no doubt, find that ultra-short-wave receivers will begin to differ considerably from the type of apparatus we have used in the past.

(Continued on page 388)

TELSEN

TELORNOR

GIVES YOUR HOME-BUILT SET THE DIGNITY AND BEAUTY OF LINE OF A COMMERCIAL RADIO RECEIVER



Three-quarter front view of the "Telornor"



Back view of the "Telornor" showing how the components can be mounted.

GIVE your home-built set the dignity of an expensive commercial radio receiver with the new Telsel "TELORNOR." It makes better sets easy to build! The handsome silver oxidized escutcheon plate, embodying an illuminated variable ratio slow-motion Disc Drive, adds immensely to the "good looks" of your set and permits, with the minimum of trouble, a very effective grouping of your Volume, Tuning, Push-Pull and On-Off controls. Ask your dealer to show you a "TELORNOR." It will make your set a set to be proud of—in appearance as well as in performance.

No. W. 206

7'6

TELSEN

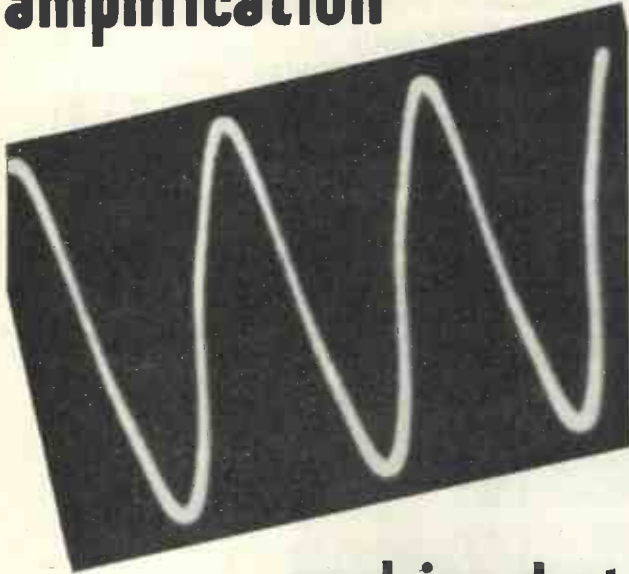
RADIO COMPONENTS

Get your copy of the new TELSEN RADIOMAG, Issue N° 3

ANNOUNCEMENT OF THE TELSEN ELECTRIC CO., LTD., ASTON, BIRMINGHAM

Mention of "Wireless Magazine" will ensure prompt attention

THIS is what we mean by distortionless amplification



... and is what you will get from the..



The above shows a magnified view of an oscillogram curve as given when a 50 cycle current is amplified by a Benjamin Transfeeda.

It is this exceptional purity of amplification which is winning for the Transfeeda such a wide spread and enthusiastic reception by Designers and Constructors alike.

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BENJAMIN TRANSFEEDA

THE BENJAMIN ELECTRIC LTD., Tariff Rd., TOTTENHAM, N.17

THE BAKER



was the Sensation of Radiolympia!

You must HEAR & SEE this wonderful 'PERMAG' Moving Coil Speaker

Fitted with the NEW TONE CONTROL UNIT which enables you to obtain the most amazing realism of reproduction with just the very tone that will delight your own particular taste. It was RADIOLYMPIA'S FINEST SPEAKER: Price

Complete with beautiful Cabinet, Transformer and TONE CONTROL ... **49/6**



WRITE TO-DAY FOR NEW BOOKLETS

BAKER'S
Selhurst
RADIO

ASK YOUR DEALER TO DEMONSTRATE IT

OFFICES: 89 SELHURST ROAD, S. NORWOOD, S.E.25
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FLUXITE
INDISPENSABLE
TO EVERY
RADIO
ENTHUSIAST
IT SIMPLIFIES
ALL SOLDERING

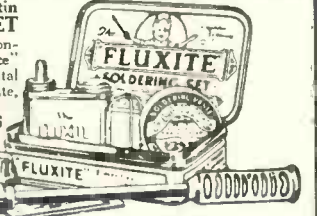
"We're Fluxite and Solder, The reliable pair, Famous for Soldering—Known everywhere!"

Now here is a statement—Bound to come true, If you'll invite US To come and help You!"

See that Fluxite and solder are always by you—in the house, garage, workshop—anywhere where simple, speedy, soldering is needed. They cost so little, but will make scores of everyday articles last years longer! For Pots, Pans, Silver, and Brassware; RADIO; odd jobs in the garage—there's always something useful for Fluxite and Solder to do.

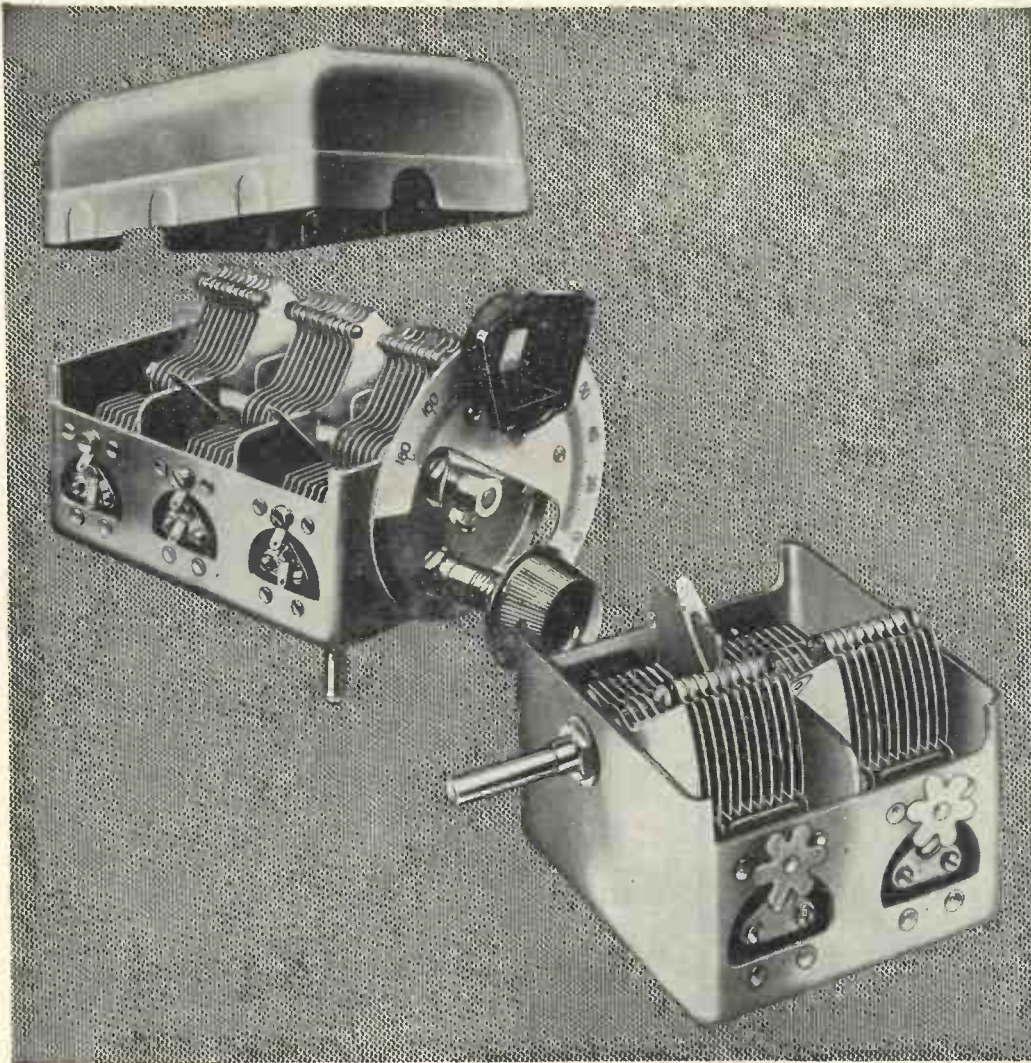
ANOTHER USE FOR FLUXITE
Hardening Tools and Case Hardening. Ask for Leaflet on improved method.

All Hardware and Ironmongery Stores sell Fluxite in tins, 8d., 1/4 and 2/8.
NEW "JUNIOR" SIZE, 4d. per tin
FLUXITE SOLDERING SET
Simple to use and lasts for years in constant use. Contains special "small-space" soldering iron with non-heating metal handle; pocket blow-lamp, Fluxite Solder, etc.; and full instructions.
COMPLETE, 7/6 or LAMP only 2/6



FLUXITE LTD.,
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ALL MECHANICS WILL HAVE
FLUXITE
IT SIMPLIFIES ALL SOLDERING

**NUGANG.****Semi-screened—**

2-Gang ...	14/-
3-Gang ...	21/-
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Fully-screened—

2-Gang ...	16/-
3-Gang ...	23/6
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NUGANG Type "A."
Complete with Disc Drive.**Semi-screened—**

2-Gang ...	16/6
3-Gang ...	24/6
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Fully-screened—

2-Gang ...	18/6
3-Gang ...	27/-
4-Gang ...	34/6

Capacity without trimmers—

Minimum ...	20 m.m.f.
Maximum ...	520 m.m.f.

Capacity of trimmers—

70 m.m.f.

Dimensions**(NUGANG)—**

4 in. wide × 3½ in. high
× 1 ⅞ in. per stage +
⅜ in.

Some **J.B. NUGANG** models

A rigid chassis that is all one piece—not merely a framework bolted together. A one-piece chassis so strong that there can never be the slightest distortion in use . . . this is the chassis of the J. B. NUGANG, a condenser of extreme and lasting accuracy for use in modern sharp-tuned circuits.

Trimmers to each stage inside the chassis are operated by external starwheels. Construction is robust throughout. Vanes wide spaced and of heavy gauge. Special rotor bearings ensure permanent accuracy and give remarkably free movement.

Finally, each condenser is matched to within ⅓ per cent. + ⅓ m.m.f. Supplied in four types as illustrated—semi- or fully-screened, with or without Disc Drive. Capacity .0005.

Special Model available for Superhets. *Write for Catalogue.*



Advertisement of Jackson Bros., 72 St. Thomas' Street, London, S.E.1.

Telephone : Hop 1837.

Speedy replies result from mentioning "Wireless Magazine"

NEWS OF THE SHORT WAVES—Cont. from page 384

Body-capacity and difficult tuning are matters which will probably not amuse the manufacturers, but they will have to be tackled seriously before a really satisfactory type of general receiver is evolved for 7-metre work. No doubt we also shall have some special valves for work at this frequency, although the types which we now use seem to be fairly satisfactory.

Screen-grids on Short Waves

Receivers will probably remain at the "detector and L.F." stage for some time yet, as screen-grid valves are not particularly useful for amplification below 10 metres. At the same time, however, I hear that an American worker has obtained a fairly small stage gain, using a special type of high-frequency valve in a "straight" amplifier on extremely low wavelengths—5 metres or so.

The only other practical solution at the present time for a greater step-up, of course, is the super-heterodyne receiver, where we can step up our signal practically without limit. I see, also, that various experimenters are investigating the possibilities of the old Armstrong super-regenerative receiver for short and ultra short-wave work and results seem very favourable.

Strange it is how our ideas of what is the best practice in radio work vary from year to year! Since short-wave work first started, we have learnt a lot and the general efficiency of the art has increased tremendously.

For instance, at one time we were told that for short-wave work the capacity between the pins of the European-type valve was unfortunately too great for really satisfactory working, and that the best results could only be obtained by gently removing the offending base and pins and using a good stick of solder to finish the deed.

Striking Point

The rather striking point about this to-day is that in theory this idea stands just as firmly as it did, say, six years ago, but *actual practice* has shown us that as regards the final signal strength obtained—which, after all, is what we are really worrying about—we have practically

nothing whatever to gain by de-capping the valve and that it is perfectly safe to use a modern base and socket arrangement.

Also, we have thrown off the funny little idea that it is necessary to use a piece of tramway cable (or thereabouts) for our coils, and modern coils are wound with wire as thin as twenty-sixes with precious little loss.

Furthermore, we ruin the whole contraption by actually incorporating wave-change switching arrangements operating down to below 20 metres! And yet, despite this, the 1932 short-wave receiver is positively a treat to handle compared with the product of some years ago.

* * *

Fate has been kind during the past

THE CALIBRATOR

is not just a stunt receiver. It is a definite and serious attempt on the part of radio designers to avoid the usual difficulties associated with ganging. The scheme has been thoroughly tested out by the "Wireless Magazine" Technical Staff and is presented to our readers with full confidence.

Complete constructional details for building the Calibrator appear in this issue. You will be interested in the design—and so will your friends if you bring it to their attention. Remember that the tuning dial is

CALIBRATED
IN WAVELENGTHS!

summer months and presented us with some quite respectable short-wave reception conditions, really good Transatlantic reception being possible many times. My only hope is that conditions will remain so throughout the winter months and not fall off in the autumn as they did to some extent last year.

I am more particularly referring to conditions for Transatlantic reception when I say this, as poor atmospheric conditions for reception of the American stations does not necessarily mean that stations in other directions will also be poor. However, I suppose the American stations are the biggest "bait" for the newcomer to the short waves, and you have certainly not had your

share of short-wave reception until you have heard some Americans.

It is surely true to say that the fact that American short-wave stations are often well received over here has had a great amount of influence in increasing the number of short-wave listeners in Europe. Our old friends KDKA, W2XAF, W2XAD, etc., have truly had a lot to be responsible for!

Exciting Transmissions

What short-wave transmission—if any—has impressed you as being the most exciting you have ever heard? I think in my case the prize probably goes to a transmission which came from the bed of the Atlantic ocean!

The American stations, including W2XAD or W2XAF—I forget which, possibly both—relayed a transmission from a "rescue" from a submarine which had conveniently been placed on the bed of the ocean by the United States Navy for the occasion.

We heard a running commentary on the happenings down below, including the rescue of the men in a diving-bell, these transmissions being run from the bed of the ocean to a steamer on the surface by a special cable, thence from a short-wave transmitter on the ship to a receiver at the coast and from there by land-line to the broadcasting network of stations.

I tuned-in this transmission accidentally one evening and for radio thrills have not yet found an equal!

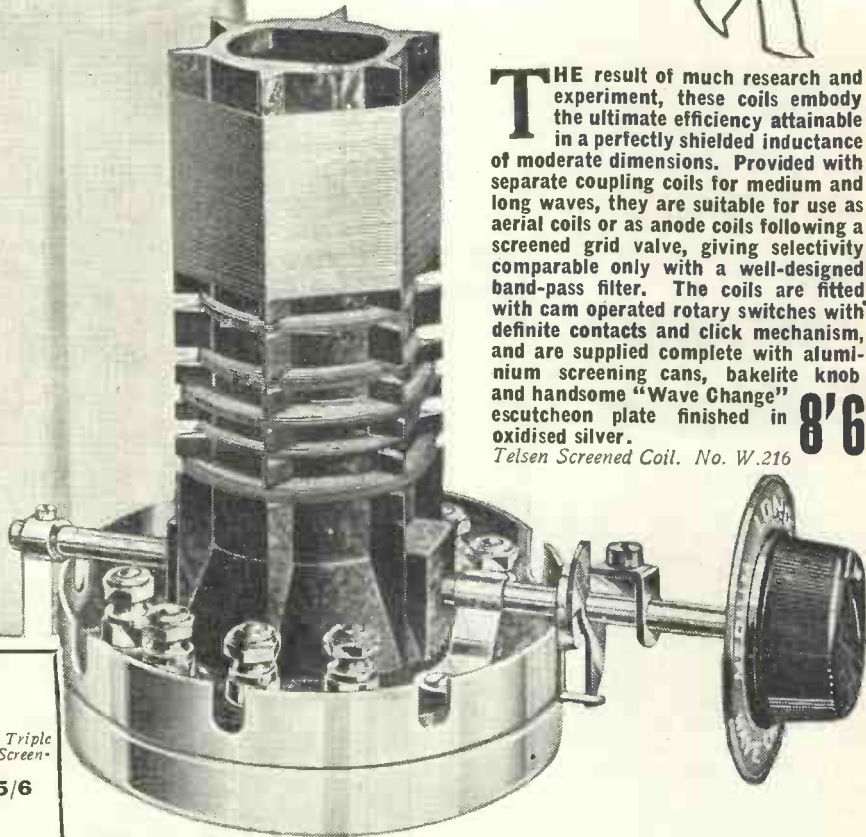
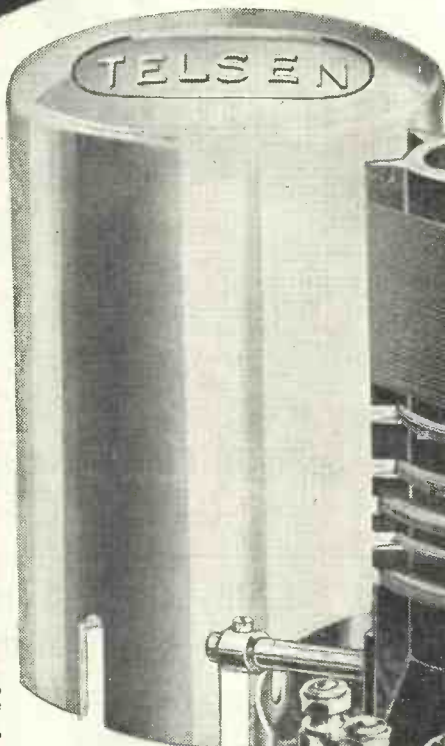
"Stunt" Work

The very nature of short waves lends itself rather well to "stunt" work, such as this, and many stunt transmissions have been carried out during the past few years, which could not have been possible without the use of such wavelengths. Unfortunately, the broadcasting authorities in Europe do not always seem disposed to seize as many opportunities as they might for this type of transmission.

A few words from Professor Piccard, for instance, during his recent trip into the skies above would surely have proved a very successful stunt! A low-powered short-wave telephony transmitter would have done the trick very easily.

TELSEN

SCREENED TUNING COILS



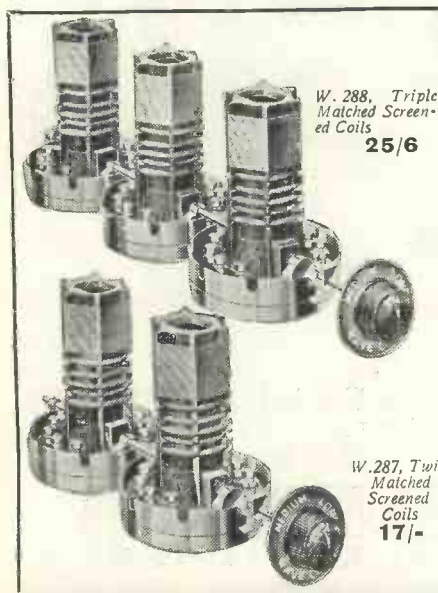
THE result of much research and experiment, these coils embody the ultimate efficiency attainable in a perfectly shielded inductance of moderate dimensions. Provided with separate coupling coils for medium and long waves, they are suitable for use as aerial coils or as anode coils following a screened grid valve, giving selectivity comparable only with a well-designed band-pass filter. The coils are fitted with cam operated rotary switches with definite contacts and click mechanism, and are supplied complete with aluminium screening cans, bakelite knob and handsome "Wave Change" escutcheon plate finished in oxidised silver.

Telsen Screened Coil. No. W.216

8'6

TELSEN COIL SWITCH KNOB ASSEMBLY

Specially designed for use with the Telsen Screened Tuning Coils. The extension on the knob spindle fits over the switch rod supplied with the Coils, a firm coupling to the rod being ensured by tightening the small screw provided. The assembly is suitable for mounting to any standard thickness of panel, and includes a neat disc escutcheon. The knob is of the push-on type in Black Bakelite. No. W.218 **1/-**



W.288, Triple Matched Screened Coils **25/6**

W.287, Twin Matched Screened Coils **17/-**

TELSEN COIL SWITCH COUPLING ASSEMBLY

When it is desired to mount two or more of the Telsen Screened Coils in a line parallel to the panel, and to control the wave-change switching by a single knob on the panel, this switch coupling assembly will be found indispensable. The link arms of the coupler are fitted over the switch rods of the coils, and adjusting slots are provided in the link bar to allow for the spacing of the coils varying from 3 in. to 6 1/2 in. The whole assembly has a neat nickel-plated finish, is perfectly smooth and positive in action, and free from backlash. No. W.217 **6d.**

TELSEN

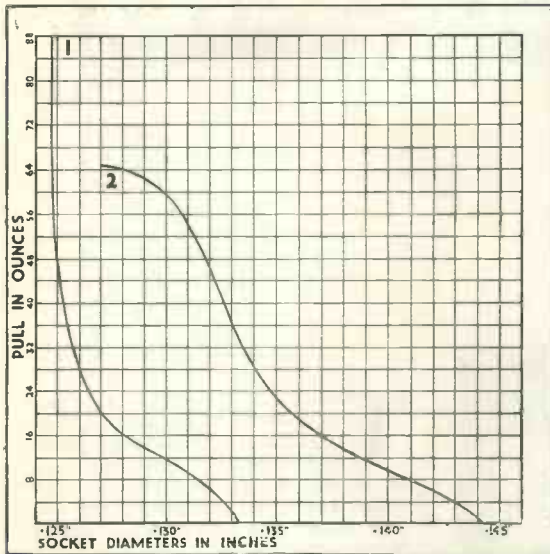
RADIO COMPONENTS

Get your copy of the new **TELSEN RADIOMAG, Issue N° 3**

ANNOUNCEMENT OF THE TELSEN ELECTRIC CO. LTD., ASTON, BIRMINGHAM

When you send your order don't forget to say you "saw it in the 'W M.'"

Which is the better plug ?

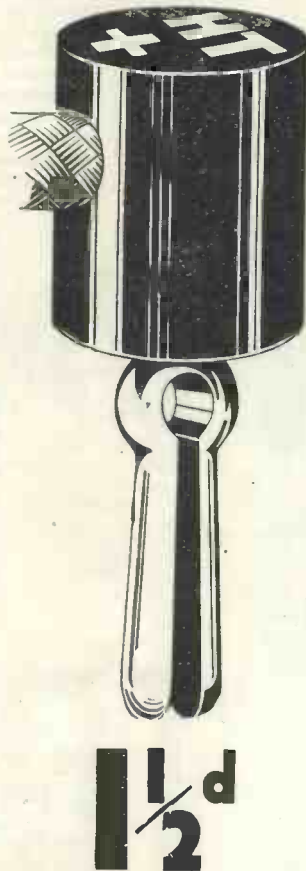


New "BOWSPRING" Wander plug

Some wander plugs grip a limited range of sockets strongly. Others adapt themselves to a wide range of sockets, but make such light contact that they easily come adrift.

The curves above record the performance of two wander plugs — (1) a typical "split pin" type and (2) the new Belling-Lee "Bowspring." Starting from a small socket, each plug has been pulled out and pushed into progressively larger sockets until no contact is made. The curves show the force in ounces needed to pull each plug from the various sockets.

A glance will show which is the better plug. The "Bowspring" gives strong pressure over a far wider range of diameters than any plug we have so far tested.



BELLING-LEE
FOR EVERY RADIO CONNECTION

Advt. of Belling & Lee, Ltd., Cambridge Arterial Road, Enfield, Mdx.

No Chatter - - -

No Scratching - No Case Resonance with the All-British

Clarion Pick-up



PRICE 21/-
Handsomely finished in Walnut Bakelite

Ask your dealer to let you see and hear the wonderful range of Clarion 100-per-cent. British-made Radio instruments.

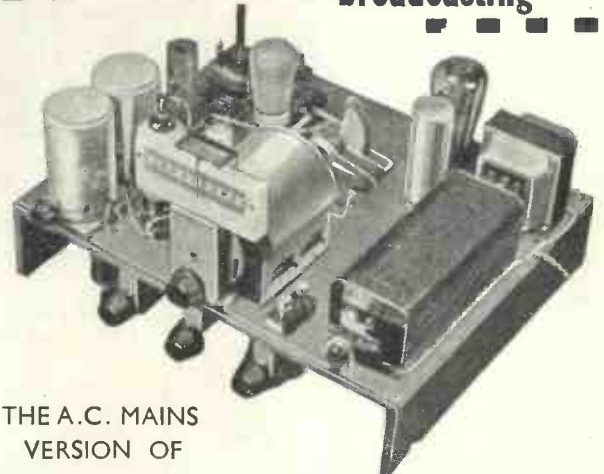
Table Model, Console Model, Radio-gramophone, Radio-gramophone with Automatic Record Changer.

The all-British Clarion Pick-up is amazing in its realism. The entire absence of extraneous noises ensures smoothness of tone which provides an added joy from your records. This model is fitted to the famous Clarion Radio-gram. Can be fitted to any gramophone in five minutes.

BRITISH CLARION Co., Ltd.
Clarion Works, Miller Street, N.W.1

Telephone: Museum 3624/3625
Telegrams: Crosradcla, Norwest, London

"To get the very best from modern broadcasting"



THE A.C. MAINS VERSION OF

THE PROSPERITY THREE
IS FITTED WITH THE **H.T.8.**

WESTINGHOUSE METAL RECTIFIER

This gives a smoothed rectified output of 200 volts 60 mA. It costs only 18/6, "and can be regarded for all practical purposes as being everlasting."

THE WESTINGHOUSE BRAKE AND SAXBY SIGNAL CO. LTD.
82, YORK ROAD, KING'S CROSS, LONDON, N.1

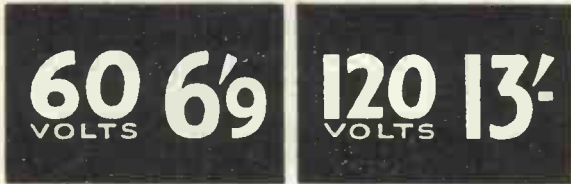
Advertisers like to know you "saw it in the 'Wireless Magazine'"

"GIVING THE FIRST CLASS SERVICE WHICH WAS EXPECTED OF THEM"

" Radio enthusiasts can purchase them with every confidence. Their outputs are above the average and they give a clean, steady output "

says the Technical Editor of "Popular Wireless"

You can end all your H.T. battery troubles—you can take all the uncertainty out of battery buying, for Ediswan H.T. Batteries are now GUARANTEED against failure to give absolutely satisfactory service. No battery manufacturer could afford to give such a guarantee unless he had complete confidence in his product. Every single cell in every Ediswan battery must successfully pass four separate tests before it leaves the factory, and special precautions are taken to ensure perfect insulation between cells.



Standard Capacity. Where the anode current required does not exceed 10 M/a these batteries will give highly satisfactory service. If super-power valves are used, the super-capacity type should be used.

Super Capacity. These batteries have twice the capacity of the standard type, and, owing to their large reserve of power, last nearly three times as long when used as a replacement to a battery of standard capacity.

Look for the Ediswan Authorised Dealer sign when you buy!

Send for your FREE copy of "How to get the most out of your H.T. Battery." Full of useful data, hints and tips.

Guarantee

The Edison Swan Electric Co. Ltd. guarantee that Ediswan Batteries are of full voltage and capacity. Should any Ediswan Battery fail to give satisfactory service, we undertake to deal with customer's complaint within 24 hours of receipt of the defective battery.

EDISWAN

the Guaranteed
RADIO H.T. BATTERIES

THE EDISON SWAN ELECTRIC CO. LTD.



PONDERS END, MIDDLESEX

B.173

You will get prompt replies by mentioning "Wireless Magazine"

WHAT OF THE NEW VALVES?—Cont. from page 328

overcome this trouble once and for all. Owing to their unique construction, the grid can be run at nearly red heat without becoming an emitter.

All Micromesh valves are constructed in unit form, the electrodes being secured by means of a mica spacing piece placed at both top and bottom. Not only is a cooling fin attached to the anode, but to the grid as well; this is a distinct advance over the original type of mains valve having a practically closed electrode system.

Impossible Commercially

The electrode spacing is so close that up to quite recently such construction would have been considered impossible commercially. As the electrodes are secured in the way explained, variation in spacing is very unlikely, if not impossible. This type of construction has allowed the makers to produce valves having figures infinitely better than those to which we are accustomed.

For example, the PA1, a mains power valve, has an amplification factor of 12.6 with an impedance of only 1,050 ohms. Less than two years ago a valve having an impedance of this order would usually have a maximum slope of about 3 or 3.5.

The PA1, with 200 volts on the anode, and approximately 10 volts bias, consumes nearly 50 milliamperes, but with such a high slope it will be appreciated that only a moderate input is required to give an extremely high output, making the valve very suitable for A.C. receivers incorporating only one low-frequency stage.

Detector Capacity

The detector valve is designated HLA1, having an impedance of 10,000 ohms with a magnification factor of 80. An interesting point about this valve is that the anode to grid capacity is approximately .00005 micromicrofarad. This is, we believe, the first time these details have been given for a detector valve.

This shows that the manufacturers have at last realised that the man-in-the-street is keenly interested in all the characteristics and not only the bare operating details. We understand that a screen-grid valve is under construction and will be

issued shortly; if it is as successful as the PA1, it should revolutionise the high-frequency stage in modern receivers.

Turning to the rectifying valves, in this range the most interesting is the R2. This is a full-wave rectifier having a 4-volt filament consuming 2.25 amperes.

As the valve is indirectly heated, there is no possibility of the filament breaking or sagging and falling on to the anode, thus causing a short-circuit. This valve, with 350 volts A.C. on each anode, will give a rectified output of nearly 400 volts at 120 milliamperes. The R1 is more suitable for simple receivers, as with 250 volts on each anode it gives 300 volts D.C. at 60 milliamperes.

Mullard valves have always been of particular interest to the small

You will be missing something good if you do not get a copy of the November issue of "Wireless Magazine." It will contain many special features of interest to all listeners. The day of publication is Friday, October 21

battery-set user, and this season's programme is of particular interest. This firm is marketing three new valves, which are a really good combination for the average three-valve receiver, giving the maximum output with the minimum high-tension consumption. These valves have been designated PM12A, PM1HL, and the PM2A.

The PM1HL operates very effectively with only 50 volts on the anode; this not only reduces the anode current to a very low figure, but it also lessens the tendency for the valve to be microphonic when used in a self-contained receiver. The makers claim that this valve is absolutely free from any microphonic troubles whatever, even when using the maximum anode voltage.

Pentodes are now quite popular, due mainly to the many low-consumption types available; 4.5 milli-

amperes with 100 volts on the anode will operate the Mullard PM22A and give sufficient output for all normal purposes.

Those who handled the original zinc-coated metallised valves cannot have failed to notice how quickly they become soiled. The new Mullard mains valves have been coated with a combination of metals, one of which is copper, giving the whole valve quite an attractive appearance.

Better Conductor

One of the many advantages of this is that the copper is a better conductor and gives a more satisfactory screening effect, as well as not soiling so readily as the zinc originally employed. We understand that this type of coating adheres more perfectly to the glass during the process of manufacture. It is small points of this kind that help to make the English valve supreme in the radio world.

Many mains receivers using internal loud-speakers are prone to microphony; this trouble has been with us for some time, but the rigid construction of the new Mullard mains valves overcomes the trouble.

The technical data supplied with the Mazda screen-grid valves is unusually clear, giving not only the operating details, but also the inter-electrode capacities. The D.C. screen-grid valve in this range has very attractive figures. The amplification figure is given as 1,000, with a mutual conductance of 2.75 milliamperes per volt. This valve should be very suitable for receivers using one high-frequency stage where a D.C. indirectly-heated valve is usable.

Complete Range

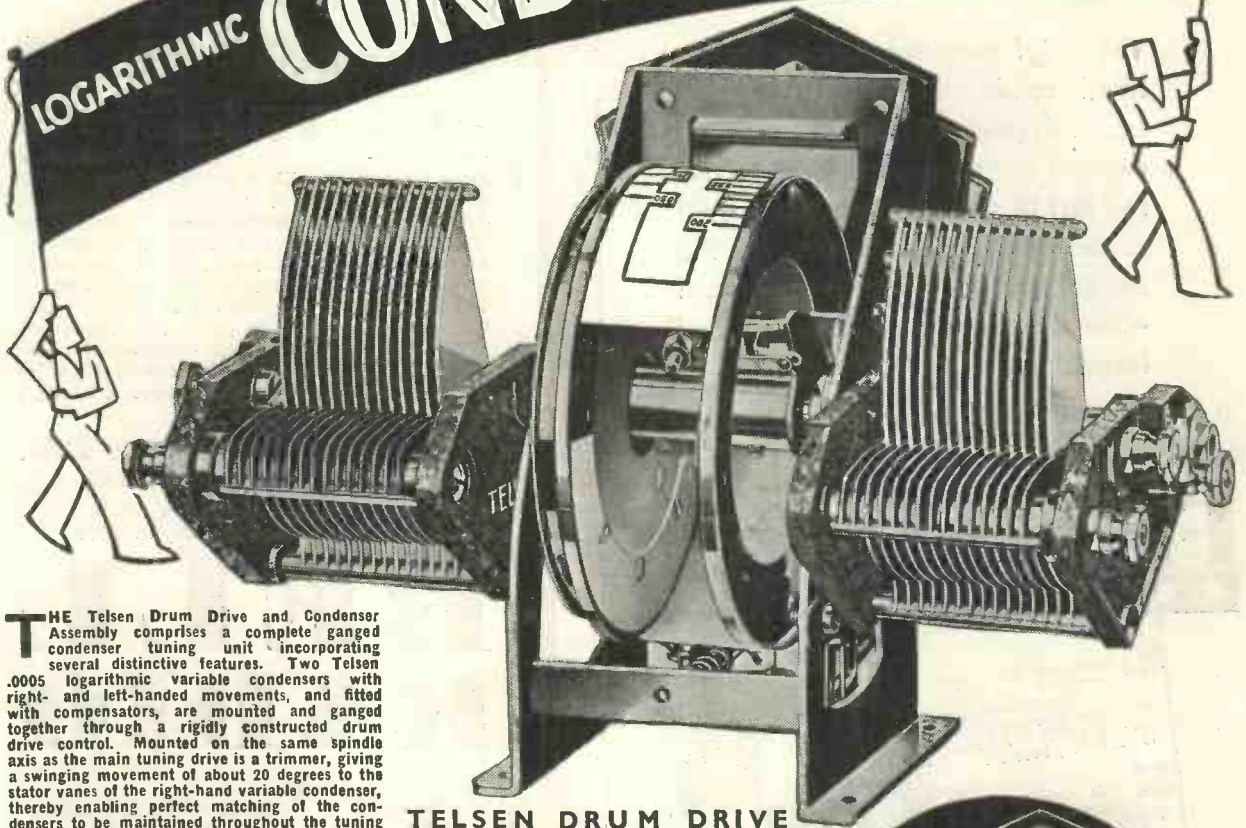
A complete range of D.C. valves is marketed by Mazda, including a DC/HL, DC/P, and DC/Pen.

An amplification factor of nearly 800 from a 2-volt battery screen-grid valve would have been considered ridiculous less than two years ago. This figure has now been obtained with the introduction of the new Mazda S/215A.

As the anode current of this valve under normal working conditions is under 2 milliamperes, it should be very satisfactory for use with small-capacity dry batteries.

TELSEN

LOGARITHMIC CONDENSERS and DRUM-DRIVE



THE Telsen Drum Drive and Condenser Assembly comprises a complete ganged condenser tuning unit incorporating several distinctive features. Two Telsen .0005 logarithmic variable condensers with right- and left-handed movements, and fitted with compensators, are mounted and ganged together through a rigidly constructed drum drive control. Mounted on the same spindle axis as the main tuning drive is a trimmer, giving a swinging movement of about 20 degrees to the stator vanes of the right-hand variable condenser, thereby enabling perfect matching of the condensers to be maintained throughout the tuning range. Two scales are supplied with the unit, one marked in wavelengths and one in graduations from 0-100. The scale is illuminated and has the additional advantage of being easily removable when it is desired to fit one of special calibration. The escutcheon is handsomely finished in oxidised silver, and knobs of the push-on type are fitted. Provision is made for panel and baseboard mounting, and a double-ended spanner is supplied free with the unit for fitting the variable condensers. Full instructions for mounting are included with every unit. No. W.262.

17/6
Price

TELSEN DRUM DRIVE

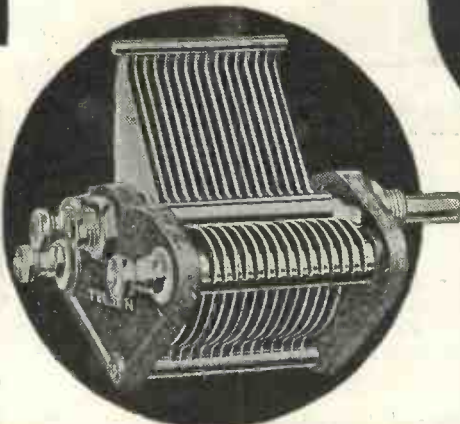
Follows standard practice generally, but embodies several detail refinements, among which may be instanced the cord drive, arranged to reduce wear to a minimum and to prevent over-run, and the rocking stator trimmer, which gives a variation of 20°, and visual indication of setting. For use with Telsen screened coils, an extra scale, marked in wavelengths, is supplied free of charge. Illustration shows escutcheon, handsomely finished in oxidised silver. No. W.255. **8/6**



TELSEN LOGARITHMIC CONDENSERS

The frame is braced by three solid pillars, and the effective clamping of the vanes, each held at three points, makes distortion impossible. The rotor is also built into a rigid unit, the vanes being held at both ends. Generous bearings obviate backlash and end-plate. Models No. 260 and 261 (left-hand and right-hand movements respectively) incorporate a compensator (max. cap. 60 micro-micro henries).

- No. 130 Cap .00025, 4/6
- No. 131 Cap .00035, 4/6
- No. 132 Cap .0005, 4/6
- No. 260 (Left-hand movement with trimmer) Cap .0005, 5/-
- No. 261 (Right-hand movement with trimmer) Cap .0005, 5/-



TELSEN

RADIO COMPONENTS

Get your copy of the new TELSEN RADIOMAG, Issue No 3

ANNOUNCEMENT OF THE TELSEN ELECTRIC CO. LTD., ASTON BIRMINGHAM

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A WORD about FIXED CONDENSERS

The chief consideration in buying fixed condensers is service, and from this point of view Ferranti Condensers are a by-word. Add to this the fact that Ferranti are the lowest priced quality condensers on the market, and you'll decide on Ferranti—the Condensers you can 'fit and forget.'

Just consider these features in addition to those above:

FERRANTI CONDENSERS

1 Their test pressures are higher than those of many other condensers of similar type and price, yet the dielectric material is not unduly stressed.

2 Their insulation resistances are much higher per 2 Mfd than can usually be claimed, and are maintained in service.

3 They are not of the "Mansbridge" pattern but are of the rolled foil type giving extremely low internal resistance. This facilitates the smoothing action and greatly reduces the possibility of back coupling.

4 They are easily capable of withstanding all service conditions for a long period, being designed and made by Engineers whose experience includes the building of condensers for working pressures of more than 1,000,000 volts.



PRICES from 3/- to 9/6
PACKS from 24/- to 30/-

It is only natural that Ferranti Fixed Condensers should be so often recommended when experts are designing a Receiver or Unit in which Quality is the dominating factor. There are types to suit your need exactly—detailed in Leaflet W.522.

Ferranti Ltd. Head Office & Works, Hollinwood, Lancashire.
London: Bush House, Aldwych, W.C.2.

To-day's outstanding radio entertainment and value

Hear all Europe with a purity of tone that is decisively eloquent of "quality"—Realism in Radio. The luxurious rendering of operas, the thrills of radio plays and vaudeville's sparkling comedy. Tune in by a single knob and appreciate how much more enjoyable radio entertainment can be. There is a superiority of reception that will instantly appeal to those who desire the best in radio and radio-gram reproduction. Bell Radio is the crowning achievement in radio design and construction that makes it to-day's outstanding radio value.

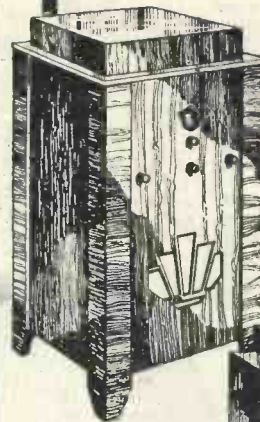
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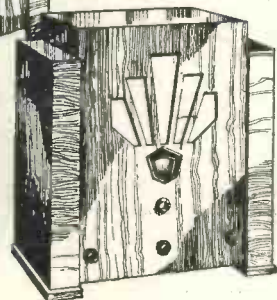
BELL RADIO

Write off for full particulars of Bell Radio new 1933 A.C. all-mains receivers and radio-grams. Convenient deferred payment terms can be arranged.

1933 RECEIVERS AND
RADIO-GRAMS IN 4
NEW CABINET
DESIGNS



Radio-gram with built-in 3-valve screened-grid receiver operating on voltage supplies from 100 to 250. Fitted with fully automatic Collaro gramophone motor, with separate volume control. Beautiful walnut cabinet. Price 27 Gns. Royalties extra. Deferred terms arranged.



A.C. All-mains "European 3" Screened-grid Receiver, with band-pass pre-selector circuit. Single-knob tuning. Scale illuminated and calibrated in metres. Magnavox energised moving-coil loud-speaker. Volume is controlled independent of reaction. Price only 16 Gns. Royalties extra. Deferred terms arranged.

Reid, Walker

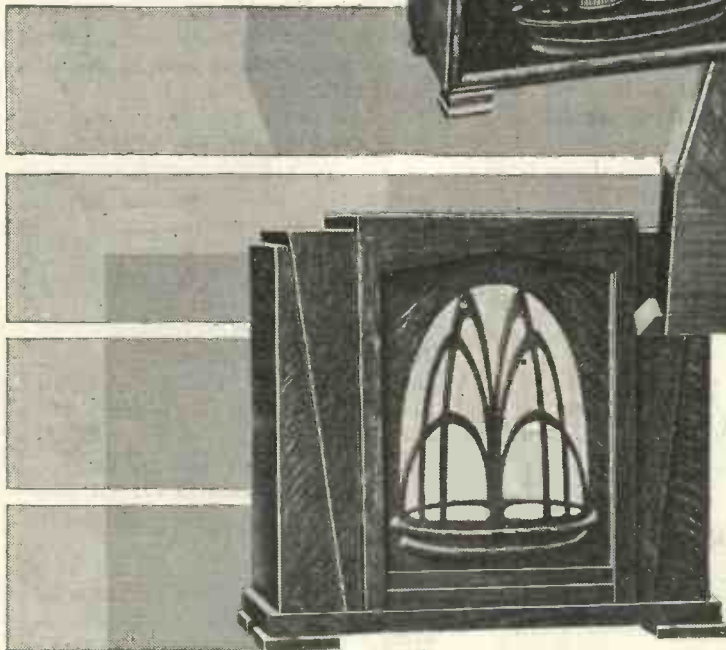
It helps us if you mention "Wireless Magazine"

THERE'S THE SPEAKER YOU WANT IN THE B.T.H. RANGE of MOVING COIL REPRODUCERS 1933 MODELS

The Minor R.K. Reproducer, Permanent Magnet Model, is supplied complete with multi-ratio transformer. The unit housed in the cabinet has a 7-inch corrugated cone with moving coil having a nominal impedance of 7.5 ohms.
Prices:—
 Fumed Oak "ARUNDEL" model £217.6
 Walnut "ARUNDEL" model - £33.0



The Senior R.K. Reproducer, Permanent Magnet Model, is available complete with multi-ratio transformer.
Prices:—
 "WARWICK" model in Oak - £8.10.0
 "WARWICK" model in Walnut £8.17.6



The Senior R.K. Reproducer, Permanent Magnet Model, is available complete with multi-ratio transformer.
Price:—
 "WINDSOR" model in Oak - £8.10.0

There's a speaker to suit you and a price to suit your pocket in the R.K. range. Years of experience—the first moving coil speaker was an R.K.—have contributed to R.K. supremacy. Comparative tests have established the R.K. as the finest moving coil speaker made—regardless of price. You pay no more but you get a better speaker.

All good radio dealers will be pleased to demonstrate R.K.'s to you. A range of output transformers specially designed for use with R.K.'s is available.

EDISWAN RADIO 100 PER CENT BRITISH

The Edison Swan Electric Co. Ltd.

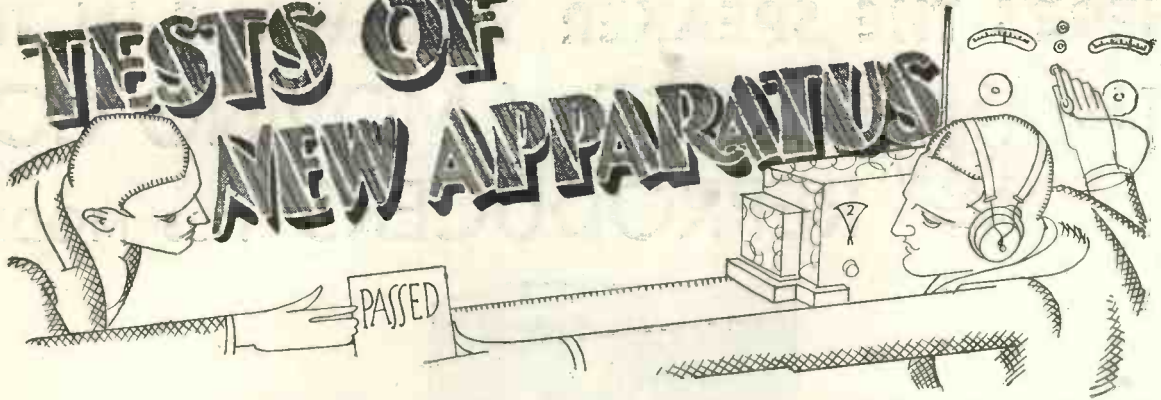


155 Charing Cross Rd. London. W.C.2

W.192

When you send your order don't forget to say you "saw it in the 'W.M.'"

TESTS OF NEW APPARATUS

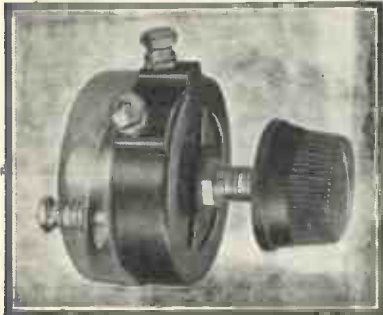


Lewcos Potentiometer :: Filt Earth :: Scott Sessions Mains Transformer :: Goltone High-frequency Choke :: Claude Lyons Switches :: Electro Dynamic Converter

LEWCOS POTENTIOMETER

APPARATUS: 50,000-ohm potentiometer.
PRICE: 3s.
MAKERS: London Electric Wire Co. and Smiths, Ltd.

A GOOD deal of ingenuity has been expended lately on high-resistance potentiometers. The resistance element itself should be



COMPLETELY WIRE WOUND
The Lewcos wire-wound potentiometer is excellent value for the money

wire wound if possible, since this construction gives silent operation and greater current-carrying capacity.

The difficulty is to make the necessary contact to the wire, which is so fine that any form of rubbing contact carries a serious danger of damage and ultimate breakdown.

The Lewcos people have just introduced an exceedingly neat arrangement. Over the resistance track is a circular disc mounted at a slight angle, so that it rests on the resistance track at one point.

Rocking Disc

As the spindle is rotated the disc rocks round, so that it rests on a different portion of the track and in this way achieves the same effect as

a rotating contact arm, with the advantage that there is no rubbing, but only a light pressure on the high-resistance wire the whole time.

A transparent cover is fitted over the mechanism itself and the component sells at a remarkably low price. Graded types are available at a slight extra charge.

The sample we tested was rated at 50,000 ohms and was found to have exactly this value. As one would expect from the construction, it proved quite silent in operation. Altogether it is a most satisfactory device and should make a wide appeal.

FILT EARTH

APPARATUS: Filt percolative earth.
PRICE: 2s. 6d.
MAKERS: Graham-Farish, Ltd.

A GOOD earth is a matter of considerable importance. Many a receiver will be improved in performance if the earth connection is made good, while with some mains receivers a poor earth will introduce quite an unpleasant hum in the loud-speaker for which the set is often unjustly blamed.

Graham-Farish have recently introduced a product which they call the Filt Percolative Earth. The principle employed here is that for efficient contact with the earth moisture is essential. The device, therefore, consists of a small bowl which is filled with Filt powder, this being a composition which has a strong affinity for moisture.

The bowl is buried in the earth about a foot deep, and a connection is made to the terminal on the side. The earth is replaced over the top and about half a gallon of water

sprinkled lightly over the surface in order to start the action.

Thereafter the hygroscopic properties of the Filt powder will keep the bowl permanently moist and thereby ensure good contact even in dry or sandy soil.

SCOTT SESSIONS MAINS TRANSFORMER

APPARATUS: Mains transformer for use with HT8 metal rectifier.
PRICE: £1 6s.
MAKER: G. Scott Sessions & Co.

A CONVENIENT range of mains transformers for the constructor is that manufactured by G. Scott Sessions & Co. The sample we tested was intended for use with a Westinghouse HT8 rectifier, and therefore had a 200-volt secondary and a 4-volt low-tension winding.

Both these windings are on one bobbin, while the primary (which is tapped for 210, 230, and 250 volts input) is on a separate bobbin. The iron circuit is clamped together with a sheet-metal shroud, which is turned up at the ends to provide

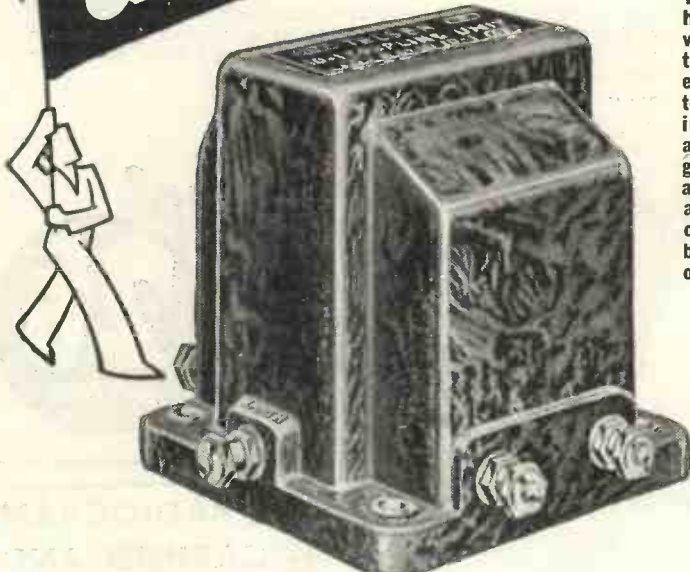
(Continued on page 400)



WELL-MADE MAINS TRANSFORMER
One of the new range of Scott Sessions mains transformers

TELSEN

10-1 COUPLING UNIT & 1-1 COUPLING UNIT



TELSEN 10-1 INTERVALVE COUPLING UNIT

This is a filter-fed transformer using a high permeability nickel alloy core, which enables a 10—1 voltage step-up to be attained while preserving an exceptionally good frequency characteristic. The response is compensated in the higher frequencies for use with a pentode valve, this combination giving an amplification greater than anything previously achieved, equal to two ordinary L.F. stages, but with better quality of reproduction.

12½

No. W.215

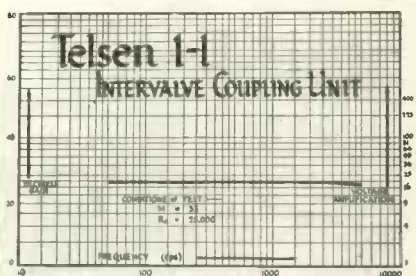
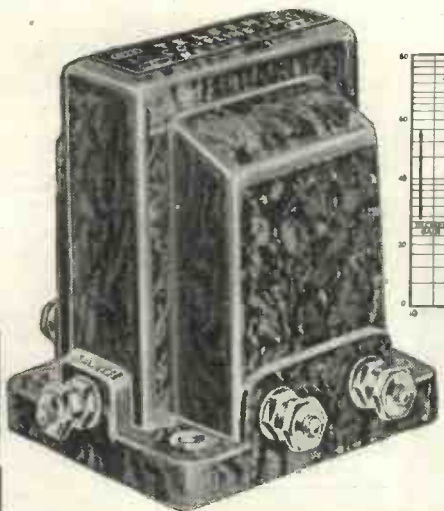
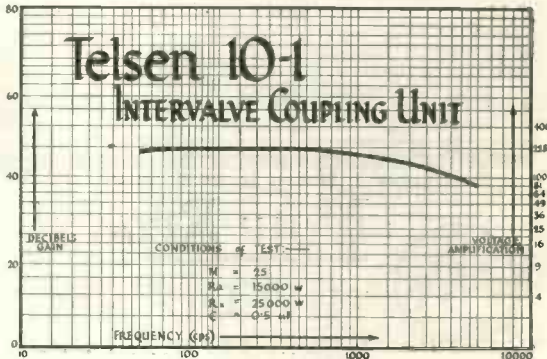


TELSEN 1-1 INTERVALVE COUPLING UNIT

This is a modern development of the one-time deservedly popular R.C. unit. It incorporates a low pass filter feed in its anode circuit, thus effectively preventing "motor-boating," "threshold howl" and other forms of instability arising out of common couplings in eliminator and battery circuits. Used with an H.L. type valve it will give an amplification of about 20 and a perfect frequency response, at the same time consuming negligible H.T. current.

7½

No. W.214



TELSEN

RADIO COMPONENTS

Get your copy of the new **TELSEN RADIOMAG, Issue N° 3**

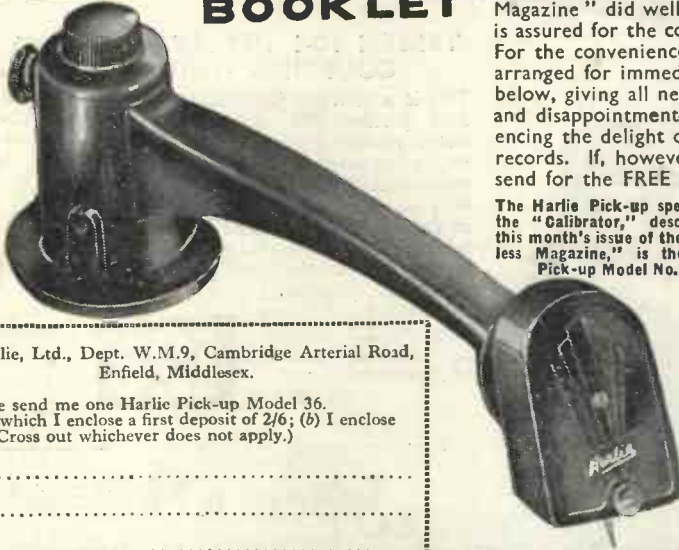
ANNOUNCEMENT OF THE TELSEN ELECTRIC CO. LTD., ASTON BIRMINGHAM.

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FREE!
THE NEW

Harlie

PICK-UP BOOKLET



SEND FOR THIS BOOKLET

It tells you how to "bring your records to life" with brilliant realism through your Radio Set with only a few minutes' alteration; double the playing life of records. All this and much more is told in this booklet that is bang up-to-date and as simple as ABC. On application it will be sent free without obligation.

The Harlie Booklet also tells you all about the wonderful Harlie Pick-up. How different the results from your radio-gram will be if you fit one of these wonderful instruments.

When you have your records played through a Harlie Pick-up you will be amazed at the extraordinary improvement—every variation of tone and pitch being recorded with startling realism. The designers of the "Calibrator" described in this issue of "Wireless Magazine" did well to choose a Harlie Pick-up because satisfaction is assured for the constructors who follow their choice.

For the convenience of readers of "Wireless Magazine" we have arranged for immediate dispatch, on receipt of the coupon shown below, giving all necessary details. Order now and so avoid delay and disappointment—many satisfied customers are already experiencing the delight of improved reproduction of their gramophone records. If, however, you feel you would like further particulars send for the FREE Harlie Booklet.

The Harlie Pick-up specified in the "Calibrator," described in this month's issue of the "Wireless Magazine," is the Harlie Pick-up Model No. 36.

New Pick-ups.

FROM

Cash Price, 27/6, or Easy Payments—first payment of 2/6, a further payment of 2/6 on receipt of goods, afterwards 5 monthly payments of 5/-.

2/6 DOWN

To Harlie, Ltd., Dept. W.M.9, Cambridge Arterial Road, Enfield, Middlesex.

Please send me one Harlie Pick-up Model 36. (a) For which I enclose a first deposit of 2/6; (b) I enclose 27/6. (Cross out whichever does not apply.)

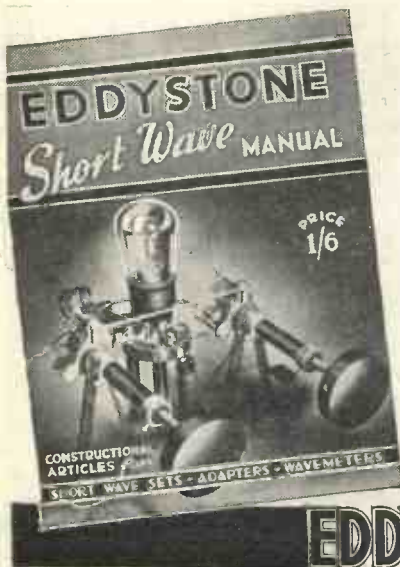
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Address



Now Ready!
The "EDDYSTONE"
Short Wave MANUAL

• Of Great Interest to Every Short Wave Enthusiast.



Contents include fully illustrated constructional articles for building 2-, 3- and 4-valve short wave receivers, a 1-valve superhet. S.W. converter, a 1-valve S.W. adaptor, a dynatron and heterodyne wavemeter, and a 7 metre ultra S.W. converter. List and cost of parts given in detail for each set. Articles on short waves, short wave tuning, S.W. condensers, trouble locating, etc.

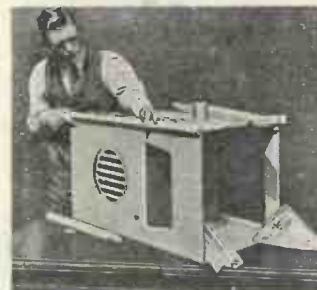
PRICE 1/6 (Post free)

STRATTON & Co. Ltd. BROMSGROVE STREET, BIRMINGHAM

EDDYSTONE Service Depot.—WEBB'S RADIO STORES, 164 Charing Cross Road, W.C.2

EDDYSTONE

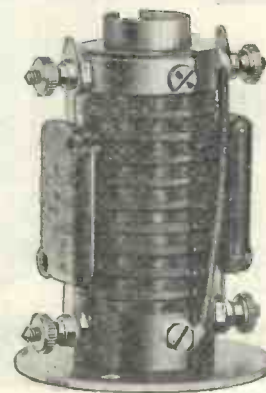
MAKE YOUR OWN RADIOGRAM CABINET AND ECONOMISE!



Suitable for every type of set, this complete kit of finest quality parts enables you to assemble your own cabinet with the greatest ease and least expense! Write for full particulars to:—

- Price in Oak £2 - 7 - 6
 - Price in Birch £2 - 0 - 0
- VIBRANTI PRODUCTS CO. 308, EUSTON ROAD, N.W.1**

FOR ALL FOREIGN RECEPTION,



with separation averaging 4-6 kc. The "Quality" Receiver needs the "Kinva" Heterodyne Filter, Type 'B' (shown) follows your H.F. Choke in Det. Anode: Type 'B1' is similar, but is also a Super H.F. Choke; Type 'A' is desirable where two L.F. stages are used. Type "B1", 7/-; 'B', 7/6; "A", 15/-.

Write for full details. **POSTLETHWAITE BROS.,** Kinver, Stourbridge.

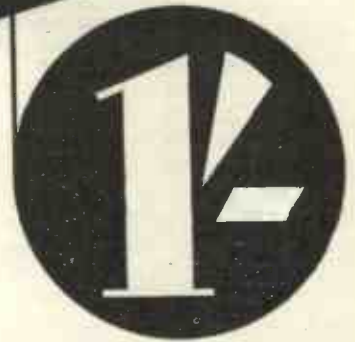
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WHEN
YOU
CAN
BUY A

DUBILIER
GRID
LEAK



FOR



WHY trust to unproved GRID LEAKS ?



In the past you may have been tempted into buying Grid Leaks and Resistances of unproved efficiency by the prospect of saving a copper or two. But with the arrival of Dubilier Grid Leaks and Resistances you need never again imperil the performance of your Set with components of unproved merit. For the Dubilier Grid Leak costs only 1/-. The famous Dubilier Metallized Resistance sells at the same price. Both are unmatched in performance and their dependability has been proved alike by technicians and public.

Use only Dubilier Grid Leaks and Resistances in your Set. You will never find better.

Have you seen the new Dubilier Component Booklet, "Choosing your Condensers and Resistances"? Ask your dealer for a copy or write to us.

DUBILIER METALLIZED
RESISTANCES

1 Watt 1/- 2 Watt 2/- 3 Watt 3/-

DUBILIER CONDENSER CO. (1925) LTD.
Ducon Works, Victoria Road, North Acton, London, W.3

There is news in the "Wireless Magazine" advertisements

TESTS OF NEW APPARATUS—Continued from page 396

fixing feet. No terminals are supplied, the ends of the windings being finished in flexible leads covered with a rather attractive cellulose insulation.

On test the transformer was found to be excellent. On the full load of 4 amperes low tension and 150 milliamperes A.C. from the high-tension winding (the value corresponding to the full 60 milliamperes D.C. from the rectifier), the voltages were 3.98 and 202 respectively. On no-load these figures rose to 4.25 and 208. Such a small variation is very good and shows that the transformer has been designed on sound lines.

The only criticism we have is that the no-load loss was rather high, being approximately 15 watts on the sample tested. For all that, we did not observe any signs of overheating on a prolonged run.



EFFICIENT CHOKE
An efficient high-frequency choke—a new Goltone component

GOLTONE HIGH-FREQUENCY CHOKE

APPARATUS: High-frequency choke.
TYPE: Super type.
PRICE: 4s. 6d.
MAKERS: Ward & Goldstone, Ltd.

THE Goltone super high-frequency choke has been designed for screen-grid valves and super-het circuits. The requirements here are a higher inductance than usual, together with at least as low a value of self-capacity. The inductance in the present instance is rated at 350,000 microhenries and was actually measured to be 310,000.

The winding is accommodated in ten slots carried in an ordinary solid former, without any attempt at air spacing or other frills. This simplicity is amply justified by the results, which are uniformly good over the whole of the normal operating waveband.

The choking effect, indeed, reaches its maximum at just below 2,000 metres and

is well maintained considerably above this value, so that the manufacturers' claim that the choke is effective to 2,750 metres is quite justified. This choke should prove useful to many constructors.

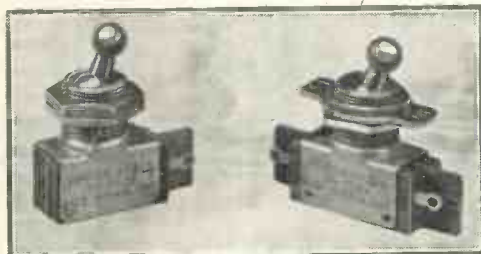
CLAUDE LYONS SWITCHES

APPARATUS: (a) On-off mains toggle switch; (b) single-pole change-over mains switch.
PRICE: (a) 1s. 6d. (b) 1s. 9d.
MAKERS: Claude Lyons, Ltd.

WE have received from Claude Lyons, Ltd., two Arrow mains switches. These are of the familiar laminated type, being built up of bakelised sheet and provided with the customary toggle action giving quick make and break.

These switches are made in the usual forms, the two samples we received being the simple on-and-off switch capable of breaking 3 amperes at 250 volts and a single-pole change-over switch of the same rating.

In each case the centre lamination is extended beyond the others to form a shield between the two terminal connections as a precaution against inadvertent short-circuits.



TWO GOOD SWITCHES
Two examples of switches from the Claude Lyons range

ELECTRO DYNAMIC CONVERTER

APPARATUS: Rotary transformer (D.C. to A.C.)
TYPE: X $\frac{1}{2}$.
PRICE: £17 5s.
MAKERS: Electro Dynamic Construction Co., Ltd.

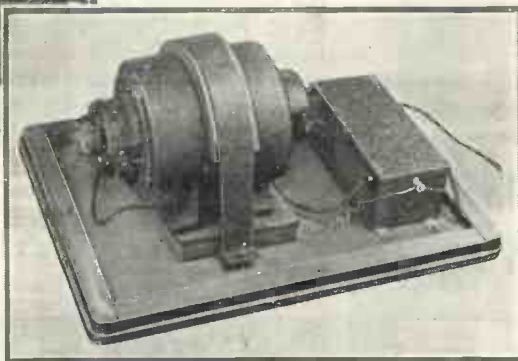
CONVERTERS (or rotary transformers, as they are sometimes called) are of great value to those who want to work A.C. sets from D.C. mains. We have recently tested such a converter made by the ElectroDynamic Construction Co., Ltd.

Machines can be wound for a D.C. input of any voltage from 24 to 250 volts, the particular model we tested being rated at 220 volts. Tests showed that the regulation was constant at all loads up to the maximum, which is in the neighbourhood of 180 watts.



CONVERTS D.C. TO A.C.
This view shows the neat appearance of the Electro Dynamic D.C. to A.C. converter

The model tested is only one of a range of mains transformers for all purposes. Most constructors will be interested in the models for use with the Westinghouse type LT4, LT5, HT7, HT8 and HT10 metal rectifiers. There is also a range for valve rectifiers.



NEAT INTERNAL ARRANGEMENT
Another view of the Electro Dynamic rotary transformer, which is mechanically silent in operation

The TELSEN TELELEXOR

THE Telexor represents a new development in radio set construction, and renders unnecessary all existing wave change methods by switching or changing coils. In conjunction with the Telsen Dual Range Tuning Coil, the whole of the medium and long wave broadcast band may be covered by one turn of the dial, without any operation being necessary to change wave lengths. Briefly, it incorporates a special design of tuning condenser, covering the full circle and giving "log law" tuning in both directions, together with an

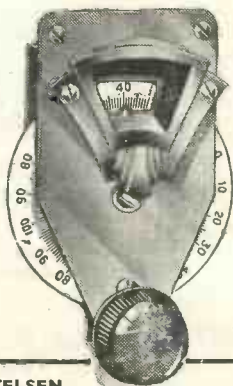
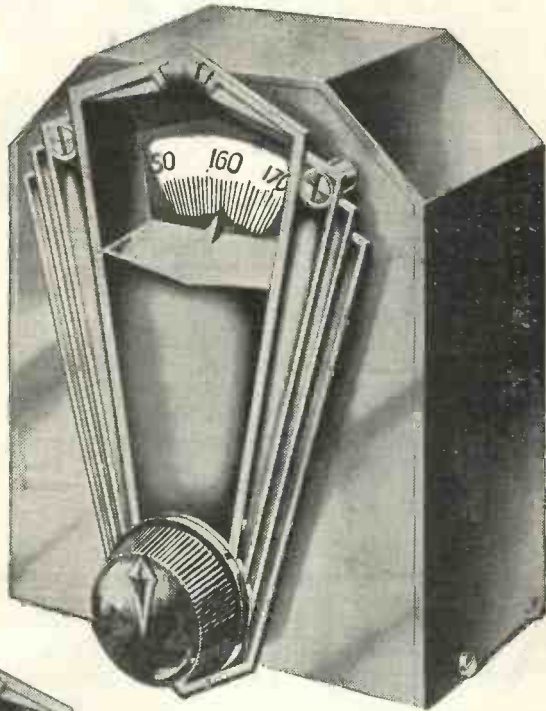
automatic wave change switch and illuminated disc drive.

No. W.180.

MOUNTING INSTRUCTIONS

Full instructions are included with every Telexor for baseboard or panel mounting, together with the necessary screws. The approx. overall dimensions, excluding the escutcheon plate, are 5½" high 4½" wide and 2¾" deep.

10/6

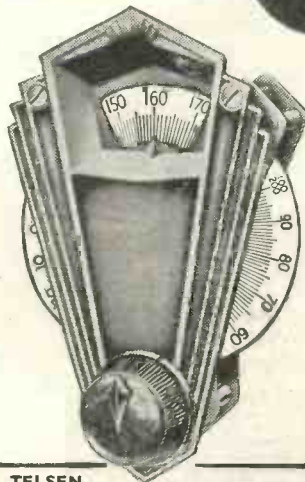


TELSEN SMALL FRICTION DISC DRIVE.

A low-priced disc drive for auxiliary controls. It is extremely robust and may be used for main tuning condensers when such a course is advisable owing to considerations of space.

No. W. 257

2/6



TELSEN ILLUMINATED DISC DRIVE.

Fitted with a handsome oxidised silver escutcheon of modern design, this drive incorporates an improved movement. The gear ratio of approx. 5-1, and the bold and well proportioned figures, make for delightfully easy tuning. The dial may be illuminated by means of an ordinary flash lamp bulb. A double ended spanner, to fit all Telsen one-hole fixing nuts, is supplied free.

No. W. 184

3/6

TELSEN SLOW MOTION DIAL.

An exceptionally smooth-acting dial, with an approx. ratio of 8-1. There is no toothed gearing, so that it is impossible to strip the dial. The figures are clear and arranged to provide for right and left hand condensers.

No. W. 141 (black)

No. W. 141a

2/-
(brown)
EACH



TELSEN

RADIO COMPONENTS

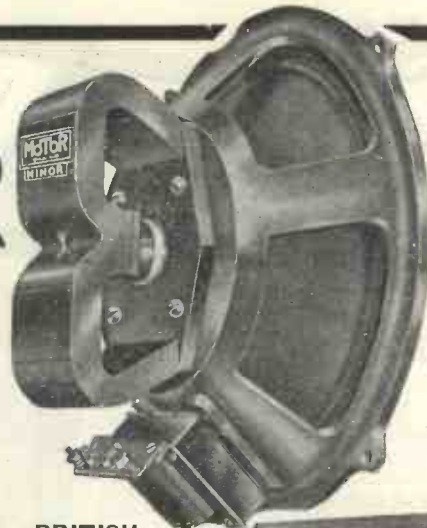
Get your copy of the new **TELSEN RADIOMAG, Issue N°3**

ANNOUNCEMENT OF THE TELSEN ELECTRIC CO., LTD., ASTON, BIRMINGHAM

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QUALITY is the **MOTOR** POLICY

Superior performance, and a high quality that will make you and your friends gasp with admiration—that is what MoToR has aimed at—and achieved, in the richness of tone, naturalness of speech, and unusual sensitivity of the MoToR Minor moving-coil speaker. Make quality your policy too—hear this, and the full range of MoToR speakers at your radio dealer's. Then you will realise you don't need a new set—you just need a MoToR Minor.



BRITISH
MADE

MoToR MINOR

Permanent Magnet
MOVING COIL

Including transformer and baffle board

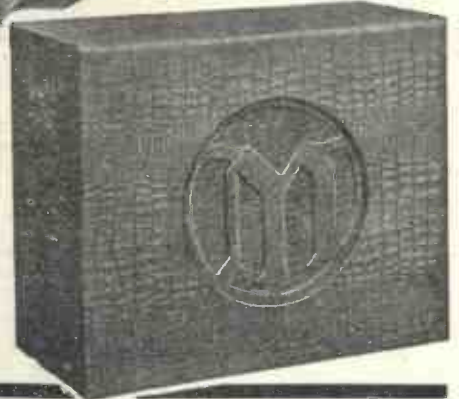
39/6

CHESTER. Handsome walnut cabinet incorporating MoToR Minor P.M. Moving Coil Speaker

65/-

MoToR Minor Unit in attractive leatherette Baffle Case as shown below

45/-



In moving coil and balanced armature type speakers MoToR is supreme. Write for fully descriptive pamphlets to :

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NON - INDUCTIVE CONDENSERS

Tested at 1,500 v. D.C. Continuous working voltage 500 v. D.C.

SPECIFIED FOR THE
"PROSPERITY THREE"

TYPE
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2 mfd. ... 3/9 each
4 mfd. ... 6/9 each

1 mfd., 2/8; .5 mfd., 2/6;
.25 mfd., 2/4; .1 mfd., 2/2.

PEAK

also specified for the
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TYPE
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A NEW PEAK CONDENSER

Tested at 2,400 v. D.C.
Continuous working voltage
800 v. D.C.

.25 mfd. 3/6 2 mfd. 7/3
.5 mfd. 3/9 3 mfd. 10/-
1 mfd. 4/6 4 mfd. 12/6

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Robust Construction,
Reliability, Long Service,
Quality. A Credit to British
enterprise and workmanship

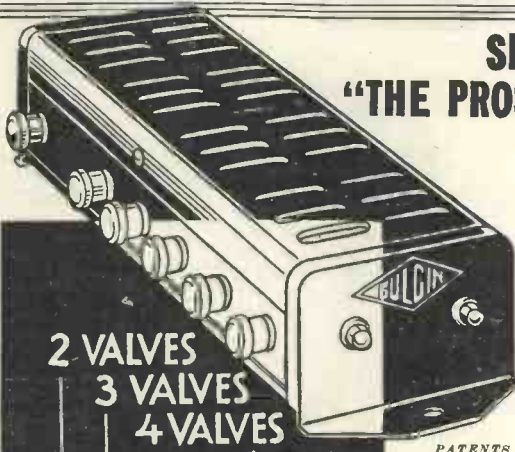
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SPECIFIED FOR "THE PROSPERITY D.C. THREE"

Build a Bulgin D.C. Mains resistance into your set and follow the example of thousands who have already done likewise.

Remember it is a Bulgin PRODUCT. Your finest guarantee of quality construction, highest efficiency and advanced design.

A COMPLETE RANGE MR2 UNIVERSAL (Type B)

For any number of valves from 2 to 6—a wonderful advantage when you propose adding one or more valves. **18/6**

OR ALTERNATIVELY

MR5 SEMI-UNIVERSAL FOR 3 VALVES ONLY

Totally enclosed and adequately ventilated as above model. **11/6**

OR AGAIN ALTERNATIVELY

MR8 SKELETON TYPE

Wound with finest nickel-chrome wire on fireproof tube, clearly marked tapping bands. **5/6**

ALL THE ABOVE TAPPED FOR MAINS 200-250 VOLTS.

Send 2d. Postage for our 80 pp. Catalogue giving full details

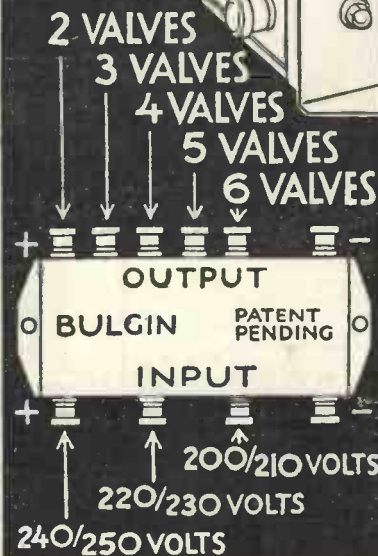
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HERE IS THE "RADIOPAK"

PRICE
COMPLETE

£3



specified for the

"CALIBRATOR"

THE British Radiophone Bandpass **RADIOPAK** bids fair to enjoy the same popularity with designers of famous modern sets that British Radiophone Ganged Condensers have enjoyed for so long. The **RADIOPAK** has been specially produced to bring perfect bandpass tuning within reach of all constructors.

The unit consists of the necessary coils; the gang condenser with illuminated slow-motion escutcheon and disc drive calibrated in wavelengths; a wave-change switch; and a wire-

wound volume control complete with on-off Q.M.B. power switch. The switching arrangement is the best yet devised for any radio component and the combined volume control and switch is one of the famous Radiophone standard types needing no further recommendation. Owing to the high degree of accuracy in the matching of the coils and condensers, this unit will **REVOLUTIONISE** modern set-construction. Write for full descriptive particulars.

Price complete, £3

RADIOPAK
TRADE MARK
THE ONLY COMPLETE BAND-PASS TUNER

BRITISH RADIOPHONE LTD.,
ALDWYCH HOUSE, ALDWYCH,
LONDON, W.C.2

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A RADIO FAN'S CAUSERIE CONDUCTED BY BM/PRESS

After Olympia :: Similarity of Sets :: Constructor Activities :: An Ideal Achieved :: Record Changers :: Thank the Dumb! :: Sparking-plug Trouble :: Top-note Quality

After Olympia

WELL, another Radio Exhibition has passed by and we are all a year older and wiser. What is one to say about Radiolympia, 1932? It was a great show—conclusive proof, if one were needed, of the hold that radio has on the public imagination. And at last there are signs of some attempt at stability in design; manufacturers no longer adopt freak arrangements just to be different from “the other fellow.”

Similarity of Sets

I heard many remarks about the similarity of sets as regards appearance and (supposed) performance. That is all to the good in my opinion. It does give the man-in-the-street a chance to understand something of what constitutes good technique. It is evident that the three-valver with a variable- μ high-frequency stage, detector and pentode gives the required results in most districts, or it would not be so popular.

There were no startling price reductions, but I had the impression that the set buyer is now going to get very much better value for his money than he has had in the past.

What surprises me is the ambitious production programmes on which many firms are engaged. Even small makers are budgeting for 10,000 sets during the season and one big con-

cern is out to sell 180,000 receivers. It is difficult, even when one knows something of the tremendous demand for radio all over the country, to see how every firm is going to sell its full quota. It seems as if some of the more unfortunate will be badly stung.

This great number of sets will mean that the second-hand value of a receiver is going to be a big problem to the radio trade in a few years time. People are not going to spend anything from £15 to £30 on a good set and then, after a couple of years, be satisfied with the remark, “We have no machinery for selling second-hand sets and can only advise you to sell your old receiver privately.”

In my opinion, much more is going to be heard about this problem. Of course, nobody who knows the first thing about radio—unless they really like fault finding!—would buy a second-hand outfit.

Constructor Activities

Some people thought that the constructor was not at all well catered for at the Show. There is something in that, but not very much, I think. The fact was that the big firms concentrated their displays on their complete sets—which is quite natural when the prices are taken into consideration—and the smaller component makers were mostly hidden

away in odd corners on the ground floor or else up in the gallery. There were plenty of constructor exhibits for anybody who made a point of ferreting them out.

In my opinion the three outstanding items for the constructor were: (1) the British Radiophone Radiopak; (2) the Garrard automatic record changer; and (3) the Multitone transformer. I shall have something to say about each in turn.

An Ideal Achieved

Last month I reminded you of a suggestion that I had made a year before—the need for a matched tuning unit with the coils and condensers in one case, already ganged up and sealed before leaving the factory.

Well, now we have the Radiopak. I do claim some credit for the fact that such a useful unit is now available on the market. It is not exactly what I had hoped for, but that is unavoidable. I refer to my suggestion for sealing the unit. It was found in practice that stray circuit capacities—and the differences in valve capacities—were so great that some trimming was essential in order to keep the circuits perfectly matched.

I do believe that the Radiopak will meet a long-felt need. The coils are accurately matched up with the condenser in the factory and the operator-

(Continued on page 408)

The **TELSEN**

AJAX 3

BUILD THIS BRILLIANT CIRCUIT WITH THE AID OF THE FULL-SIZE 1/- BLUE-PRINT GIVEN FREE WITH THE NEW AND ENLARGED EDITION OF THE TELSEN RADIOMAG



TOTAL COST OF
TELSEN MATCHED COMPONENTS

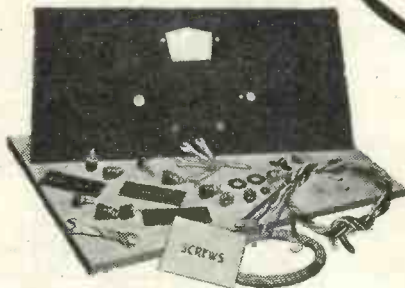
61'6

For building the Ajax 3, including panel, base-board, terminals, battery cords and all accessories.



The Telsen "Ajax 3" represents one of the greatest circuit triumphs ever achieved by Telsen technicians. For here, at last, is a circuit which is as inexpensive to build and operate as only a "straight three" can be, yet which, owing to its brilliance of design, gives an all-round performance of hitherto unattainable excellence, with

a degree of range, power, and selectivity which definitely sets a new standard for receivers of its type. Full constructional details of this and several other brilliant circuits together with free full-size 1/- blueprints, are contained in the new, bigger, and better issue of the Telsen Radiomag—price 6d. You'll agree that it's the finest radio sixpenny-worth ever offered, for not only does it tell you how to build the latest types of receiver—not only is it crammed with valuable information from cover to cover—but it also contains full details of the improved and now all-embracing range of Telsen radio components at the revised prices only made possible by Telsen's enormous sale—the largest in the world! Get your copy of the Telsen Radiomag NOW—from your radio dealer or newsagent.



"TELORNOR"

CONSTRUCTORS' OUTFIT

Contains all the sundry requirements for the construction of any type of receiver circuits using the Telornor.

Of these the Telsen "Triple 3," the "Ajax 3," and the "Nimrod 2" are excellent as examples. All are supplied neatly packed in a carton with instructions.

Cat. No. 220

3'6

Included in the Outfit are the following components:

Specially cut and drilled crystalline finish panel. 14 in. by 10 in. Baseboard. Eight-way Battery Cord. Complete set of Wander Plugs suitably engraved, and Spade Terminals. Terminals for Aerial;

Earth and Loud-speaker. Engraved Terminal Strips. An ample supply of 22S.W.G. Tinned Copper Wire and necessary Sleeving for wiring up the set. A double-ended Spanner for mounting the single-

hole fixing components. A four-way Spanner for tightening up all terminal nuts. All the Wood Screws and sundry other small accessories contributing to the complete assembly of the finished Receiver.

TELSEN

RADIO COMPONENTS

Get your copy of the new TELSEN RADIOMAG, Issue No. 3

ANNOUNCEMENT OF THE TELSEN ELECTRIC CO., LTD. ASTON, BIRMINGHAM

Advertisers like to know whence the business comes—please mention "W.M."

**Tune in
on
this**



NEW WIRELESS INSTRUCTION

The I.C.S. Wireless Courses cover every phase of wireless work, from the requirements of the youth who wishes to make wireless engineering his career to the man who wants to construct a broadcasting set for his home, and, at the same time, to know how and why it operates and how to locate any faults that may develop.

No branch of industry has ever progressed as rapidly as wireless and the rate of progress is increasing. Only by knowing thoroughly the basic principles can pace be kept with it. Our Instruction includes American developments and practice in addition to British. It is a modern education in radio, covering every department of the industry, and gives an outline of the principles and possibilities of television.

OUR COURSES

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We will be pleased to send you details of any or all of these subjects. Just mark and post the coupon, or write in any other way—the information you require will be forwarded at once.

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Test this against all others—we are confident you will choose 'CLIX'

The technical press congratulates 'Clix' on the design and efficiency of the 'Clix' "Master" Plug.

POPULAR WIRELESS says: "Radio enthusiasts who have experienced trouble from soft pronged or too rigid plugs and tapered H.T. Battery sockets will welcome the 'Clix' "Master" Plug.

1 1/2 D.

Supplied with long or short shanks and insulators.

METAL TO METAL CONTACT. FIRM GRIP, FULL SURFACE CONTACT WITH ANY H.T. or G.B. BATTERY SOCKETS.

Full range of markings.

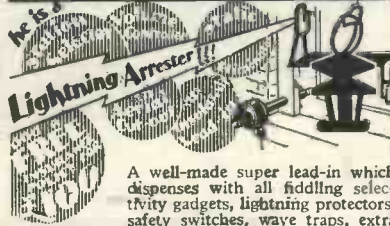


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Send for Illustrated Folder 'M' of all 'Clix' products.

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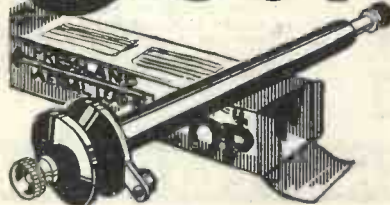
POP A COP ON YOUR AERIAL



A well-made super lead-in which dispenses with all fiddling selectivity gadgets, lightning protectors, safety switches, wave traps, extra condensers—all these cost money. A single COP at half a crown will do the work of all and do it properly. Controls volume, cuts out static nuisance, enables you to pick and choose your stations with vastly improved selectivity. Fixed in a few moments! Controlled by a touch of the finger! Get one from your local radio dealer to-day, or send P.O. (postage free) direct to the makers:

6-in. size, 2/6
9-in. size, 3/-
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CLIFFORD PRESSLAND (SALES), LTD.,
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PRICE 2/6 PRESSLAND AERIAL CONTROL COP



Scientific

You will get prompt replies by mentioning "Wireless Magazine"

**70 EXTRA
STATIONS
ON YOUR
SET**



If you fit an Eelex Short-Wave Convertor

Why be tied down to a few stations when you can increase the range and selectivity of your present set by fitting an Eelex Short-Wave Convertor?—no alteration necessary. You can then tune in stations on the 16/60 metre band, or with additional coils at 5/-, on the 60/120 metre and 120/180 metre bands, even if you have had no previous experience.

PRICES:

One valve model 60/- (with valve)
All mains model 65/- (without valve)
Two valve model 85/- (without valves)

Write for instruction booklet No. K14.

J. J. EASTICK & SONS,
Eelex House,

118, Bunhill Row, London, E.C.1

Phone: Metropolitan 0314/5/6.

Portadyne

CHALLENGE ALL EXISTING IDEAS OF RADIO VALUE

Money buys more in the new Portadyne S.G.4. CHALLENGER—a Receiver as modern as the minute—giving a performance far ahead of all similarly priced sets.

The All-British Portadyne CHALLENGER is full of exclusive features, among them being concealed and dust-proof controls, and Instantaneous Tuning which gets any selected station in 3 SECONDS. The Portadyne CHALLENGER'S range is enormous, its reproduction something new in faithfulness, its volume impressive.

Get to know more about this astounding new Receiver—it is the greatest value in the radio world to-day. Post the coupon now for fully illustrated details.



CHALLENGER

CASH PRICE £12.17.6

YOURS FOR 24/6 & 11 monthly payments of 24/6

Ask your dealer to demonstrate the new Portadyne B.M.C. . . . a Battery Receiver with Moving-coil Speaker and the tonal quality of a Mains Set!

To Portadyne Radio Ltd., Gorst Rd., North Acton, London, N.W.10
Details of CHALLENGER, please.

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The NEW Full O'Power CADET RADIO BATTERIES



60 VOLTS **5/6**
9 VOLTS, 1/- 16½ VOLTS, 1/9
THESE PRICES DO NOT APPLY IN THE IRISH FREE STATE



Represents the finest value in Radio Batteries it is possible to obtain.

Buy Full O'Power by SIEMENS

MANUFACTURED BY SIEMENS BROTHERS & CO. LTD. WOOLWICH ONE OF THE OLDEST COMPANIES IN THE ELECTRICAL INDUSTRY WHO HAVE BEEN MAKING BATTERIES FOR OVER 60 YEARS

Order of SIEMENS ELECTRIC LAMPS AND SUPPLIES LIMITED. 38/9, Upper Thames Street, London, E.C.4.

Advertisers take more interest when you mention "Wireless Magazine".

RADIO MEDLEY—Continued from page 404



JACK PAYNE AND HIS BOYS ON HOLIDAY

Their breakfast call on a saxophone! Jack Payne and his boys have been camping on the South Coast and this picture was taken at Bognor Regis. They will broadcast again on October 5

can be certain that an adjustment of the trimmers when the set is built will result in perfect ganging without a lot of trouble.

It does happen, with coils that are not made to match up with any particular condenser, that the variation obtained with the trimming condensers is not enough and it is therefore impossible in some cases ever to get a set ganged up properly.

It is for this reason that I anticipate a great success for the Calibrator, described elsewhere in this issue.

Record Changers

I welcome the Garrard automatic record changer because it gives the constructor the opportunity of building an outfit every bit as good as the most elaborate commercial radio gramophone at a very big saving in cost. The Garrard device sells, if I remember aright, at 10 guineas.

No doubt now that somebody has given a lead we shall have some other automatic record changers appearing on the scene; and a good demand should bring the price down considerably.

Talking to a number of friends about the advantages of record changers, I came across a peculiar point of view. Several of those with whom I spoke expressed the view that an automatic record changer is of no use if there is a lag of more than three or four seconds between the items.

Now that seems to me to be going

a bit too far. It is a fine thing to be able to load a machine up with enough records to last for half an hour, and I should not think of quibbling because there was a break of twenty seconds in the reproduction while the machine was doing

Poliakoff, the inventor of the Multitone low-frequency transformer.

As you know, the Multitone was put on the market only a few months ago, but it was actually designed two or three years ago. For the past twenty years or more Mr. Poliakoff has been engaged in a most laudable object—trying to teach deaf mutes to speak.

It is a long story and an interesting one, but it is only the latter part that can find a place here.

Mechanical Vibrations

Mr. Poliakoff's system is to use an amplifier and impress the mechanical vibrations corresponding to speech on some part of the patient's body. He very soon found that his subjects were sensitive to frequency variations and in order to get a more or less level overall response he began his tone-control experiments. One of the results was the low-frequency transformer now sold as the Multitone. It seems certain that we shall hear much more of this development in the future.

Another interesting revelation Mr.



B.B.C.'S FIRST TELEVISION PROGRAMME

An artist taking part in the first B.B.C. televised broadcast. An article on the B.B.C.'s latest television activities appears on page 310 of this issue

what I should have to get up out of my chair to accomplish!

Thank the Dumb!

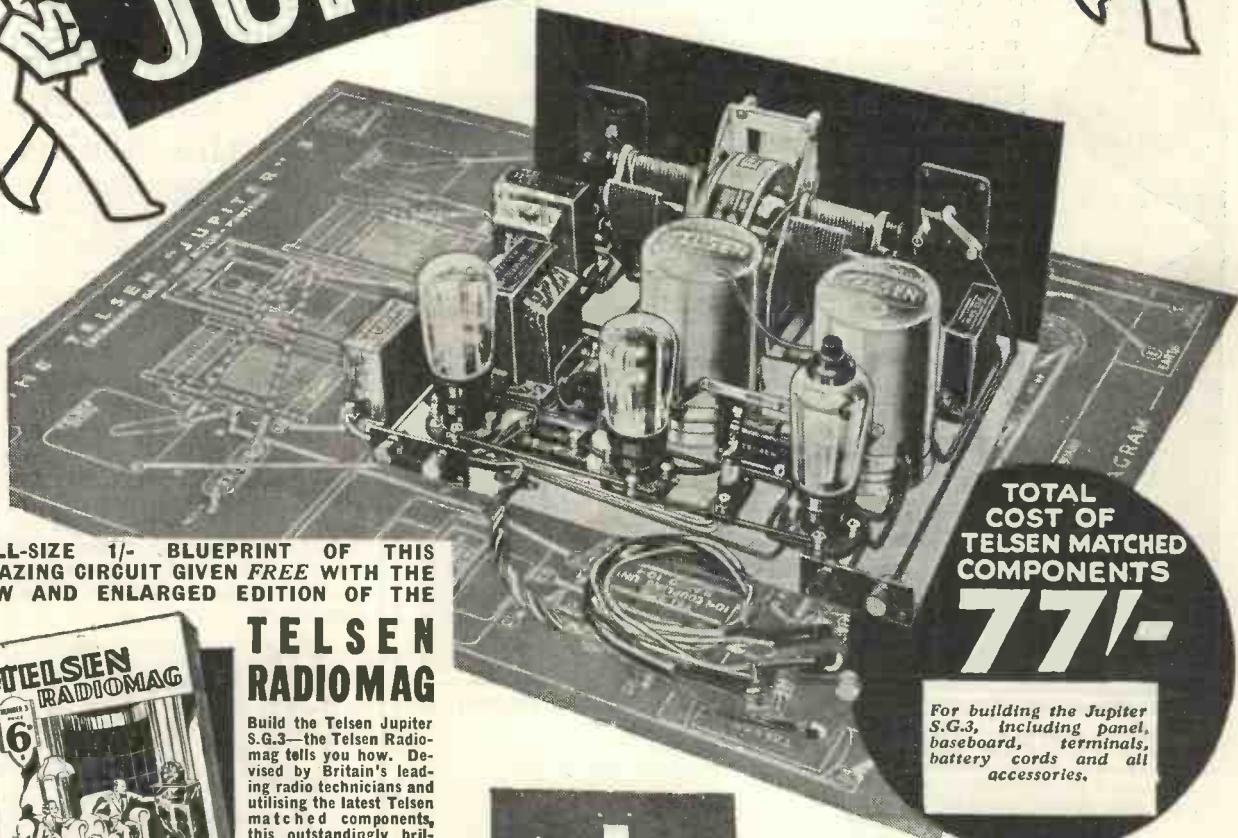
If you are one of those who like to use a tone-control transformer then you must thank the dumb. At any rate that is the conclusion I came to after a most interesting talk with Mr.

Poliakoff made to me was that as long ago as 1900 he actually took out a patent for a talking-picture film. The reproducing part included a selenium cell and an earpiece. The interesting part is that the title of the patent specification includes the term "photophone."

(Continued on page 412)

The **TELSEN**

JUPITER S.G.3



FULL-SIZE 1/- BLUEPRINT OF THIS AMAZING CIRCUIT GIVEN FREE WITH THE NEW AND ENLARGED EDITION OF THE

TELSEN RADIOMAG

Build the Telsen Jupiter S.G.3—the Telsen Radiomag tells you how. Devised by Britain's leading radio technicians and utilising the latest Telsen matched components, this outstandingly brilliant Telsen circuit is one which every keen home constructor will want to build. For it gives a performance immeasurably ahead of anything previously

achieved—not only in its extreme selectivity, its exceptionally wide range, and its tremendous amplification, but also in its really superb quality of reproduction. Complete constructional details, together with a full-size 1/- blueprint, are contained in the new Telsen Radiomag, issue No. 3. Packed with valuable information, this biggest and best issue also tells you all about the improved and now all-embracing range of Telsen radio components, at the revised prices only made possible by Telsen's enormous sale—the largest in the world. Get your copy now, price 6d., from your radio dealer or news-agent.



TOTAL COST OF TELSEN MATCHED COMPONENTS

77/-

For building the Jupiter S.G.3, including panel, baseboard, terminals, battery cords and all accessories.



DRUM DRIVE CONSTRUCTORS' OUTFIT
This Outfit contains all the necessary requirements for the construction of the TELSEN "JUPITER S.G.3," but the constructor will find the Outfit of great value in the building up of any receiver circuit employing the drum-drive condenser assembly.

No. 219
3/6

THE OUTFIT CONTAINS THE FOLLOWING:

- | | | |
|--|---|--|
| <ul style="list-style-type: none"> 1 Metal panel with attractive crystalline finish, specially cut and drilled for mounting the Telsen Drum Drive and other panel-mounted components normally required in a ganged condenser receiver. 1 Baseboard, 14 in. by 10 in. 1 Aerial and earth terminal strip. 1 Loudspeaker terminal strip. 2 Red terminals complete and mounted in holder. 2 Black ditto. | <ul style="list-style-type: none"> 7 Wander plugs mounted in holder. 2 Spade tags. 1 8-way Battery cord. 1 Cord clip. 2 Large insulating washers. 1 Small thick insulating bush. 1 Small thin ditto. 2 Spacing nuts for the reaction and aerial series condensers. 2 Spacing nuts for the "on-off" switch. 1 Wave-change Escutcheon with two screws and nuts. 1 Separator ditto. | <ul style="list-style-type: none"> 1 Volume ditto. 1 "On-off" escutcheon. 2 Height plinths for the matched screened coils. ½ in. of 3 m.m. sleeving (black). 1½ in. ditto (red). 20 ft. of 1½ m.m. sleeving (green). 21 ft. of 22 S.W.G. tinned copper wire. 1 Double-ended spanner for locknuts. 1 Four-way spanner. Assortment of ½ in., ¾ in., 1 in., 1½ in., and 1¾ in. wood screws. |
|--|---|--|

TELSEN

RADIO COMPONENTS

Get your copy of the new **TELSEN RADIOMAG, Issue No. 3**

ANNOUNCEMENT OF THE TELSEN ELECTRIC CO. LTD., ASTON BIRMINGHAM

There is news in the "Wireless Magazine" advertisements

TUNEWELL'S 2 BIG OLYMPIA HITS!

Amazing interest was shown at Olympia in the new range of Tunewell Super-Radio Components, which have removed the price-bar to quality radio. Whatever set you intend to build, there are Tunewell Components to *improve reception—and save you money!* Get the "Guide to Super-Radio" which gives details, and includes 8 FREE BLUE PRINTS (Kit Eliminator, All Mains Band Pass 3, etc.). The new Tunewell A.C. All-Electric Radio-Gramophone also made a great hit. *This instrument has given Tunewell the lead in Radio-Gramophones.* Its greatest features are wonderful fidelity and purity of tone. Send now for the illustrated Brochure.

TUNEWELL

**STOP
PRESS!**

**TUNEWELL
L.F. CHOKE**
S20/50
Price 12/6
SPECIFIED
in the
CALIBRATOR
described in
this issue

To Tunewell Radio Ltd.,
54 Station Rd., London, N. 11.

Please send me

- * (a) "Guide to Super Radio."
- * (b) Radio-Gramophone Brochure.

NAME

ADDRESS

* Cross out if not required.

W.M.4

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containing the widest selection of engineering courses in the world

Qualify for a well-paid post in engineering by studying at home with The T.G.B. Become an A.M.I.E.E., A.M.I. Mech. E., A. Rad. A., etc. Training until successful is guaranteed for the one fee. Write for Free Guide stating branch, post or qualification that interests you, to

The Technological Institute of Great Britain

105 Temple Bar House, E.C.4.
(Founded 1917, 18,000 successes)

To Success



THE BRITISH RADIO INSTITUTION.

Founded over two years ago; membership steadily increasing. Objectives: Closer technical co-operation between, and subsequent advancement of, its members. Entirely non-political. Associateship by examination or approved qualifications. Subscription membership open to all. Office Bearers act in honorary capacity only. Explanatory brochure (free) from Honorary Secretary:—
MR. J. D. FOX, 25 Kingswood Drive, Kings Park, Cathcart, Glasgow.

TAYLEX WET H.T. BATTERIES

Give long service, improved volume and tone. Very economical. Replacements for Taylex or Standard batteries at low prices; details post free. Also Bargain List, Radio Kits and parts at lowest prices.
B. TAYLOR, 57 Studley Road, STOCKWELL, LONDON

CORRECTION

A misprint occurred in the London Radio Supply Co. advertisement on page 114 of our September issue. The price of the New Corsor Melody Maker Kit should be 10/- with order and 11 monthly payments of 14/10.

YOUR OLD COMPONENTS

are worth money. Sort out the spare radio parts you no longer require and advertise them in the "Miscellaneous Columns" of **AMATEUR WIRELESS**. You will be surprised how quickly they will be snapped up.

Your announcement will cost you 3d. a word. Send your list of parts, together with your name, address and remittance, to:

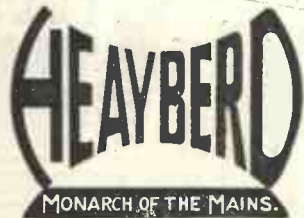
**"Small Advertisement" Dept.,
AMATEUR WIRELESS**

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



Run your radio from the Mains

Get your power from the mains with a Heayberd Mains Unit and be sure of a constant, silent, and steady H.T. and L.T. supply for your receiver. Heayberd are specialists in Mains Equipment and can supply you with Complete Mains Units, Assembled Mains Kits, or Un-assembled Mains Kits. The Mains Unit illustrated above is Model D.120—output, 20 m/A at 120 v., 2 v. 3 amp. Trickle Charger; three H.T.appings, S.G., 60—120 v. var., 100 v. and 120 v. fixed. Supplied in modern bronze-finished metal case. Incorporating Heayberd Transformer, Choke, and Westinghouse Rectifier. Price, 85/- Size, 8 in. by 5 in. by 4 1/2 in. Send coupon NOW for 1933 Catalogue of Mains Equipment.



I enclose 3d. stamps for 1933 Catalogue, packed with Technical Tips and Circuit Diagrams.

M.....

Address

W.M.6

F. G. HEAYBERD & CO.,

10, Finsbury St., London, E.C.2

One minute from Moorgate Underground Station.

Famous Makers' Offer! **£5** Radio Gram CABINET for **65/-**
7 DAYS' FREE TRIAL

10/- monthly if desired

You save 35/-! A few only at makers' prices. Rich Brown Oak "Master Grand" (as made for Radio Press) carriage paid. A fine Bargain. PHOTOGRAPHS and LISTS FREE.

All Models from 35/- to £15



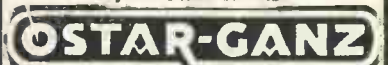
PIANO TONE

Patent 8123 improved acoustics yields mellow, rich, full volume that your speaker is really capable of. Makers to:—
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PICKETTS Piano Tone Cabinets (M.G.)
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CONVERT YOUR BATTERY SET TO ALL-MAINS
By the aid of the wonderful



HIGH VOLTAGE MAINS VALVES
It's Cheap. Easy and Safe to do this. No more H.T. or L.T. Batteries; no expensive mains transformers or resistances needed. Change over of Supply makes no difference. Works direct from D.C. or A.C. Most economical. Full clear instructions with every valve. G.P. Det. Power, 17/6 each. Super Power, 18/- Rectifying 50 M.A., 14/6. 125 M.A., 15/6. All voltages. State voltage only when ordering.

All Mains Receiver and Amplifier Kits available. Prices on application.

EUGEN FORBAT

e/o Nivalight Ltd., 1, Rossbery Avenue, London, E.C.1.
Telephone: Clerkenwell 1825

A 3V. ALL-ELECTRIC RECEIVER

with power pentode output, built-in moving-coil speaker and special tone filter in a handsome two-tone dark walnut cabinet

To offer at £12, absolutely complete, a Regentone 3-valve all-electric receiver, with a built-in moving-coil speaker and a special tone filter, is a big event. It is the consummation of many months' patient planning and research by Regentone.

The Regentone "Straight Three" is absolutely reliable, completely trouble-free, for it is built by Regentone, the specialists in all-electric radio.

All worth-while Continental programmes can be received in any part of the country. Operation is extremely simple. One switch controls the electric power, selection of high- or low-wave bands, and the use of the external gramophone pick-up. Housed in an attractive dual-tone walnut cabinet.

Ask your local dealer for a demonstration. Or write to-day for the Free Regentone booklet.

IF YOU HAVE A BATTERY-OPERATED SET—

make it all-electric with a Regentone Mains Unit. Each Regentone Mains Unit incorporates these five star features : Each model is housed in a solid drawn steel case of most attractive design, having a Florentine bronze finish.

Each and every model is provided with tappings divided into three main groups : Screen Grid, Detector, and Power. The screen-grid and detector supply each have high, medium, and low outputs. The power supply has one output only. Seven voltage tappings are common to all models. All mains units incorporate a Line Voltage Regulator, by means of which voltage fluctuation in the main supply line can be compensated. The line voltage regulator and voltage tappings are carried by a specially moulded distributing block; the sockets carrying voltage are sunk into the insulating medium. But it must be REGENTONE !



FOR ONLY
£12
COMPLETE

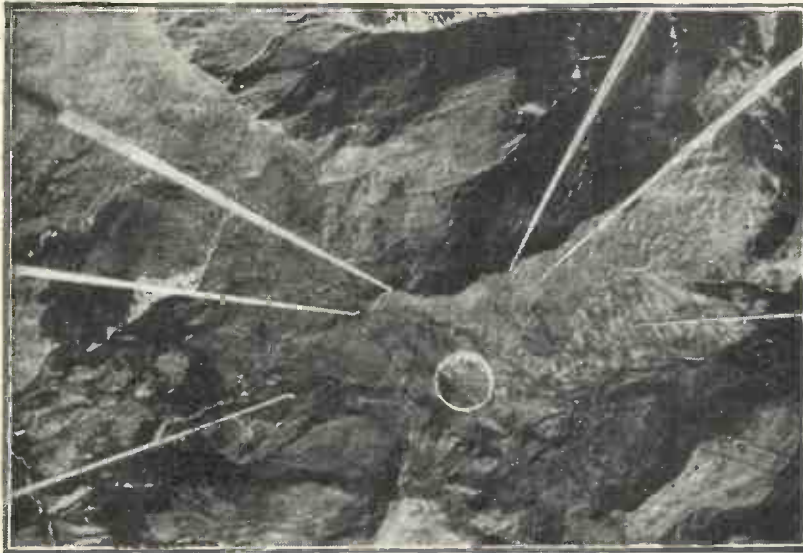
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RADIO MEDLEY—Continued from page 408



TEN MILES ABOVE THE MOUNTAINS

A photograph taken from Professor Piccard's balloon. The circle is the wireless aerial and the white lines are the mooring ropes hanging from the gas bag

Sparking-plug Trouble

I have just come across an interesting gadget; it is a resistance for fitting to the sparking plug of a car to reduce interference with a radio set. Such resistances should interest those who take their portable sets about with them and to those who have vans equipped with a public-address outfit. One resistance is needed for each plug, of course.

Dubilier's are the makers of this gadget, which costs 3s. 6d. I found it described in an interesting booklet issued by this firm under the title "Concerning Dubilier Metallized Resistances," a copy of which you should certainly send for. It contains a lot of interesting information about the choice of resistances for various purposes in radio.

Top-note Quality

The purists must be having a fine old time arguing about the modern tendency towards tone control. Experience shows that the real value of tone control is to restrict top-note response. If you cut out the very high notes in radio reception you also cut down the mush level considerably, and you may even cut out heterodynes whistles.

In the case of a radio gramophone you cut down the needle scratch and

the records you listen to seem very much sweeter.

One disadvantage of cutting off top is that you seem to reduce the volume so much. Just listen to a mushy set without a tone control; then add a tone control to cut down the top notes—and your strength will seem to go down by half!

Tone control is a most interesting subject, especially if you bear in mind the peculiar shape of the audibility

curve of the average ear, which is very much more responsive to low notes and high notes than it is to the middle of the musical register.

A Matter of Policy

If I were to become a radio-set manufacturer there are a number of things I should do differently from my rivals.

In the first place I should try to give the buyer his choice of reasonable alternatives. I would take a basic chassis and then pick a selection of cabinets suitable for it. Thus the buyer would have a choice of cabinets for the same set—a thing I am certain would be appreciated.

Then I should also make the chassis itself more or less flexible. For instance, if you wanted tone control you could have it; if you wanted separate volume controls for radio and gramophone you could have them—in fact I should try to let the buyer fix his own specification.

Of course, my prices would be a little higher than those of my competitors, but a lot of listeners with ideas of their own would come to me! I commend the suggestion to some of the smaller manufacturers who are not tied down to big production programmes on some definite line.

BM/PRESS

London, W.C.1.

Too-simple Sets!

TO the uninitiated set buyer it might seem that simplification of the set's controls could not be carried too far. This supposition is nevertheless erroneous, because a wireless set is not merely a mechanical apparatus—it is much more electrical than mechanical.

We think that mechanical simplicity can be carried to an extent that definitely mars the electrical performance. A simple yet striking example of this is offered by the type of volume-control knob that does away with a separate knob for reaction. The simplification in control knobs means a loss in the ultimate degree of selectivity.

Then there is the volume control that combines in its action the switching on and off of the mains supply or the batteries, at first

sight an admirable simplification.

Work the set for a day or so and one realises that perhaps after all a separate switch knob for the power supply is not too tiresome, seeing that with this slight extra complication it is possible to leave the volume control adjusted at just the right position for the local.

Too-frequent Setting

With the new type of volume control the setting has to be found every time the set is switched on.

If this switch-cum-volume control is to stay let us have the volume control graduated in degrees or numbers, so that the control knob can be immediately set to the right point, without waiting a minute or more for the valves to warm up.

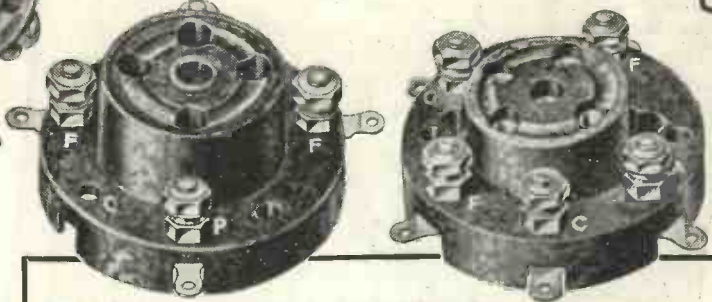
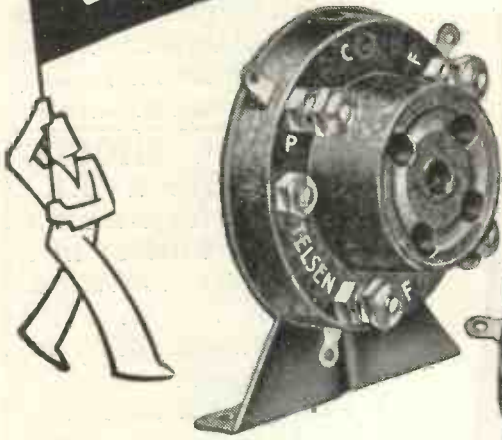
TELSEN

VALVE HOLDERS SWITCHES AND GRID LEAKS

TELSEN VALVE HOLDERS

A new range of valve holders has been introduced in both solid and anti-microphonic types. These embody special contact sockets of one-piece design with neat soldering tag ends and terminals. They have an extremely low self-capacity and are easily mounted.

SOLID TYPE		ANTI-MICROPHONIC	
NO.	PRICE	NO.	PRICE
4 Pin. W.224	- 9d.	4 Pin. W.222	- 1/-
5 Pin. W.225	- 1/-	5 Pin. W.223	- 1/3
W.198.	Universal Type Valve Holder	-	- 1/-



TELSEN GRID LEAKS

These are absolutely silent and practically unbreakable, and do not vary in resistance with application of different voltages. They are non-inductive and produce no capacity effects.

CAP. MEGOHMS. NO.	CAP. MEGOHMS. NO.
5 W.254	1 W.250
4 W.253	1/2 W.249
3 W.252	1/4 W.248
2 W.251	

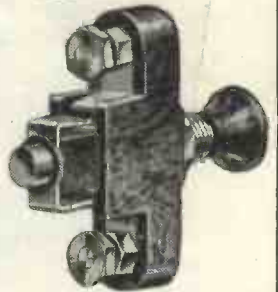
1/4

TELSEN PUSH-PULL SWITCHES

employ the "knife" type of self-cleaning contact, and a positive snap action. The nickel-silver bridge-piece is driven between the springy "fixed" contacts, and the wedge-shaped plunger squeezes the inner contacts outwards, closing the jaws in a firm grip. The series gap reduces self-capacity to a minimum, and the spindle is insulated from all contacts. For use as battery switch, or as wave-change switch with the dual-range short-wave coil unit.

Two-point. No. W.107

1/4

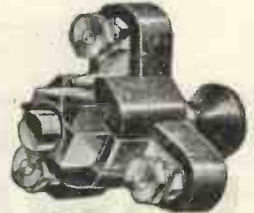


TELSEN WAVE-CHANGE SWITCH

The wave-change switch for Dual Range Aerial Coil, or for breaking L.T. and H.T. circuits simultaneously.

Three-point No. W.108

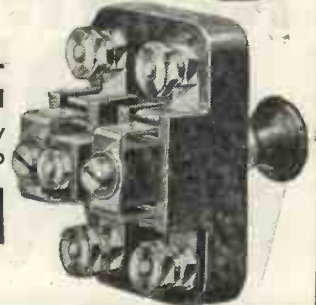
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TELSEN FOUR-POINT "TWO-POLE" PUSH-PULL SWITCH

This model is a two-pole switch highly suitable for use in wave-changing on two coils or an H.F. Transformer, or for switching pick-up leads or an additional loudspeaker.

1/6



TELSEN

RADIO COMPONENTS

Get your copy of the new **TELSEN RADIOMAG, Issue No 3**

ANNOUNCEMENT OF THE TELSEN ELECTRIC CO., LTD., ASTON, BIRMINGHAM

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Amateur and Expert



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THIS
200
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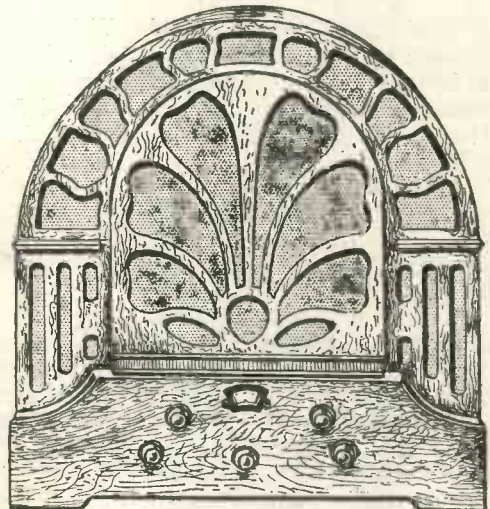
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283, Shakespeare House, 29-31, Oxford Street, London, W.1.

DON'T DELAY YOUR MUCH DESIRED RADIO-GRAMOPHONE ON THE SCORE OF EXPENSE



Build your Radio Set. This charming Radio Cabinet will take any contractors Kit or Chassis. Size 23 x 20 x 10. Panel 12 x 8. Unit B. Price £3 10s. Easy terms arranged. See page No. 373 for further details.

Send for our CHROMOGRAM UNIT C comprising Electric Motor and Pick up complete in metal chassis. Price £3 17s. 6d.

Remove centre fret, insert Unit C and your Radio-Gramophone is complete.

Full Lists and Brochures on application.

CHROMOGRAM
76/78, City Road, LONDON, E.C.

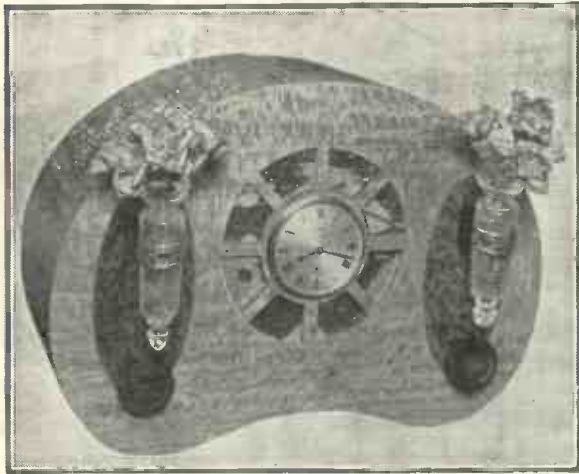
Please mention "Wireless Magazine" when corresponding with advertisers

NOTES & JOTTINGS

JUST as we go to press with this issue two books have come to hand for review. The first is a revised edition of J. H. Reyner's "Modern Radio Communication." It is described as "a manual of modern theory and practice, covering the

tember 28, and closes on Saturday, October 8. If you did not go to Olympia you must try to get to Manchester!

Three price reductions are announced by the Marconiphone Co., Ltd., as a result of the demand experienced at the Radio Exhibition. Model 330, a three-valve radio gramophone is now 29 guineas; model 535, the seven-valve super-het radiogram, will sell at 39 guineas; and model 536, the same instrument with the addition of an automatic record changer, costs 46 guineas.



YES, IT REALLY IS A RADIO SET!
This is the "W.M." Economy A.C. Two in a new guise. It can be obtained complete or as a kit of parts from Radio Furniture and Fittings, Ltd.

syllabus of the City and Guilds examination and suitable for candidates for the P.M.G. certificate." It contains 318 pages and is published at 5s. by Sir Isaac Pitman and Sons, Ltd.

The second book is for those interested in the development of marine radio. Its title is "Wireless and Shipping" and it is published at 2s. by *The Shipping World, Ltd.*, of Effingham House, Arundel Street, London, W.C.2.

In the August issue of "Wireless Magazine" (page 43) there appeared an article under the title "Height Is Not Everything!" The author, Gordon S. Mitchell, omitted to state that the tests he mentioned were originally carried out and described by the *American Radio News*.

North country readers of "Wireless Magazine" should make a point of seeing the latest "W.M." designs on our stand at the National Radio Exhibition, Manchester. This exhibition opens on Wednesday, Sep-

Wakefield Street, Edmonton, London, N.18, we have received a sample of a new 1-ampere fuse plug; 2- and 5-ampere fuses can also be supplied, the price complete with fuses being 2s. each.

The B.B.C. has just published a new booklet dealing with the talks to be broadcast from September to December, 1932. It contains 64 pages and can be obtained for 1d., post free.

Another B.B.C. publication that will interest the more technically minded listener is a 70-page booklet entitled "Technical Tables and Glossary"; the price is 1s., post free, from the B.B.C., or it can be obtained through any newsagent. It contains tables of equivalents; dielectric strengths; resistances, capacities and inductances in series and parallel; frequency, velocity and wavelengths; audible frequency ranges, etc.

From the Watmel Wireless Co., Ltd., of Imperial Works, High

Street, Edgware, Middlesex, we have received a folder dealing with the new Watmel variable and fixed resistances.

Radio Furniture and Fittings, Ltd., of 106 Victoria Street, London, S.W.1, found the Economy A.C. Two (described in the June issue) so easy to handle that they have made it up as a complete receiver, with certain minor modifications. The set uses Mullard 904V and PM24M valves and incorporates a Celestion permanent-magnet moving-coil loud-speaker. It can be supplied complete or as a kit; the cabinet can also be obtained separately if desired.

The famous mail-order kit business of Ready Radio, Ltd., has been sold to Direct Radio, Ltd. The policy of Ready Radio is to sell their components through the usual trade channels and Direct Radio, Ltd., will concentrate on kits of parts for published receivers designs.

A complete range of new leaflets dealing with Osram valves has been produced by the General Electric Co., Ltd. These can be obtained on application. Most listeners, though, will find the "Osram Wireless Guide" sufficient for their purpose.

WHY NOT?

FIT A **LIMIT** RELIANCE PICK-UP AND CARRIER in the RADIO-GRAM YOU ARE MAKING

Acknowledged to be "First-class" in value, Tone and Workmanship

No Needle Screw Turnover Head
Arm Incorporates a Rest

15/6 each

Ask your Dealer or write
LIMIT RADIO LTD., 15/29 Windsor St., N.1

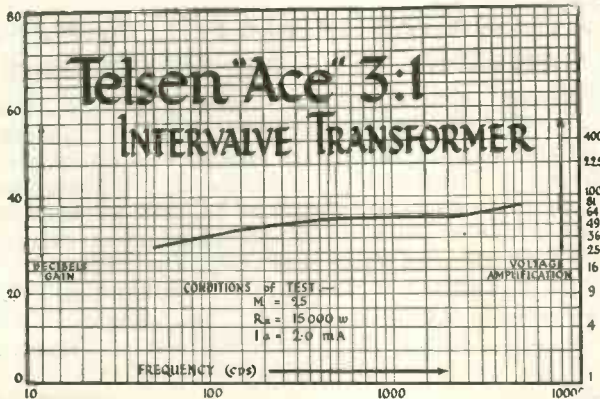
TELSEN L.F. TRANSFORMERS

THE "Telsen" Ace is eminently suitable for Receivers where highest efficiency is required at low cost and where space is limited. As its characteristic curve will show, it gives a performance equal to that of the most costly transformers.

RATIO 3-1 No. W.66

RATIO 5-1 No. W.65

5/6



TELSEN "RADIOGRAND" L.F. TRANSFORMERS.

Telsen "Radiogrand" Transformers have signified to expert designers and enthusiastic constructors all that is finest in British Radio craftsmanship. The design is based on the results of recent research coupled with the soundest engineering principles, tested rigorously for immaculate performance and enduring efficiency.

RATIO 3-1, No. W.59.
RATIO 5-1, No. W.58.

7/6



TELSEN "RADIOGRAND" (Ratio 7-1) TRANSFORMER.

This Transformer is designed to give extra high amplification on receivers employing only one stage of L.F. amplification. It is not recommended for use in receivers employing two L.F. stages, as overloading is likely to occur.

No. W.60

10/6



TELSEN "RADIOGRAND" INTERVALVE TRANSFORMER. Ratio 1.75-1.

For use in receivers employing two stages of L.F. amplification, where exceptionally good quality is desired. When used following an L.F. stage employing choke or resistance coupling it will be found to give ample volume with remarkable reproduction. No. W.61.

10/6

TELSEN

RADIO COMPONENTS

Get your copy of the new **TELSEN RADIOMAG, Issue N°3**

ANNOUNCEMENT OF THE TELSEN ELECTRIC CO., LTD., ASTON, BIRMINGHAM

You will get prompt replies by mentioning "Wireless Magazine"

Elementary WIRELESS COURSE for the BEGINNER

This is your opportunity to learn about Wireless. Read, in the issues of "Amateur Wireless" dated Sept. 17, 24 and Oct. 1, the first instalments of this Course, which has been written on the assumption that you know nothing about the subject. Everything will be explained in such a simple way that you cannot help understanding what wireless really is, how components do their duty and how your set functions. The many novel illustrations, of which four are here reproduced, have been so conceived as to make immediately clear the more difficult points dealt with in the brightly written text.

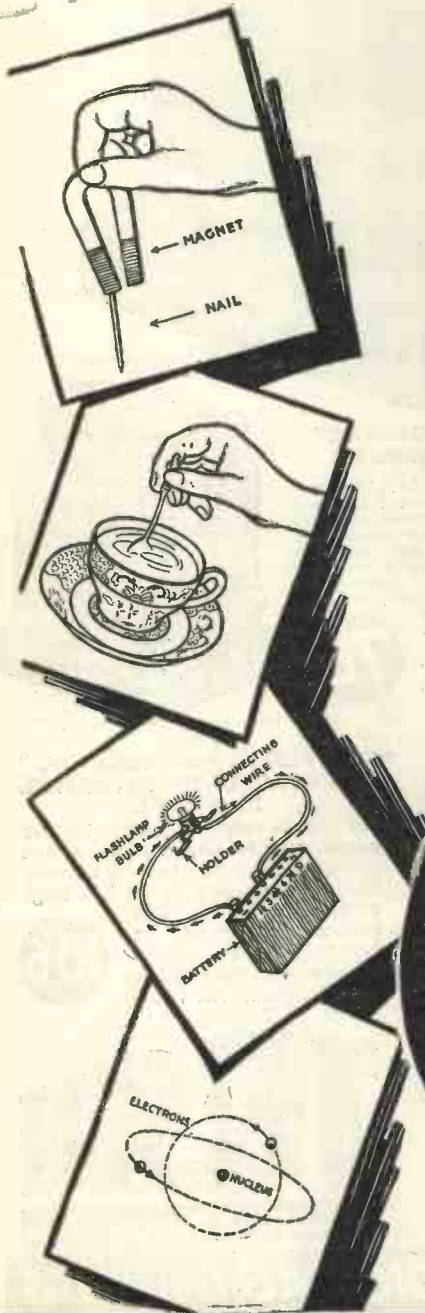
ALSO IN THE ISSUE DATED SEPT. 17

BIG SUPPLEMENT

The "WIZARD THREE"

Outstandingly new, written and illustrated for the veriest beginner, by men who know. Percy Harris takes two or three simple components, connects a wire from one to the other and shows you how to produce the simplest possible "Build as you learn set," in just a few minutes. Also many short articles of value to the beginner.

Full instructions for building this first-rate set, modern in its idea, devoid of complexity and entirely straightforward. It can be built at home in a couple of hours at extremely low cost. The "Wizard 3" is as easy to operate as it is to build. See subsequent issues for full-size wiring diagram and further information.



Amateur 3rd

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Write for our New Catalogue. This Catalogue is beautifully and somewhat expensively produced, and forms a complete guide to up-to-date Transformer and Choke construction. It gives full details of the new products, which were some of the most interesting items at the show—at least as far as the serious worker is concerned.

New Amplifier and High Power Speaker Catalogue also available.

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 Pair of Band Pass Coils and H.F. Coil similarly mounted and switched-ganged. 23/6

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by "Wireless Magazine" Technical Experts
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Oak .. £4 10 0
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All models carriage forward.

CATALOGUE OF LATEST MODELS SENT POST FREE

Advertisers like to know whence the business comes—please mention "W.M."

THINGS THAT STRUCK US—Contd. from p. 367

attention; they were well to the fore, and even casual examination of their component parts quickly demonstrated that manufacturers to-day are rightly devoting their attention to the quality of components with a view to securing sustained efficiency.

No Fear of Foreign Competition

Personally, I think that the general impression I secured from my visit was that the Exhibition must make a direct and strong appeal to the public; that the class of goods offered easily demonstrated that Great Britain has little to learn from her foreign competitors; and that the keen interest shown by the visitors forecasts a rapid increase in the number of licensed listeners.

I should not be surprised to learn that in the course of a few months the British Isles will have exceeded the six-million mark.

BY S. RUTHERFORD WILKINS

I THINK that the eight-valve super-heterodyne exhibited on the Murphy stand is deserving of great praise. The chassis upon which this receiver is built gives the impression of a soundly engineered and well-finished job. The whole set has been designed for maximum efficiency throughout, notable features being the completeness of screening and the excellent positive action of the ganged switches.

Although the set was obviously designed first and the cabinet thought about afterwards, the latter presents quite a pleasing, if unconventional, appearance.

Special Tuning Coils

Another set at the Show with several unusual features is the Philips type 630A, which has amazing claims to sensitivity and selectivity. This is largely due to the excellent design of the coils used.

SUMMARY BY D. SISSON RELPH

IT is evident from the remarks made by the contributors to this symposium—for I have had the advantage of seeing what all of them have had to say—that the work put in by radio designers during the past few months has borne good fruit.

An Imposing List

Those who have written notes for this feature were asked to confine their remarks to the three or four most outstanding things they had noticed at the Show. Nevertheless, if you will make a list of all the items that have been mentioned by name in the preceding pages you will see that it is quite an imposing one.

Several contributors have had something to say in praise of the Murphy super-het receiver. It certainly does look a good job, but unfortunately up to the time of going to press with this issue nobody has been able to try one out. Mr. Murphy claims to be "making wireless simple" and tries to appeal to the man-in-the-street. Well, with his new super-het he has certainly appealed to all the technicians as well.

I am glad to see that Mr. Percy Harris has drawn attention to the so-called "demonstrations" of sets at Olympia. I knew that all the sets on the stands in the main hall had only their loud-speakers connected to the

These are wound on a glass former about $1\frac{1}{2}$ inches in diameter and have a medium-wave winding of a special stranded wire. This feature, combined with the fact that the coil dimensions have been carefully considered, is stated to give the coil the extremely high dynamic resistance of 500,000 ohms, with a consequent high standard of selectivity and sensitivity.

Another unusual feature of the set is the special vernier tuning control, which gives the tuning dial an equivalent length of about 60 inches. Thus, despite a very high order of selectivity, stations are tuned-in with great ease.

A Portable You Can Carry!

It is characteristic of most portables that their weight makes it impossible to carry them more than a few yards at a time. This year, however, Adey Radio have provided us with a four-valve portable which weighs only 12 lb. complete with batteries; the dimensions are only 14 by 14 by 6 inches. Perhaps the "portable" is not a myth after all.

BY KENNETH ULLYETT

WHILE most complete sets this year have station-calibrated or wavelength-calibrated dials, only one make of set, the Zetavox, incorporated an automatic tuning device.

No firm at Olympia appeared to be offering alternative tuning scales, in the case of station-calibrated sets, in the event of station positions in the ether changing.

Loud-speaker improvements (apart from cheaper moving coils) were not striking, in my opinion, but I rather marvelled at the difference that the Broadcasting House type of loud-speaker baffle made to any ordinary small reproducer. One of these baffles was working on the "Wireless Magazine" and *Amateur Wireless* stand.

B.B.C. landline, but I admit I had a shock when I realised that the sets being demonstrated in the annexe were not working on radio.

They seem to be able to arrange things much better in Berlin, for I have seen a photograph of a device used there for connecting a score of sets to the same aerial.

Personally, I do not like the tendency among set makers to mark the names of stations on their tuning dials. Wavelength calibrations are to be encouraged, for they are always of use. If a station goes off its official wavelength only a little you are almost certain to confuse it with some other transmitter if your dial is marked with names. Constructors who have had difficulty in deciding which is which between two adjacent and reasonably powerful transmissions will appreciate this point.

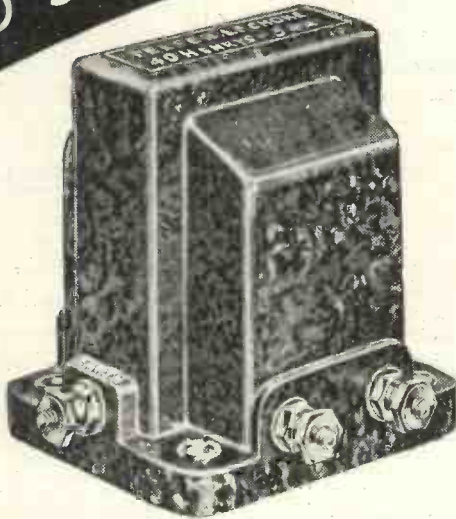
Sorting Out the Good Things

Everybody in the radio trade is now trying to sort out the new products and find just where they stand. Although there were comparatively few revolutionary developments at this year's Show every stand was full of new apparatus.

The standard that has been set for 1933 is a high one—a thing for which we should all be thankful.

TELSEN

COUPLING, OUTPUT, AND SMOOTHING CHOKES



TELSEN INTERVALVE L.F. COUPLING CHOKES

These popular L.F. Chokes are primarily intended for use as coupling chokes, but may be used in any circuit not carrying more than the stipulated maximum current. The 100 H. type is for H. or H.L. type valves, the 40 H. type for L. type valves.

RATING	NORMAL CURRENT	MAX. CURRENT	NO.
40.H. at	5.M.A.	10.M.A.	W.68
100.H. at	3.M.A.	8.M.A.	W.69

5¹/₂



TELSEN TAPPED PENTODE OUTPUT CHOKE

This choke is designed primarily for pentodes taking an anode current of not more than 20.M/A which includes the ordinary battery operated types. The single tapping provided gives (by reversing) ratios of, 1-1, 1.6-1, 2.5-1, which provide for matching under widely varying conditions. The choke is equally suitable for matching a low impedance speaker with an ordinary power valve. A coupling condenser of 1.Mfd. is recommended.

No. W.72

7¹/₆



TELSEN POWER PENTODE OUTPUT CHOKE

The purpose of this power pentode output choke is to prevent direct current passing through the Loudspeaker, and also to match the speaker to the pentode valve. By using this choke in conjunction with a condenser of 1.Mfd. the quality obtained from a pentode becomes quite equal to that expected from a normal super power valve, and the volume is much increased. This model is suitable for mains power pentodes carrying currents up to 40 M/A and for correct matching gives the choice of three ratios, viz:—
1-1, 1.3-1, and 1.7-1.

No. W.172

10¹/₆



TELSEN OUTPUT CHOKE

Designed for use as Output Filter in conjunction with a condenser not less than 1 Mfd., following any power or super power valve taking up to 40 M/A anode current. Gives an ideal response curve under all conditions.

No. W.71

7¹/₆

TELSEN

RADIO COMPONENTS

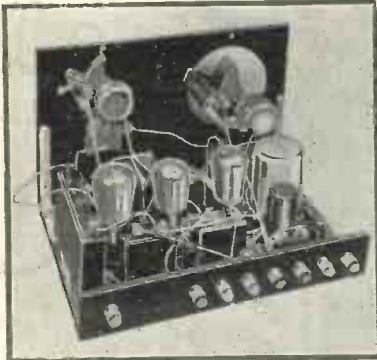
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Easy-to-Build One .. AW304
"B.B.C." One .. AW344
Portable Short-wave One .. AW354

TWO-VALVE SETS

All these 1s. each, post free

Ever-tuned Regional Two (D, Trans) .. WM241
Station-finder Two (D, Trans) .. WM243
Music-lover's Two (D, Trans) .. WM260
New Economy Two (D, Trans) .. WM265
Family Two (D, Trans) .. WM278
Economy A.C. Two (D, Trans) .. WM286
Screen-grid Two (SG, Trans) .. WM289
Two for Seven Metres (D, Trans) .. WM295
*New Style Radiogram (D, Trans) .. WM299
Big-volume Two (D, Pen) .. AW309
Two Star 2 (D, Pen) .. AW315
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Midget Two (D, Trans) .. AW348
Mascot Two (D, Trans) .. AW353
Ideal Regional Two (D, Trans) .. AW357

THREE-VALVE SETS

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Everybody's Radiogram (SG, D, Trans) .. WM258
Double Band-pass Three (SG, D, Trans) WM259
Everybody's Radiogram (with Automatic Grid Bias) .. WM262

A blueprint of any one set described in the current issue of the "Wireless Magazine" can be obtained for half-price up to the date indicated on the coupon (which is always to be found on the last page) if this is sent when application is made. These blueprints are marked with an asterisk (*) in the above list and are printed in bold type. An extension of time will be made in the case of overseas readers.

New Economy Three (SG, D, Trans) .. WM263
New Plug-in-Coil Three (D, 2 Trans) .. WM270
Transportable Three (SG, D, Trans) .. WM271
Multi-Mag Three (D, 2 Trans) .. WM288
Percy Harris A.C. Radiogram (D, RC, Trans) .. WM294
The Prosperity Three for Batteries (SG, D, Pen) .. WM296
The Prosperity Three for A.C. Mains (SG, D, Pen) .. WM297
The Prosperity Three for D.C. Mains (SG, D, Pen) .. WM298
Square-peak Three (SG, D, Trans) .. AW293
Universal Short-wave Three (SG, D, Trans) .. AW301
Olympian Three (SG, D, Trans) .. AW306
Tonality Three (D, RC, Trans) .. AW321
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Baby Three (D, RC, Trans) .. AW324
World Wide Short-wave Three (D, RC, Trans) .. AW332
New Favourite Three (D, RC, Trans) .. AW334
Home Lover's All-electric Three (SG, D, Trans) .. AW335
P.W.H. Mascot (D, RC, Trans) .. AW337
Home Lover's Battery Three (SG, D, Pen) .. AW341
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The Gold Coaster (AC Short-wave) .. WM292
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*The Calibrator (SG, D, RC, Trans) .. WM300
All-Europe Four (2HF, D, Trans) .. AW173
Stability Four (HF, D, RC, Trans) .. AW182
4/3 3s. Four (SG, D, RC, Trans) .. AW303
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Four-star Four (SG, D, RC, Trans) .. AW318
The 50/- Four (SG, D, RC, Trans) .. AW331
Up-to-the-Minute Four (SG, D, RC, Trans) .. AW356
Your Home Radiogram (SG, D, RC, Trans) .. AW358

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All these 1s. 6d. each, post free

Regional D.C.5 (SG, D, LF, Push-pull) WM252
Ideal Home Super (Super-het) .. WM280
Easytune 60 (Super-het) .. WM284
Britain's Super (Super-het) .. AW311
A.C. Britain's Super (Super-het) .. AW322
" Mains section (1/-) .. AW322A
James Short-wave Super-het .. AW324
Simple Super (Super-het) .. AW340

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A.C. Super 60 (Super-het Radiogram) .. WM239
A.C. Super 60 (Super-het Table Model) WM245
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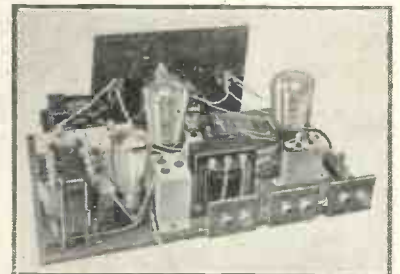
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Output Unit for Pentode Sets .. AW316 1/-
"A.W." Short-wave Adaptor .. AW317 1/-
Short-wave Plug-in Adaptor .. AW326 -/6
Super-het Short-wave Adaptor .. AW329 -/6
"A.W." Short-wave Adaptor .. AW339 1/-
Mascot Mains Unit .. AW350 1/-
"A.W." Trickle Charger .. AW352 1/-
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A TWO FOR A.C. MAINS
The Economy A.C. Two is cheap to build
and gives first-rate results. A valve rectifier is used

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1 Colvern dual-range coil, type KGR, without screen and wavechange switch	8	8	
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2 Belling-Lee spade terminals, marked: L.T., L.T.—	4		
1 Lewoco 20,000-ohm spaghetti resistance	1	8	
1 Dubilier 2-megohm grid leak	1	0	
1 Magnum 2,500-ohm variable resistance combined with on-off switch, type 1130	7	0	
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1 Varley "Rectatone" L.F. transformer	15	0	
1 Table model cabinet	17	6	
1 Wooden chassis	2	6	
1 Mullard FM1LL valve	7	0	
1 Mullard FM2 valve	8	9	
	25	5	1

Kit No. 1 (less valves and cabinet) **£3-11-10**
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PROSPERITY THREE Recommended Accessories

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Peritrix 150-volt super-power H.T. 301	1	11	0
Peritrix 15-volt G.B. type 292	2	3	
Peritrix 9-volt G.B. type 290	1	3	
Peritrix 2-volt accumulator, type PLB3	12	6	
Collaro B.30 clockwork gramophone motor with 12-in. turntable (for battery receivers)	1	12	0
R. & A. "Challenger" moving-coil speaker	1	15	0
Pair of Ericsson headphones	12	6	
3 Cosor valves: 220VSG, HL2, 220PT	2	1	0
Camco "Gresham" radiogram cabinet	6	0	0

A.C. Model Accessories

Pair Ericsson headphones	12	6
Camco "Gresham" radiogram cabinet	6	0
Collaro induction gramophone motor with automatic stop (for A.C. set)	3	0
British Magnavox R.M.2500 loudspeaker (for A.C. sets)	1	15
3 Mullard valves: MM4V, 904V, PEN4V	2	12

D.C. Model Accessories

Pair Ericsson headphones	12	6
Camco "Gresham" radiogram cabinet	6	0
Macom Universal gramophone motor with automatic switch (for D.C. sets)	2	12
British Magnavox RPM 7500 loud-speaker (for D.C. sets)	1	17
3 Osram valves: VDS, DE, DPT	2	12

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Atlas A.Q.244, H.T. only	2	19 6
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Pick-up, Bowyer-Lowe A.E.D. Mark III	1	10 0
Pick-up volume control, Bowyer-Lowe A.E.D. log-law	8	
Moving-coil speakers (including input transformers):—		
R. & A. "Bantam"	6	1 7 6
R. & A. "Challenger"	1	15 0
R. & A. "Victor"	3	10 0
Our special "Soundex" speaker cabinet in polished veneered walnut can be supplied at an extra cost of	1	5 0
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Or 12 monthly payments of 7/8.		

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1 Wearite screened H.F. choke, type HFP	3	6	
1 R.I. L.F. choke, general purpose	12	6	
1 Magnum three-coil assembly, type WM3	1	10	0
2 Dubilier .0002-mfd. fixed condensers, 670	2	0	
1 Dubilier .0006-mfd. fixed condenser, 670	1	6	
1 Dubilier 1-mfd. fixed condenser, 9200	2	9	
3 Dubilier 2-mfd. fixed condensers, 9200	11	3	
1 Utility .0005-mfd. 2-gang condenser, W314/2	17	0	
1 Utility .0003-mfd. reaction condenser, W/320	4	0	
1 Utility .0002-mfd. short-wave condenser, W/187	6	6	
1 Peto-Scott neutralising condenser	3	6	
1 Sovereign pre-set condenser, .0003 max., "J"	1	3	
1 Utility non-insulated coupler	1	0	
1 Bulgin 4-in. condenser extension spindle, EH2	1	9	
1 Utility BL full-aperture S.M. dial, W/317	7	6	
1 W.B. 5-pin miniature type valve holder	8		
1 Claude Lyons 20,000-ohm 1-watt resistance	10		
1 Lissen 400-ohm baseboard potentiometer, LN140	1	6	
1 Wearite 100,000-ohm potentiometer combined with switch, QVC and G40	7	6	
1 Glazite and rubber-covered flex	1	0	
1 Packet Goltone shielded wire	9		
1 Baseboard chassis assembly	2	6	
1 Sheet aluminium foil, 17 in. by 14 in.	1	6	
5 Wearite aluminium brackets	1	3	
3 Telsen terminal blocks, A, E, LS, PU	1	6	
1 Belling-Lee insulated anode connector	4		
1 R.I. Hypermite L.F. transformer	12	6	
2 W.B. 4-pin miniature type valve holders	1	4	
8 Belling-Lee wander plugs, marked: H.T.+2, H.T.+1, H.T.—, G.B.—(2), G.B.—1, G.B.—2, G.B.—3	1	4	
2 Belling-Lee spade terminals, marked: L.T., L.T.—	4		
1 50,000-ohm 1-watt resistance	10		
1 Dubilier 3-megohm grid leak with wire ends	1	0	
1 Wearite 50,000-ohm potentiometer (type QVC) with switch (type G40)	6	6	
2 Pairs Bulgin G.B. clips, No. 5	4		
1 2.5-volt flash-lamp bulb for dial	6		
1 Becker on-off switch, type 460	1	10	

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